Signal Converters
Switching Devices
Power Supply Units

2011

INTERFACE

PHOENIX CONTACT
INSPIRING INNOVATIONS

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INTERFACE | Signal conditioning for all aspects of control

For all aspects of control, the INTERFACE products from Phoenix Contact provide signal conditioning for digital, analog, serial, and power signals. Whether you need them for conversion, switching, isolation, adaptation, amplification, connection or supply tasks – our INTERFACE blocks can take care of it all.

Our comprehensive range of high-quality products is the key to providing you with top-class cost-effective solutions.

Innovation in Interface.

INTERFACE Serial

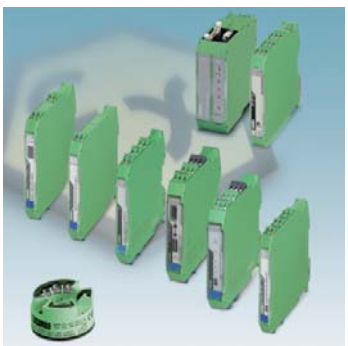
Interface converters, isolators, and industrial modems for fieldbus systems and Ethernet based on copper, fiber-optic and wireless technology.
See page 467.

INTERFACE Wireless

Wireless systems for wireless transmission of analog and digital I/O signals and serial data in industrial environments.
See page 635.

INTERFACE Analog

Modular analog converters for MCR technology applications.
See page 341.



INTERFACE Ex

Components for Ex applications and innovative interface systems for process engineering.
See page 429.

INTERFACE Power Supply

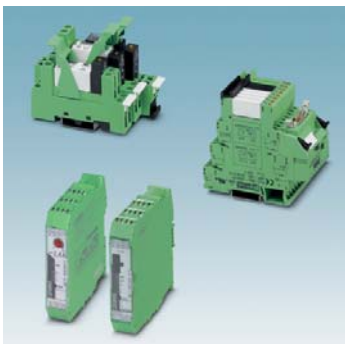
Power supply units - for maximum system availability.
See page 579.

INTERFACE Safety

Certified safety devices – from emergency stop relays to configurable safety modules.
See page 5.

INTERFACE Relay

Relays, solid-state relays, and power electronics for practical implementation of industrial automation concepts.
See page 47.



INTERFACE Cabling

For quick, universal, and error-free I/O wiring between the field and automation levels.
See page 199.

INTERFACE Monitoring

Products for measuring, converting, and monitoring electrical power system and system parameters.
See page 683.

INTERFACE Safety

Safety relays, speed monitors, and configurable safety modules

Safety devices for every application

Safety relays

- Modules for all common applications such as emergency stop, safety doors, light grid, etc.
- Relevant safety equipment can be connected easily, no need for additional settings on the safety relay
- Like all PSR safety devices: available in compact housing with plug-in and keyed screw or spring-cage terminal blocks

PSR-TRISAFE configurable safety modules

- Multifunctional evaluation module with 20 safe inputs and 4 safe outputs for monitoring all the safety-related functions of a machine, such as emergency stop, safety doors, light grid, etc.
- The PSR-TRISAFE modular allows for flexible extension with safe digital I/O modules
- Easy graphical configuration with the SAFECONF software
- Recommended for machines and systems with more than three different safety functions

Downtime and speed monitors

- Modules for monitoring various speeds during operation and for monitoring during downtime; e.g., for safe stop or safely reduced speed functions on a machine or system when the safety door is open
- Easy connection thanks to use of standard sensors

Safety relays for the process industry

- Modules for coupling digital output signals from failsafe controllers to I/O devices
- Long service life thanks to filtering of controller test pulses
- Easy proof test according to IEC 61508 thanks to integrated positively driven signaling contact

Product range overview

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PSR safety relays

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PSR downtime and speed monitors

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Overview of PSR range

PSR safety relays

Type	Application					Output contacts			Safety approvals			Page
									CAT/EN 954-1	PL/ISO 13849-1	SILCL/IEC 62061	
PSR-ESA2-B 24 V AC/DC	X	X				4		1	2[1])	d[1])	3	10
PSR-ESAM2-B 230 V AC	X	X				3		1	2[1])	d[1])	3	10
PSR-ESAM4/2X1 24 V AC/DC	X	X				2		1	4	e	3	11
PSR-ESAM4/3X1-B Various voltages	X	X				3		1	4	e	3	12
PSR-ESAM4/8X1 24 V AC/DC	X	X	X[5])			8		1	4	e	3	13
PSR-SDC4 24 V DC	X	X	X	X		2		1[3])	4	e	3	23
PSR-ESD30 24 V DC	X	X	X			2	2		4	e	3	14
PSR-ESD300 24 V DC	X	X	X[5])			3	2	1	4[4])	e[4])	3[4])	14
PSR-ESD-T 24 V DC	X	X	X[5])			3	2	1	4[4])	e[4])	3[4])	15
PSR-ESL4 24 V AC/DC	X	X	X			3		1	4	e	3	16
PSR-THC4 24 V AC/DC		X			X2)	2		1	4	e	3	17
PSR-URM4 24 V AC/DC	Contact extensions					5		2	4	e	3	18
PSR-URM4-B 24 V AC/DC	Contact extensions					5		2	4	e	3	18

Modular safety relay system with PSR-TBUS connection

Type	Application					Output contacts			Safety approvals			Page
									CAT/EN 954-1	PL/ISO 13849-1	SILCL/IEC 62061	
PSR-SDC4 24 V DC	X	X	X	X		2		1[3])	4	e	3	23
PSR-URM4/B 24 V DC	Contact extensions					4		2	4	e	3	23
PSR-URD3/3 24 V DC	Contact extensions						4	2 (delayed)	3	d	2	23
PSR-URD3/30 24 V DC	Contact extensions						4	2 (delayed)	3	d	2	24
PSR-URD3/T2 24 V DC	Contact extensions						4	2 (delayed)	3	d	2	24

[1]) Cat. 4/PL e with additional measures.
[2]) Type IIIC according to EN 574.
[3]) Semiconductor output.
[4]) Non-delayed contacts: Cat. 4, PL e, SILCL 3, off-delay contacts: Cat. 3, PL d, SILCL 2.
[5]) Suitable light grid types available on request.

All the PSR products in this overview feature positively driven contacts according to EN 50205.

Positively driven coupling relays

Type	Application	Output contacts			Page
PSR-URM/5X1/2X2	Coupling relay	5	2		19
PSR-URM/3X1/3X2	Coupling relay	3	3		20
PSR-URM/5X1/1X2	Coupling relay	5	1		20
PSR-URM/4X1/2X2	Coupling relay	4	2		21
PSR-URM/2X21	Coupling relay			2	21

Downtime and speed monitors

Type	Application		Output contacts		Safety approvals				Page
	$n=0$	$n>n_{max}$			CAT/EN 954-1	PL/ISO 13849-1	SILCL/IEC 62061	SIL/IEC 61508	
PSR-SSM 24 V DC	X		2	2	4			3	35
PSR-RSM4 24 V DC	X	X	4		4			3	35

Coupling relays for the process industry

Type	Application	Output contacts		Safety approvals			Page
	SIL			SIL/IEC 61508	SIL/IEC 61511	SIL/IEC 50156	
PSR-FSP 24 V DC	Coupling relays for failsafe controllers and ESD applications	1	1	3	3	3	37
PSR-FSP/2X1 24 V DC		2	1	3	3	3	38
PSR-FSP2/2X1 24 V DC		2	1	2	2	2	38
PSR-ESP4 24 V DC		2	1	3	3	3	39
PSR-ESAM4/3X1-B Various voltages		3	1	3	3	3	12
PSR-ESAM4/3X1 24 ... 230 V AC/DC		3	1	3	3	3	39

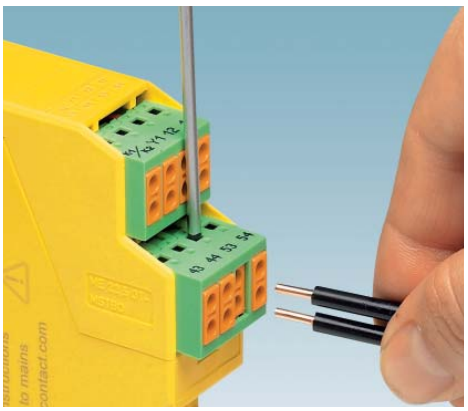
Safety solutions from Phoenix Contact: Simplicity equals safety!

PSR safety devices offer you solutions for all common applications such as:
- Emergency stop
- Safety door
- Light grid
- Solenoid switch
- Two-hand control devices
- Enable switch

PSR safety relays are suitable for applications involving up to three different safety functions. More extensive applications can be accommodated easily and in a flexible way with the configurable PSR-TRISAFE safety module. There are special modules available for downtime and speed monitoring. These can be used to implement safe stop or safely reduced speed functions on a system, for example.

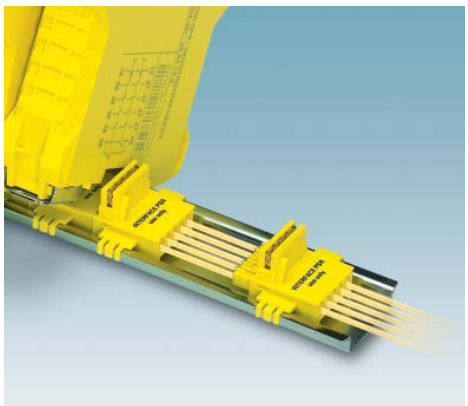
Our PSR safety devices demonstrate that innovative safety solutions do not necessarily have to be complex in order to meet the high safety requirements of the machine and system engineering industry. As well as offering easy integration and handling, the modules are characterized by their compact, space-saving design as well as their high quality, safety, and reliability.

Other advantages include:
- Convenient connection method
- Quick extension
- Suitable for universal use based on all relevant approvals



Convenient connection method

All PSR safety devices are available with plug-in screw or spring-cage connection methods. The twin spring-cage connectors provide enough space for two cables per connection point.



Quick extension

The modular safety systems allow additional extension modules to be integrated easily using the TBUS DIN rail connectors. As a result, there is no longer any need to install cross-wiring for additional output contacts.

Numerous approvals

PSR safety relays conform to all relevant safety standards such as EN 954-1, ISO 13849-1, and IEC 61508. In addition, there are modules available with GL approval or certification according to EN 50156.

The safety standards at a glance

EC Machinery Directive

The EC Machinery Directive (2006/42/EC) is a binding regulation for all machines that are put into circulation on the single European market. Until now, EN 954-1 was applicable to safety-related parts in controllers in order to demonstrate compliance with the general health and safety requirements specified in the Machinery Directive. EN 954-1 has now been succeeded by harmonized standards EN ISO 13849-1 and EN IEC 62061, which describe the current state of the art and provide improvements.

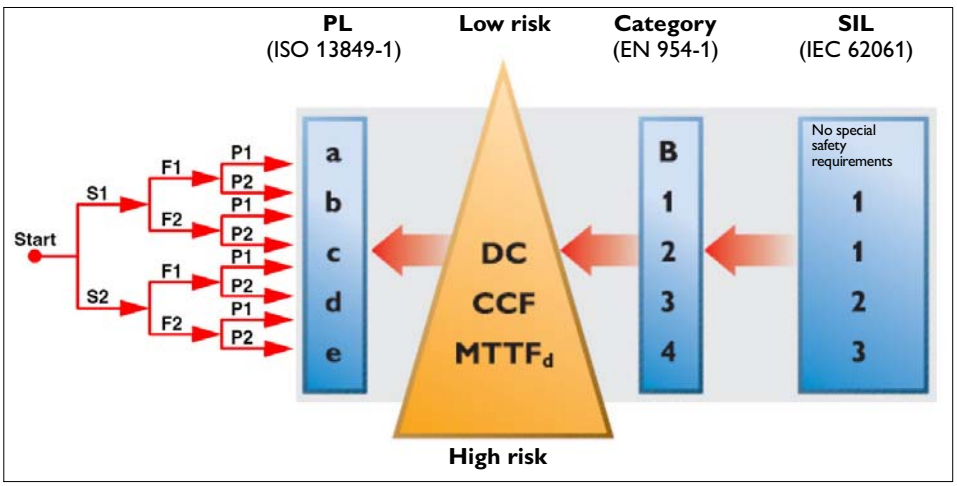
ISO 13849-1: The Performance Level (PL) is used to assess the probability of a safety-related controller component failing. With PL e, the level of probability is very low (= high safety level), whereas PL a means that it is higher (= lower safety level). A new feature is that the entire safety chain is now considered as are the $MTTF_d$, CCF, and DC variables (see below).

IEC 62061: Based on IEC 61508, IEC 62061 has been specifically tailored to complex electronic systems in machine engineering applications. Once again, a Safety Integrity Level (SIL) is determined for the safety system.. This is based on the SIL values for the individual parts (SILCL, see example).

IEC 61508: This standard is mainly applicable to the process industry. The Safety Integrity Level (SIL) indicates how reliable a functional safety system (electrical/electronic/programmable) is over its entire service life.

SIL3 is the highest safety level (SIL4 only in special cases), whereas SIL1 is the lowest.

Relationship between ISO 13849-1, EN 954-1, and IEC 62061



$MTTF_d$ **M**ean **T**ime **T**o **F**ailure **d**angerous - describes the reliability of individual components used as part of a safety function. Example: A contactor that is capable of performing approximately 100,000 switching cycles a year under normal load conditions will start to demonstrate dangerous failure behavior after an average of 20 years.

CCF **C**ommon **C**ause **F**ailure Management refers to the ability to manage failures with a common cause. Example: In an application involving safety door monitoring with 2 safety switches, both switches fail due to an excessive ambient temperature. Remedy: Use a suitable cooler.

DC **D**iagnostic **C**overage involves assessing the integrated diagnostic functions that a controller can use to detect faults. Example: A welded contactor contact is safely detected by evaluating a confirmation contact.

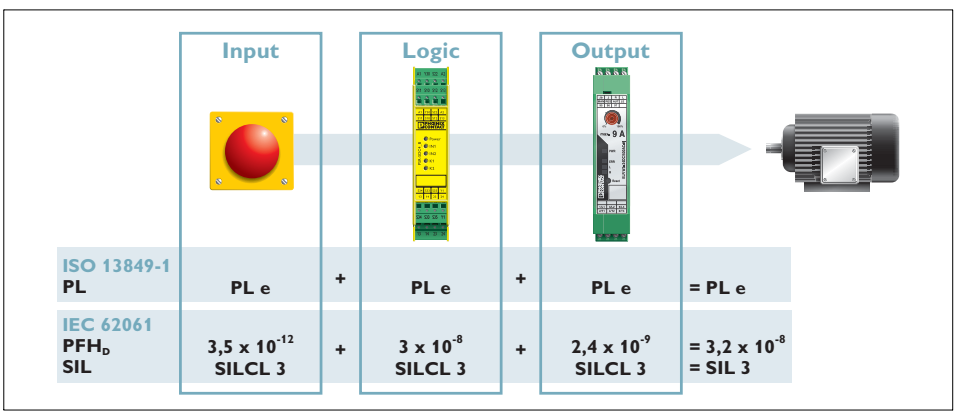
The required PL can be determined in accordance with ISO 13849-1 using what are known as risk graphs. This involves taking the starting point and then evaluating each of the following points in turn: injury severity (S), frequency and/or exposure time (F), and possibility of avoiding hazard (P).

S **Severity of injury**
S1 Slight (normally reversible) injury
S2 Serious (normally irreversible) injury

F **Frequency and/or exposure time to the hazard**
F1 Seldom to quite often and/or exposure time is short
F2 Frequent to continuous and/or exposure time is long

P **Possibility of avoiding the hazard**
P1 Possible under specific conditions
P2 Scarcely possible

Example safety function according to ISO 13849-1 and IEC 62061

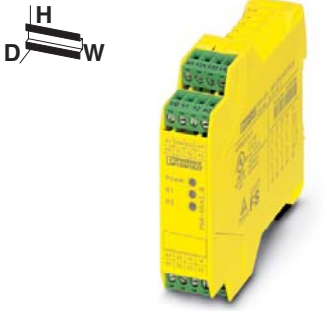


In this example, a motor is shut down safely when the emergency stop button is actuated. In this context, both ISO 13849-1 and IEC 62061 consider the entire safety chain: the emergency stop button that has to be detected, the safety relay used for signal processing, and the CONTACTRON semiconductor contactor used for shutdown.

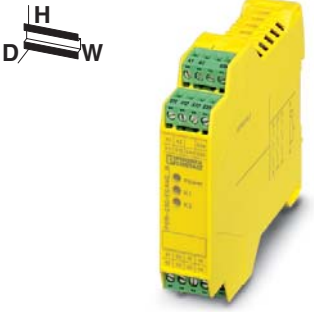
N

Safety relay for single-channel emergency stop and safety door monitoring

- Single-channel control
- 3 or 4 enabling current paths, 1 signaling current path
- Basic insulation
- Activation (depending on type): manual/automatic or manually monitored/automatic
- Up to Cat. 2/PL d according to ISO 13849-1, SILCL 2 according to IEC 62061, SIL 2 according to IEC 61508



Manual and automatic activation, 24 V AC/DC

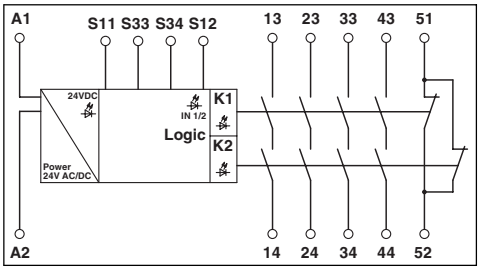


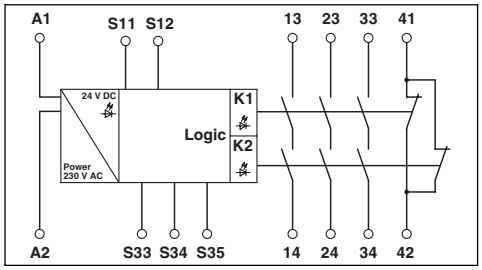
Manually monitored and automatic activation, 230 V AC

Notes:

Connection examples are given starting on page 41.

Applied for:
UL listed / CUL listed





	Technical data	Technical data
Input data		
Nominal input voltage U_N	24 V AC/DC	230 V AC
Permissible range (with reference to U_N)	0.85 ... 1.1	0.85 ... 1.1
Typ. current consumption (with reference to U_N)	140 mA AC / 65 mA DC	22 mA
Typ. response time (K1, K2) at U_N	65 ms	50 ms (manual start) / 300 ms (automatic start)
Typ. release time (K1, K2) at U_N	45 ms	20 ms (when controlled via S11/S12) / 150 ms (when controlled via A1)
Recovery time	1 s	1 s
Output data		
Contact type	4 enabling current paths, 1 signaling current path	3 enabling current paths, 1 signaling current path
Contact material	$AgSnO_2$, + 0.2 µm Au	$AgSnO_2$, gold-flashed
Max. / min. switching voltage	250 V AC/DC / 15 V AC/DC	250 V AC/DC / 10 V AC/DC
Limiting continuous current	6 A (N/O contact), 3 A (N/C contact)	6 A (N/O contact), 5 A (N/C contact)
Max. / min. inrush current	6 A / 25 mA	6 A / 10 mA
Min. switching power	0.4 W	100 mW
Switching capacity (360/h cycles)	24 V DC 4 A; 230 V AC 4 A	24 V DC 6 A; 230 V AC 5 A
Switching capacity (3600/h cycles)	24 V (DC 13) 2.5 A; 230 V (AC 15) 3 A	24 V (DC 13) 3 A; 230 V (AC 15) 3 A
Short-circuit protection of the output circuits	6 A fast blow, C6 (24 V AC/DC) automatic device	10 A gL/gG NEOZED (enabling current paths), 6 A gL/gG NEOZED (signaling current paths)
General data		
Ambient temperature range	-20°C ... 55°C	-25°C ... 55°C
Air and creepage distances between the circuits	DIN EN 50178 / VDE 0160	DIN EN 50178 / VDE 0160
Rated surge voltage / insulation	4 kV / basic insulation (safe isolation, reinforced insulation, and 6 kV between input circuit/N/C contacts and enabling current paths)	4 kV / basic insulation (safe isolation, reinforced insulation, and 6 kV between A1-A2/logic/enabling and signaling current paths)
Screw connection solid / stranded / AWG	0.2 - 2.5 mm^2 / 0.2 - 2.5 mm^2 / 24 - 12	0.2 - 2.5 mm^2 / 0.2 - 2.5 mm^2 / 24 - 12
Spring-cage connection solid / stranded / AWG	0.2 - 1.5 mm^2 / 0.2 - 1.5 mm^2 / 24 - 16	0.2 - 1.5 mm^2 / 0.2 - 1.5 mm^2 / 24 - 16
Dimensions W / H / D — Screw version	22.5 mm / 99 mm / 114.5 mm	22.5 mm / 99 mm / 114.5 mm
Dimensions W / H / D — Spring-cage version	22.5 mm / 112 mm / 114.5 mm	22.5 mm / 112 mm / 114.5 mm

Description	Ordering data: Type	Order No.	Pcs. / Pkt.	Ordering data: Type	Order No.	Pcs. / Pkt.
Emergency stop and safety door monitoring, one-channel, activation: manual and automatic						
With screw connection	**PSR-SCP- 24UC/ESA2/4X1/1X2/B**	**2963802**	1			
With spring-cage connection	**PSR-SPP- 24UC/ESA2/4X1/1X2/B**	**2963954**	1			
Emergency stop and safety door monitoring, single-channel, activation: manually monitored and automatic						
With screw connection				**PSR-SCP-230AC/ESAM2/3X1/1X2/B**	**2901430**	1
With spring-cage connection				**PSR-SPP-230AC/ESAM2/3X1/1X2/B**	**2901431**	1

Safety relay for two-channel emergency stop and safety door monitoring

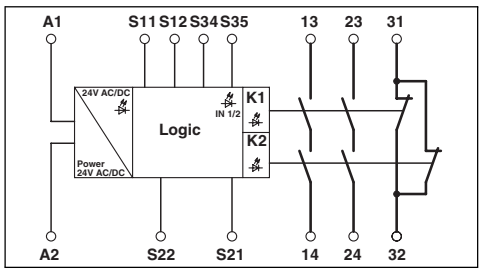
- Single and two-channel control
- 2 enabling current paths, 1 signaling current path
- Reinforced insulation
- Manually monitored and automatic activation in one device
- Up to Cat. 4/PL e according to ISO 13849-1, SILCL 3 according to IEC 62061, SIL 3 according to IEC 61508

Notes:

Connection examples are given starting on page 41.

Additional PSR safety relays with either automatically or manually monitored activation (PSR-ESA4 and PSR-ESM4) are available in the e-shop.

Manually monitored and automatic activation, reinforced insulation



Technical data

Input data	
Nominal input voltage U_N	24 V AC/DC
Permissible range (with reference to U_N)	0.85 ... 1.1
Typ. current consumption (with reference to U_N)	140 mA AC / 65 mA DC
Typ. response time (K1, K2) at U_N	20 ms (manual start) / 150 ms (automatic start)
Typ. release time (K1, K2) at U_N	45 ms (single-channel) / 10 ms (two-channel)
Recovery time	1 s
Output data	
Contact type	2 enabling current paths, 1 signaling current path
Contact material	$AgSnO_2$, + 0.2 µm Au
Max. / min. switching voltage	250 V AC/DC / 15 V AC/DC
Limiting continuous current	6 A (N/O contact)
Max. / min. inrush current	6 A / 25 mA
Min. switching power	0.4 W
Switching capacity (360/h cycles)	24 V DC 6 A; 230 V AC 5 A
Switching capacity (3600/h cycles)	24 V (DC 13) 3 A; 230 V (AC 15) 3 A
Short-circuit protection of the output circuits	10 A gL/gG NEOZED (N/O contact), 6 A gL/gG NEOZED (N/C contact)
General data	
Ambient temperature range	-20°C ... 55°C
Air and creepage distances between the circuits	DIN EN 50178 / VDE 0160
Rated surge voltage / insulation	6 kV / safe isolation, reinforced insulation
Screw connection solid / stranded / AWG	0.2 - 2.5 mm^2 / 0.2 - 2.5 mm^2 / 24 - 12
Spring-cage connection solid / stranded / AWG	0.2 - 1.5 mm^2 / 0.2 - 1.5 mm^2 / 24 - 16
Dimensions W / H / D — Screw version	22.5 mm / 99 mm / 114.5 mm
Dimensions W / H / D — Spring-cage version	22.5 mm / 112 mm / 114.5 mm

Ordering data

Description	Type	Order No.	Pcs. / Pkt.
Emergency stop and safety door monitoring, single and two-channel, activation: automatic and manually monitored			
With screw connection	**PSR-SCP- 24UC/ESAM4/2X1/1X2**	**2900525**	1
With spring-cage connection	**PSR-SPP- 24UC/ESAM4/2X1/1X2**	**2900526**	1

N

Safety relay for two-channel emergency stop and safety door monitoring

- Single and two-channel control
- 3 enabling current paths, 1 signaling current path
- Basic insulation
- Manually monitored and automatic activation in one device
- Up to Cat. 4/PL e according to ISO 13849-1, SILCL 3 according to IEC 62061, SIL 3 according to IEC 61508

Notes:

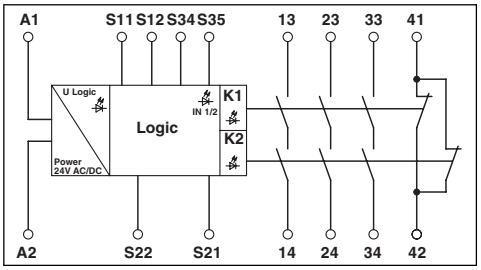
Connection examples are given starting on page 41.

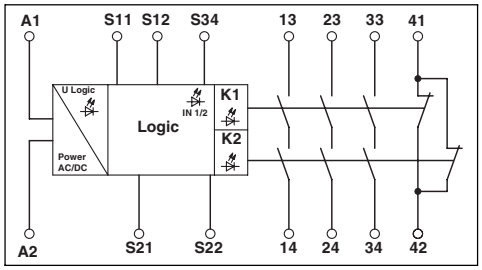
Additional PSR safety relays with either automatically or manually monitored activation (PSR-ESA4 and PSR-ESM4) are available in the e-shop.

Basic insulation, 24 V AC/DC

Basic insulation, 42 - 48 V, 60 V, 120 V, 230 V AC/DC

Applied for:
UL listed / CUL listed





	Technical data	Technical data	
Input data			
Nominal input voltage U_N	24 V AC/DC	-	230 V AC/DC
Nominal input voltage range	-	42 V AC/DC ... 48 V AC/DC	-
Permissible range (with reference to U_N)	0.85 ... 1.1	0.85 ... 1.1	0.85 ... 1.1
Typ. power consumption (with reference to U_N)	3.36 VA / 1.56 W	4.5 VA / 2 W	4.5 VA / 2 W
Typ. response time (K1, K2) at U_N	20 ms (man. start)	40 ms (man. start)	40 ms (man. start)
Typ. release time (K1, K2) at U_N	45 ms (single-channel) / 10 ms (two-channel)	90 ms (single-channel) / 20 ms (two-channel)	150 ms (single-channel) / 20 ms (two-channel)
Recovery time	1 s	1 s	1 s
Output data			
Contact type	3 enabling current paths, 1 signaling current path	3 enabling current paths, 1 signaling current path	
Contact material	$AgSnO_2$, + 0.2 µm Au	$AgSnO_2$, + 0.2 µm Au	
Max. / min. switching voltage	250 V AC/DC / 10 V AC/DC	250 V AC/DC / 10 V AC/DC	
Limiting continuous current	6 A (N/O contact), 5 A (N/C contact)	6 A (N/O contact), 5 A (N/C contact)	
Max. / min. inrush current	6 A / 10 mA	6 A / 10 mA	
Min. switching power	100 mW	100 mW	
Switching capacity (360/h cycles)	24 V DC 6 A; 230 V AC 5 A	24 V DC 6 A; 230 V AC 5 A	
Switching capacity (3600/h cycles)	24 V (DC 13) 3 A; 230 V (AC 15) 3 A	24 V (DC 13) 3 A; 230 V (AC 15) 3 A	
Short-circuit protection of the output circuits	10 A gL/gG NEOZED (N/O contact), 6 A gL/gG NEOZED (N/C contact)	10 A gL/gG NEOZED (N/O contact), 6 A gL/gG NEOZED (N/C contact)	
General data			
Ambient temperature range	-20°C ... 55°C	-25°C ... 55°C	
Air and creepage distances between the circuits	DIN EN 50178 / VDE 0160	DIN EN 50178 / VDE 0160	
Rated surge voltage / insulation	4 kV / basic insulation (safe isolation, reinforced insulation, and 6 kV between input circuit and enabling current paths)	4 kV / basic insulation (safe isolation, reinforced insulation, and 6 kV between A1-A2/logic/enabling and signaling current paths)	
Screw connection solid / stranded / AWG	0.2 - 2.5 mm^2 / 0.2 - 2.5 mm^2 / 24 - 12	0.2 - 2.5 mm^2 / 0.2 - 2.5 mm^2 / 24 - 12	
Spring-cage connection solid / stranded / AWG	0.2 - 1.5 mm^2 / 0.2 - 1.5 mm^2 / 24 - 16	0.2 - 1.5 mm^2 / 0.2 - 1.5 mm^2 / 24 - 16	
Dimensions W / H / D — Screw version	22.5 mm / 99 mm / 114.5 mm	22.5 mm / 99 mm / 114.5 mm	
Dimensions W / H / D — Spring-cage version	22.5 mm / 112 mm / 114.5 mm	22.5 mm / 112 mm / 114.5 mm	

Description	Ordering data: Type	Order No.	Pcs. / Pkt.	Ordering data: Type	Order No.	Pcs. / Pkt.
Emergency stop and safety door monitoring, single and two-channel, activation: automatic and manually monitored, **with screw connection**						
24 V AC/DC nominal input voltage	**PSR-SCP- 24UC/ESAM4/3X1/1X2/B**	**2900509**	1			
42 - 48 V AC/DC nominal input voltage				**PSR-SCP-42-48UC/ESAM4/3X1/1X2B**	**2901416**	1
60 V AC/DC nominal input voltage				**PSR-SCP- 60UC/ESAM4/3X1/1X2/B**	**2901426**	1
120 V AC/DC nominal input voltage				**PSR-SCP-120UC/ESAM4/3X1/1X2/B**	**2901422**	1
230 V AC/DC nominal input voltage				**PSR-SCP-230UC/ESAM4/3X1/1X2/B**	**2901428**	1
Emergency stop and safety door monitoring, single and two-channel, activation: automatic and manually monitored, **with spring-cage connection**						
24 V AC/DC nominal input voltage	**PSR-SPP- 24UC/ESAM4/3X1/1X2/B**	**2900510**	1			
42 - 48 V AC/DC nominal input voltage				**PSR-SPP-42-48UC/ESAM4/3X1/1X2B**	**2901417**	1
60 V AC/DC nominal input voltage				**PSR-SPP- 60UC/ESAM4/3X1/1X2/B**	**2901427**	1
120 V AC/DC nominal input voltage				**PSR-SPP-120UC/ESAM4/3X1/1X2/B**	**2901425**	1
230 V AC/DC nominal input voltage				**PSR-SPP-230UC/ESAM4/3X1/1X2/B**	**2901429**	1

Safety relay for two-channel emergency stop and safety door monitoring

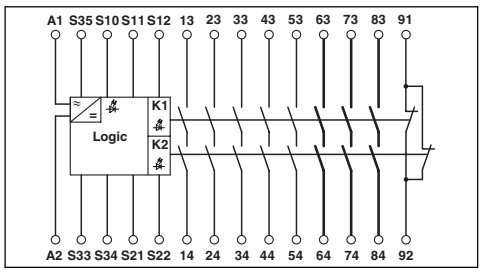
- Single and two-channel control
- 8 enabling current paths, 1 signaling current path
- Manually monitored and automatic activation in one device
- Up to Cat. 4/PL e according to ISO 13849-1, SILCL 3 according to IEC 62061, SIL 3 according to IEC 61508

Notes:

Connection examples are given starting on page 41.

Reinforced insulation, 8 enabling current paths

Applied for: TUEV-RH



Technical data

Input data	
Nominal input voltage U_N	24 V AC/DC
Permissible range (with reference to U_N)	0.85 ... 1.1
Typ. current consumption (with reference to U_N)	210 mA AC / 120 mA DC
Typ. response time (K1, K2) at U_N	60 ms (man. start) / 250 ms (automatic start)
Typ. release time (K1, K2) at U_N	20 ms
Recovery time	1 s
Output data	
Contact type	8 enabling current paths, 1 signaling current path
Contact material	$AgSnO_2$, + 0.2 µm Au
Max. / min. switching voltage	250 V AC/DC / 15 V AC/DC
Limiting continuous current	6 A
Max. / min. inrush current	6 A / 25 mA
Min. switching power	0.4 W
Switching capacity (360/h cycles)	24 V DC 4 A; 230 V AC 4 A
Switching capacity (3600/h cycles)	24 V (DC 13) 2.5 A; 230 V (AC 15) 3 A
Short-circuit protection of the output circuits	6 A fast blow, C6 (24 V AC/DC) automatic device
General data	
Ambient temperature range	-20°C ... 55°C
Air and creepage distances between the circuits	DIN EN 50178 / VDE 0160
Rated surge voltage / insulation	4 kV / basic insulation (safe isolation, reinforced insulation, and 6 kV between input circuit and enabling current paths (**63/64**, **73/74**, **83/84**) and between **63/64**, **73/74**, **83/84** themselves)
Screw connection solid / stranded / AWG	0.2 - 2.5 mm^2 / 0.2 - 2.5 mm^2 / 24 - 12
Spring-cage connection solid / stranded / AWG	0.2 - 1.5 mm^2 / 0.2 - 1.5 mm^2 / 24 - 16
Dimensions W / H / D — Screw version	45 mm / 99 mm / 114.5 mm
Dimensions W / H / D — Spring-cage version	45 mm / 112 mm / 114.5 mm

Ordering data

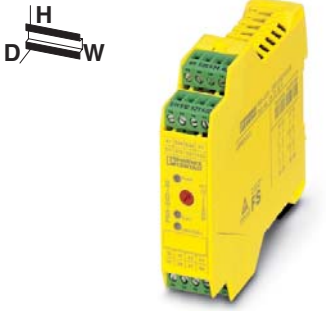
Description	Type	Order No.	Pcs. / Pkt.
Emergency stop and safety door monitoring, one and two-channel, with/without cross-circuit detection, activation: manually monitored and automatic			
With screw connection	**PSR-SCP- 24UC/ESAM4/8X1/1X2**	**2963912**	1
With spring-cage connection	**PSR-SPP- 24UC/ESAM4/8X1/1X2**	**2963996**	1

Safety relay with time functions

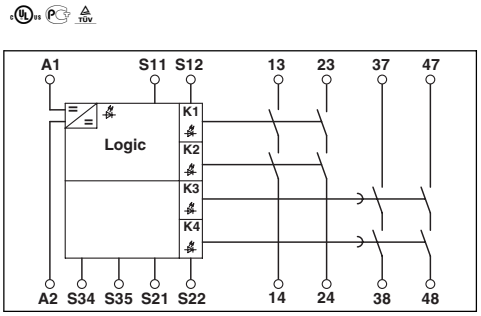
- For emergency stop and safety door monitoring and for evaluation of light grids (suitable light grids on request)
- Single and two-channel control
- Manually monitored and automatic activation
- Max. 3 undelayed and 2 drop-out contacts
- Delay times adjustable from 0.1 s to 30 s (PSR-ESD-30) or 0.2 s to 300 s (PSR-ESD-300)
- Protection labels against manipulation of the set time (PSR-ESD-300) or electronic manipulation protection (PSR-ESD-30)
- Up to Cat.3/4 and PL d/e according to ISO 13849-1, SILCL 3 according to IEC 62061, SIL 3 according to IEC 61508

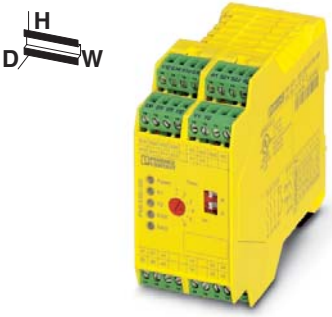
Notes:

Connection examples are given starting on page 41.

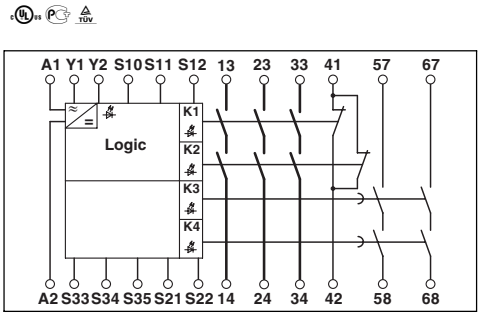


Adjustable release delay time 0.1 - 30 s





Adjustable release delay time 0.2 - 300 s



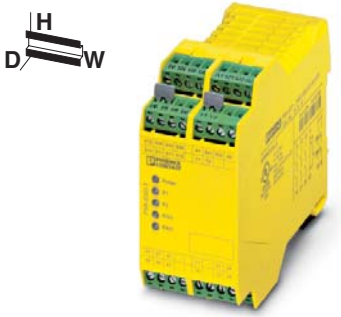
	Technical data	Technical data
Input data		
Nominal input voltage U_N	24 V DC	24 V DC
Permissible range (with reference to U_N)	0.85 ... 1.1	0.85 ... 1.1
Typ. current consumption (with reference to U_N)	75 mA DC	155 mA DC
Typ. response time (K1, K2) at U_N	150 ms (monitored/manual and automatic start)	70 ms (manual start) / 600 ms (automatic start)
Typ. release time (K1, K2) at U_N	20 ms (undelayed contacts) / 100 ms (delayed contacts)	20 ms (undelayed contacts)
Typ. release time range	0.1 s ... 30 s	0.2 s ... 300 s
Recovery time	330 ms (restart)	1 s
Output data		
Contact type	2 enabling current paths undelayed, 2 delayed	3 enabling current paths undelayed, 2 delayed, 1 signaling current path undelayed
Contact material	$AgSnO_2$	$AgSnO_2$
Max. / min. switching voltage	250 V AC/DC / 15 V AC/DC	250 V AC/DC / 15 V AC/DC
Limiting continuous current	6 A (N/O contact)	6 A (N/O contact), 3 A (N/C contact)
Max. / min. inrush current	6 A / 25 mA	6 A / 25 mA
Min. switching power	0.4 W	0.4 W
Switching capacity (360/h cycles)	(On request); -	24 V DC 4 A; 230 V AC 4 A
Switching capacity (3600/h cycles)	24 V (DC 13) 3 A; 230 V (AC 15) 3 A	24 V (DC 13) 2.5 A; 230 V (AC 15) 3 A
Short-circuit protection of the output circuits	10 A gL/gG NEOZED (N/O contact)	6 A fast blow (undelayed), C6 (24 V AC/DC) automatic device (undelayed), 10 A gL/gG NEOZED (delayed)
General data		
Ambient temperature range	-20°C ... 55°C	-20°C ... 55°C
Air and creepage distances between the circuits	DIN EN 60947-1	DIN EN 50178 / VDE 0160
Rated surge voltage / insulation	4 kV / basic insulation	4 kV / basic insulation (safe isolation, reinforced insulation, and 6 kV between the enabling current paths **(13/14, 23/24, 33/34)** and the remaining current paths and between **13/14, 23/24, 33/34** themselves)
Screw connection solid / stranded / AWG	0.2 - 2.5 mm^2 / 0.2 - 2.5 mm^2 / 24 - 12	0.2 - 2.5 mm^2 / 0.2 - 2.5 mm^2 / 24 - 12
Spring-cage connection solid / stranded / AWG	0.2 - 1.5 mm^2 / 0.2 - 1.5 mm^2 / 24 - 16	0.2 - 1.5 mm^2 / 0.2 - 1.5 mm^2 / 24 - 16
Dimensions W / H / D — Screw version	22.5 mm / 99 mm / 114.5 mm	45 mm / 99 mm / 114.5 mm
Dimensions W / H / D — Spring-cage version	22.5 mm / 112 mm / 114.5 mm	45 mm / 112 mm / 114.5 mm

Ordering data

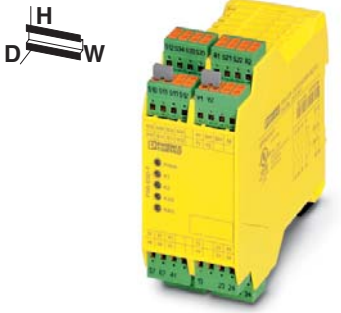
Description	Type	Order No.	Pcs. / Pkt.	Type	Order No.	Pcs. / Pkt.
Emergency stop, safety door and light grid monitoring, with delayed and undelayed contacts, one and two-channel, adjustable from 0.1 s to 30 s, with/without cross-circuit detection, activation: manually monitored and automatic						
With screw connection	**PSR-SCP- 24DC/ESD/4X1/30**	**2981800**	1			
With spring-cage connection	**PSR-SPP- 24DC/ESD/4X1/30**	**2981813**	1			
Emergency stop and safety door monitoring, with delayed and undelayed contacts, one and two-channel, adjustable from 0.2 s to 300 s, with/without cross-circuiting detection, activation: manually monitored and automatic						
With screw connection				**PSR-SCP- 24DC/ESD/5X1/1X2/300**	**2981428**	1
With spring-cage connection				**PSR-SPP- 24DC/ESD/5X1/1X2/300**	**2981431**	1

Safety relay with time functions

- For emergency stop and safety door monitoring and for evaluation of light grids (suitable light grids on request)
- Single and two-channel control
- Manually monitored and automatic activation
- 3 undelayed and 2 drop-out contacts
- Fixed delay times of 0.5 s...30 s (see table)
- Up to Cat.3/4 and PL d/e according to ISO 13849-1, SILCL 3 according to IEC 62061, SIL 3 according to IEC 61508

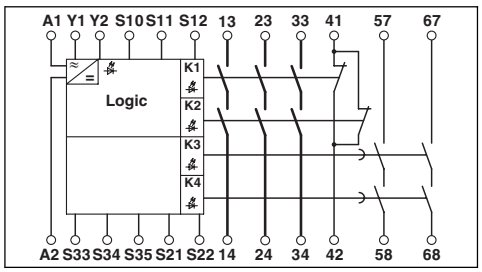


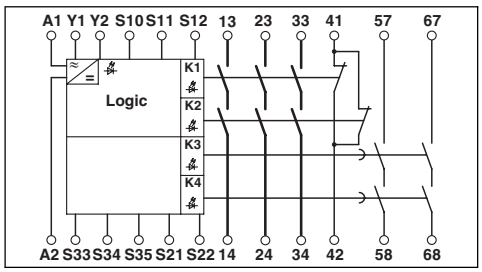
Fixed release delay time (versions), screw connection



Fixed release delay time (versions), spring-cage connection

Notes:
Connection examples are given starting on page 41.
Other time options available on request





	Technical data	Technical data
Input data		
Nominal input voltage U_N	24 V DC	24 V DC
Permissible range (with reference to U_N)	0.85 ... 1.1	0.85 ... 1.1
Typ. current consumption (with reference to U_N)	150 mA DC	150 mA DC
Typ. response time (K1, K2) at U_N	70 ms (manual start) / 600 ms (automatic start)	70 ms (manual start) / 600 ms (automatic start)
Typ. release time (K1, K2) at U_N	20 ms (undelayed contacts)	20 ms (undelayed contacts)
Recovery time	1 s	1 s
Output data		
Contact type	3 enabling current paths undelayed, 2 delayed, 1 signaling current path undelayed	3 enabling current paths undelayed, 2 delayed, 1 signaling current path undelayed
Contact material	$AgSnO_2$	$AgSnO_2$
Max. / min. switching voltage	250 V AC/DC / 15 V AC/DC	250 V AC/DC / 15 V AC/DC
Limiting continuous current	6 A	6 A
Max. / min. inrush current	6 A / 25 mA	6 A / 25 mA
Min. switching power	0.4 W	0.4 W
Switching capacity (360/h cycles)	24 V DC 4 A; 230 V AC 4 A	24 V DC 4 A; 230 V AC 4 A
Switching capacity (3600/h cycles)	24 V (DC 13) 2.5 A; 230 V (AC 15) 3 A	24 V (DC 13) 2.5 A; 230 V (AC 15) 3 A
Short-circuit protection of the output circuits	6 A fast blow (undelayed), C6 (24 V AC/DC) automatic device (undelayed), 10 A gL/gG NEOZED (delayed)	6 A fast blow (undelayed), C6 (24 V AC/DC) automatic device (undelayed), 10 A gL/gG NEOZED (delayed)
General data		
Ambient temperature range	-20°C ... 55°C	-20°C ... 55°C
Air and creepage distances between the circuits	DIN EN 50178 / VDE 0160	DIN EN 50178 / VDE 0160
Rated surge voltage / insulation	4 kV / basic insulation (safe isolation, reinforced insulation, and 6 kV between the enabling current paths **(13/14, 23/24, 33/34)** and the remaining current paths and between **13/14, 23/24, 33/34** themselves)	4 kV / basic insulation (safe isolation, reinforced insulation, and 6 kV between the enabling current paths (13/14, 23/24, 33/34) and the remaining current paths and between 13/14, 23/24, 33/34 themselves)
Dimensions W / H / D	45 mm / 99 mm / 114.5 mm	45 mm / 112 mm / 114.5 mm
Screw connection solid / stranded / AWG	0.2 - 2.5 mm² / 0.2 - 2.5 mm² / 24 - 12	0.2 - 1.5 mm² / 0.2 - 1.5 mm² / 24 - 16

Ordering data

Description	Type	Order No.	Pcs. / Pkt.	Type	Order No.	Pcs. / Pkt.
Emergency stop and safety door monitoring						
Delay time 0.5 s	**PSR-SCP- 24DC/ESD/5X1/1X2/0T 5**	**2981101**	1	**PSR-SPP- 24DC/ESD/5X1/1X2/0T 5**	**2981130**	1
Delay time 1 s	**PSR-SCP- 24DC/ESD/5X1/1X2/ T 1**	**2981143**	1	**PSR-SPP- 24DC/ESD/5X1/1X2/ T 1**	**2981156**	1
Delay time 3 s	**PSR-SCP- 24DC/ESD/5X1/1X2/ T 3**	**2981224**	1	**PSR-SPP- 24DC/ESD/5X1/1X2/ T 3**	**2981237**	1
Delay time 5 s	**PSR-SCP- 24DC/ESD/5X1/1X2/ T 5**	**2981266**	1	**PSR-SPP- 24DC/ESD/5X1/1X2/ T 5**	**2981279**	1
Delay time 10 s	**PSR-SCP- 24DC/ESD/5X1/1X2/ T10**	**2981088**	1	**PSR-SPP- 24DC/ESD/5X1/1X2/ T10**	**2981091**	1
Delay time 30 s	**PSR-SCP- 24DC/ESD/5X1/1X2/ T30**	**2981347**	1	**PSR-SPP- 24DC/ESD/5X1/1X2/ T30**	**2981350**	1

Safety relay for light grid, emergency stop and safety door monitoring

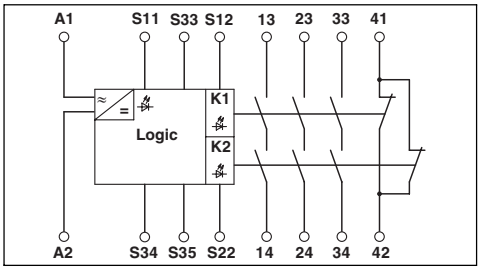
- Single and two-channel control
- Manually monitored and automatic activation
- 3 enabling current paths and 1 signaling current path
- Up to Cat. 4/PL e according to ISO 13849-1, SILCL 3 according to IEC 62061, SIL 3 according to IEC 61508

Notes:

Moreover, the PSR-SDC4 is also suitable for light grid monitoring, see page 23.

Connection examples are given starting on page 41.

Also ideal for light grid monitoring



Technical data

Input data	
Nominal input voltage U_N	24 V AC/DC
Permissible range (with reference to U_N)	0.85 ... 1.1
Typ. current consumption (with reference to U_N)	150 mA AC / 70 mA DC
Typ. response time (K1, K2) at U_N	25 ms (100 ms automatic start)
Typ. release time (K1, K2) at U_N	10 ms
Recovery time	1 s
Output data	
Contact type	3 enabling current paths, 1 signaling current path
Contact material	$AgSnO_2$, + 0.2 µm Au
Max. / min. switching voltage	250 V / 15 V AC/DC
Limiting continuous current	6 A
Max. / min. inrush current	6 A / 25 mA
Min. switching power	0.4 W
Switching capacity (360/h cycles)	24 V DC 6 A; 230 V AC 5 A
Switching capacity (3600/h cycles)	24 V (DC 13) 3 A; 230 V (AC 15) 3 A
Short-circuit protection of the output circuits	10 A gL/gG NEOZED (N/O contact)
General data	
Ambient temperature range	-20°C ... 55°C
Air and creepage distances between the circuits	DIN EN 50178 / VDE 0160
Rated surge voltage / insulation	4 kV / basic insulation (safe isolation, reinforced insulation, and 6 kV between input circuit and enabling current paths)
Screw connection solid / stranded / AWG	0.2 - 2.5 mm^2 / 0.2 - 2.5 mm^2 / 24 - 12
Spring-cage connection solid / stranded / AWG	0.2 - 1.5 mm^2 / 0.2 - 1.5 mm^2 / 24 - 16
Dimensions W / H / D — Screw version	22.5 mm / 99 mm / 114.5 mm
Dimensions W / H / D — Spring-cage version	22.5 mm / 112 mm / 114.5 mm

Ordering data

Description	Type	Order No.	Pcs. / Pkt.
Optical data link emergency stop and safety door monitoring, one and two-channel, activation: manually monitored and automatic			
With screw connection	**PSR-SCP- 24UC/ESL4/3X1/1X2/B**	**2981059**	1
With spring-cage connection	**PSR-SPP- 24UC/ESL4/3X1/1X2/B**	**2981062**	1

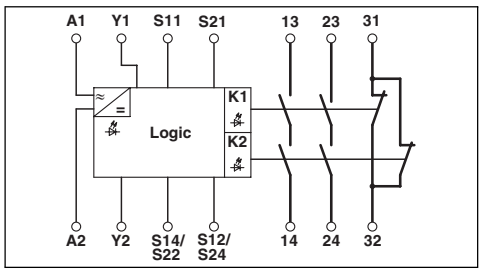
Safety relay for two-hand control devices and safety door circuits

- Two-channel control
- Automatic activation
- For two-hand control devices as per EN 574 type IIIC
- Concurrence monitoring < 0.5 s
- 2 enabling current paths and 1 signaling current path
- Up to Cat. 4/PL e according to ISO 13849-1, SILCL 3 according to IEC 62061, SIL 3 according to IEC 61508

Notes:

Connection examples are given starting on page 41.

Also ideal for two-hand controls



Technical data

Input data	
Nominal input voltage U_N	24 V AC/DC
Permissible range (with reference to U_N)	0.85 ... 1.1
Typ. current consumption (with reference to U_N)	125 mA AC / 60 mA DC
Typ. response time (K1, K2) at U_N	50 ms
Typ. release time (K1, K2) at U_N	20 ms
Recovery time	1 s
Output data	
Contact type	2 enabling current paths, 1 signaling current path
Contact material	$AgSnO_2$, + 0.2 µm Au
Max. / min. switching voltage	250 V AC/DC / 15 V AC/DC
Limiting continuous current	6 A
Max. / min. inrush current	6 A / 25 mA
Min. switching power	0.4 W
Switching capacity (360/h cycles)	24 V DC 4 A; 230 V AC 4 A
Switching capacity (3600/h cycles)	24 V (DC 13) 2.5 A; 230 V (AC 15) 3 A
Short-circuit protection of the output circuits	10 A gL/gG NEOZED (N/O contact), 6 A gL/gG NEOZED (N/C contact)
General data	
Ambient temperature range	-20°C ... 55°C
Air and creepage distances between the circuits	DIN EN 50178 / VDE 0160
Rated surge voltage / insulation	6 kV / safe isolation, increased insulation
Screw connection solid / stranded / AWG	0.2 - 2.5 mm^2 / 0.2 - 2.5 mm^2 / 24 - 12
Spring-cage connection solid / stranded / AWG	0.2 - 1.5 mm^2 / 0.2 - 1.5 mm^2 / 24 - 16
Dimensions W / H / D — Screw version	22.5 mm / 99 mm / 114.5 mm
Dimensions W / H / D — Spring-cage version	22.5 mm / 112 mm / 114.5 mm

Ordering data

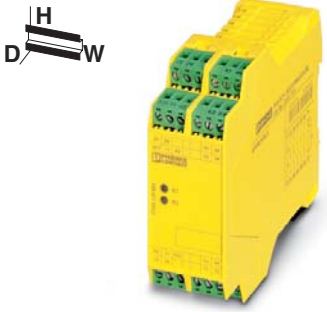
Description	Type	Order No.	Pcs. / Pkt.
Two-hand control units and safety door monitoring, two-channel, with cross-circuiting detection, activation: automatic			
With screw connection	**PSR-SCP- 24UC/THC4/2X1/1X2**	**2963721**	1
With spring-cage connection	**PSR-SPP- 24UC/THC4/2X1/1X2**	**2963983**	1

Safety relay for contact expansion

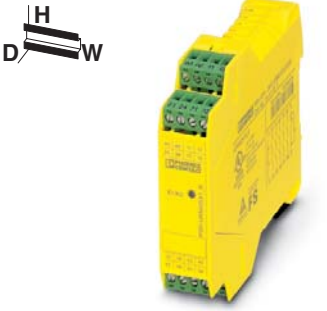
- Single and two-channel control
- 5 enabling current paths, 1 signaling current path, and 1 confirmation current path
- Option of basic insulation or reinforced insulation
- Up to Cat. 4/PL e according to ISO 13849-1, SILCL 3 according to IEC 62061, SIL 3 according to IEC 61508

Notes:

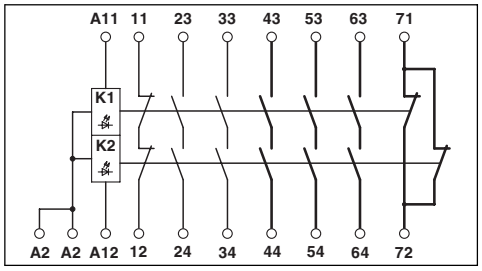
Connection examples are given starting on page 41.

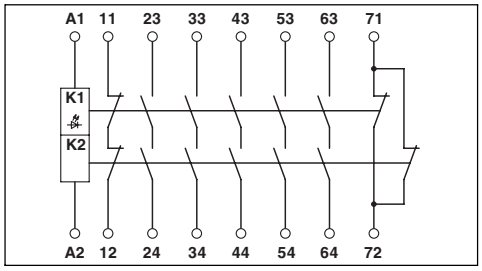


Contact extension with reinforced insulation



Contact extension with basic insulation



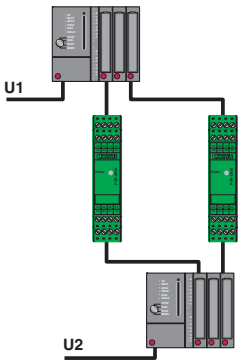


	Technical data	Technical data
Input data		
Nominal input voltage U_N	24 V AC/DC	24 V AC/DC
Permissible range (with reference to U_N)	0.8 ... 1.1	0.8 ... 1.1
Typ. current consumption (with reference to U_N)	47 mA (per channel)	92 mA
Typ. response time (K1, K2) at U_N	20 ms	20 ms
Typ. release time (K1, K2) at U_N	20 ms	20 ms
Output data		
Contact type	5 enabling current paths, 1 signaling current path, 1 checkback current path	5 enabling current paths, 1 signaling current path, 1 checkback current path
Contact material	$AgSnO_2$, + 0.2 µm Au	$AgSnO_2$, + 0.2 µm Au
Max. / min. switching voltage	250 V AC/DC / 15 V AC/DC	250 V AC/DC / 15 V AC/DC
Limiting continuous current	6 A (N/O contact), 3 A (N/C contact 11/12)	6 A (N/O contact), 3 A (N/C contact)
Max. / min. inrush current	6 A, 3 A (N/C contact 11/12) / 25 mA	6 A (N/O contact), 3 A (N/C contact) / 25 mA
Min. switching power	0.4 W	0.4 W
Switching capacity (360/h cycles)	24 V DC 4 A; 230 V AC 4 A	24 V DC 4 A; 230 V AC 4 A
Switching capacity (3600/h cycles)	24 V (DC 13) 2.5 A; 230 V (AC 15) 3 A	24 V (DC 13) 2.5 A; 230 V (AC 15) 3 A
Short-circuit protection of the output circuits	6 A fast blow, C6 (24 V AC/DC) automatic device	6 A fast blow, C6 (24 V AC/DC) automatic device
General data		
Ambient temperature range	-20°C ... 55°C	-20°C ... 55°C
Air and creepage distances between the circuits	DIN EN 50178 / VDE 0160	DIN EN 50178 / VDE 0160
Rated surge voltage / insulation	4 kV / basic insulation (safe isolation, reinforced insulation, and 6 kV between input circuit and enabling current paths **(43/44, 53/54, 63/64, 71/72)** and between **43/44, 53/54, 63/64, 71/72** themselves)	4 kV / basic insulation (safe isolation, increased isolation, and 6 kV between A1/A2, 11/12, 23/24, 71/72 and 33/34, 43/44, 53/54, 63/64)
Screw connection solid / stranded / AWG	0.2 - 2.5 mm^2 / 0.2 - 2.5 mm^2 / 24 - 12	0.2 - 2.5 mm^2 / 0.2 - 2.5 mm^2 / 24 - 12
Spring-cage connection solid / stranded / AWG	0.2 - 1.5 mm^2 / 0.2 - 1.5 mm^2 / 24 - 16	0.2 - 1.5 mm^2 / 0.2 - 1.5 mm^2 / 24 - 16
Dimensions W / H / D — Screw version	35 mm / 99 mm / 114.5 mm	22.5 mm / 99 mm / 114.5 mm
Dimensions W / H / D — Spring-cage version	35 mm / 112 mm / 114.5 mm	22.5 mm / 112 mm / 114.5 mm

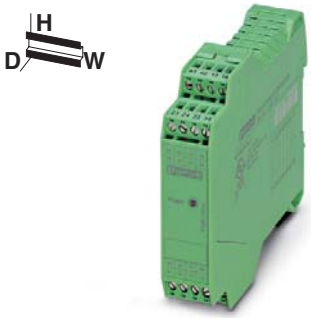
Description	Ordering data: Type	Order No.	Pcs. / Pkt.	Ordering data: Type	Order No.	Pcs. / Pkt.
Extension module with one or two-channel control						
With screw connection	**PSR-SCP- 24UC/URM4/5X1/2X2**	**2963734**	1			
With spring-cage connection	**PSR-SPP- 24UC/URM4/5X1/2X2**	**2964005**	1			
Extension module, with one-channel control						
With screw connection				**PSR-SCP- 24UC/URM4/5X1/2X2/B**	**2981033**	1
With spring-cage connection				**PSR-SPP- 24UC/URM4/5X1/2X2/B**	**2981046**	1

Positively driven coupling relays

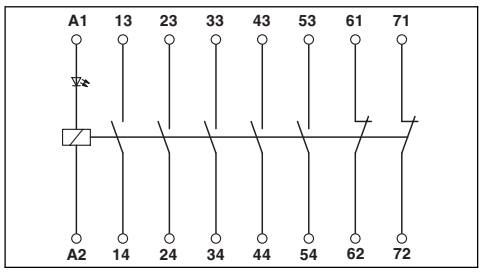
– Single-channel control
– Like all PSR safety relays, equipped with forcibly guided contacts as per EN 50205



Reliable signal exchange between two systems with confirmation function



Positively driven coupling relay, 5 N/O contacts, 2 N/C contacts



Technical data

Input data	
Nominal input voltage U_N	24 V AC/DC
Permissible range (with reference to U_N)	0.8 ... 1.1
Typ. current consumption (with reference to U_N)	47 mA
Typ. response time (K1, K2) at U_N	20 ms
Typ. release time (K1, K2) at U_N	20 ms
Output data	
Contact type	5 N/O, 2 N/C contacts
Contact material	$AgSnO_2$, + 0.2 µm Au
Max. / min. switching voltage	250 V AC/DC / 15 V AC/DC
Limiting continuous current	6 A
Max. / min. inrush current	6 A / 25 mA
Min. switching power	0.4 W
Switching capacity (360/h cycles)	24 V DC 4 A; 230 V AC 4 A
Switching capacity (3600/h cycles)	24 V (DC 13) 2.5 A; 230 V (AC 15) 3 A
Short-circuit protection of the output circuits	6 A fast blow, C6 (24 V AC/DC) automatic device
General data	
Ambient temperature range	-20°C ... 55°C
Air and creepage distances between the circuits	DIN EN 50178 / VDE 0160
Rated surge voltage / insulation	4 kV / basic insulation
Screw connection solid / stranded / AWG	0.2 - 2.5 mm^2 / 0.2 - 2.5 mm^2 / 24 - 12
Spring-cage connection solid / stranded / AWG	0.2 - 1.5 mm^2 / 0.2 - 1.5 mm^2 / 24 - 16
Dimensions W / H / D — Screw version	22.5 mm / 99 mm / 114.5 mm
Dimensions W / H / D — Spring-cage version	22.5 mm / 112 mm / 114.5 mm

Ordering data

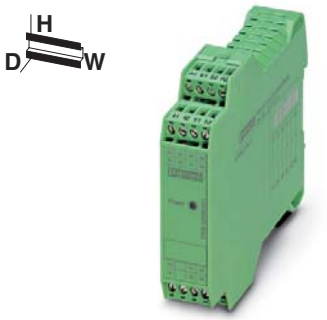
Description	Type	Order No.	Pcs. / Pkt.
Coupling relay, with forcibly guided contacts			
With screw connection for 24 V AC/DC	**PSR-SCP- 24UC/URM/5X1/2X2**	**2963747**	1
With spring-cage connection for 24 V AC/DC	**PSR-SPP- 24UC/URM/5X1/2X2**	**2963970**	1
Coupling relay, with forcibly guided contacts			
With screw connection for 120 V AC/DC	**PSR-SCP-120UC/URM/5X1/2X2**	**2981402**	1
With spring-cage connection for 120 V AC/DC	**PSR-SPP-120UC/URM/5X1/2X2**	**2981415**	1

Positively driven coupling relays

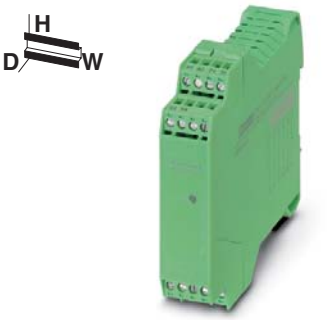
– Single-channel control
– Like all PSR safety relays, equipped with forcibly guided contacts as per EN 50205

Notes:

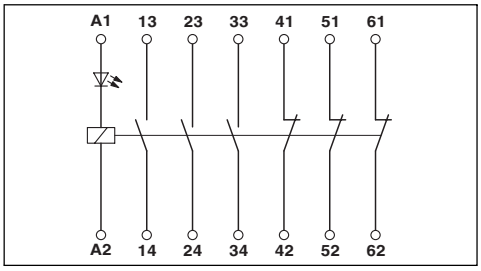
For marking systems and mounting material, see CLIPLINE catalog, part 2.

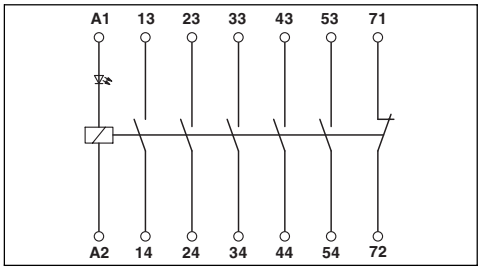


Positively driven coupling relay, 3 N/O contacts, 3 N/C contacts



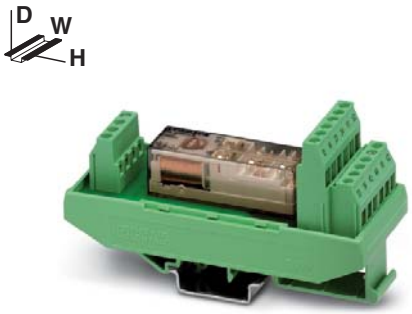
Positively driven coupling relay, 5 N/O contacts, 1 N/C contact





	Technical data	Technical data
Input data		
Nominal input voltage U_N	24 V AC/DC	24 V AC/DC
Permissible range (with reference to U_N)	0.85 ... 1.1	0.8 ... 1.1
Typ. current consumption (with reference to U_N)	45 mA	47 mA
Typ. response time (K1, K2) at U_N	15 ms	20 ms
Typ. release time (K1, K2) at U_N	15 ms	20 ms
Output data		
Contact type	Three N/O contacts, three N/C contacts	5 enabling current paths, 1 signaling current paths
Contact material	$AgSnO_2$	$AgSnO_2$, + 0.2 µm Au
Max. / min. switching voltage	250 V AC/DC / 15 V AC/DC	250 V AC/DC / 15 V AC/DC
Limiting continuous current	6 A (N/O contact), 6 A (N/C contact)	6 A
Max. / min. inrush current	6 A / 25 mA	6 A / 25 mA
Min. switching power	0.4 W	0.4 W
Switching capacity (360/h cycles)	24 V DC 6 A; 230 V AC 5 A	24 V DC 4 A; 230 V AC 4 A
Switching capacity (3600/h cycles)	24 V (DC 13) 3 A; 230 V (AC 15) 3 A	24 V (DC 13) 2.5 A; 230 V (AC 15) 3 A
Short-circuit protection of the output circuits	10 A gL/gG NEOZED (N/O contact), 4 A gL/gG NEOZED (N/C contact)	6 A fast blow (N/O contact), 6 A fast blow (N/C contact)
General data		
Ambient temperature range	-20°C ... 55°C	-20°C ... 55°C
Air and creepage distances between the circuits	DIN EN 50178 / VDE 0160	DIN EN 50178
Rated surge voltage / insulation	4 kV / basic insulation (safe isolation, reinforced insulation, and 6 kV between the input circuit and the output (13/14, 23/24, 33/34))	4 kV / basic insulation (safe isolation, reinforced isolation, and 6 kV between A1/A2, 53/54, 71/72 and 13/14, 23/24, 33/34, 43/44)
Screw connection solid / stranded / AWG	0.2 - 2.5 mm^2 / 0.2 - 2.5 mm^2 / 24 - 12	0.2 - 2.5 mm^2 / 0.2 - 2.5 mm^2 / 24 - 12
Spring-cage connection solid / stranded / AWG	0.2 - 1.5 mm^2 / 0.2 - 1.5 mm^2 / 24 - 16	0.2 - 1.5 mm^2 / 0.2 - 1.5 mm^2 / 24 - 16
Dimensions W / H / D — Screw version	22.5 mm / 99 mm / 114.5 mm	22.5 mm / 99 mm / 114.5 mm
Dimensions W / H / D — Spring-cage version	22.5 mm / 112 mm / 114.5 mm	22.5 mm / 112 mm / 114.5 mm

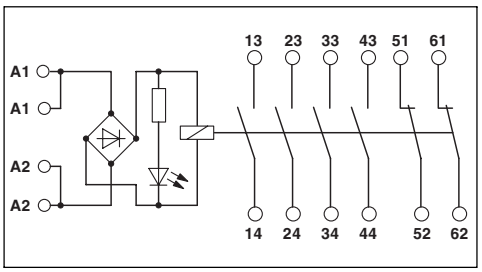
Description	Ordering data: Type	Order No.	Pcs. / Pkt.	Ordering data: Type	Order No.	Pcs. / Pkt.
Coupling relay, with forcibly guided contacts						
With screw connection	**PSR-SCP- 24UC/URM/3X1/3X2**	**2981839**	1	**PSR-SCP- 24UC/URM/5X1/1X2**	**2981952**	1
With spring-cage connection	**PSR-SPP- 24UC/URM/3X1/3X2**	**2981842**	1	**PSR-SPP- 24UC/URM/5X1/1X2**	**2981965**	1
Coupling relay, with forcibly guided contacts						
With screw connection for 120 V AC/DC						
With spring-cage connection for 120 V AC/DC						
Relay, with forcibly guided contacts, suitable for PR1 relay base						

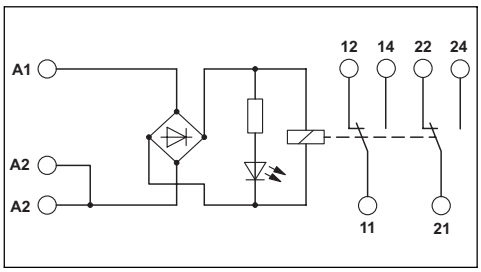


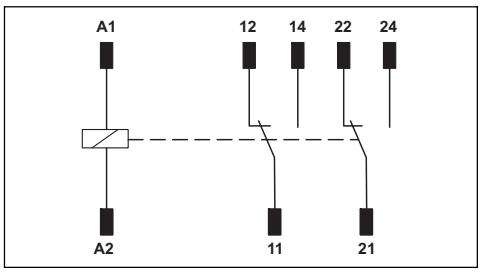
Positively driven coupling relay, 4 N/O contacts, 2 N/C contacts

Positively driven coupling relay, 2 PDTs

Safety relay with forcibly guided contacts, as per EN 50205, application type B







Technical data

24 V AC/DC	120 V AC/DC
0.8 ... 1.1	0.8 ... 1.1
52 mA	12 mA
10 ms	10 ms
10 ms	10 ms
4 N/O, 2 N/C contacts	
$AgSnO_2$	
250 V AC/DC / 15 V AC/DC	
6 A (total current on request)	
6 A / 25 mA	
0.4 W	
24 V DC 6 A; 230 V AC 5 A	
24 V (DC 13) 3 A; 230 V (AC 15) 3 A	
10 A gL/gK NEOZED (N/O contact), 4 A gL/gK NEOZED (N/C contact)	
-20°C ... 55°C	
DIN EN 50178 / VDE 0160	
4 kV / basic insulation (safe isolation, reinforced insulation, and 6 kV between the input circuit and the output (13/14, 23/24, 33/34))	
0.2 - 2.5 mm^2 / 0.2 - 2.5 mm^2 / 24 - 12	
0.2 - 2.5 mm^2 / 0.2 - 2.5 mm^2 / 24 - 12	
40 mm / 111 mm / 56 mm	
40 mm / 111 mm / 56 mm	

Ordering data

Type	Order No.	Pcs. / Pkt.
PSR-SCF- 24UC/URM/4X1/2X2	**2981444**	1
PSR-SPF- 24UC/URM/4X1/2X2	**2981457**	1
PSR-SCF-120UC/URM/4X1/2X2	**2981460**	1
PSR-SPF-120UC/URM/4X1/2X2	**2981473**	1

Technical data

24 V AC/DC	120 V AC/DC
0.85 ... 1.1	0.85 ... 1.1
30 mA	9 mA
10 ms	10 ms
10 ms	10 ms
2 PDT	
AgNi	
250 V AC/DC / 15 V AC/DC	
5 A (N/O contact), 3.5 A (N/C contact)	
6 A / 10 mA	
0.24 W	
24 V DC 6 A (N/O contact); 230 V AC 3 A (N/O contact)	
24 V (DC 13) 2 A (N/O contact); 230 V (AC 15) 3 A (N/O contact)	
6 A gL/gG NEOZED (N/O contact), 4 A gL/gG NEOZED (N/C contact)	
-20°C ... 50°C	
DIN EN 50178 / VDE 0160	
4 kV / basic insulation (safe isolation, reinforced isolation, and 6 kV between A1/A2, 53/54, 71/72 and 13/14, 23/24, 33/34, 43/44)	
0.2 - 2.5 mm^2 / 0.2 - 2.5 mm^2 / 24 - 12	
- / - / -	
17.5 mm / 75 mm / 60.5 mm	
- / - / -	

Ordering data

Type	Order No.	Pcs. / Pkt.
PSR-SCF- 24UC/URM/2X21	**2981363**	10
PSR-SCF-120UC/URM/2X21	**2981376**	10

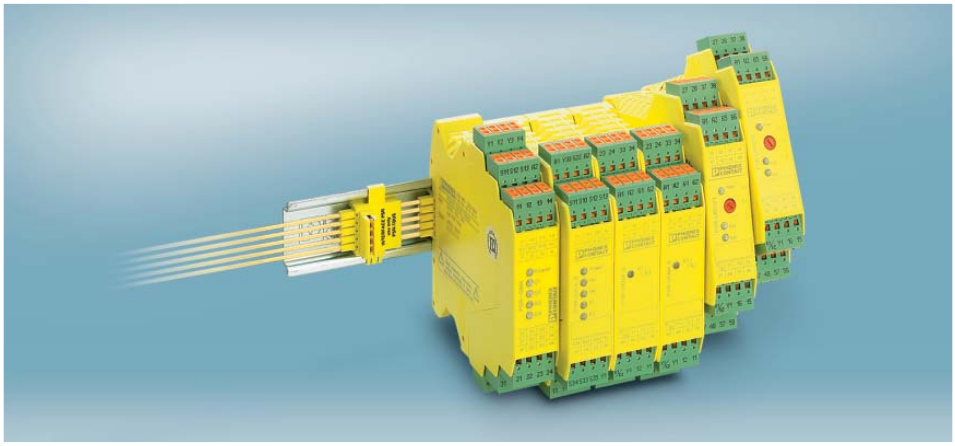
Technical data

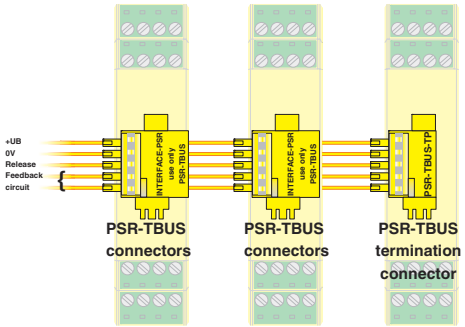
24 V DC
(On request)
29 mA / 17 mA (for use with PR1 base)
10 ms
4 ms
2 PDT
AgNi
250 V AC/DC / 15 V
6 A (N/O contact), 6 A (N/C contact)
6 A / 10 mA
0.24 W
24 V DC 6 A (N/O contact); 230 V AC 3 A (N/O contact)
24 V (DC 13) 2 A (N/O contact); 230 V (AC 15) 3 A (N/O contact)
-
-25°C ... 70°C
DIN EN 50178
6 kV / safe isolation, increased insulation
- / - / -
- / - / -
12.6 mm / 29 mm / 25.5 mm
- / - / -

Ordering data

Type	Order No.	Pcs. / Pkt.
REL-SR- 24DC/2X21	**2961574**	10

Modular safety relay system
Master and extension modules





The TBUS connectors carry out the cross-wiring between the modules.

The PSR safety relay system reduces planning effort, facilitates wiring, and minimizes storage costs. The PSR-SDC4 multifunctional master (can also be used as a standalone component) monitors the various safety-related signals - without the need for programming or additional switch settings. The relevant safety equipment (emergency stop buttons, safety door/electromagnetic switches, and light grids) is simply connected to the module. If necessary, the PSR-URM4/B and PSR-URD3 extension devices can be used to integrate additional non-delayed and off-delay contacts via the PSR-TBUS DIN rail connector.

The PSR-SIM4 interface module and PSR-SACB sensor box are suitable for wiring several safety switches with N/C or N/O contacts (e.g., in the case of multiple safety doors or safety flaps). The individual switches are automatically linked to one another and connected to the PSR-SDC4 master.

Additional signal outputs enable precise diagnostics.

– Up to Cat.4/PL e according to ISO 13849-1, SILCL 3 according to IEC 62061, SIL 3 according to IEC 61508 (extension modules with adjustable release time up to Cat.3/PL d according to ISO 13849-1, SILCL 2 according to IEC 62061, SIL 2 according to IEC 61508)

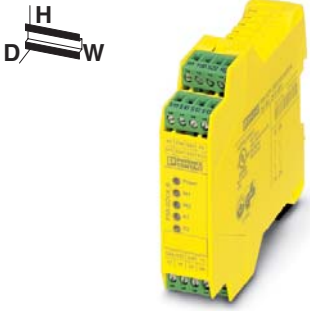
Notes:

Connection examples are given starting on page 41.

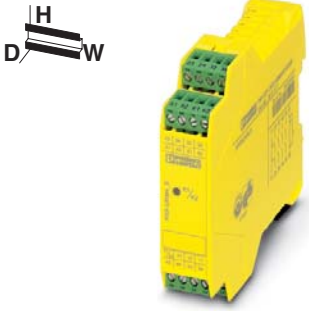
Input data	
Nominal input voltage U_N	
Permissible range (with reference to U_N)	
Typ. current consumption (with reference to U_N)	
Typ. response time (K1, K2) at U_N	
Typ. release time (K1, K2) at U_N	
Typ. release time range	
Recovery time	
Output data	
Contact type	
Contact material	
Max. / min. switching voltage	
Limiting continuous current	
Max. / min. inrush current	
Min. switching power	
Switching capacity (360/h cycles)	
Switching capacity (3600/h cycles)	
Short-circuit protection of the output circuits	
General data	
Ambient temperature range	
Air and creepage distances between the circuits	
Rated surge voltage / insulation	
Screw connection solid / stranded / AWG	
Spring-cage connection solid / stranded / AWG	
Dimensions	Screw version
W / H / D	Spring-cage version

Description
Master module for emergency stop, protective door, light grid and magnetic switch, one-channel and two-channel, with/without cross-circuit detection, activation: manually monitored and automatic
With screw connection
With spring-cage connection
Extension module, with one-channel control
With screw connection
With spring-cage connection

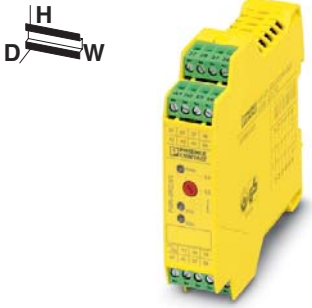
PSR-TBUS DIN rail connector, for supplying/controlling/monitoring (depending on the module)
PSR TBUS dummy plug



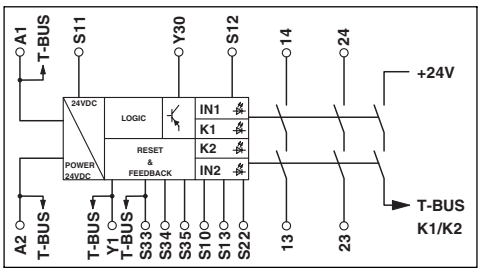
Multifunctional master module

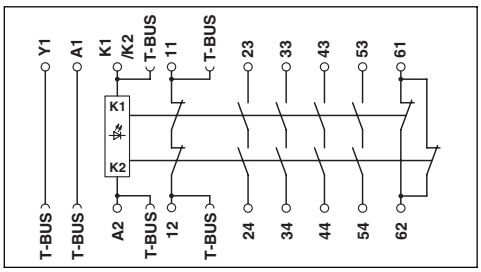


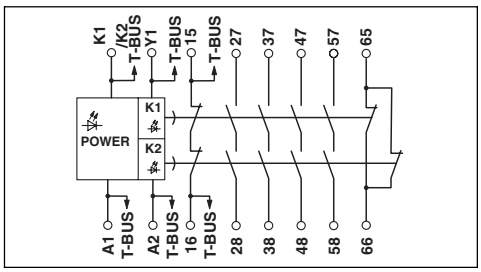
Extension module with 4 additional enabling current paths



Extension module with off-delay contacts (adjustable up to a max. of 3 s)







Technical data

24 V DC	24 V DC	24 V DC
0.85 ... 1.1	0.9 ... 1.1	0.85 ... 1.1
70 mA	42 mA	84 mA
20 ms (150 ms automatic start)	10 ms	20 ms
10 ms	10 ms	-
-	-	0.3 s ... 3 s
1 s	1 s	1 s
Two enabling current paths, one semiconductor alarm output	4 enabling current paths, 1 signaling current path, 1 confirmation path	4 enabling current paths, 1 signaling current path, 1 checkback path, all delayed
$AgSnO_2$	$AgSnO_2$	$AgSnO_2$
250 V AC/DC / 15 V AC/DC	250 V AC/DC / 15 V AC/DC	250 V AC/DC / 15 V AC/DC
6 A (N/O contact), 100 mA (signal output)	6 A (N/O contact), 3 A (N/C contact)	6 A (N/O contact), 3 A (N/C contact)
6 A / 25 mA	6 A (N/O contact), 3 A (N/C contact) / 25 mA	6 A (N/O contact), 3 A (N/C contact) / 25 mA
0.4 W	0.4 W	0.4 W
24 V DC 6 A; 230 V AC 5 A	24 V DC 6 A; 230 V AC 5 A	24 V DC 6 A; 230 V AC 5 A
24 V (DC 13) 3 A; 230 V (AC 15) 3 A	24 V (DC 13) 3 A; 230 V (AC 15) 3 A	24 V (DC 13) 3 A; 230 V (AC 15) 3 A
10 A gL/gG NEOZED (N/O contact)	10 A gL/gG NEOZED (N/O contact), 4 A gL/gG NEOZED (N/C contact)	10 A gL/gG NEOZED (N/O contact), 4 A gL/gG NEOZED (N/C contact)
-20°C ... 55°C	-20°C ... 55°C	-20°C ... 55°C
DIN EN 50178 / VDE 0160	DIN EN 50178 / VDE 0160	DIN EN 50178 / VDE 0160
4 kV / basic insulation (safe isolation, reinforced insulation, and 6 kV between input circuit and enabling current paths)	4 kV / basic insulation (safe isolation, reinforced insulation, and 6 kV between input circuit/N/C contacts and enabling current paths)	4 kV / basic insulation (safe isolation, reinforced insulation, and 6 kV between input circuit/N/C contacts and enabling current paths)
0.2 - 2.5 mm^2 / 0.2 - 2.5 mm^2 / 24 - 12	0.2 - 2.5 mm^2 / 0.2 - 2.5 mm^2 / 24 - 12	0.2 - 2.5 mm^2 / 0.2 - 2.5 mm^2 / 24 - 12
0.2 - 1.5 mm^2 / 0.2 - 1.5 mm^2 / 24 - 16	0.2 - 1.5 mm^2 / 0.2 - 1.5 mm^2 / 24 - 16	0.2 - 1.5 mm^2 / 0.2 - 1.5 mm^2 / 24 - 16
22.5 mm / 99 mm / 114.5 mm	22.5 mm / 99 mm / 114.5 mm	22.5 mm / 99 mm / 114.5 mm
22.5 mm / 112 mm / 114.5 mm	22.5 mm / 112 mm / 114.5 mm	22.5 mm / 112 mm / 114.5 mm

Ordering data

Type	Order No.	Pcs. / Pkt.
PSR-SCP- 24DC/SDC4/2X1/B	**2981486**	1
PSR-SPP- 24DC/SDC4/2X1/B	**2981499**	1

Accessories

PSR-TBUS	**2890425**	50
PSR-TBUS-TP	**2981716**	50

Ordering data

Type	Order No.	Pcs. / Pkt.
PSR-SCP- 24DC/URM4/4X1/2X2/B	**2981677**	1
PSR-SPP- 24DC/URM4/4X1/2X2/B	**2981680**	1

Accessories

PSR-TBUS	**2890425**	50
PSR-TBUS-TP	**2981716**	50

Ordering data

Type	Order No.	Pcs. / Pkt.
PSR-SCP- 24DC/URD3/4X1/2X2/3	**2981732**	1
PSR-SPP- 24DC/URD3/4X1/2X2/3	**2981745**	1

Accessories

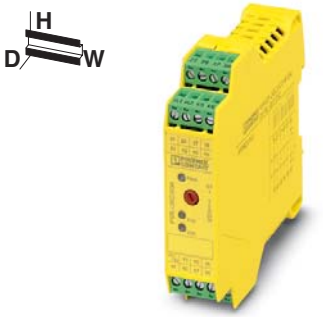
PSR-TBUS	**2890425**	50
PSR-TBUS-TP	**2981716**	50

Modular safety relay system
Extension modules

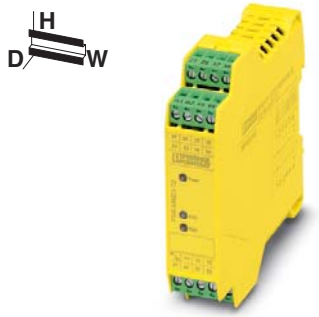
- Single-channel control
- With 4 enabling current paths, 1 signaling current path, and 1 confirmation current path each, all drop-out
- Up to Cat. 3/PL d according to ISO 13849-1, SILCL 2 according to IEC 62061, SIL 2 according to IEC 61508

Notes:

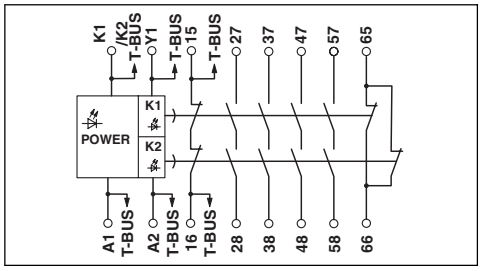
Connection examples are given starting on page 41.

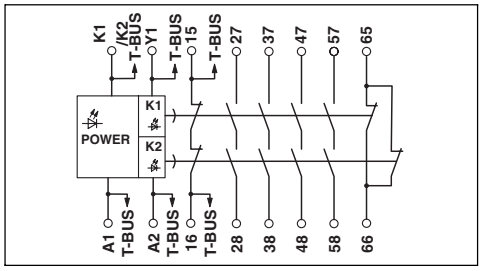


Extension module with off-delay contacts (adjustable up to a max. of 30 s)



Extension module with off-delay contacts (permanently set to 2 seconds)





	Technical data	Technical data
Input data		
Nominal input voltage U_N	24 V DC	24 V DC
Permissible range (with reference to U_N)	0.85 ... 1.1	0.85 ... 1.1
Typ. current consumption (with reference to U_N)	84 mA	84 mA
Typ. response time (K1, K2) at U_N	20 ms	20 ms
Typ. release time (K1, K2) at U_N	-	2 s
Typ. release time range	0.5 s ... 38 s ±20% (BG rating to max. 30 s)	-
Recovery time	1 s	1 s
Output data		
Contact type	4 enabling current paths, 1 signaling current path, 1 checkback path, all delayed	4 enabling current paths, 1 signaling current path, 1 checkback path, all delayed
Contact material	$AgSnO_2$	$AgSnO_2$
Max. / min. switching voltage	250 V AC/DC / 15 V AC/DC	250 V AC/DC / 15 V AC/DC
Limiting continuous current	6 A (N/O contact), 3 A (N/C contact)	6 A (N/O contact), 3 A (N/C contact)
Max. / min. inrush current	6 A (N/O contact), 3 A (N/C contact) / 25 mA	6 A (N/O contact), 3 A (N/C contact) / 25 mA
Min. switching power	0.4 W	0.4 W
Switching capacity (360/h cycles)	24 V DC 6 A; 230 V AC 5 A	24 V DC 6 A; 230 V AC 5 A
Switching capacity (3600/h cycles)	24 V (DC 13) 3 A; 230 V (AC 15) 3 A	24 V (DC 13) 3 A; 230 V (AC 15) 3 A
Short-circuit protection of the output circuits	10 A gL/gG NEOZED (N/O contact), 4 A gL/gG NEOZED (N/C contact)	10 A gL/gG NEOZED (N/O contact), 4 A gL/gG NEOZED (N/C contact)
General data		
Ambient temperature range	-20°C ... 55°C	-20°C ... 55°C
Air and creepage distances between the circuits	DIN EN 50178 / VDE 0160	DIN EN 50178 / VDE 0160
Rated surge voltage / insulation	4 kV / basic insulation (safe isolation, reinforced insulation, and 6 kV between input circuit/N/C contacts and enabling current paths)	4 kV / basic insulation (safe isolation, reinforced insulation, and 6 kV between input circuit/N/C contacts and enabling current paths)
Screw connection solid / stranded / AWG	0.2 - 2.5 mm^2 / 0.2 - 2.5 mm^2 / 24 - 12	0.2 - 2.5 mm^2 / 0.2 - 2.5 mm^2 / 24 - 12
Spring-cage connection solid / stranded / AWG	0.2 - 1.5 mm^2 / 0.2 - 1.5 mm^2 / 24 - 16	0.2 - 1.5 mm^2 / 0.2 - 1.5 mm^2 / 24 - 16
Dimensions W / H / D — Screw version	22.5 mm / 99 mm / 114.5 mm	22.5 mm / 99 mm / 114.5 mm
Dimensions W / H / D — Spring-cage version	22.5 mm / 112 mm / 114.5 mm	22.5 mm / 112 mm / 114.5 mm

Description	Ordering data: Type	Order No.	Pcs. / Pkt.	Ordering data: Type	Order No.	Pcs. / Pkt.
Extension module with drop-out delay contacts, one-channel control						
With screw connection	**PSR-SCP- 24DC/URD3/4X1/2X2**	**2981512**	1	**PSR-SCP- 24DC/URD3/4X1/2X2/T 2**	**2981703**	1
With spring-cage connection	**PSR-SPP- 24DC/URD3/4X1/2X2**	**2981525**	1	**PSR-SPP- 24DC/URD3/4X1/2X2/T 2**	**2981729**	1
Accessories						
PSR-TBUS DIN rail connector, for supplying/controlling/monitoring (depending on the module)	**PSR-TBUS**	**2890425**	50	**PSR-TBUS**	**2890425**	50
PSR TBUS dummy plug	**PSR-TBUS-TP**	**2981716**	50	**PSR-TBUS-TP**	**2981716**	50

Modular safety relay system, interface modules

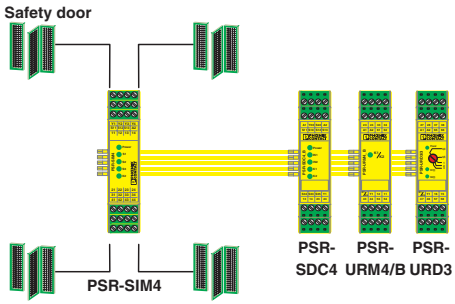
In machines and systems, connecting several two-channel safety switches to the evaluating safety relay is often time-consuming and requires a lot of wiring.

The PSR-SIM4 interface module can be used to connect up to two safety sensors or switches with one N/O or N/C combination each to the PSR-SDC4 safety relay easily and conveniently.

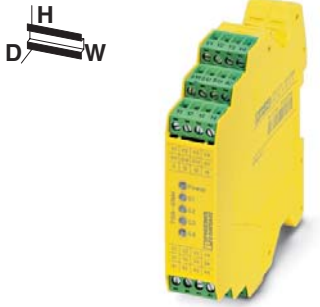
If more than four safety switches are required, several PSR-SIM4 modules can be quickly and easily interconnected via the DIN rail connector PSR-TBUS and evaluated by the master safety relay PSR-SDC4.

– Four two-channel N/O or N/C inputs
– Four LEDs as the status indicator of the relevant sensor/switch
– Four PLC diagnostics outputs for evaluating the switching status of the safety sensors
– PSR-TBUS connection
– Up to Cat. 3/PL d according to ISO 13849-1, SILCL 2 according to IEC 62061, SIL 2 according to IEC 61508 (in conjunction with the PSR-SDC4 master)

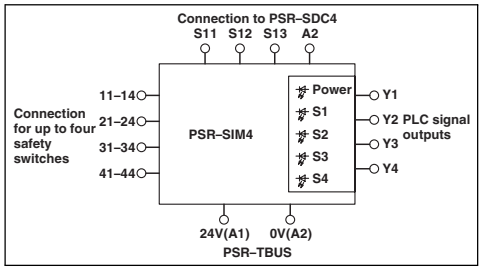
Notes:
Connection examples are given starting on page 41.



Up to 4 safety door switches can be connected to one PSR-SIM4.



Interface module for safety sensors and switches



Technical data

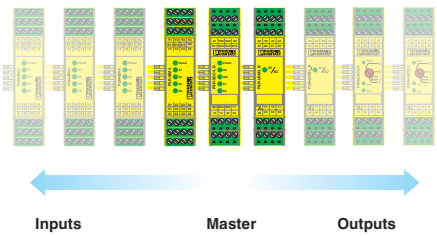
Input data		
Nominal input voltage U_N		24 V DC (from PSR)
Input voltage range in reference to U_N		0.85 ... 1.1
Max. permissible current		100 mA (per signal output)
Max. permissible total current		100 mA (alarm outputs)
Status display		Green LED
General data		
Ambient temperature (operation)		-20°C ... 55°C
Nominal operating mode		100% operating factor
Degree of protection		IP20
Mounting position		Any
Mounting		In rows with zero spacing
Air and creepage distances		DIN EN 50178
Rated insulation voltage		50 V DC
Rated surge voltage		0.8 kV
Screw connection solid / stranded / AWG		0.2 - 2.5 mm² / 0.2 - 2.5 mm² / 24 - 12
Spring-cage connection solid / stranded / AWG		0.2 - 1.5 mm² / 0.2 - 1.5 mm² / 24 - 16
Dimensions	Screw version	22.5 mm / 106 mm / -
W / H / D	Spring-cage version	22.5 mm / 106 mm / -

Ordering data

Description	Type	Order No.	Pcs. / Pkt.
Interface module, for up to four safety sensors/switches with N/O or N/C contacts			
With screw connection	**PSR-SCP- 24DC/SIM4**	**2981936**	1
With spring-cage connection	**PSR-SPP- 24DC/SIM4**	**2981949**	1

Accessories

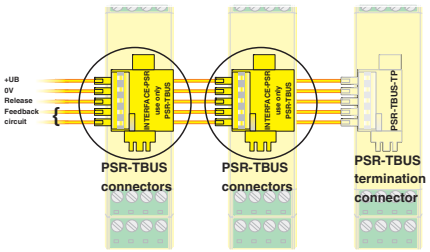
PSR-TBUS DIN rail connector, for supplying/controlling/monitoring (depending on the module)	**PSR-TBUS**	**2890425**	50



Additional inputs are aligned on the left of the PSR-SDC4, outputs are to its right.

Modular safety relay system
PSR-TBUS DIN rail connector

The safety-related wiring between the individual PSR modules is established automatically by the PSR-TBUS DIN rail connector. In addition to the supply voltage, an enable signal and the confirmation current path of the extension modules are routed via the connector. The dummy plug (see below) closes the checkback circuit in the system.

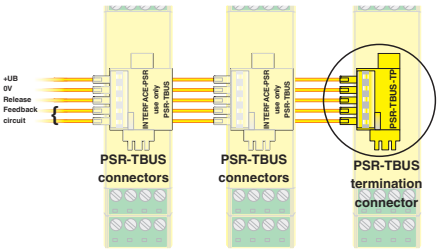


PSR-TBUS DIN rail connector

Description	Ordering data		
	Type	Order No.	Pcs. / Pkt.
PSR-TBUS DIN rail connector, for supplying/controlling/monitoring (depending on the module)	**PSR-TBUS**	**2890425**	50

Modular safety relay system
PSR-TBUS-TP dummy plug

When structuring a modular safety relay system, the PSR-TBUS-TP is mounted under the module that completes the entire module on the right side. This closes the confirmation circuit of the system.



PSR-TBUS-TP dummy plug

Description	Ordering data		
	Type	Order No.	Pcs. / Pkt.
PSR TBUS dummy plug	**PSR-TBUS-TP**	**2981716**	50

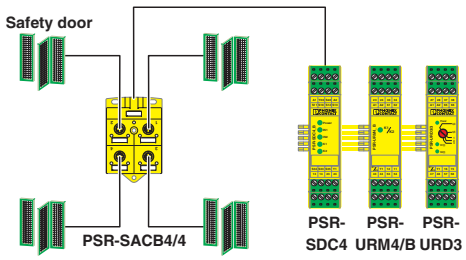
Sensor box PSR-SACB with M12 slots

The PSR-SACB box for safety limit switches supports space-saving installation. It safely connects four connected limit switches, each with an N/C contact and an N/O contact, to a safety relay combination, e.g., PSR-SDC4. The N/C contacts are connected in series and the N/O contacts in parallel, which means that safe evaluation according to category 3/PL d of ISO 13849-1 is ensured. Unused slots are bridged using dummy plugs.

The LEDs are used for signaling. In addition, four signal outputs (Y1-Y4) are also available and they can be evaluated in the control unit. The boxes are suitable for a rough industrial environment, correspond to the requirements of the IP65/IP67 degree of protection and are supplied with either 5 m or 10 m cable length.

The appropriate connecting cables for connection with sensors are available from a comprehensive range of products, see the PLUSCON catalog.

– Up to Cat. 3/PL d according to ISO 13849-1, SILCL 2 according to IEC 62061, SIL 2 according to IEC 61508 (in conjunction with the PSR-SDC4 master)



Signals of up to 4 safety door switches can be switched together directly in the field.

Sensor box, with connected master cable, with LED

Technical data

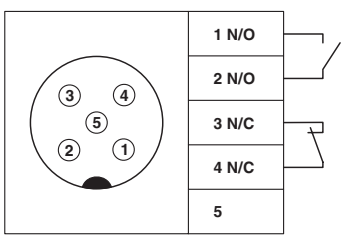
Nominal input voltage U_N	24 V DC (from PSR)
Input voltage range in reference to U_N	0.8 ... 1.1
Max. permissible current	100 mA (per signal output)
Max. permissible total current	100 mA (alarm outputs)
Status display	Yellow LED
Number of positions per slot	4
Master cable (stranded cable conduit-capable)	
Signal line cross section, stranded	6x 0.34 mm^2
Power supply cross section, stranded	2x 0.75 mm^2
External diameter	8.2 mm
Ambient temperature (operation)	-30°C ... 70°C (for fixed installation) -5°C ... 70°C (for flexible installation)
General data	
Ambient temperature (operation)	-20°C ... 70°C
Degree of protection	IP65/IP67
Mounting position	Any
Mounting	In rows with zero spacing
Interfaces	Master cable suitable for stranded cable conduit / M12 female connector
Air and creepage distances	DIN EN 50178
Rated insulation voltage	50 V DC
Rated surge voltage	0.8 kV
Insulation material (housing)	PA 6.6
Inflammability class according to UL 94	V0
Dimensions W / H / D	54 mm / 19 mm / 82 mm

Ordering data

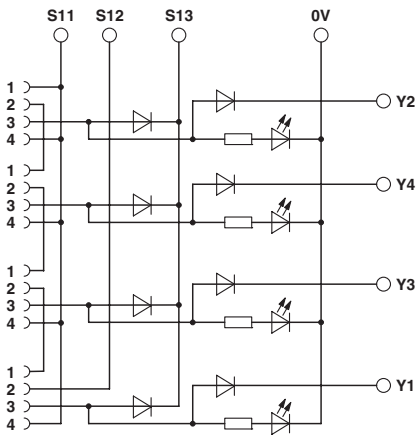
Description	Type	Order No.	Pcs. / Pkt.
Sensor box, with markers, for magnetic limit switch with N/C / N/O contacts			
Length of cable: 5 m	**PSR-SACB-4/4-L- 5,0PUR-SD**	**2981871**	1
Length of cable: 10 m	**PSR-SACB-4/4-L-10,0PUR-SD**	**2981884**	1

Accessories

Dummy plug, for free slots	**SAC-2P-M12MS ASI TR**	**1539570**	5
Marking material	**ZBN 18:UNBEDRUCKT**	**2809128**	10



Wiring of the M12 contacts (open safety door)



Block diagram

PSR-TRISAFE can meet all safety function requirements quickly and easily.

PSR-TRISAFE offers numerous benefits:

- Compatible for multifunctional use for a variety of safety functions
- Open to extension with safe inputs and outputs
- Straightforward graphics-based configuration instead of intensive programming
- Handy simulation and test options get things started in next to no time

Master module open to extension

The configurable safety module is supplied with 20 safe inputs, 4 safe outputs, and 4 alarm outputs integrated as standard. If more inputs and outputs are required, up to 10 extension modules can be connected alongside the expandable PSR-TRISAFE-M safety module. Safe digital I/O modules are available for flexible system expansion.

Integration into a bus system

Adaptable fieldbus gateways, available as an option, can be used to integrate the PSR-TRISAFE system into a bus system (such as a PROFIBUS DP network). This enables communication with the higher-level control system for diagnostic and visualization purposes.

INTERFACE DIN rail T-BUS

The INTERFACE DIN rail T-BUS provides the link between extension modules and the safety module.

Easy device configuration

Functions are easy to configure with drag & drop in the free SAFECONF software.

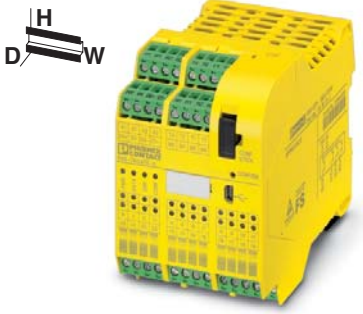
PSR-TRISAFE-S

- Freely configurable safety module for monitoring emergency stop, safety doors, light grids, etc.
- With 20 safe inputs, 4 safe outputs, 4 alarm outputs, and 2 clock outputs on a design width of just 67.5 mm
- Easily graphically configurable with the SAFECONF software
- Quick commissioning by means of comprehensive simulation and test functions
- Option for connecting fieldbus gateways for diagnostics and for signaling functions, see page 160
- Incl. IFS-CONFSTICK memory stick for easy storage and backup of the configuration
- Up to Cat. 4/PL e according to ISO 13849-1, SILCL 3 according to IEC 62061, SIL 3 according to IEC 61508

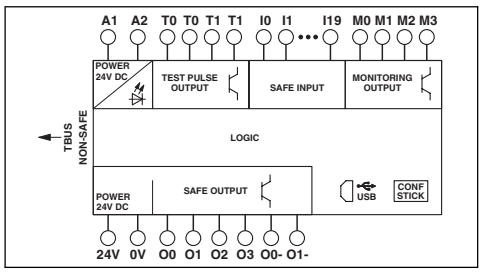
Notes:

The necessary SAFECONF configuration software can be downloaded free of charge from www.phoenixcontact.com.

Configuration package incl. USB cable, see page 33



Configurable safety module, cannot be extended



Technical data

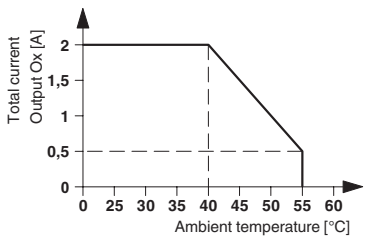
Module data		
Nominal input voltage U_N		24 V DC
Permissible range (with reference to U_N)		0.85 ... 1.1
Typ. current consumption (with reference to U_N)		200 mA
Max. response time		30 ms
Interfaces		USB, DIN rail TBUS for bus couplers
Input data		
Number of safe inputs		20
Nominal voltage		24 V DC
Electrical isolation		Yes
Output data		
Safe semiconductor outputs		4 (Cat.4 / ISO 13849)
Nominal voltage		24 V DC
Limiting continuous current		2 A (see derating curve)
Electrical isolation		Yes, to logic and inputs A1, A2
Ground switching outputs		2
Clock outputs		2
Alarm outputs		4
General data		
Ambient temperature range		-20°C ... 55°C
Screw connection solid / stranded / AWG		0.2 - 2.5 mm^2 / 0.2 - 2.5 mm^2 / 24 - 12
Spring-cage connection solid / stranded / AWG		0.2 - 1.5 mm^2 / 0.2 - 1.5 mm^2 / 24 - 16
Dimensions	Screw version	67.5 mm / 99 mm / 114.5 mm
W / H / D	Spring-cage version	67.5 mm / 112 mm / 114.5 mm

Ordering data

Description	Type	Order No.	Pcs. / Pkt.
Freely configurable safety module, for monitoring emergency stop, safety doors, light grids, etc., with 20 safe inputs and 4 safe outputs, 4 signaling and 2 cycle outputs			
With screw connection	**PSR-SCP- 24DC/TS/S**	**2986229**	1
With spring-cage connection	**PSR-SPP- 24DC/TS/S**	**2986232**	1

Accessories

Multifunctional memory block for the INTERFACE system	**IFS-CONFSTICK**	**2986122**	1
PSR-TBUS DIN rail connector, for supplying/controlling/monitoring (depending on the module)	**PSR-TBUS**	**2890425**	50



Load current as a function of the ambient temperature
Operating time: 100% operating factor

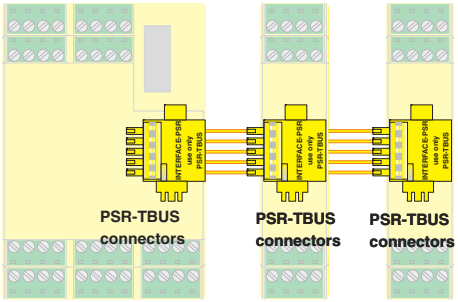
PSR-TRISAFE modular

Freely configurable safety module for monitoring emergency stops, safety doors, light grids, etc.

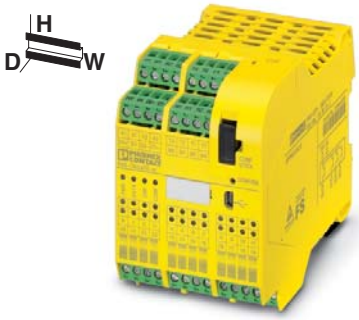
- Safe and standard extension via INTERFACE DIN rail TBUS
- With 20 safe inputs, 4 safe outputs, 4 alarm outputs, and 2 clock outputs on a design width of just 67.5 mm
- Easily graphically configurable with the SAFECONF software
- Option for connecting fieldbus gateways for diagnostics and for signaling functions, see page 160
- Incl. IFS-CONFSTICK memory stick for easy storage and backup of the configuration
- Incl. PSR-TBUS connector (DIN rail connector) for adapting safe extension modules
- Up to Cat. 4/PL e according to ISO 13849-1, SILCL 3 according to IEC 62061, SIL 3 according to IEC 61508

Notes:

For extension modules for PSR-TRISAFE modular, see from page 31.

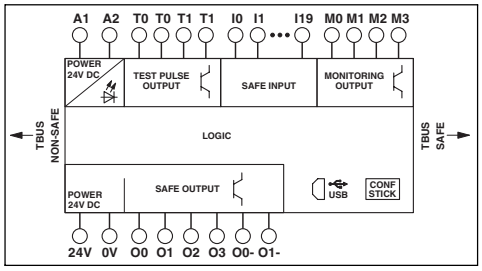


TBUS connectors implement the cross-wiring between modules.



Configurable safety module, can be extended

Applied for: UL listed / CUL listed



Technical data

Module data	
Nominal input voltage U_N	24 V DC
Permissible range (with reference to U_N)	0.85 ... 1.1
Typ. current consumption (with reference to U_N)	110 mA
Max. response time	30 ms
Interfaces	USB, DIN rail TBUS for extension modules and bus couplers
Input data	
Number of safe inputs	20
Nominal voltage	24 V DC (A1 / A2)
Electrical isolation	Yes
Output data	
Safe semiconductor outputs	4 (Cat.4 / ISO 13849)
Nominal voltage	24 V DC
Limiting continuous current	2 A (see derating curve)
Electrical isolation	Yes, to logic and inputs A1, A2
Ground switching outputs	2
Clock outputs	2
Alarm outputs	4
General data	
Ambient temperature range	-5°C ... 45°C
Screw connection solid / stranded / AWG	0.2 - 2.5 mm^2 / 0.2 - 2.5 mm^2 / 24 - 12
Spring-cage connection solid / stranded / AWG	0.2 - 1.5 mm^2 / 0.2 - 1.5 mm^2 / 24 - 16
Dimensions W / H / D — Screw version	67.5 mm / 99 mm / 114.5 mm
Dimensions W / H / D — Spring-cage version	67.5 mm / 112 mm / 114.5 mm

Ordering data

Description	Type	Order No.	Pcs. / Pkt.
Freely configurable master module, for monitoring emergency stops, safety doors, light grids, etc., with 20 safe inputs and 4 safe outputs, 4 alarm outputs and 2 clock outputs, safe and standard extension, including memory stick and PSR-TBUS connector			
With screw connection	**PSR-SCP- 24DC/TS/M**	**2986012**	1
With spring-cage connection	**PSR-SPP- 24DC/TS/M**	**2986025**	1

Accessories

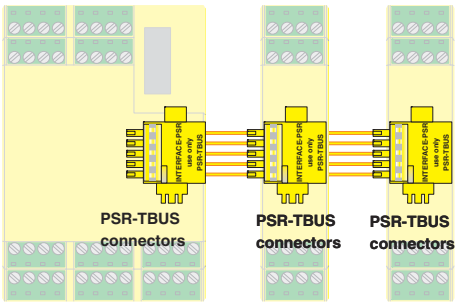
Multifunctional memory block for the INTERFACE system	**IFS-CONFSTICK**	**2986122**	1
PSR-TBUS DIN rail connector, for supplying/controlling/monitoring (depending on the module)	**PSR-TBUS**	**2890425**	50

PSR-TRISAFE modular

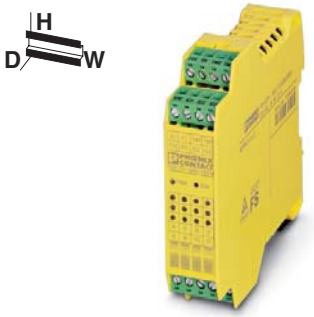
I/O extension for PSR-TRISAFE-M
- 8 safe digital inputs
- 4 safe digital outputs or 4 additional digital inputs (that can be configured using SAFECONF)
- 2 alarm outputs or 2 clock outputs (that can be configured using SAFECONF)
- Slim 22.5 mm housing
- Including PSR-TBUS connector (DIN rail connector) for adapting to the PSR-TRISAFE-M master module
- Up to Cat. 4/PL e according to ISO 13849-1, SILCL 3 according to IEC 62061, SIL 3 according to IEC 61508

Notes:

For PSR-TRISAFE-M master module, see page 30.

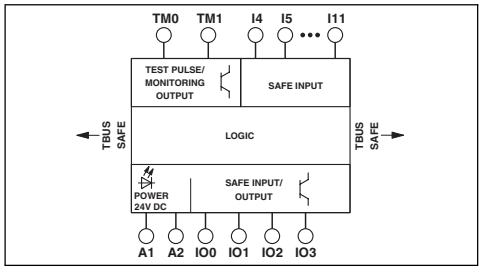


TBUS connectors implement the cross-wiring between modules.



Extension module with 8 safe inputs, plus 4 safe inputs or outputs

Applied for: UL listed / CUL listed



Technical data

Module data	
Nominal input voltage U_N	24 V DC (A1 / A2)
Permissible range (with reference to U_N)	0.85 ... 1.1
Typ. current consumption (with reference to U_N)	100 mA
Max. response time	< 30 ms
Interfaces	DIN rail TBUS for connection to the master module
Input data	
Number of safe inputs	12 (can be configured as input or output)
Nominal voltage	24 V DC
Electrical isolation	Yes
Output data	
Safe semiconductor outputs	4 (if the four parameterizable inputs/outputs are used as outputs)
Nominal voltage	24 V DC
Limiting continuous current	4 x 0.5 A (see derating curve)
Electrical isolation	Yes, to logic
Ground switching outputs	0
Cycle/alarm outputs	2
General data	
Ambient temperature range	-5°C ... 45°C
Screw connection solid / stranded / AWG	0.2 - 2.5 mm² / 0.2 - 2.5 mm² / 24 - 12
Spring-cage connection solid / stranded / AWG	0.2 - 1.5 mm² / 0.2 - 1.5 mm² / 24 - 16
Dimensions W / H / D — Screw version	22.5 mm / 99 mm / 114.5 mm
Dimensions W / H / D — Spring-cage version	22.5 mm / 112 mm / 114.5 mm

Ordering data

Description	Type	Order No.	Pcs. / Pkt.
Extension module, 8 safe inputs and 4 safe freely parameterizable channels (as safe inputs or outputs), including PSR-TBUS connector			
With screw connection	**PSR-SCP- 24DC/TS/SDI8/SDIO4**	**2986038**	1
With spring-cage connection	**PSR-SPP- 24DC/TS/SDI8/SDIO4**	**2986041**	1

Accessories

PSR-TBUS DIN rail connector, for supplying/controlling/monitoring (depending on the module)	**PSR-TBUS**	**2890425**	50

PSR-TRISAFE system configuration

Easy software configuration using drag & drop

SAFECONF software supports quick and easy configuration of the PSR-TRISAFE module. Instead of being programmed, the required functions and components are dragged to the connection area, where they can be linked. It takes just 3 steps to create a project, test it, and transfer it to the safety module.

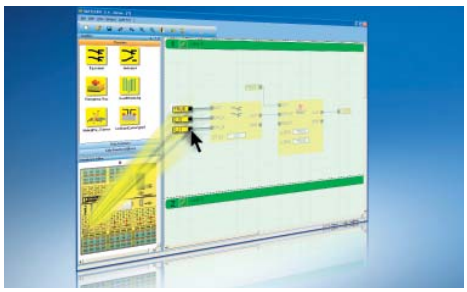
Just 3 steps and your project is ready

1. Straightforward selection and linking of safety functions.

Intuitive blocks are available for the safety function concerned (e.g., emergency stop monitoring or safety door monitoring). These are simply moved with the mouse to the connection area where they can be linked. There are no additional windows or submenus requiring further data input. This means the safety logic is very clearly arranged.

2. Hardware integration via drag & drop

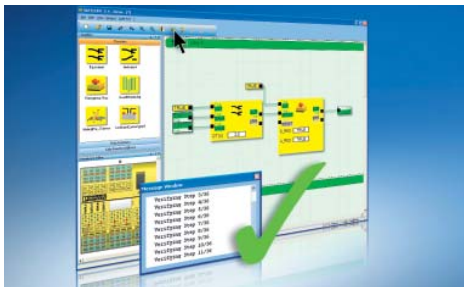
It is just as quick and easy to link the hardware with the safety logic. The safety module and its connection terminal blocks are shown directly under the window for selecting blocks. This makes it easy to move the relevant inputs and outputs via drag & drop to the connection area, where they can be linked to the safety blocks.



3. Testing and transferring

Automatic testing of the configuration prior to transfer provides additional safety. This ensures, for example, that inputs or outputs which are not connected are recognized by the blocks. In addition, the entire circuit can be tested on the computer in simulation mode. This makes it possible to validate changes at the office before these are implemented within the system during operation.

Following testing, the configuration is transferred to the safety module with a standard USB cable. The transfer must be acknowledged manually on the device to prevent any unintentional data changes. The configuration is then active and can be put into operation.



Configuration software

– SAFECONF software, USB connecting cable, and Quick Start Guide for the PSR-TRISAFE safety module are available as a configuration package
– Connecting cable also optionally available
– SAFECONF software also available individually as a free download at **www.phoenixcontact.com**

Configuration software and connecting cable

Technical data

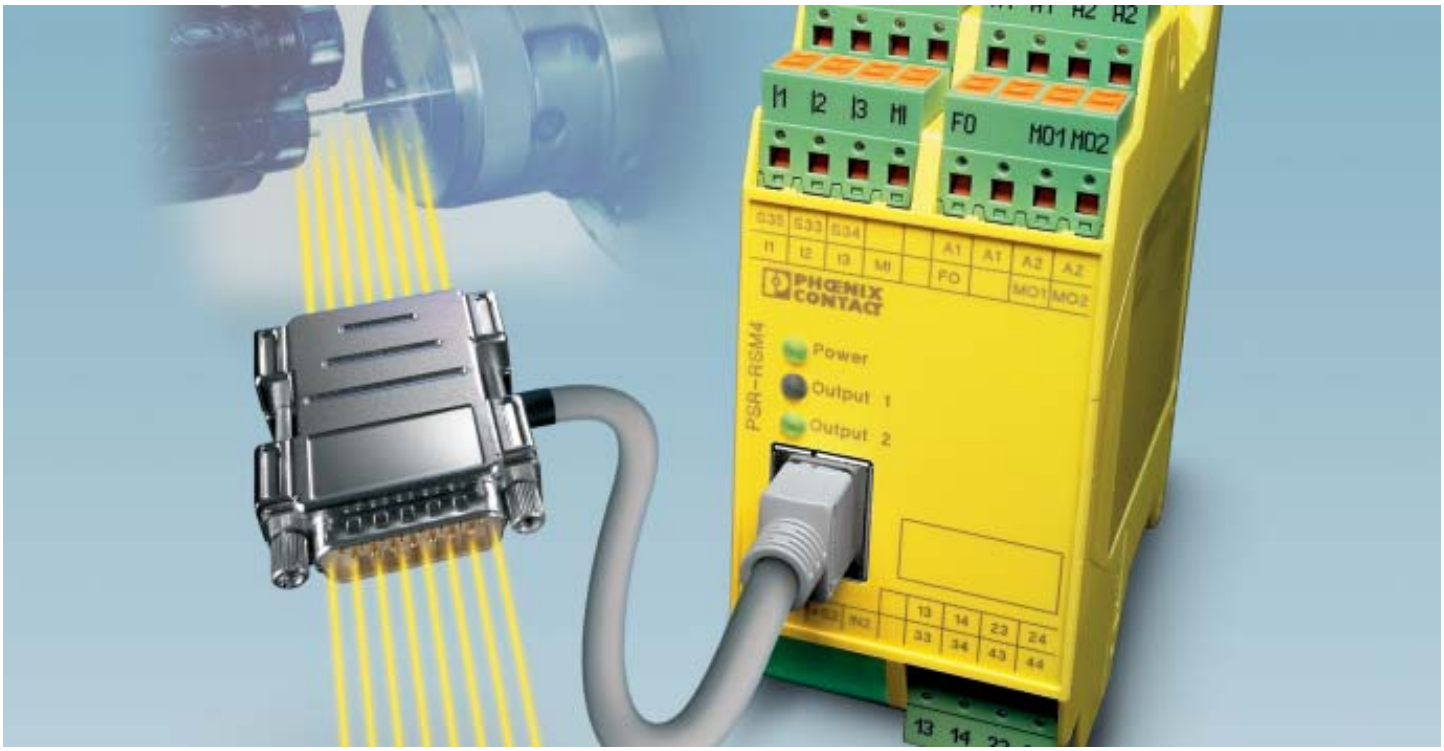
Hardware requirements	
CPU	Pentium, 2 GHz (recommended), 1 GHz (min.)
Main memory	Under Windows Vista: 2 GB (recommended) or 1 GB (min.) Under Windows XP/2000: 1 GB (recommended) or 512 MB (min.)
Hard disk memory	Min. 250 MB
Optical drive	CD-ROM
Operating equipment	Keyboard, mouse
Monitor resolution	800x600
Basic functions	
	Configuration of the PSR-TRISAFE safety module
Supported languages	
	German, English, French, Spanish, Italian, Japanese
Software requirements	
Operating systems	MS Windows 2000 (SP4), MS Windows XP (SP2), MS Windows Vista, MS Windows 7
Supported browsers	Internet Explorer 6 or higher

Ordering data

Description	Type	Order No.	Pcs. / Pkt.
Configuration package for the PSR-TRISAFE safety module, comprising the SAFECONF software, connecting cable, and Quick Start Guide			
German	**PSR-SAFECONF-BOX-DE**	**2986151**	1
English	**PSR-SAFECONF-BOX-EN**	**2986164**	1

Accessories

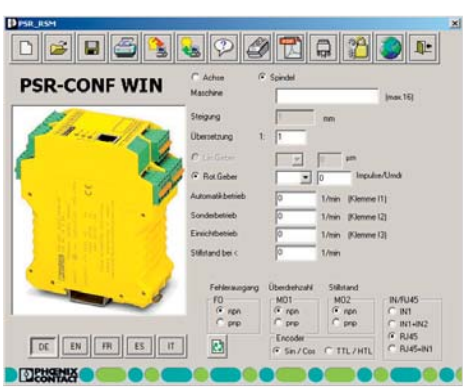
Connecting cable (single) for configuration of the PSR-TRISAFE system - Length: 3 m	**CABLE-USB/MINI-USB-3,0M**	**2986135**	1



It is often necessary to work with the safety door open when setting up a machine or system. In such cases, the movements of the drive must be monitored for safe stop or safe reduced speed, for example. If the speed of a drive exceeds the permissible maximum value, the system is shut down safely.

PSR speed and downtime monitors can be used to implement applications of this type up to Cat. 4 acc. to EN 954-1 or SIL3 acc. to IEC 61508, dependent upon the external wiring.

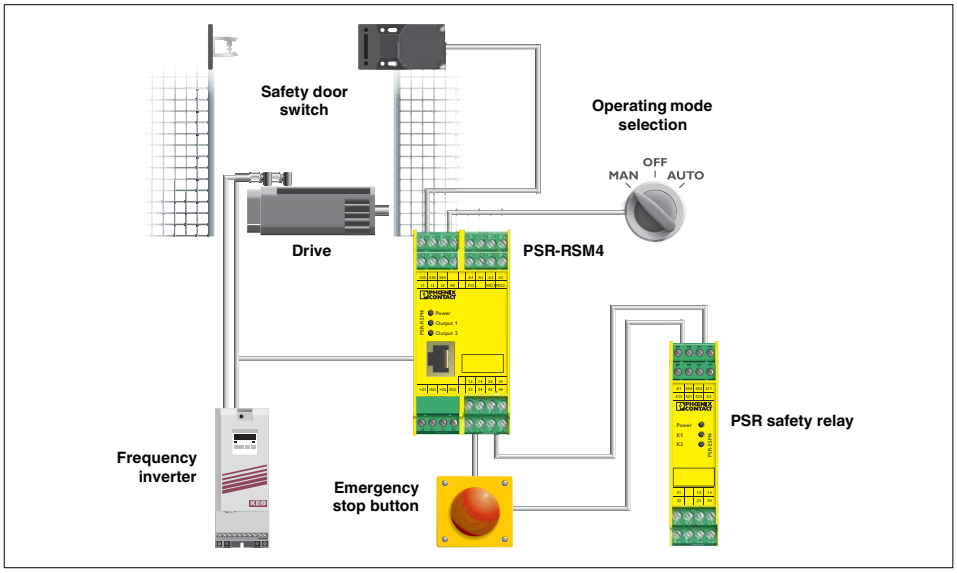
The PSR-RSM4 speed monitor is suitable for monitoring up to three different speeds during operation, as well as being compatible for downtime monitoring.



The PSR-RSM4 speed monitor is configured via the serial interface using user-friendly Windows-based software.

Movement is detected by proximity switches or an incremental encoder, which can be connected quickly and easily to the PSR-RSM4 using a pre-assembled cable adapter.

The PSR-SSM downtime monitor monitors safe stop, for example, using a proximity switch mounted on a gear rack or a gearwheel.



Example of speed monitoring of a drive using the motor-side incremental encoder.

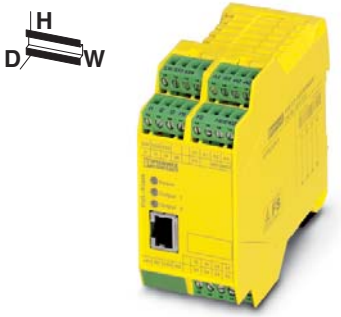
Two standard sensors are used for control. Cable breaks and open circuits can also be detected.

An emergency stop is triggered if the speed is exceeded when the safety door is open.

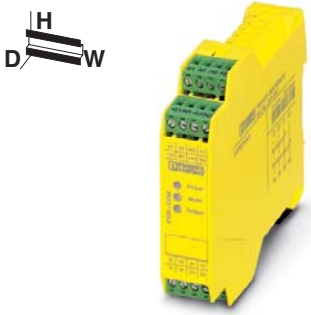
Safe downtime and speed monitors

- Standard sensors can be connected
- Easy configuration via software (PSR-RSM4)
- Up to SIL 3 according to IEC 61508

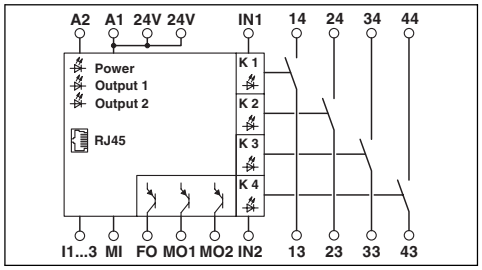
Notes:
Connection examples are given starting on page 41.
Pre-assembled cable adapters are available for connecting the PSR-RSM4 safe speed and downtime monitor to the motor feedback system (of the controller) - order no. on request.
The necessary PSR-CONF-WIN configuration software can be downloaded free of charge from www.phoenixcontact.com.

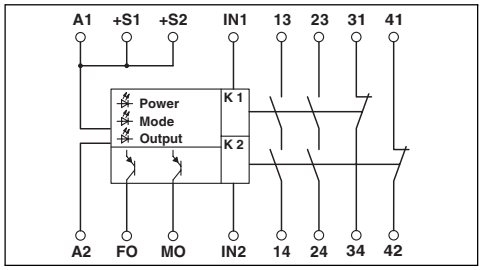


Speed and downtime monitor, suitable for encoder and initiator connection



Downtime monitor, suitable for connecting 2 initiators





	Technical data	Technical data
Input data		
Nominal input voltage U_N	24 V DC	24 V DC
Permissible range (with reference to U_N)	0.85 ... 1.1	0.85 ... 1.1
Typ. current consumption (with reference to U_N)	100 mA	60 mA
Typ. response time (K1, K2) at U_N	15 ms	12 ms
Typ. release time (K1, K2) at U_N	12 ms	8 ms
Recovery time	1 s	1 s
Output data		
Contact type	4 enabling current paths	2 enabling current paths, 2 signaling current paths
Contact material	AgNi10, + 5 µm Au	AgNi10, + 5 µm Au
Max. / min. switching voltage	250 V AC/DC / 100 mV AC/DC	250 V AC/DC / 100 mV AC/DC
Limiting continuous current	5 A, 100 mA (alarm outputs)	5 A, 100 mA (alarm outputs)
Max. / min. inrush current	6 A / 1 mA	5 A / 1 mA
Min. switching power	1 mW	1 mW
Switching capacity (3600/h cycles)	24 V (DC 13) 2 A; 230 V (AC 15) 3 A	24 V (DC 13) 2 A; 230 V (AC 15) 3 A
Short-circuit protection of the output circuits	6 A gL	6 A gL
General data		
Ambient temperature range	-20°C ... 55°C	-20°C ... 55°C
Air and creepage distances between the circuits	EN 60664 / VDE 0110	EN 60664 / VDE 0110
Rated surge voltage / insulation	4 kV / basic insulation (safe isolation, reinforced insulation, and 6 kV between input circuit and enabling current paths)	4 kV / basic insulation (safe isolation, reinforced insulation, and 6 kV between input circuit and enabling current paths)
Screw connection solid / stranded / AWG	0.2 - 2.5 mm² / 0.2 - 2.5 mm² / 24 - 12	0.2 - 2.5 mm² / 0.2 - 2.5 mm² / 24 - 12
Spring-cage connection solid / stranded / AWG	0.2 - 1.5 mm² / 0.2 - 1.5 mm² / 24 - 16	0.2 - 1.5 mm² / 0.2 - 1.5 mm² / 24 - 16
Dimensions W / H / D — Screw version	45 mm / 99 mm / 114.5 mm	22.5 mm / 99 mm / 114.5 mm
Dimensions W / H / D — Spring-cage version	45 mm / 112 mm / 114.5 mm	22.5 mm / 112 mm / 114.5 mm

Ordering data

Description	Type	Order No.	Pcs. / Pkt.
Speed and downtime monitor, 2-channel, automatic control with cable adapter or two initiators, activation: manual and automatic			
With screw connection	**PSR-SCP- 24DC/RSM4/4X1**	**2981538**	1
With spring-cage connection	**PSR-SPP- 24DC/RSM4/4X1**	**2981541**	1
Downtime monitor, 2-channel, control with two standard initiators			
With screw connection			
With spring-cage connection			

Ordering data

Type	Order No.	Pcs. / Pkt.
PSR-SCP- 24DC/SSM/2X1	**2981567**	1
PSR-SPP- 24DC/SSM/2X1	**2981570**	1

Accessories

Cable adapter for PSR-RSM4, cable length 2.5 m, for control unit:			
Lenze	**CABLE- 9/8/250/RSM/LENZE**	**2981826**	1
Siemens Heidenhain, 15/8-pole	**CABLE-15/8/250/RSM/SIMO611D**	**2981606**	1
Siemens Heidenhain, 25/8-pole	**CABLE-25/8/250/RSM/SIMO611D**	**2981583**	1
Further types on request			
PSR configuration software with connecting cable, language: German, English, French, Italian and Spanish	**PSR-CONF-WIN1.0**	**2981554**	1

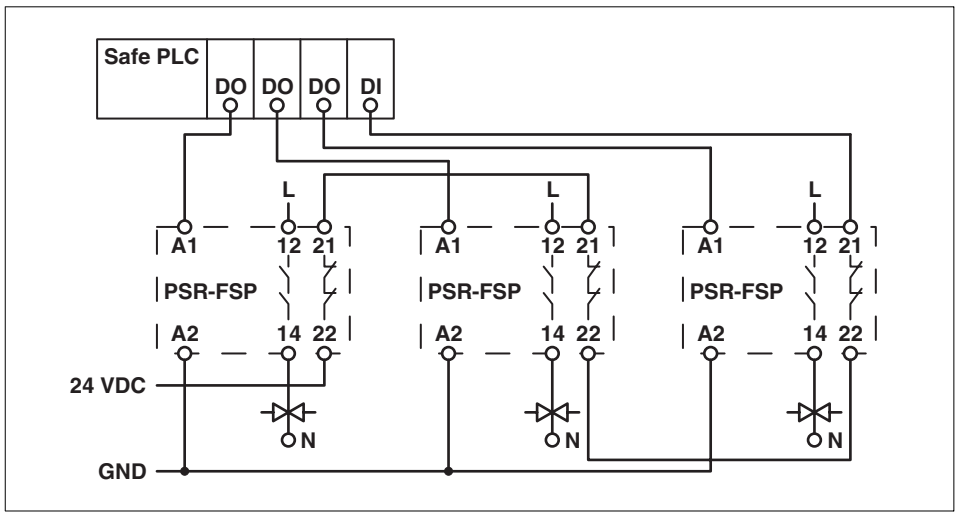
Accessories

Failsafe controllers are used as standard in process engineering. In this context, the use of safe coupling relays for power adjustment and the electrical isolation of actuators is gaining in significance, as actuators often need more current or other voltages than the controllers are able to supply. Furthermore, the digital outputs of failsafe controllers run automatic selftests at regular intervals in order to detect faults. However, the test pulses involved usually cause premature wear of the relays.

With their integrated test pulse filter and control circuit to adjust power consumption, all FSP devices take these special requirements of a failsafe controller into account. The devices also meet all requirements for use in applications up to a maximum of SIL 3 according to IEC 61508.

Operators must maintain the SIL level of their equipment by running a periodic and intensive function test known as a proof test. The modules in the PSR-FSP series feature a floating alarm contact which can be used to check the switching state of the N/O contacts.

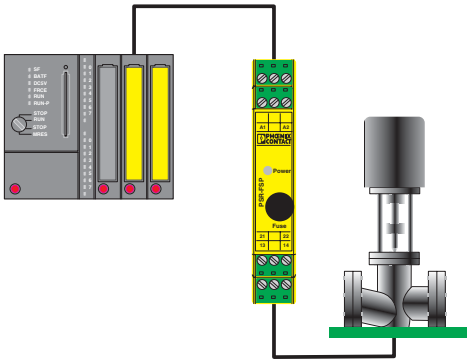
Groups of devices can be created by connecting the alarm contacts of the individual relays in series. Safety checks can then be carried out in a single operation for each group. This method enables the proof test to be carried out quickly and easily. They do not have to be tested manually with a measuring device, or even sent back to the manufacturer or replaced. The engineer installing the equipment and the equipment operator are thus provided with a solution that is both user-friendly and fit for the future.



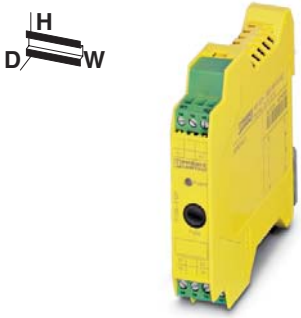
Emergency stop coupling relay for failsafe controllers in the process industry

- Connects digital output signals from fail safe controllers to the peripherals (valves, etc.) for electrical isolation and power adaptation
- One enabling current path
- 17.5 mm slim housing
- Long service life thanks to filtering of controller test pulses
- With installed and replaceable fuse in the enabling current path
- Forcibly guided contacts according to EN 50205
- Simple proof test as per IEC 61508 due to integrated signaling contact
- Up to SIL 3 according to IEC 61508

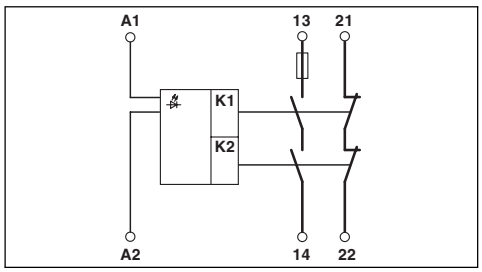
Notes:
Additional products for SIL applications can be found on page 12.
Connection examples are given starting on page 41.



Example of electrical isolation of a safety PLC output from the field



Safe coupling relay
SIL 3 according to IEC 61508



Technical data

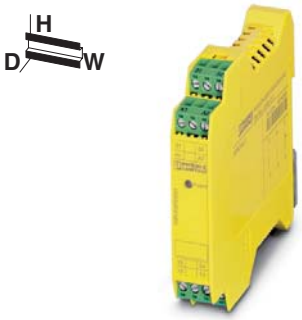
Input data	
Nominal input voltage U_N	24 V DC
Permissible range (with reference to U_N)	0.85 ... 1.1
Typ. current consumption (with reference to U_N)	55 mA
Typ. response time (K1, K2) at U_N	50 ms
Typ. release time (K1, K2) at U_N	50 ms
Recovery time	1 s
Output data	
Contact type	1 enabling current path undelayed, 1 confirmation current path undelayed
Contact material	AgCuNi, + 0.2 µm Au
Max. / min. switching voltage	250 V AC/DC / 15 V AC/DC
Limiting continuous current	5 A (N/O contact, pay attention to the derating), 100 mA (N/C contact)
Max. / min. inrush current	5 A / 5 mA
Min. switching power	75 mW
Switching capacity (3600/h cycles)	24 V (DC 13) 5 A; 230 V (AC 15) 5 A
Short-circuit protection of the output circuits	5 A T fuse
General data	
Ambient temperature range	-20°C ... 55°C
Air and creepage distances between the circuits	DIN EN 50178
Rated surge voltage / insulation	6 kV / safe isolation, increased insulation
Screw connection solid / stranded / AWG	0.2 - 2.5 mm² / 0.2 - 2.5 mm² / 24 - 12
Spring-cage connection solid / stranded / AWG	0.2 - 1.5 mm² / 0.2 - 1.5 mm² / 24 - 16
Dimensions W / H / D — Screw version	17.5 mm / 99 mm / 114.5 mm
Dimensions W / H / D — Spring-cage version	17.5 mm / 112 mm / 114.5 mm

Ordering data

Description	Type	Order No.	Pcs. / Pkt.
Emergency stop coupling relay for failsafe controllers in process engineering, with secured enabling current path			
With screw connection	**PSR-SCP- 24DC/FSP/1X1/1X2**	**2981978**	1
With spring-cage connection	**PSR-SPP- 24DC/FSP/1X1/1X2**	**2981981**	1

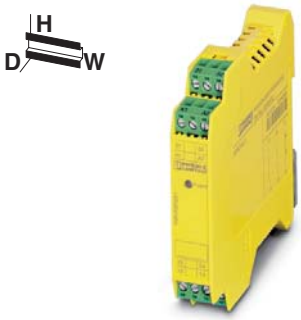
Emergency stop coupling relay for failsafe controllers in the process industry

- Couples digital output signals from failsafe controllers to I/O devices (valves, etc.) for electrical isolation and power adaptation
- Two enabling current paths
- 17.5 mm slim housing
- Long service life thanks to filtering of controller test pulses
- Simple proof test as per IEC 61508 due to integrated signaling contact
- Forcibly guided contacts according to EN 50205
- Up to SIL 3 according to IEC 61508



Safe coupling relay, SIL 2 according to IEC 61508

Applied for: UL listed / CUL listed



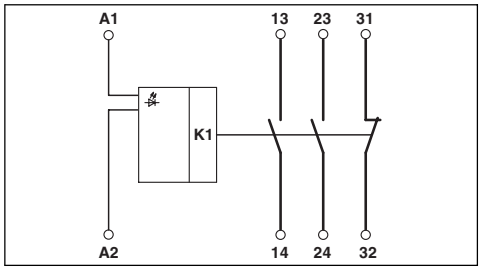
Safe coupling relay, SIL 3 according to IEC 61508

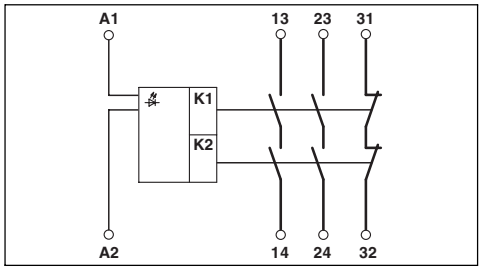
Applied for: UL listed / CUL listed

Notes:

Additional products for SIL applications can be found on page 12.

Connection examples are given starting on page 41.





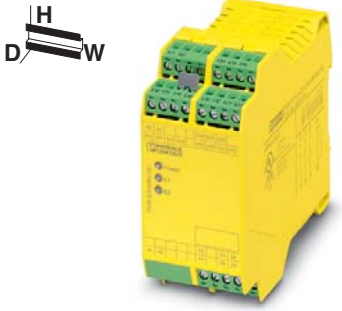
	Technical data	Technical data
Input data		
Nominal input voltage U_N	24 V DC	24 V DC
Permissible range (with reference to U_N)	0.85 ... 1.1	0.85 ... 1.1
Typ. current consumption (with reference to U_N)	55 mA	55 mA
Typ. response time (K1, K2) at U_N	50 ms	50 ms
Typ. release time (K1, K2) at U_N	50 ms	50 ms
Output data		
Contact type	2 undelayed enabling current paths, 1 undelayed confirmation path	2 undelayed enabling current paths, 1 undelayed confirmation path
Contact material	AgCuNi, + 0.2 µm Au	AgCuNi, + 0.2 µm Au
Max. / min. switching voltage	250 V AC/DC / 15 V AC/DC	250 V AC/DC / 15 V AC/DC
Limiting continuous current	5 A (N/O contact), 100 mA (N/C contact)	5 A (N/O contact), 100 mA (N/C contact)
Max. / min. inrush current	5 A / 5 mA	5 A / 5 mA
Min. switching power	75 mW	75 mW
Switching capacity (3600/h cycles)	24 V (DC 13) 5 A; 250 V (AC 15) 5 A	24 V (DC 13) 5 A; 250 V (AC 15) 5 A
Short-circuit protection of the output circuits	10 A gL/gG (N/O contact), 6 A gL/gG (N/C contact)	10 A gL/gG (N/O contact), 6 A gL/gG (N/C contact)
General data		
Ambient temperature range	-20°C ... 55°C	-20°C ... 55°C
Air and creepage distances between the circuits	DIN EN 50178 / VDE 0160	DIN EN 50178 / VDE 0160
Rated surge voltage / insulation	6 kV / safe isolation, reinforced insulation	6 kV / safe isolation, reinforced insulation
Screw connection solid / stranded / AWG	0.2 - 2.5 mm² / 0.2 - 2.5 mm² / 24 - 12	0.2 - 2.5 mm² / 0.2 - 2.5 mm² / 24 - 12
Spring-cage connection solid / stranded / AWG	0.2 - 1.5 mm² / 0.2 - 1.5 mm² / 24 - 16	0.2 - 1.5 mm² / 0.2 - 1.5 mm² / 24 - 16
Dimensions W / H / D — Screw version	17.5 mm / 99 mm / 114.5 mm	17.5 mm / 99 mm / 114.5 mm
Dimensions W / H / D — Spring-cage version	17.5 mm / 112 mm / 114.5 mm	17.5 mm / 112 mm / 114.5 mm

Description	Ordering data: Type	Order No.	Pcs. / Pkt.	Ordering data: Type	Order No.	Pcs. / Pkt.
Emergency stop coupling relay, for failsafe controllers, two enabling current paths**, SIL 2 according to IEC 61508**						
With screw connection	**PSR-SCP- 24DC/FSP2/2X1/1X2**	**2986575**	1			
With spring-cage connection	**PSR-SPP- 24DC/FSP2/2X1/1X2**	**2986588**	1			
Emergency stop coupling relay, for failsafe controllers, two enabling current paths, **SIL 3 according to IEC 61508**						
With screw connection				**PSR-SCP- 24DC/FSP/2X1/1X2**	**2986960**	1
With spring-cage connection				**PSR-SPP- 24DC/FSP/2X1/1X2**	**2986957**	1

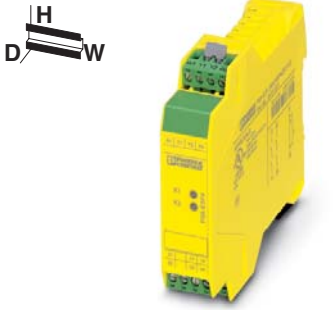
Emergency stop coupling relay for failsafe controllers in the process industry

- Single and two-channel control
- Manual and automatic activation
- Max. 3 enabling current paths
- With wide-range input (PSR-ESAM4/3X1)
- With switch-on current reduction, thus suitable for connecting to failsafe controllers (PSR-ESP4)
- Up to Cat. 4/PL e according to ISO 13849-1, SILCL 3 according to IEC 62061, SIL 3 according to IEC 61508

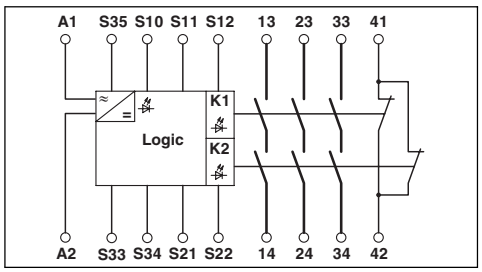
Notes:
Additional products for SIL applications can be found on page 12.
Connection examples are given starting on page 41.

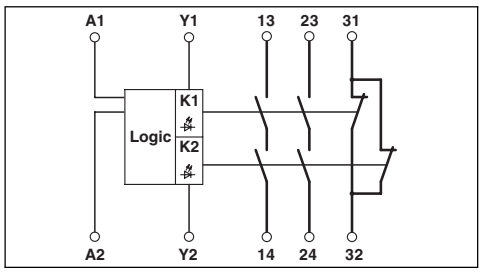


Wide-range input (24 - 230 V), manually monitored with automatic activation



24 V DC, manual and automatic activation





	Technical data	Technical data
Input data		
Nominal input voltage U_N	-	24 V DC
Nominal input voltage range	24 V AC/DC ... 230 V AC/DC	-
Permissible range (with reference to U_N)	0.85 ... 1.1	0.85 ... 1.1
Typ. current consumption (with reference to U_N)	120 mA (at 24 V DC) / 15 mA (for 230 V AC)	50 mA DC
Typ. response time (K1, K2) at U_N	60 ms (manual start) / 250 ms (automatic start)	60 ms (automatic/manual start)
Typ. release time (K1, K2) at U_N	20 ms (single-channel)	20 ms
Recovery time	1 s	Approx. 1 s
Output data		
Contact type	3 enabling current paths, 1 signaling current path	2 enabling current paths, 1 signaling current path (type B according to EN 50205)
Contact material	$AgSnO_2$	$AgSnO_2$, gold-flashed
Max. / min. switching voltage	250 V AC/DC / 15 V AC/DC	250 V AC/DC / 10 V
Limiting continuous current	6 A	6 A (N/O contact/N/C contact, high demand), 4 A (N/O contact/N/C contact, low demand)
Max. / min. inrush current	6 A / 25 mA	6 A / 10 mA
Min. switching power	0.4 W	0.2 W
Switching capacity (360/h cycles)	24 V DC 4 A; 230 V AC 4 A	24 V DC 5 A; 230 V AC 5 A
Switching capacity (3600/h cycles)	24 V (DC 13) 2.5 A; 230 V (AC 15) 3 A	24 V (DC 13) 5 A; 230 V (AC 15) 5 A
Short-circuit protection of the output circuits	6 A fast blow, C6 (24 V AC/DC) automatic device	6 A gL/gG NEOZED (high demand), 4 A gL/gG NEOZED (low demand)
General data		
Ambient temperature range	-20°C ... 55°C	-20°C ... 55°C
Air and creepage distances between the circuits	DIN EN 50178 / VDE 0160	DIN EN 50178 / VDE 0160
Rated surge voltage / insulation	4 kV / basic insulation (safe isolation, increased isolation, and 6 kV between the input circuit and the enabling current paths **(13-14, 23-24, 33-34)** and between **13-14, 23-24, 33-34** themselves)	6 kV / safe isolation, increased insulation
Screw connection solid / stranded / AWG	0.2 - 2.5 mm^2 / 0.2 - 2.5 mm^2 / 24 - 12	0.2 - 2.5 mm^2 / 0.2 - 2.5 mm^2 / 24 - 12
Spring-cage connection solid / stranded / AWG	0.2 - 1.5 mm^2 / 0.2 - 1.5 mm^2 / 24 - 16	0.2 - 1.5 mm^2 / 0.2 - 1.5 mm^2 / 24 - 16
Dimensions W / H / D — Screw version	45 mm / 99 mm / 114.5 mm	22.5 mm / 99 mm / 114.5 mm
Dimensions W / H / D — Spring-cage version	45 mm / 112 mm / 114.5 mm	22.5 mm / 112 mm / 114.5 mm

	Ordering data			Ordering data		
Description	Type	Order No.	Pcs. / Pkt.	Type	Order No.	Pcs. / Pkt.
Emergency stop and safety door monitoring, one and two-channel, with/without cross-circuit detection, activation: manually monitored and automatic						
With screw connection	**PSR-SCP-24-230UC/ESAM4/3X1/1X2**	**2981114**	1			
With spring-cage connection	**PSR-SPP-24-230UC/ESAM4/3X1/1X2**	**2981127**	1			
Process technology, emergency stop and safety door monitoring, one-channel, activation: manual and automatic						
With screw connection				**PSR-SCP- 24DC/ESP4/2X1/1X2**	**2981020**	1
With spring-cage connection				**PSR-SPP- 24DC/ESP4/2X1/1X2**	**2981017**	1

Safety Services
Benefit from experts

We can support you every step of the way during the entire machine safety cycle for your application. We can even carry out a separate process analysis at your site.

Simply relax and learn to rely on the know-how of our safety experts!

Benefit from:
- Time savings
- Maximum legal certainty
- The optimum technical safety solution for you
- Sophisticated process management
- Target-oriented project management
- Consistent documentation

Advice

We can provide you with fundamental insights into safety technology, work with you to devise the right approach or work intensively alongside your design experts in-house.

Engineering

Our safety experts will be happy to help you implement all the safety-related requirements associated with your application.

Our Safety Services are based on the individual phases of the machine safety cycle as specified in IEC 61508:

Phase 0 - Risk assessment
Phase 1 - Safety planning
Phase 2 - Specification
Phase 3 - Validation planning
Phase 4 - Implementation
Phase 5 - Verification
Phase 6 - Code simulation
Phase 7 - Validation

Service

If queries arise during startup and operation, you can contact our specialists at any time via our safety hotline. They will be happy to answer general queries regarding the functionality of individual components or to assist you with an actual process.
- 24-hour safety hotline
  (+ 49 5281 9-462777)
- E-mail:
  safety-service@phoenixcontact.com
- On-site service
- Startup support

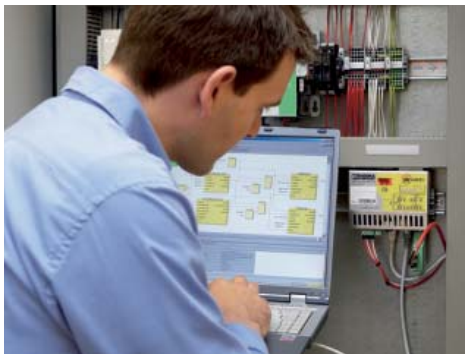
Training

As well as being dependent on the components used, safety is also heavily influenced by the employees involved. Our seminars provide a starting point for dealing with this issue:
- Evening seminar on machine safety
- Detailed daytime seminars on machine safety

The standard training program covers the following topics:
- Safety technology basics
- Functional safety EN 13849-1
- Functional safety workshop EN 13849-1
- SISTEMA user course
- Machinery Directive
- PROFIsafe system course
- PROFIsafe diagnostics
- INTERBUS safety system course
- INTERBUS safety diagnostics

By offering you custom-made training tailored precisely to your needs, we can impart the specific knowledge you need for your safety environment.

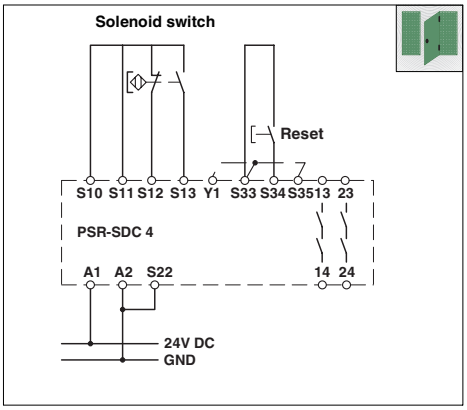
Many of our services are available worldwide. For further information, please contact your local sales company (contact details can be found on the back page of this catalog).



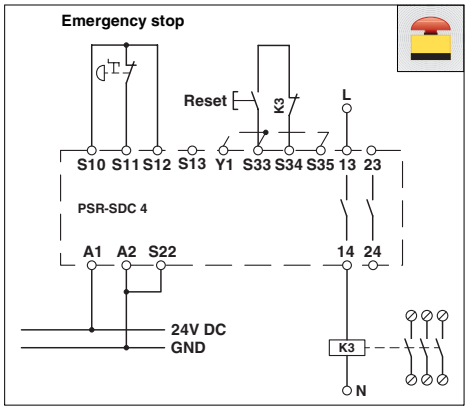
Further information concerning our Safety Services can be found on the Phoenix Contact homepage.

PSR-SDC4

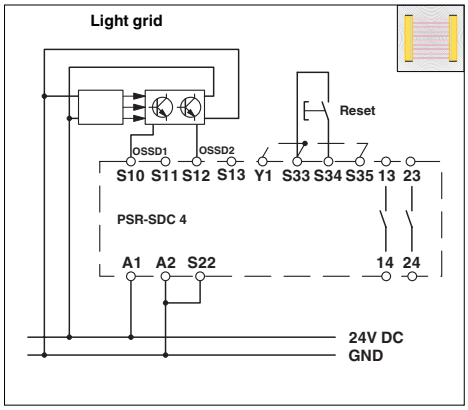
Safety door monitoring with keyed solenoid switch (monitored reset button at S33/S34: manual activation, bridge at Y1-S33-S35: automatic activation).



Single-channel emergency stop circuit with monitored contact extension (monitored reset button at S33/S34: manual activation, bridge at Y1-S33-S35: automatic activation).

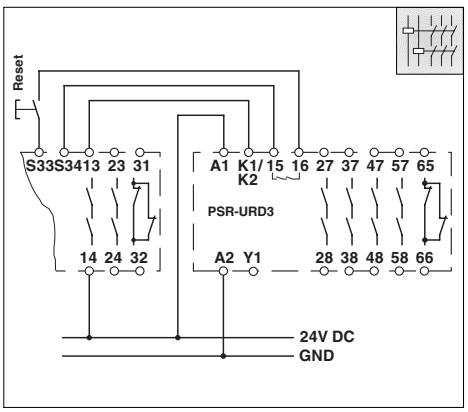


Two-channel light grid monitoring with cross-circuit detection (monitored reset button at S33/S34: manual activation, bridge at Y1-S33-S35: automatic activation).

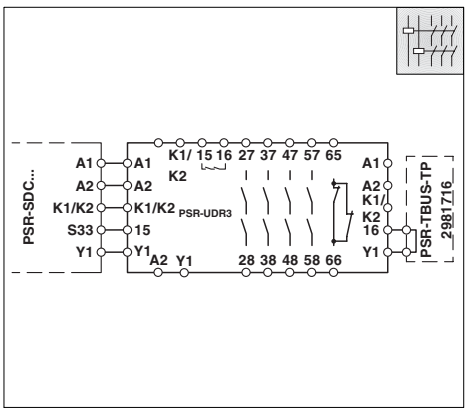


PSR-URD3

Single-channel connection with confirmation current path 15-16 integrated into the basic device. Wiring via connection terminal blocks.

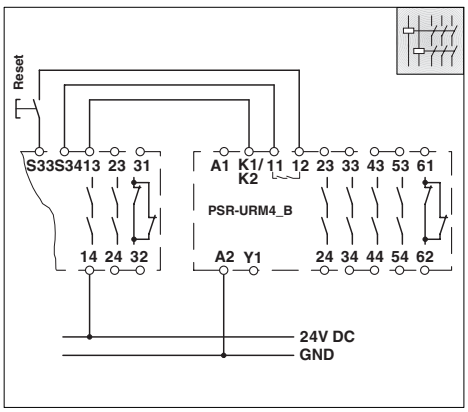


Single-channel connection with confirmation current path 15-16 integrated into the basic device. Wiring via TBUS DIN rail connector.



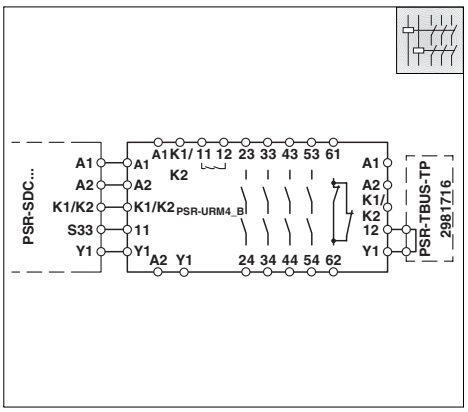
PSR-URM4/B

Single-channel connection with confirmation current path 11-12 integrated into the basic device. Wiring via connection terminal blocks.



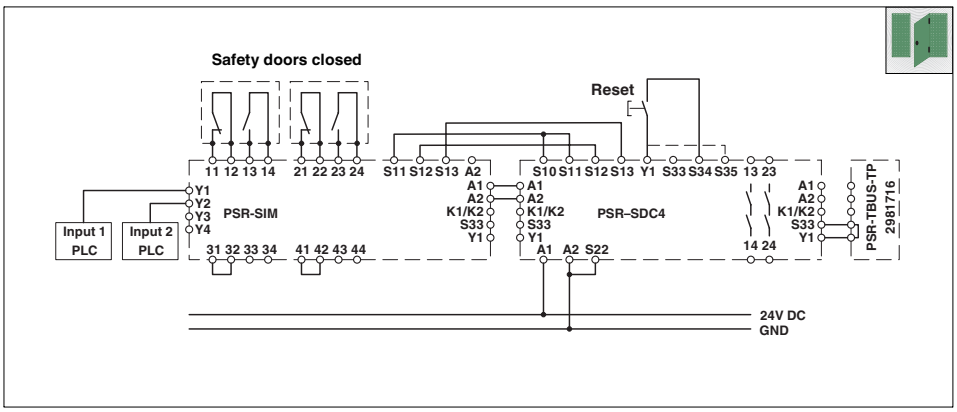
PSR-URM4/B

Single-channel connection with confirmation current path 11-12 integrated into the basic device. Wiring via TBUS DIN rail connector.



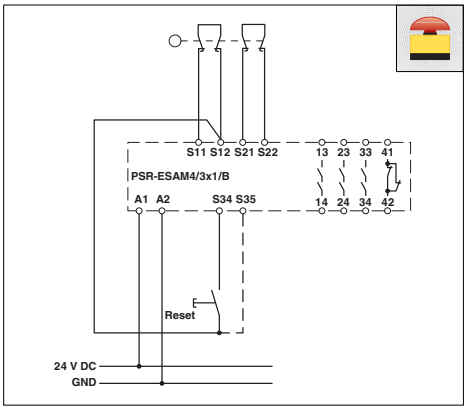
PSR-SIM4

Two-channel safety door monitoring without cross-circuit detection, with manual activation (bridge S35-Y1: automatic activation). The safety doors are depicted closed and the states of the safety switches are connected to PLC inputs to facilitate visualization. The PSR-SDC4 safety relay (depicted here as a stand-alone version) can be extended using the PSR-URM4/B and PSR-URD3 modules.

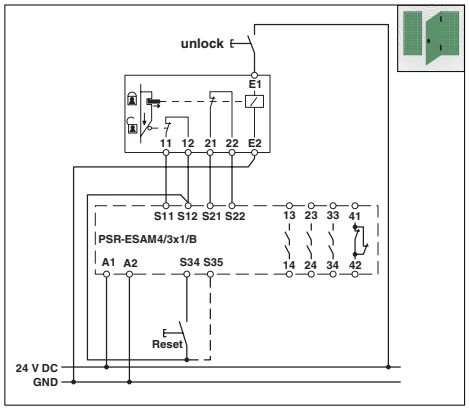


PSR-ESAM4/2X1, PSR-ESAM4/3X1_B

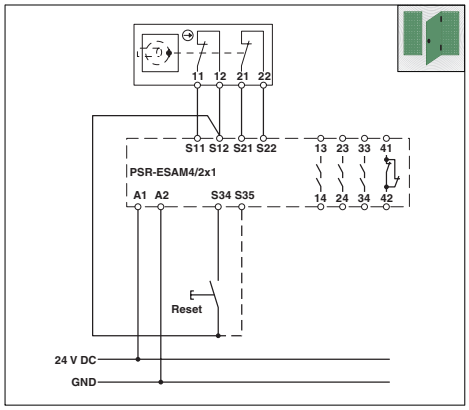
Two-channel monitoring of a cable-operated switch, manual activation with monitored reset button.



Two-channel monitoring of a safety switch with guard locking, manual activation with monitored reset button.

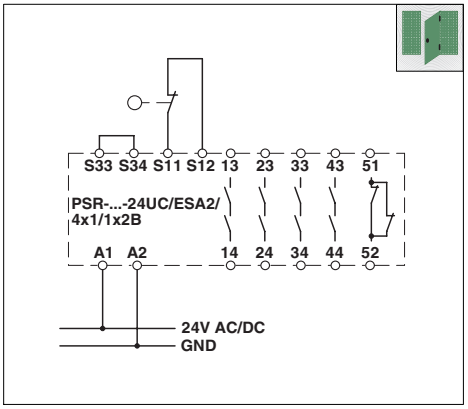


Two-channel monitoring of a safety hinge switch, manual activation with monitored reset button.

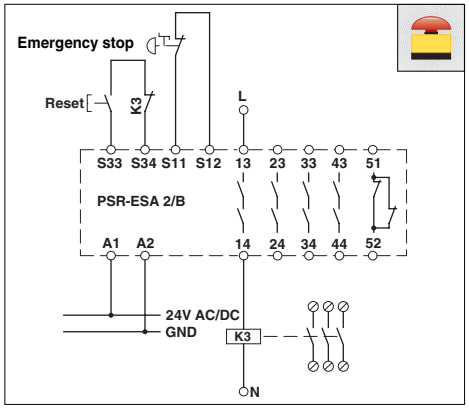


PSR-ESA2_B

Single-channel safety door monitoring with automatic activation.



Single-channel emergency stop circuit with manual activation and monitored contact extension.



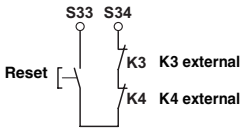
Explanations:

≙ open

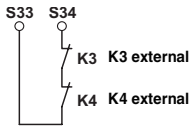
≙ closed

Integration of contact extension

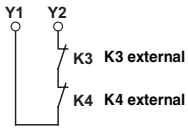
- **With reset button**



- **Automatic start**

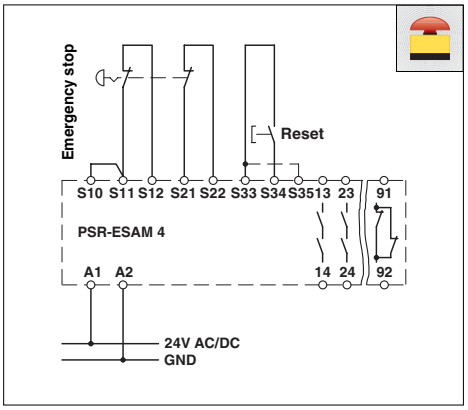


- Automatic start with PSR-ESD-300, PSR-ESP 4, PSR-THC 4 (see following page)

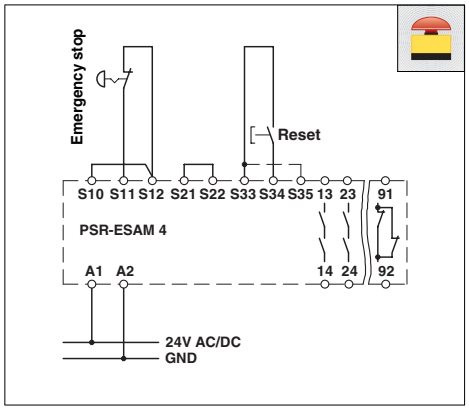


PSR-ESAM4/8X1

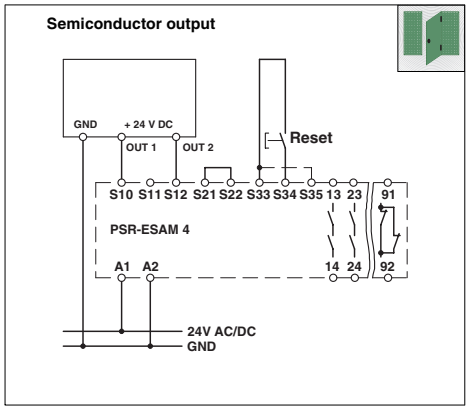
Two-channel emergency stop circuit with cross-circuit detection and monitored reset button (bridge at S33/S35: automatic activation).



Single-channel emergency stop circuit with monitored reset button (bridge at S33/S35: automatic activation).

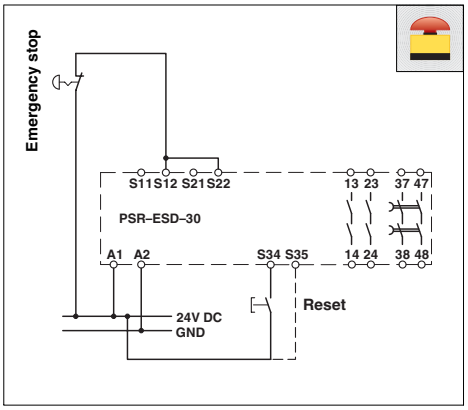


Two-channel limit switch monitoring with semiconductor output and monitored reset button (bridge at S33/S35: automatic activation).

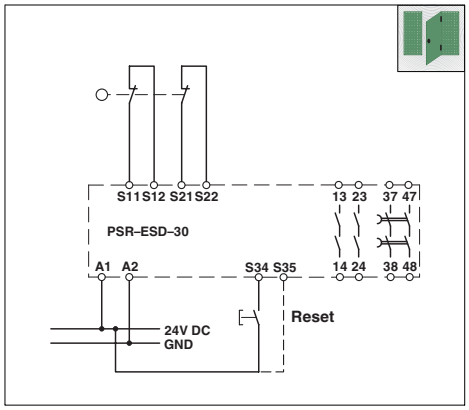


PSR-ESD-30

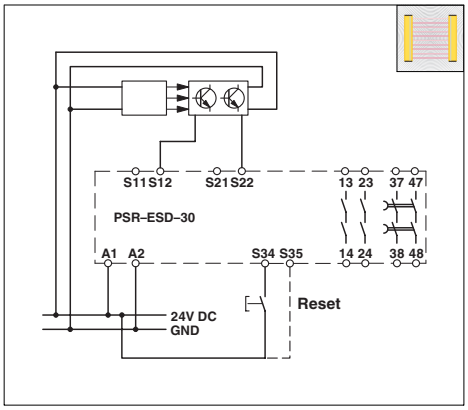
Single-channel emergency stop circuit with monitored reset button (bridge S35-A1: automatic activation).



Two-channel safety door monitoring without cross-circuit detection, with monitored reset button (bridge S35-A1: automatic activation).

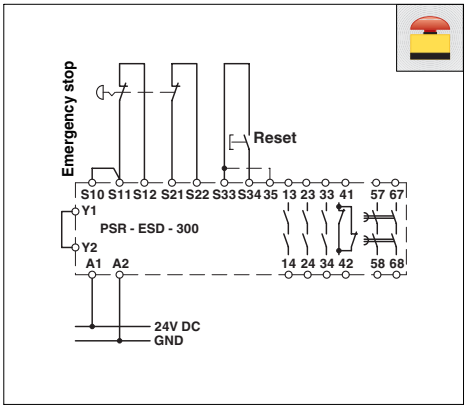


Two-channel light grid monitoring (cross-circuit detection via light grid) with monitored reset button (bridge S35-A1: automatic activation).

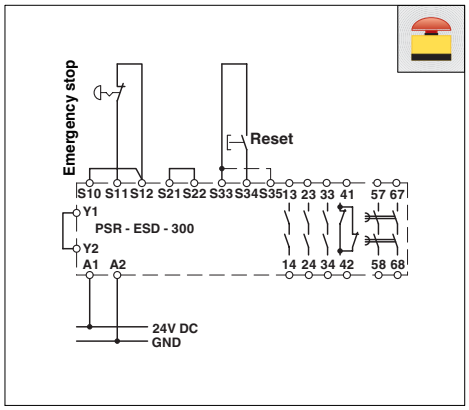


PSR-ESD-T, PSR-ESD-300

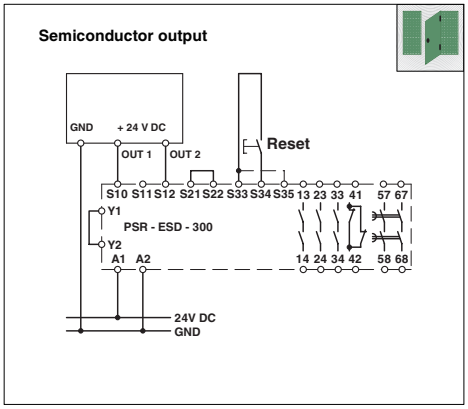
Two-channel emergency stop circuit with cross-circuit detection and monitored reset button (bridge at S33/S35: automatic activation).



Single-channel emergency stop circuit with monitored reset button (bridge at S33/S35: automatic activation).

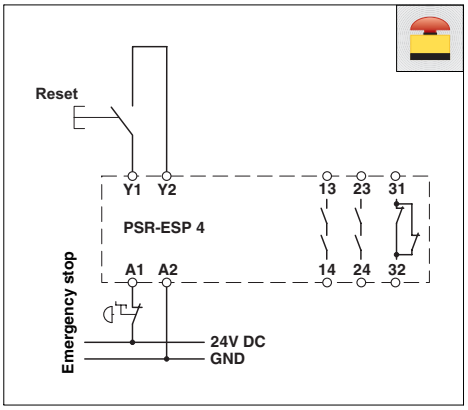


Two-channel limit switch monitoring with semiconductor output and monitored reset button (bridge at S33/S35: automatic activation).

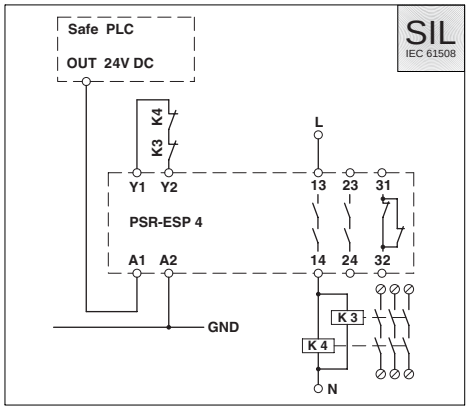


PSR-ESP4

Single-channel emergency stop circuit with manual activation.

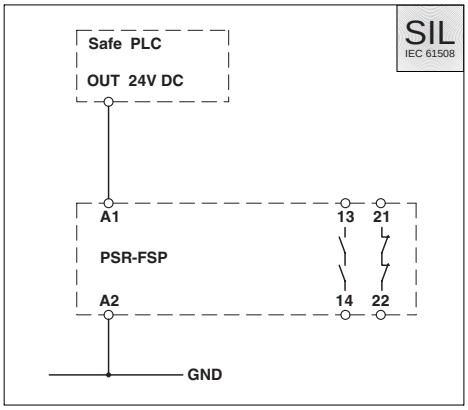


Single-channel evaluation of a safety controller with automatic activation and monitored contact extension, suitable for applications up to SIL 3.



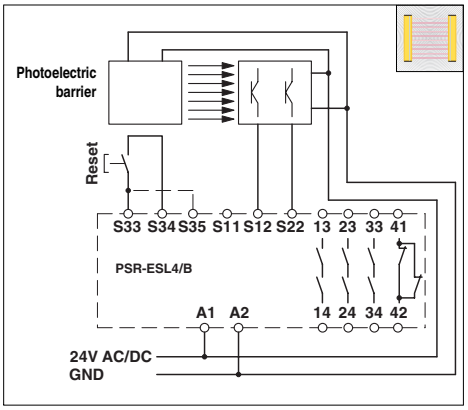
PSR-FSP

Single-channel control by means of a safety controller, suitable for applications up to SIL 3 (low demand mode).

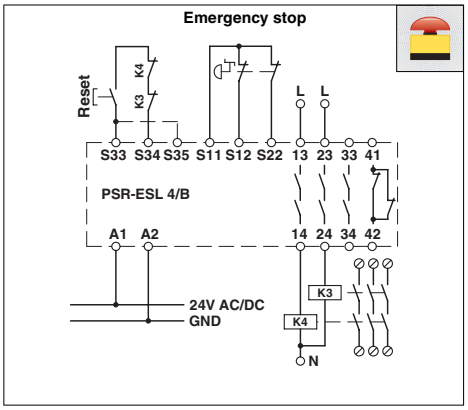


PSR-ESL4_B

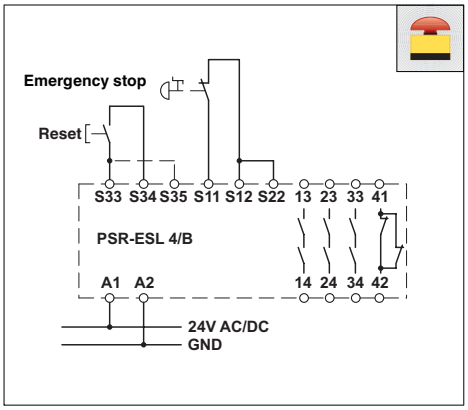
Two-channel photoelectric barrier monitoring with cross-circuit detection and manual activation (automatic activation: bridge at S33/S35).



Two-channel emergency stop circuit with manual activation and monitored contact extension (automatic activation: bridge at S33/S35).

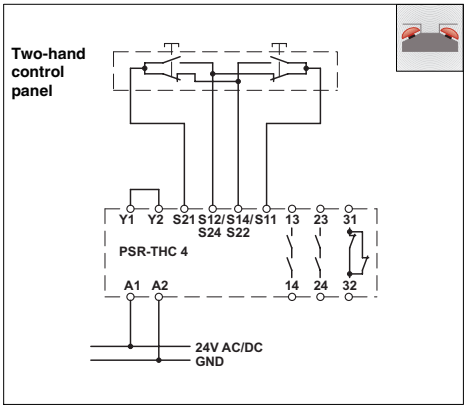


Single-channel emergency stop circuit with manual activation (automatic activation: bridge at S33/S35).

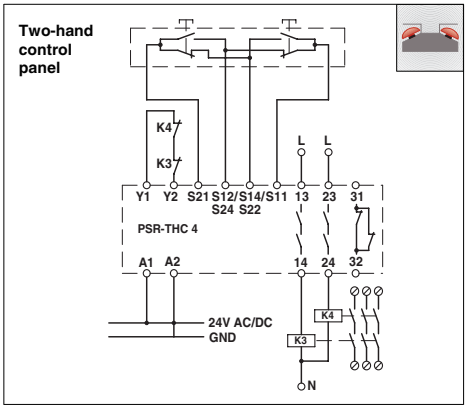


PSR-THC4

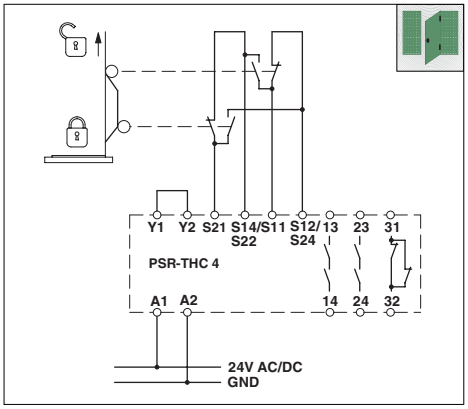
Two-hand control device with equality monitoring < 0.5 s, corresponds to EN 574 type IIIC.



Two-hand control device with equality monitoring < 0.5 s and monitored contact extension, corresponds to EN 574 type IIIC.

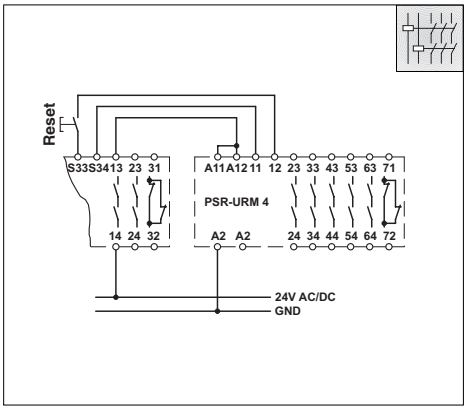


Monitoring of controlling, isolating safety equipment according to EN 1088 with equality monitoring < 0.5 s.

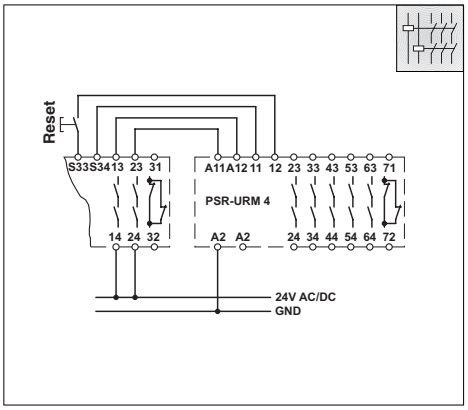


PSR-URM4, PSR-URM4_B

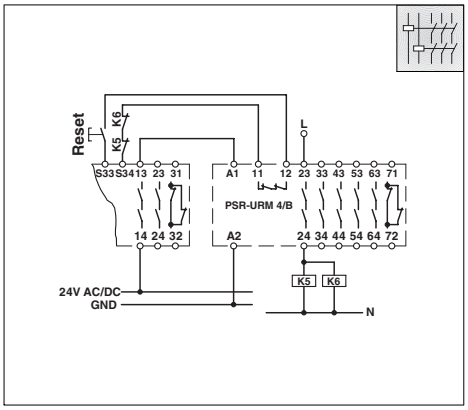
Single-channel connection with confirmation current path 11/12 integrated into the basic device.



Two-channel connection with confirmation current path 11/12 integrated into the basic device.

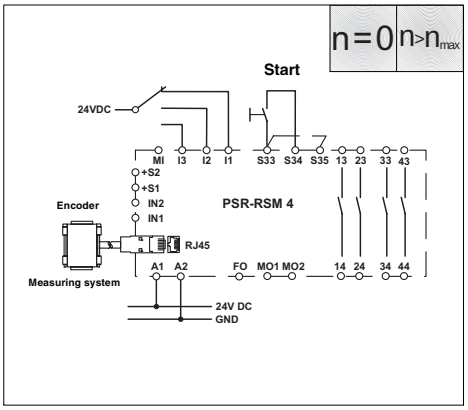


Single-channel connection with confirmation current path 11/12 integrated into the basic device. With externally monitored contacts.

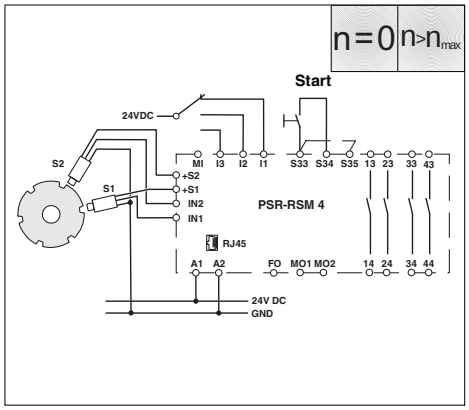


PSR-RSM4

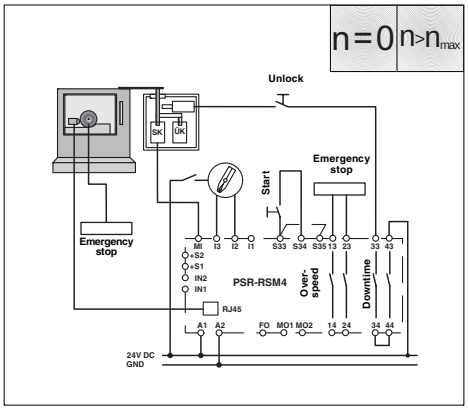
Speed and downtime monitoring via encoder. Manual activation with start button at S33/S34 (bridge S33/S35: automatic activation).



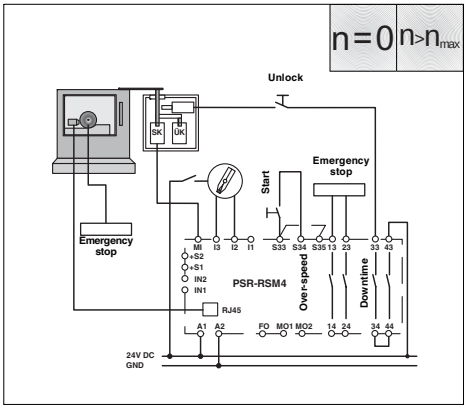
Two-channel speed and downtime monitoring with two PNP or two-wire proximity switches. Manual activation with start button at S33/S34 (bridge S33/S35: automatic activation).



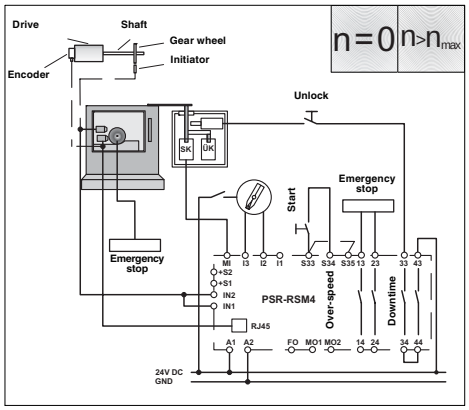
Speed monitoring for a single machine with a drive and an item of isolating safety equipment. Manual activation with start button at S33/S34 (bridge S33/S35: automatic activation).



Speed monitoring for a single machine with a monitored drive, an item of isolating safety equipment, an enable switch, and a mode selector switch.

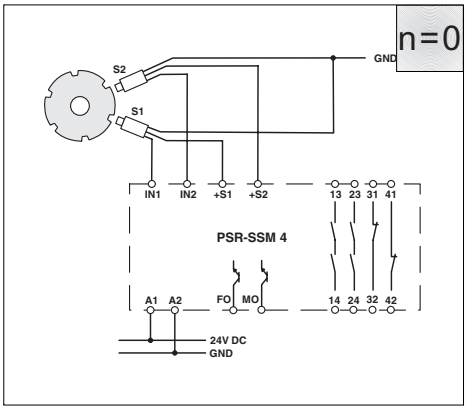


Speed monitoring for a single machine with a monitored drive and monitoring of the drive shaft.



PSR-SSM

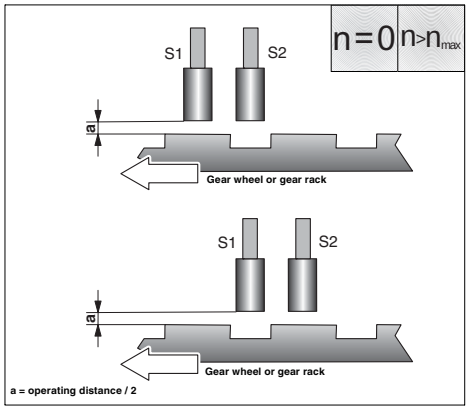
Two-channel downtime monitoring with two PNP or two-wire proximity switches.



PSR-SSM and RSM

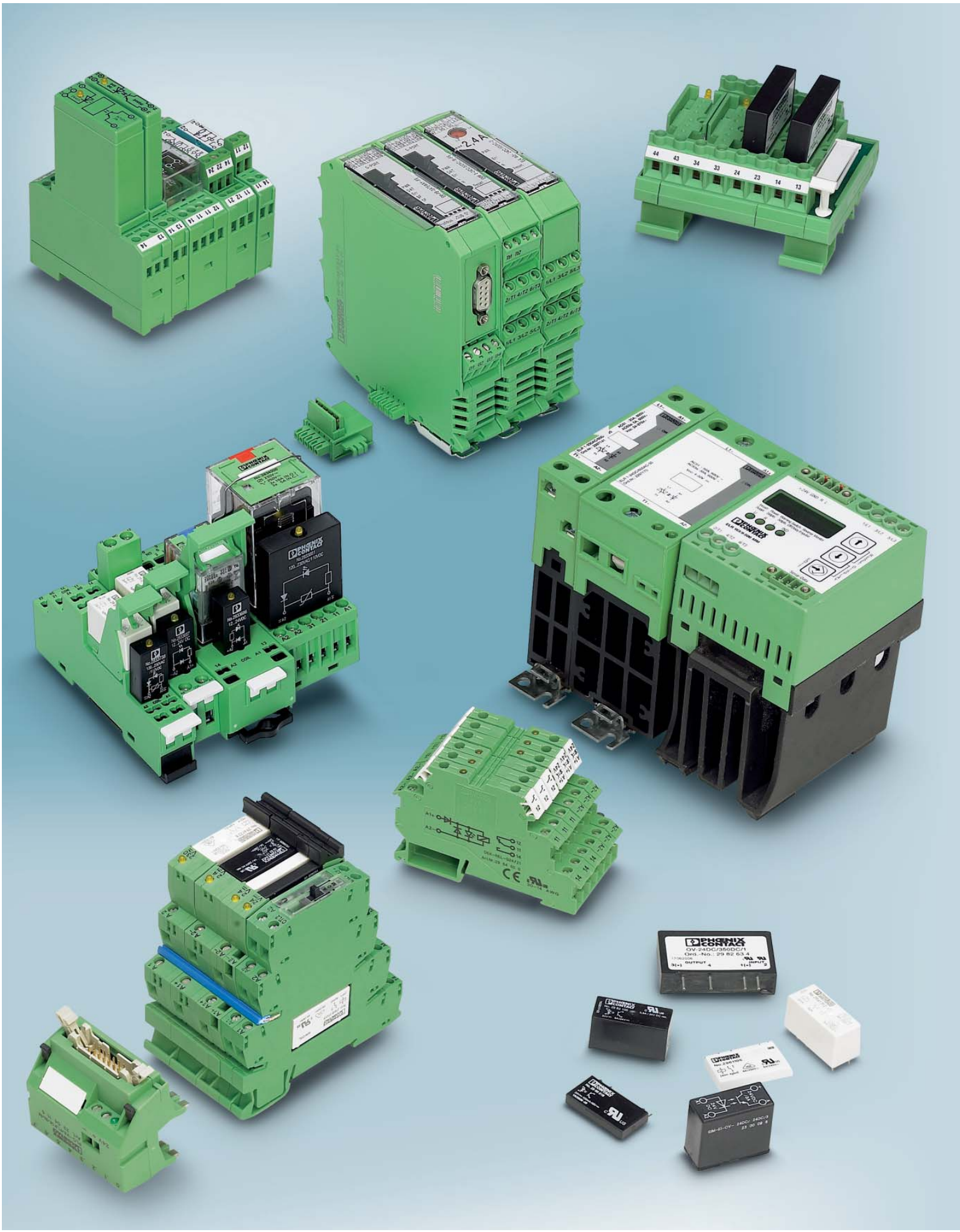
Connection of initiators to PSR-SSM and PSR-RSM.

Mounting of proximity switches.



Requirements of a gear wheel or a gear rack
The design of the gear wheel or the gear rack is an important factor for safe operation. The gear wheel area must always be bigger than the gap between the teeth. This ensures that at least one proximity switch is actuated. For details of proximity switch design, see figure.

Tooth > tooth gap
Tooth > switch diameter
Gap depth > switch operating distance
a ≤ switch operating distance / 2



INTERFACE Relay

Relays, solid-state relays, and power electronics

As the use of electronic modules continues to become more widespread, it is becoming increasingly important for industrial automation equipment to offer the requisite reliability.

In this context, modern relay/solid-state relay interfaces are responsible for performing a wide variety of tasks. Whether at the level of production technology, electrical equipment for machines or the control and instrumentation technology used for energy distribution, building automation, and process engineering, it always comes down to ensuring that signals are exchanged correctly between the process I/O devices and the higher-level central control and management systems with the assurance of operational reliability, zero potential, and unambiguous electrical relationships. Safe electrical interface blocks capable of meeting the requirements of modern system concepts must offer various performance features. These include:

- Coupling of different signal levels
- Safe electrical isolation between input and output
- High level of interference immunity

In practice, people opt for a relay interface whenever they need a flexible interface configuration with a wide switching capacity range and the option to combine various different types of contact. Other key features of relay interfaces:

- Electrical isolation between open contacts
- Switching of independent switching current types
- High short-term overload resistance in the event of a short circuit or voltage peaks
- Practically impervious to electromagnetic fields
- Easy handling

Solid-state relay modules are used when the following demands are placed on an interface between the process I/O devices and the electronics:

- Low control power
- High switching frequencies
- Wear-free switching with no contact bounce
- Resistance to vibration and impacts
- Long service life

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Product overview

PR series

Description	**PR1** for miniature or solid-state relays	**PR2** for industrial relays	**PR3** for octal relays	Accessories
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Page				

DEK series

Description	With miniature relays	With solid-state relays	Actuator series with miniature relays	Sensor series with miniature relays
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Special relay and solid-state relay modules

Description	Relay terminal blocks with switch	Interference-free relays and solid-state relays	Relays for switching lamp loads	Solid-state power relays with 400 V AC/400 V AC / 3 A output
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CONTACTRON power electronics

Description	Electronic motor management	PROFIBUS gateway for IFS	Electronic reversing load relay with motor management	3-phase hybrid motor starters
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PLC series

With relay/solid-state relay

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As sensor/actuator version

86

For high inrush/continuous currents

92

Resistant to interference currents/voltages

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General

Electromechanical relays are used as interface modules between the process I/O devices, on the one hand, and the open-loop/closed-loop control and signaling equipment, on the other, for level and power adjustment purposes.

Essentially, electromechanical relays can be divided into two main groups: monostable and bistable relays.

With monostable DC or AC relays, the contacts automatically return to the release state when the excitation current is switched off.

In the case of bistable relays, the contacts remain in their present switch position when the excitation current is switched off.

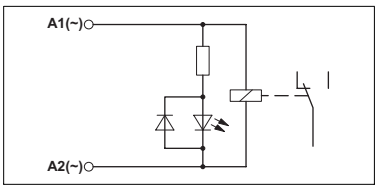
Coil side

Input circuits and voltage types

There are various kinds of input circuit depending on the type of relay used and the nature of the control voltage.

If pure AC relays are used (AC input), the input circuit is generally nothing more than a visual switching status indicator.

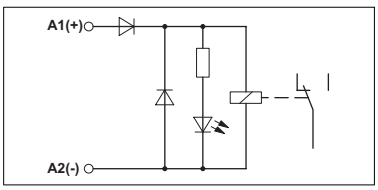
Unless otherwise specified, the frequency of the control voltage is 50/60 Hz.



Block diagram of relay with AC input

In the case of a pure DC input, the most important addition to the circuit is a free-wheeling diode. This limits the voltages induced on the coil on circuit interruption to a value of approximately 0.7 V, which does not pose a danger to any connected control electronics.

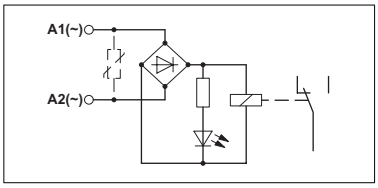
As the free-wheeling diode can only perform its required function if the polarity of the voltage connection is correct, a reverse polarity protection diode is also integrated into the input circuit.



Block diagram of relay with DC input

To allow DC or AC voltage operation, a bridge rectifier is connected in the input circuit. The diodes are simultaneously responsible for performing rectification, freewheeling and polarity reversal protection functions. The interrupting voltage of the coil is limited to approximately 1.4 V.

To protect the input circuit against overvoltages, a varistor is also connected (depending on the type) upstream of the bridge rectifier.

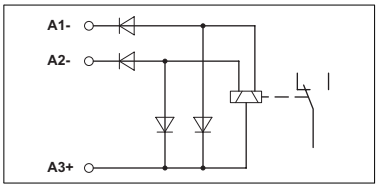


Block diagram of relay with AC/DC input

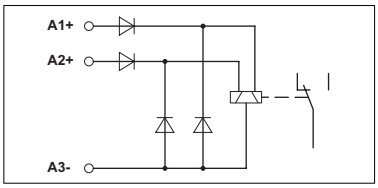
Bistable remanence relays with a double winding are only ever operated with DC voltage.

With these types of relay, there are three coil connections on the coil side. In addition to the common connection, there are separate connections for "setting" and "resetting"; these are controlled by short pulses only. As a result, the relays hardly heat up at all. Simultaneous control of both control inputs is not permitted.

A distinction is made between negative switching (M) and positive switching (P) types, depending on the polarity of the freewheeling and reverse polarity protection diodes.



Block diagram of a bistable relay, negative switching type



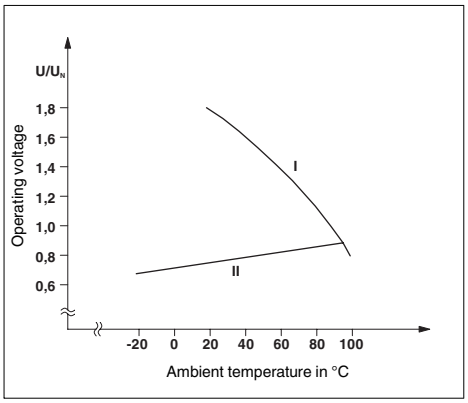
Block diagram of bistable relay, positive switching type

Operating voltage range

The ambient temperature prevailing at the location of use has a major impact on certain relay operating parameters.

As the ambient temperature increases, the coil winding heats up, causing the response and release voltages to rise. At the same time, the maximum permissible coil voltage decreases, which means that the usable working range becomes restricted as a result.

The diagram below illustrates how the operating voltage behaves as a function of the ambient temperature.



Sketch of a relay operating voltage characteristic

I: Maximum permissible voltage with 100% operating time (OT) and assuming compliance with the coil temperature limit

II: Minimum operating voltage

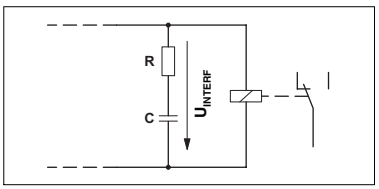
Interference voltages and interference currents on the coil side

When inductive or capacitive interference voltages are coupled into the long supply conductors of a relay, this can prevent the relay from operating safely and reliably.

If the coupled-in voltage exceeds the release voltage demanded by the IEC 61810-1 "relay standard", in extreme cases the relay may fail to release. In the case of DC relays, this release voltage is $\geq 0.05 \times U_N$; with AC relays, it is $\geq 0.15 \times U_N$.

The same disturbances can occur when a relay with a low input power is controlled by an electronics module with an AC output featuring an RC circuit. The typical leakage current from RC elements of this kind (generally in the region of several mA) provides sufficient control power to prevent the downstream relay from releasing or even enough power to excite it.

The disturbance level of any interference voltages that are present can be reduced by connecting an RC element in parallel with the relay coil. This measure also subjects the interference voltage to a capacitive load, causing it to collapse.



External RC interference suppression filter to prevent interference voltage coupling

The following values are recommended for the purpose of dimensioning the RC element:
– R = 100 ... 220 Ω
– C = 220 ... 470 nF

The SO46 series have been developed to provide even higher levels of immunity to interference. These products already contain an integrated RCZ filter. See, for example, PLC...SO46.

Contact side, contact materials

Given the wide variety of potential applications in the different industrial sectors, the relays used must be matched to the various tasks that need to be performed by selecting the right kind of contact material.

The voltage, current, and power values play an important role when determining the suitability of contact materials. Other criteria include:
– Contact resistance
– Erosion resistance
– Material migration
– Welding tendency
– Chemical effects

In this way, the various contact materials (generally noble metal alloys) can be matched to the relevant areas of application.

The adjacent table provides details of some of the key materials.

Contact material	Typ. properties	Typ. applications	Guide values for the area of application*
Gold Au	Largely insensitive to industrial atmospheres; low and constant contact resistances in the range of small switching capacities with nickel (AuNi) or silver (AuAg) alloys	Dry measuring and switching circuits, control inputs	µA ... 0.2 A µV ... 30 V
Silver Ag	High electrical conductivity; sensitive to sulfur, therefore often gold-flashed (approximately 0.2 µm) as protection; nickel (AgNi) or copper (AgCu) alloys increase the mechanical resistance and erosion resistance and reduce the welding tendency.	Universal; suitable for medium loads; nickel alloys (AgNi 0.15) for DC circuits with medium to large loads	≥ 12 V ≥ 10 mA
Silver, hard gold-plated Ag+Au	Properties similar to gold Au. When switching loads > 30 V/0.2 A, the hard gold plating (5-10 µm) is destroyed and the values and properties of the Ag contact are applicable. However, a reduction in the service life is then to be expected.	Suitable for control inputs and other small loads.	≥ 100 mV ≥ 1 mA
Tungsten W	Highest melting point; very high erosion resistance; greater contact resistances; very low welding tendency; susceptible to corrosion; often used as lead contact.	Loads with very high inrush currents, e.g., glow lamps, fluorescent lamps.	≥ 60 V ≥ 1 A
Silver nickel AgNi	High erosion resistance; low welding tendency; higher contact resistances than with pure silver.	Universal; suitable for medium to high loads; DC circuits and inductive loads.	≥ 12 V ≥ 10 mA
Silver nickel AgNi+Au	Properties similar to gold Au. When switching loads > 30 V/0.2 A, the hard gold plating (5-10 µm) is destroyed and the values and properties of the AgNi contact are applicable. However, a reduction in the service life is then to be expected.	Suitable for control inputs and other small loads.	≥ 100 mV ≥ 1 mA
Silver tin oxide AgSnO	Low welding tendency; very high erosion resistance for high switching capacities; low material migration	Application depends heavily on the relay type; switching circuits with high make and break loads, e.g., glow lamps and fluorescent lamps, AC and DC circuits. Due to different alloys and production procedures, partly also suitable for smaller loads.	≥ 12 V ≥ 100 mA (≥ 10 mA)
Silver tin oxide, hard gold-plated AgSnO+Au	Properties similar to gold Au. When switching loads > 30 V/0.2 A, the hard gold plating (5-10 µm) is destroyed and the values and properties of the AgSnO contact are applicable. However, a reduction in the service life is then to be expected.	Suitable for control inputs and other small loads.	≥ 100 mV ≥ 1 mA

* Values depend on the relay used and on further operating conditions.

Contact protective circuit

Every electrical load constitutes a mixed load with ohmic, capacitive, and inductive components.

When these loads are switched, the switching contact is in turn subjected to a load, to either a lesser or greater extent. This load can be reduced by including a suitable contact protective circuit.

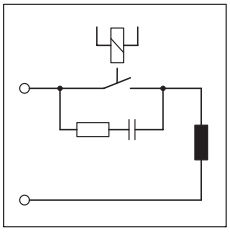
In view of the fact that loads with a large inductive component are predominantly used in practice (e.g., contactors, solenoid valves, motors, etc.), these application cases are worth considering in more detail.

On interruption, voltage peaks with values of up to several thousand volts occur due to the energy stored in the coil.

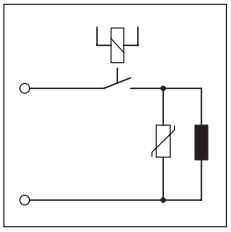
These high voltages cause an arc on the switching contact which can destroy the contact due to material vaporization and material migration. The electrical service life is reduced considerably as a result. In extreme cases, the relay may fail in the very first cycle with DC voltage and a static arc.

A protective circuit must be used to suppress the formation of an arc. With optimum dimensioning, almost the same number of cycles can be achieved as with an ohmic load.

In principle, there are a number of possible ways of achieving an effective protective circuit:
1. Contact wiring
2. Load wiring
3. Combination of both wiring methods



Contact protective circuit



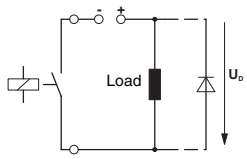
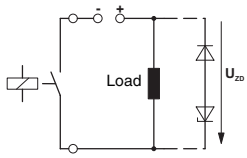
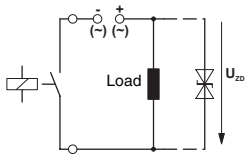
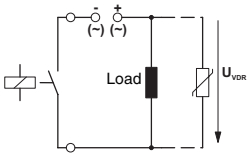
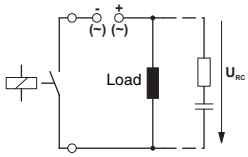
Inductive load protective circuit

In principle, a protective measure should be directly implemented at the source of the interference.

Wiring a load should therefore be given priority over wiring the contact.

The following points are advantageous for the load circuit (image on right):
1. The circuit is only loaded with the induction voltage during interruption. By contrast, the sum of the operating voltage and the induction voltage is applied to the contact circuit.
2. When the contact is open, the load is electrically isolated from the operating voltage.
3. It is not possible for the load to be activated or to "stick" due to undesired operating currents, e.g., from RC elements.
4. Cut-off peaks of the load cannot be coupled into parallel control lines.

Nowadays, solenoid valves are usually connected using valve connectors that are also supplied with LEDs and components that limit the induction voltage. Valve connectors with an RC element, varistor or Z-diode often do not quench the arc and only serve to comply with the EMC laws. Only valve connectors with an integrated 1N4007 free-wheeling diode quench the arc quickly and safely, thereby increasing the service life of the relay by a factor of 5 to 10. Valve connectors with LED, integrated 1N4007, and free cable end can be supplied on request as part of the SAC range.

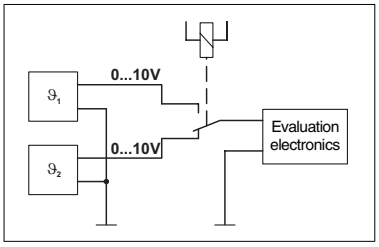
Load protective circuit	Additional off delay	Defined induction voltage limiting	Effective bipolar attenuation	Advantages/disadvantages
Diode 	Large	Yes (UD)	No	**Advantages:** • Good effect in terms of extending the service life of the contacts • Easy implementation • Cost-effective • Reliable • Dimensioning not critical • Low induction voltage **Disadvantages:** • Attenuation only via load resistor • Long off delay
Diode/Zener diode, series connection 	Medium to small	Yes (UZD)	No	**Advantages:** • Dimensioning not critical **Disadvantages:** • Attenuation only above U_{ZD} • Minimal effect in terms of extending the service life of the contacts
Suppressor diode 	Medium to small	Yes (U_{ZD})	Yes	**Advantages:** • Cost-effective • Dimensioning not critical • Limitation of positive peaks • Suitable for AC voltages **Disadvantages:** • Attenuation only above U_{ZD} • Minimal effect in terms of extending the service life of the contacts
Varistor 	Medium to small	Yes (UVDR)	Yes	**Advantages:** • High energy absorption • Dimensioning not critical • Suitable for AC voltages **Disadvantages:** • Attenuation only above U_{VDR} • Minimal effect in terms of extending the service life of the contacts
R/C combination 	Medium to small	No	Yes	**Advantages:** • HF attenuation due to energy storage • Suitable for AC voltages • Level-independent damping **Disadvantages:** • Precise dimensioning required • High starting current inrush • Minimal effect in terms of extending the service life of the contacts

Switching small loads

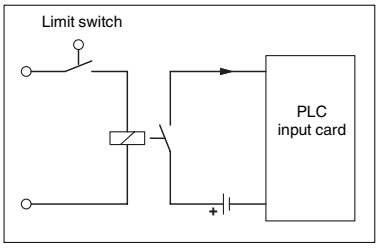
Small loads must be processed mainly in applications where signals must be forwarded to control inputs (e.g., of a PLC).

With these loads, no switching sparks (arcs) occur on the contacts in the small load range.

In addition to the constant cleaning effect due to contact friction, this switching spark assumes the function of penetrating non-conductive contamination layers that are formed on the contact surfaces of power contacts.



Application example: measurement point changeover



Application example: PLC input signal

These contamination layers are usually oxidation or sulfidation products of the contact materials silver (Ag) or silver alloys such as silver nickel (AgNi) or silver tin oxide (AgSnO). As a result, the contact resistance may rise so considerably within a short time that reliable switching is no longer possible in the case of small loads.

Due to these properties, the high-performance contact materials mentioned are not suitable for small load applications.

Gold (Au) has become accepted as the contact material of choice for these areas of application mainly on account of its low and constant contact resistances even with small loads and its insensitivity to sulfurous atmospheres.

For the smallest of loads and even greater contact reliability, double contact relays with gold contacts are used.

The slotted contact spring in this design provides two parallel contact points with even lower contact resistances and considerably higher contact reliability.

Switching large loads

A few important points also need to be considered with regard to switching processes in the large load range that involve power contacts made of either silver (Ag) or silver tin oxide (AgSnO).

A basic distinction must be made between switching DC and AC loads.

Switching large AC loads

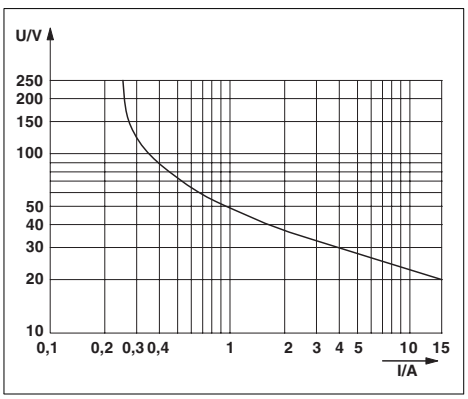
When switching large AC loads, the relay can be operated up to the corresponding maximum values for switching voltage, current, and power. The arc that occurs during interruption depends on the current, voltage, and phase angle. This cut-off arc usually disappears automatically the next time the load current crosses zero.

In applications with an inductive load, an effective protective circuit must be provided, otherwise the service life of the system will be reduced considerably.

Switching large DC loads

Conventional switching relays can only switch off relatively small direct currents (which contrasts with their ability to switch off the maximum permissible AC current), since there is no zero crossing to extinguish the arc automatically. This maximum DC value is also dependent to a large extent on the switching voltage and is determined, among other things, by constructional features such as contact spacing and contact opening speed.

The corresponding current and voltage values are documented by relay manufacturers in arc or load limit curves.



Example of a load limit curve (dependent on the type)

An unattenuated inductive DC load further reduces the values given for switchable currents. The energy stored in the inductor can cause an arc to occur, which forwards the current through the open contacts.

With an effective contact protective circuit, preferably free-wheeling diodes of the type 1N4007, the service life can be increased by a factor of 5 to 10 compared with unprotected or poorly protected inductive loads (see also chapter titled Contact protective circuits).

If higher DC loads than those documented are to be switched or if the electrical service life is to be increased, several contacts of a relay can be connected in series. See, for example, REL-IR... industrial relays.

Alternatively, solid-state relays with DC voltage output can also be used.

Switching lamps and capacitive loads

Regardless of the type of voltage, all kinds of lamps and loads with a capacitive component impose extreme requirements on the switching contacts. The moment it is switched on, in other words precisely in the dynamic chattering phase of the relay, extremely powerful current peaks occur. These are often in the region of several tens of amps, and not infrequently are known to exceed 100 A, which results in welding of the contact. This can be remedied by using specially optimized "lamp load relays" that can cope with these inrush peaks. See, for example, PLC...IC type.

Switching capacity in accordance with utilization categories AC15 and DC13 (IEC 60947)

In practice, both the maximum interrupting rating for AC loads and the DC interruption values taken from the load limit curves provide only a rough guide for the choice of relay. In reality, this is insufficient, since real loads in the vast majority of industrial applications have inductive or capacitive components and the wiring of the loads can be totally different. As already described, this sometimes leads to considerable variations in terms of service life.

The IEC 60947 contactor standard tries to avoid these disadvantages by dividing the loads into various utilization categories (DC13, AC15...). This standard is also partly applied to relays. However, users must be aware of the fact that these values are only applicable in practice to a limited extent as well, since all DC13 and AC15 test loads are highly inductive and are also operated without any protective circuit at all (see section titled Contact protective circuit). Moreover, the switching capacity test in accordance with IEC 60947 only requires 6060 cycles to be performed by way of a minimum requirement.

A much more reliable way to determine the switching capacity and the anticipated service life is to refer to the specific application data. Using a comprehensive data bank, the service life can be accurately estimated for most applications and, if necessary, suggestions for improvement can be made. In the case of critical applications, the user is advised to gather service life information based on empirical data.

Control side

Solid-state relays for various voltage and power levels are available from Phoenix Contact for use as interface modules designed to match process I/O devices to control, signaling and regulating devices. The solid-state relay element which is actually located in the module is limited to one defined voltage range by virtue of its design. The current consumption on the input side fluctuates depending on the circuit architecture and voltage level.

To accommodate all industrial voltages of between 5 V and 230 V, an input circuit is provided. The inputs for DC voltage and AC voltage must always be differentiated.

DC input

Adjustments are made in accordance with the various voltage levels by adding electronics which have been especially adapted to the desired voltage range. In the case of most modules, a polarity protection diode provides reliable protection against destruction in the event of a control voltage being connected incorrectly. Specially tuned filters reliably suppress possible high-frequency noise emissions.

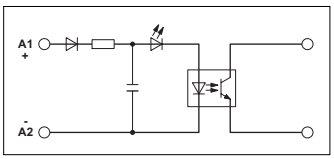


Figure 1: Block diagram DC input

AC input

The solid-state relay element requires a stable control voltage to ensure reliable operation. In the case of the AC input, this is achieved by connecting a rectifier and filter capacitor upstream. Rectifying is followed, in principle, by the same circuit architecture as the DC input.

The switching frequency always lies below half the mains frequency. Due to the filter capacitor, a higher switching frequency cannot be achieved. This would result in continuous through-switching.

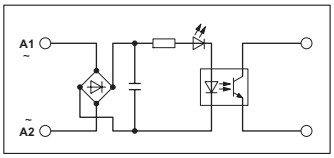


Figure 2: Block diagram AC input

Load side

Depending on the application and the type of load, the solid-state relay output must meet various requirements. The following are crucial:

– Power amplification
– Matching the switching voltage and the switching current (AC/DC), as well as
– Short-circuit protection

For these different applications, the solid-state relay element must also be processed using additional electronics on the output side.

DC output

In order to achieve the necessary output power, the solid-state relay element is supplemented by one or more semiconductor components.

The on-site user should nevertheless simply regard the connection terminal blocks of the output as conventional switch connections. Observing the specified polarity is the only essential requirement.

For practical reasons, the following criteria should be taken into account when selecting a suitable solid-state relay:

1. Operating voltage range
   (e.g., 12 ... 60 V DC)
   This determines the minimum or maximum voltage to be switched. The lower value must be observed in to ensure reliable operation. In order to protect the output transistor, the upper value must not be exceeded.
2. Maximum continuous current (e.g., 1 A)
   This value indicates the maximum continuous current. If this value is exceeded continuously, the output semiconductor will be destroyed. The dependence of the output current on the ambient temperature of the solid-state relay should also be taken into consideration. In the case of power solid state relays, a derating curve is, therefore, generally provided to show the maximum load current as a function of the ambient temperature.
3. Output circuit
   The 2-wire output is similar to a mechanical contact. Only the polarity of the connections is specified and must be observed.

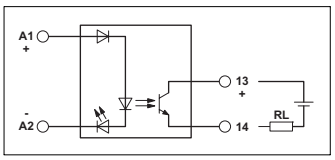


Figure 3: 2-wire output

The 3-wire output is non-isolated and requires both potentials from the power supply source on the output side to be connected if it is to operate reliably.

When switched off, a permanent reference to the ground (negative potential) is established. In addition, this output circuit offers the advantage of an almost constant internal resistance.

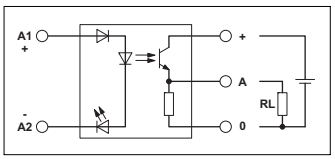


Figure 4: 3-wire output

AC output

In order to control the switching and control devices for AC voltage, a semiconductor for AC voltage (TRIAC or thyristor) is connected downstream of the solid-state relay element.

As with the DC output, it is particularly important to consider the maximum operating voltage range and the maximum continuous load current as a function of the ambient temperature.

In addition, the maximum peak reverse voltage of the TRIAC (e.g., 600 V) is crucial with AC outputs. This must not be exceeded even in the case of voltage fluctuations or interference voltage peaks in order to prevent destruction. That is why the AC outputs of all solid-state relays from Phoenix Contact have an internal RC protective circuit to protect against interference voltage peaks.

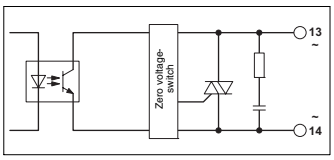


Figure 5: Basic circuit diagram of AC output

Protective circuits

The moment inductive loads (contactors, solenoid valves, motors) are switched off, surge voltages occur and these can reach very high amplitudes. Electronic components and switching elements are particularly susceptible to these. A protective circuit should therefore always be provided to prevent destruction.

A parallel connection to the load effectively reduces the switching surge voltage to a harmless level. Depending upon the solid-state relay output and type of load,

- a free-wheeling diode/suppressor diode (DC only),
- varistor (AC and DC) or
- RC element (AC only)

can provide the necessary protection.

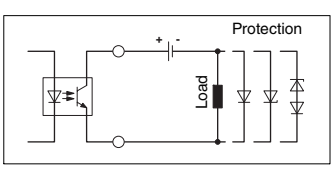


Figure 6: Protective circuit with DC voltage output

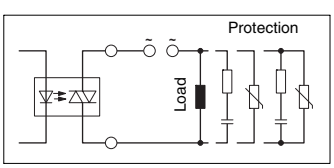


Figure 7: Protective circuit with AC voltage output

Application notes

Input solid-state relays acting in the direction from the I/O devices to the controller (signaling, controlling, monitoring)

Plug-in version:
- PLC-O...

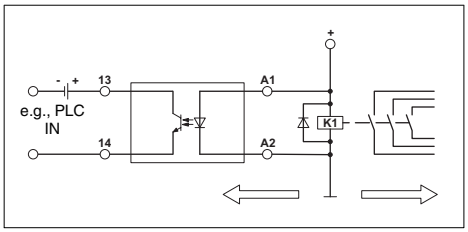
Modular version:
- DEK-OE...
- EMG 10-OE...
- SIM-EI...
- OPT...

Output (power) solid-state relays acting in the direction from the controller to the I/O devices (switching, amplifying, controlling)

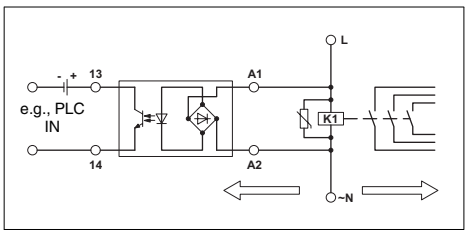
Plug-in version:
- PLC-O...

- Modular version:
- DEK-OV...
- EMG 10-OV
- EMG 12-OV
- EMG 17-OV
- OV...
- OPT...

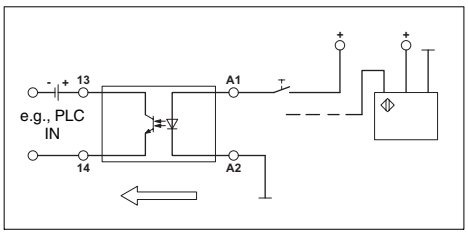
Example: Load contactor monitoring (DC contactor)



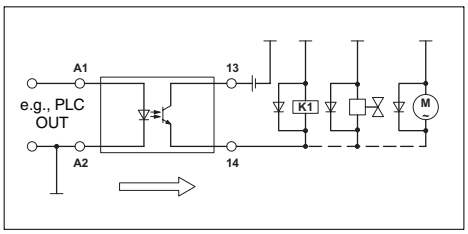
Example: Load contactor monitoring (AC contactor)



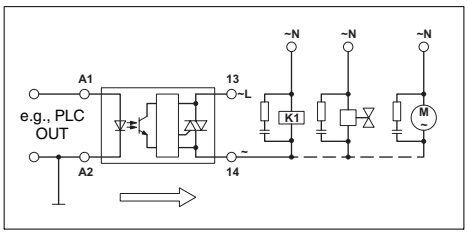
Example: Position indication with limit stop contact or initiator



Example: Switching the contactor, solenoid valve or motor (DC load)

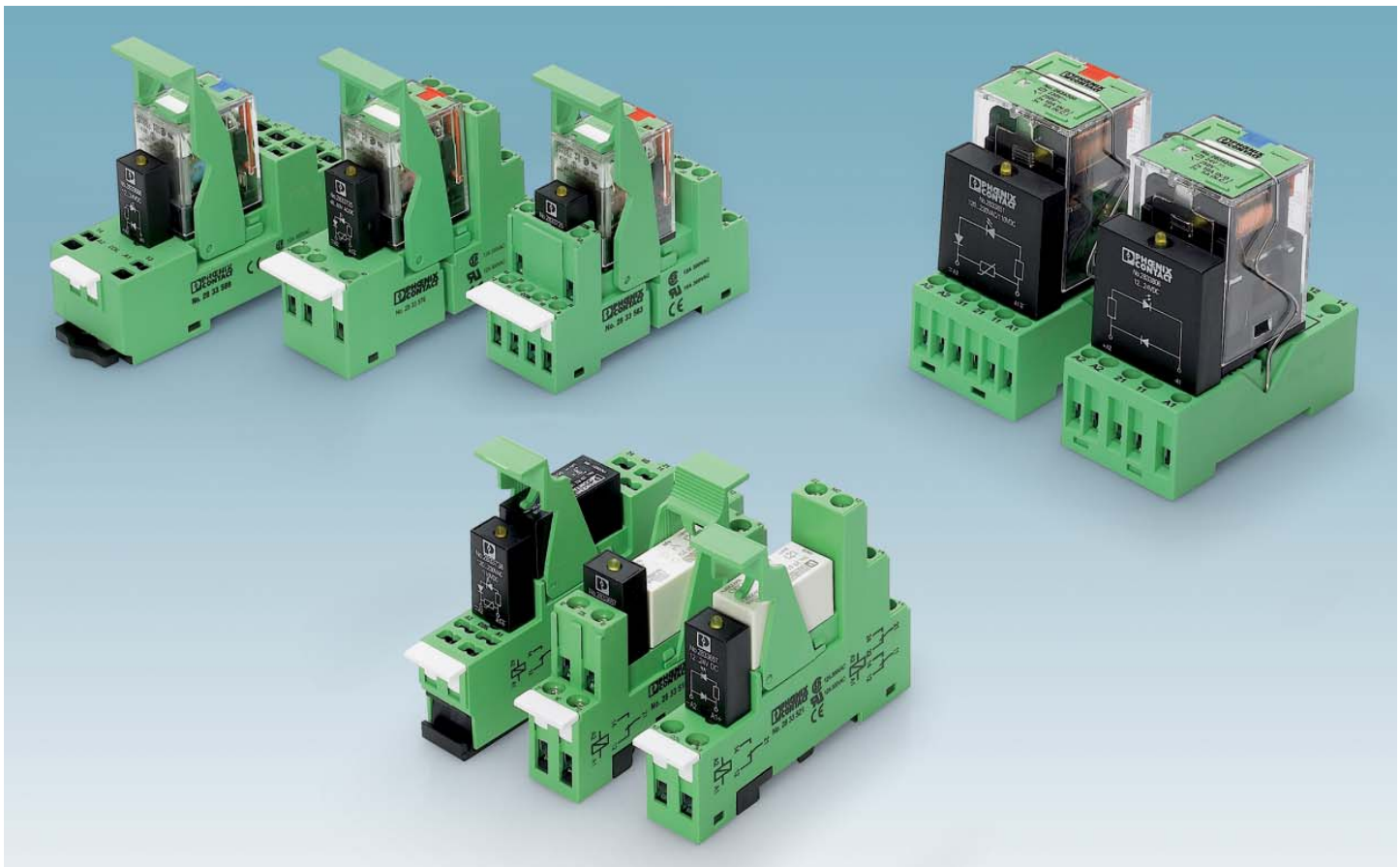


Example: Switching the contactor, solenoid valve or motor (AC load)



Remarks:

[1]) Ground (minus) potential from the input and output of the solid-state relay should not be connected.
[2]) DC loads must be provided with an effective protective circuit (e. g., diode).
[3]) AC loads must be protected with a varistor or an RC element.

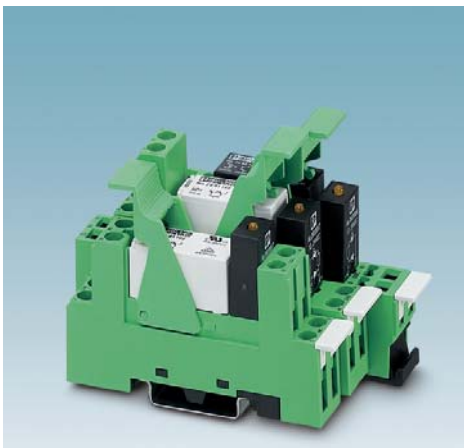


The PR series is an attractively priced modular relay system, comprising DIN rail bases, relays, plug-in input/interference suppression modules, engagement levers, and the matching marking labels and universal bridging materials for all bases. The modules are largely compatible with the usual standards on the market, have the major international approvals, and are, therefore, accepted worldwide.

Besides the familiar relay bases with the screw connection method, relay bases with the spring-cage connection method for miniature power relays with one or two PDT contacts and for industrial relays with two or four PDT contacts are also available as part of the PR series. The connections in these bases are configured with double spring cages for free, simple bridging of all potentials.

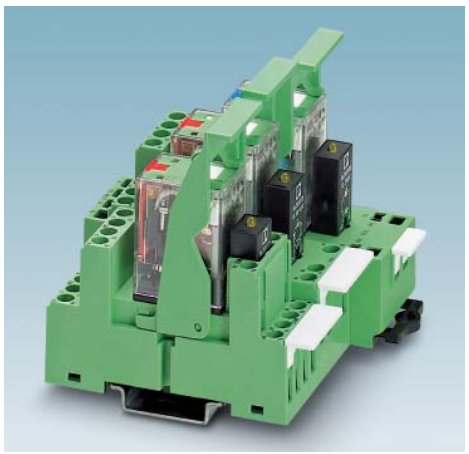
The PR series also boasts its own particular features:

– Relay retaining bracket: The EL... plastic relay retaining brackets that can be used to hold and, if necessary, eject the relays, have an exposed, smooth, large equipment marking area for standard self-adhesive labels that can be printed easily and inexpensively using standard printers. When fitted, the engagement lever is securely connected to the base, which means that the labeling cannot be lost.
– Industrial relays: All REL-IR... industrial relays feature an LED status indicator as standard and all DC types also have an integrated free-wheeling diode. In many cases, this eliminates the need for the plug-in input modules that would otherwise also be required.
– Plug-in input modules with RC element: Most standard input/interference suppression modules with an RC element used for compensation of interference coupling on long lines or in the event of leakage currents from electronic AC outputs have only low capacitance values. This greatly limits the filter effect. By contrast, the RC-120-230UC and RC3-120-230UC plug-in module series for mains voltage applications have a filter function that is up to 10 times better. Unlike with the discharge resistors that are normally used for such applications, using RC plug-in modules does not result in any additional rises in temperature!



PR1 series

The narrow 16 mm PR1 base series for relays with one or two contacts is available with screw or spring-cage connection technology. Traditional 2/2-level bases are available and there is also a choice of two modern "logical" 1/3-level versions with fully opposite coil and contact connections.

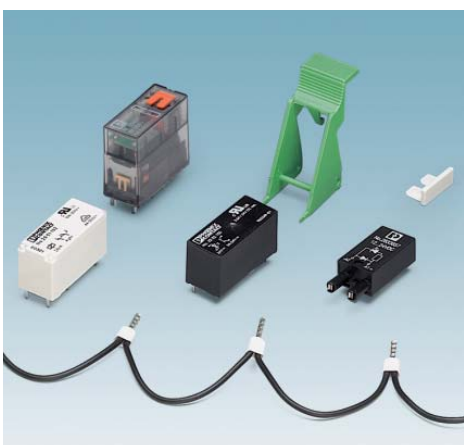


PR2 series

The PR2 base series accommodates plug-in industrial relays with two or four PDT contacts. Like the PR1 series, the bases are available with screw and spring-cage connection methods; they are also available in the traditional 2/2-level and modern "logical" 1/3-level versions.

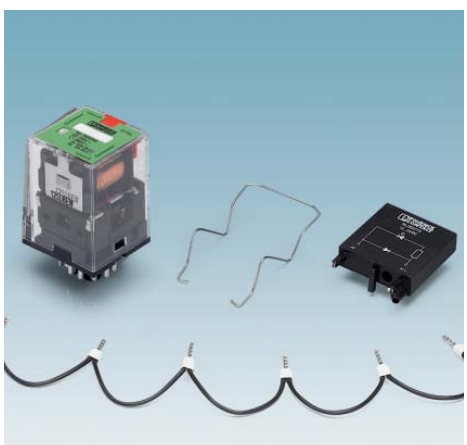
PR3 series

The rugged octal relays with two or three PDT contacts that are widely used in some areas fit on the PR3 base with contact-protected screw connections. All the base connections have a large connection cross section and are arranged on one level for good accessibility.



The active components of the PR1 modular system include various miniature power relays (optionally available with manual test function) and electronic solid-state relays. Matching relay retaining brackets with integrated labeling area prevent them from being shaken loose. Depending on requirements, input/ interference suppression modules with various functions can also be plugged in. Marking labels and loop bridges in various colors that are suitable for universal use with all PR bases complete the range of accessories.

The PR2 modular system is specifically designed for plug-in industrial relays. Industrial relays from Phoenix Contact feature the following as standard: a manual test button, switch position indicator, status LED, and free-wheeling diode (DC coils only). Interference suppression modules with a varistor or RC element can also be plugged in as an option. Relay retaining brackets with integrated labeling areas prevent the relays from being shaken loose. Marking labels and loop bridges in various colors that are suitable for universal use with all PR bases complete the range of accessories.

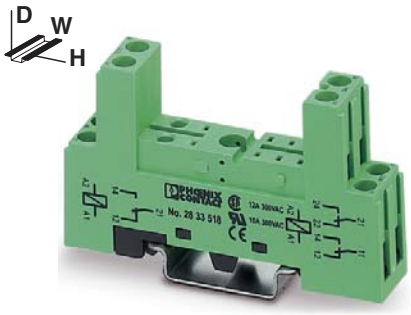


The PR3 modular system is specifically designed for the robust octal relays. The relays have a switch position indicator and a manual test button and there is a wire bracket to prevent them from being shaken loose. Input/interference suppression modules with various functions can also be plugged in as an option. The base can be labeled with an 8x20 mm standard adhesive label. Loop bridges in various colors for universal use round off the range of accessories.

Modular PR1 relay base

Relay base family that can be fitted with 1 PDT or 2 PDT relay or solid-state relay
Range of accessories includes:
- Pluggable input modules/interference suppr. modules
- Relay retaining bracket with labeling field and ejection function
- Marking labels
- Loop bridges

Notes:
Type of housing: Polyamide fiber reinforced PA-F, color: Green.
For marking systems and mounting material, see CLIPLINE catalog, part 2.



2/2-level design with screw connection

Technical data

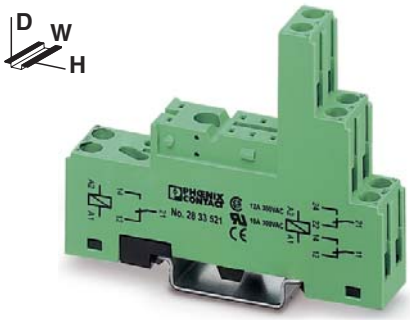
Nominal voltage U_N	300 V AC/DC
Nominal current at U_N	12 A
General data	
Ambient temperature (Operation)	-25°C ... 85°C
Connection data solid / stranded / AWG	0.2 ... 2.5 mm² / 0.2 ... 2.5 mm² / 26 - 14
Dimensions	
Width	16 mm
Depth with retaining bracket	63 mm (EL1-P16) 71 mm (EL1-P25)
Height	75 mm

Ordering data

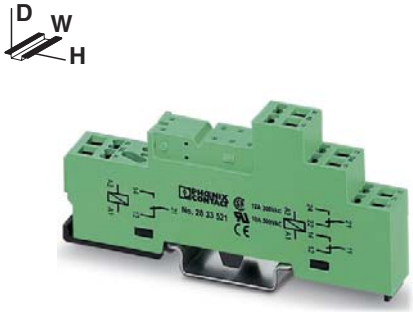
Description	Type	Order No.	Pcs. / Pkt.
Relay base PR1, 2/2-level design, plug-in option for input/interference suppression module, safe isolation I/O, including ten marking labels MP1 per pack			
With screw connection	**PR1-BSC2/2X21**	**2833518**	10
Relay base PR1, 1/3-level design, plug-in option for input/interference suppression module, safe isolation I/O, including ten marking labels MP1 per pack			
With screw connection			
Relay base PR1, 1/3-level design, plug-in option for input/interference suppression module, safe isolation I/O, including ten marking labels MP1 per pack			
With spring-cage connection			
Relay retaining bracket, with ejector function and integrated equipment marking area (7.5 x 15 mm), suitable for relay socket PR1			
for 16 mm tall miniature power relay and solid-state relay	**EL1-P16**	**2833547**	10
for 25 mm tall miniature switching relay and solid-state relay	**EL1-P25**	**2833550**	10

Accessories

Equipment marking label, labeling surface 6 x 15 mm	**MP 1**	**2833631**	10
Device marking label, for thermal transfer printer, labeling surface 6 x 15 mm 2500 labels per roll	**EML (15X6) R YE**	**0819288**	1
Loop bridge, 50-pos., can be separated, max. bridging distance 60 mm, 0.5 mm²			
blue	**DB 50- 90 BU**	**2821180**	1
black	**DB 50- 90 BK**	**2820916**	1
gray	**DB 50- 90 GY**	**2820929**	1



1/3-level design with screw connection



1/3-level design with spring-cage connection

Relay retaining bracket

Technical data	Technical data	Technical data
300 V AC/DC	300 V AC/DC	-
12 A	10 A	-
-25°C ... 85°C	-25°C ... 85°C	-
0.2 ... 2.5 mm² / 0.2 ... 2.5 mm² / 26 - 14	0.5 ... 1.5 mm² / 0.5 ... 1.5 mm² / 26 - 16	-
16 mm	16 mm	-
71 mm (EL1-P16)	72 mm (EL1-P16)	-
79 mm (EL1-P25)	80 mm (EL1-P25)	-
78.5 mm	97 mm	-

Ordering data			Ordering data			Ordering data		
Type	Order No.	Pcs. / Pkt.	Type	Order No.	Pcs. / Pkt.	Type	Order No.	Pcs. / Pkt.
PR1-BSC3/2X21	2833521	10						
			PR1-BSP3/2X21	2833534	10			
EL1-P16	2833547	10	EL1-P16	2833547	10	EL1-P16	2833547	10
EL1-P25	2833550	10	EL1-P25	2833550	10	EL1-P25	2833550	10

Accessories			Accessories			Accessories		
MP 1	2833631	10	MP 1	2833631	10			
EML (15X6) R YE	0819288	1	EML (15X6) R YE	0819288	1			
DB 50- 90 BU	2821180	1	DB 50- 90 BU	2821180	1			
DB 50- 90 BK	2820916	1	DB 50- 90 BK	2820916	1			
DB 50- 90 GY	2820929	1	DB 50- 90 GY	2820929	1			

Relay to match PR1 relay base

Plug-in power relay with 1 or 2 PDT contacts

The advantages:

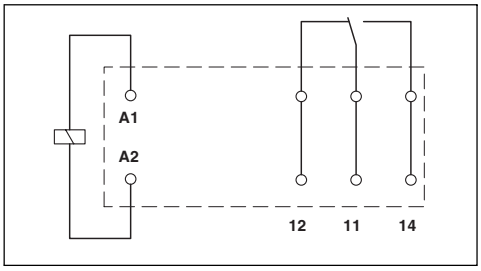
– Switching current of up to 16 A
– Multi-layer gold contact or power contact
– RT III wash tight (comparable to IP67)

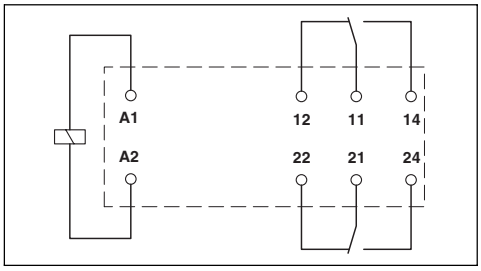
Notes:

If the specified maximum values for multi-layer contact relays are exceeded, the gold plating is destroyed. The maximum values of the power contact relay are then valid. This can result in a shorter service life than with a pure power contact.

1 PDT relay

2 PDT relay





Technical data

Input data		①	②	③	④	⑤	⑥	⑦	⑧
Permissible range (with reference to U_N)		Refer to the diagram							
Typ. input current at U_N	[mA]	33	17	8.7	8.2	4.1	32	7	3
Typ. response time at U_N	[ms]	7	7	7	7	7			
Typ. response time at U_N (depending on phase relation)	[ms]						3 - 12	3 - 12	3 - 12
Typ. release time at U_N	[ms]	3	3	3	3	3			
Typ. release time at U_N (depending on phase relation)	[ms]						2 - 9	2 - 9	2 - 9
Output data									
Contact type		Single contact, 1 PDT				Single contact, 1 PDT			
Contact material		AgNi				AgNi, hard gold-plated			
Max. switching voltage		250 V AC/DC				30 V AC / 36 V DC			
Min. switching voltage		12 V AC/DC (at 10 mA)				100 mV (at 10 mA)			
Limiting continuous current		16 A				50 mA			
Max. inrush current		30 A (300 ms)				50 mA			
Min. switching current		100 mA				1 mA (at 24 V)			
Max. interrupting rating, ohmic load	250 V AC	4000 VA				-			
General data									
Test voltage (winding / contact)		5 kV AC (50 Hz, 1 min.)							
Test voltage (contact / contact)		-							
Ambient temperature (operation)		-40°C ... 85°C							
Mechanical service life		3 x 10^7 cycles							
Electrical service life		See diagram							
Standards / regulations		IEC 60664, EN 50178, IEC 62103							

Technical data

Input data		①	②	③	④	⑤	⑥	⑦	⑧
Permissible range (with reference to U_N)		Refer to the diagram							
Typ. input current at U_N	[mA]	33	17	8.7	8.2	4.1	32	7	3
Typ. response time at U_N	[ms]	7	7	7	7	7			
Typ. response time at U_N (depending on phase relation)	[ms]						3 - 12	3 - 12	3 - 12
Typ. release time at U_N	[ms]	3	3	3	3	3			
Typ. release time at U_N (depending on phase relation)	[ms]						2 - 9	2 - 9	2 - 9
Output data									
Contact type		Single contact, 2 PDT				Single contact, 2 PDT			
Contact material		AgNi				AgNi, hard gold-plated			
Max. switching voltage		250 V AC/DC				30 V AC / 36 V DC			
Min. switching voltage		5 V AC/DC (at 10 mA)				100 mV (at 10 mA)			
Limiting continuous current		8 A				50 mA			
Max. inrush current		15 A (300 ms)				50 mA			
Min. switching current		10 mA (at 5 V)				1 mA (at 24 V)			
Max. interrupting rating, ohmic load	250 V AC	2000 VA				-			
General data									
Test voltage (winding / contact)		5 kV AC (50 Hz, 1 min.)							
Test voltage (contact / contact)		2.5 kV AC (50 Hz, 1 min.)							
Ambient temperature (operation)		-40°C ... 85°C							
Mechanical service life		3 x 10^7 cycles							
Electrical service life		See diagram							
Standards / regulations		IEC 60664, EN 50178, IEC 62103							

Ordering data

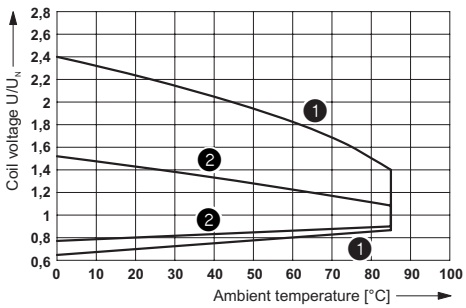
Description		Input voltage U_N	Type	Order No.	Pcs. / Pkt.
Pluggable miniature relays					
with power contact	①	12 V DC	**REL-MR- 12DC/21HC**	**2961309**	10
with power contact	②	24 V DC	**REL-MR- 24DC/21HC**	**2961312**	10
with power contact	③	48 V DC	**REL-MR- 48DC/21HC**	**2834821**	10
with power contact	④	60 V DC	**REL-MR- 60DC/21HC**	**2961325**	10
with power contact	⑤	110 V DC	**REL-MR-110DC/21HC**	**2961338**	10
with power contact	⑥	24 V AC	**REL-MR- 24AC/21HC**	**2961406**	10
with power contact	⑦	120 V AC	**REL-MR-120AC/21HC**	**2961419**	10
with power contact	⑧	230 V AC	**REL-MR-230AC/21HC**	**2961422**	10
Pluggable miniature relays					
with gold contact	①	12 V DC	**REL-MR- 12DC/21HC AU**	**2961532**	10
with gold contact	②	24 V DC	**REL-MR- 24DC/21HC AU**	**2961545**	10
with gold contact	③	48 V DC			
with gold contact	④	60 V DC			
with gold contact	⑤	110 V DC	**REL-MR-110DC/21HC AU**	**2961561**	10
with gold contact	⑥	24 V AC	**REL-MR- 24AC/21HC AU**	**2961503**	10
with gold contact	⑦	120 V AC	**REL-MR-120AC/21HC AU**	**2961516**	10
with gold contact	⑧	230 V AC	**REL-MR-230AC/21HC AU**	**2961529**	10

Ordering data

Description		Input voltage U_N	Type	Order No.	Pcs. / Pkt.
Pluggable miniature relays					
with power contact	①	12 V DC	**REL-MR- 12DC/21-21**	**2961257**	10
with power contact	②	24 V DC	**REL-MR- 24DC/21-21**	**2961192**	10
with power contact	③	48 V DC	**REL-MR- 48DC/21-21**	**2834834**	10
with power contact	④	60 V DC	**REL-MR- 60DC/21-21**	**2961273**	10
with power contact	⑤	110 V DC	**REL-MR-110DC/21-21**	**2961202**	10
with power contact	⑥	24 V AC	**REL-MR- 24AC/21-21**	**2961435**	10
with power contact	⑦	120 V AC	**REL-MR-120AC/21-21**	**2961448**	10
with power contact	⑧	230 V AC	**REL-MR-230AC/21-21**	**2961451**	10
Pluggable miniature relays					
with gold contact	①	12 V DC	**REL-MR- 12DC/21-21AU**	**2961299**	10
with gold contact	②	24 V DC	**REL-MR- 24DC/21-21AU**	**2961215**	10
with gold contact	③	48 V DC	**REL-MR- 48DC/21-21AU**	**2834847**	10
with gold contact	④	60 V DC	**REL-MR- 60DC/21-21AU**	**2961286**	10
with gold contact	⑤	110 V DC	**REL-MR-110DC/21-21AU**	**2961228**	10
with gold contact	⑥	24 V AC	**REL-MR- 24AC/21-21AU**	**2961464**	10
with gold contact	⑦	120 V AC	**REL-MR-120AC/21-21AU**	**2961477**	10
with gold contact	⑧	230 V AC	**REL-MR-230AC/21-21AU**	**2961480**	10

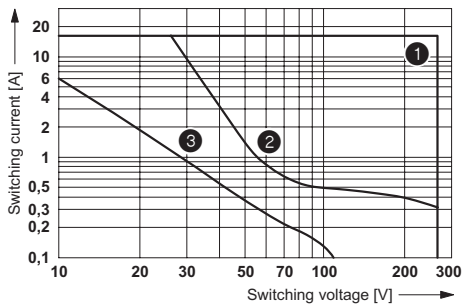
REL-MR...21HC... (1 PDT)

Operating voltage range



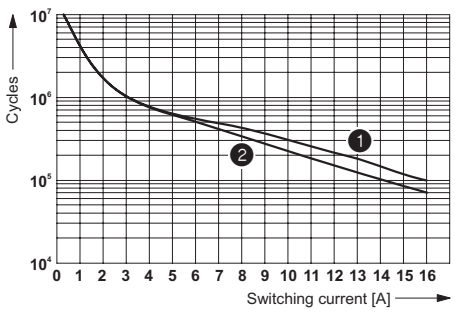
❶ DC coils
❷ AC coils

Interrupting rating



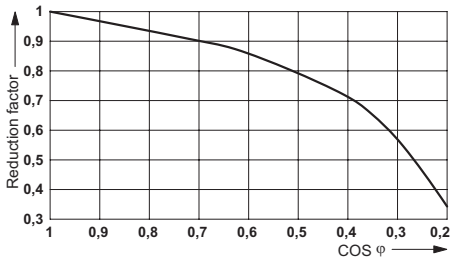
❶ AC, ohmic load
❷ DC, ohmic load
❸ DC, L/R = 40 ms

Electrical service life



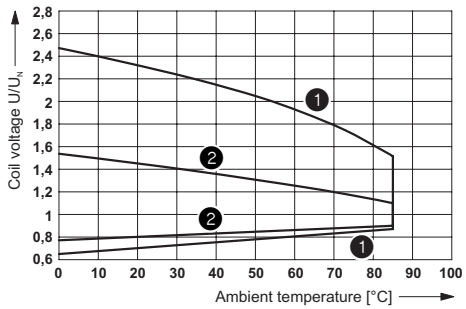
❶ 250 V AC, ohmic load (DC coils)
❷ 250 V AC, ohmic load (AC coils)

Service life reduction factor with various cos phi



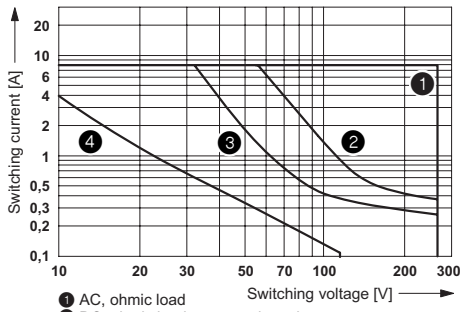
REL-MR...21-21... (2 PDTs)

Operating voltage range



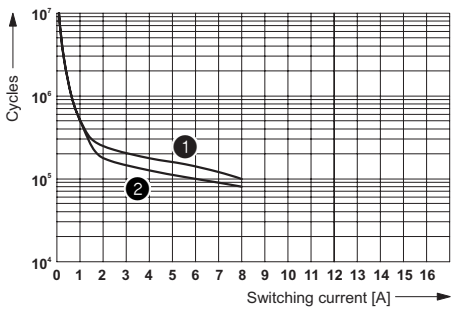
❶ DC coils
❷ AC coils

Interrupting rating



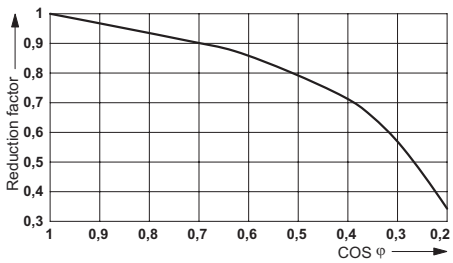
❶ AC, ohmic load
❷ DC, ohmic load, contacts in series
❸ DC, ohmic load
❹ DC, L/R = 40 ms

Electrical service life



❶ 250 V AC, ohmic load (DC coils)
❷ 250 V AC, ohmic load (AC coils)

Service life reduction factor with various cos phi



Relay to match PR1 relay base

Plug-in power relay with 1 or 2 PDT contacts and manual operation

The advantages:

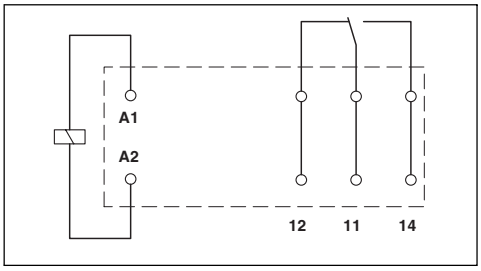
- Switching current of up to 16 A
- With lockable manual operation
- Mechanical switch position indicator
- Integrated status LED
- Multi-layer gold contact or power contact
- DC types with integrated free-wheeling diode

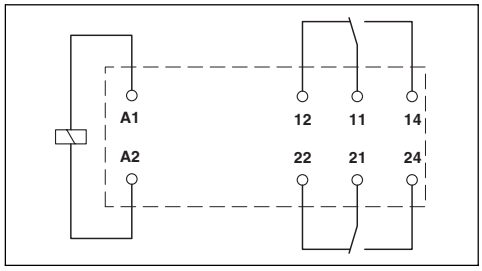
Notes:

If the specified maximum values for multi-layer contact relays are exceeded, the gold plating is destroyed. The maximum values of the power contact relay are then valid. This can result in a shorter service life than with a pure power contact.

1 PDT relay

2 PDT relay





Technical data

		①	②	③	④		
Input data							
Permissible range (with reference to U_N)		Refer to the diagram					
Typ. input current at U_N	[mA]	18	32	7	3.5		
Typ. response time at U_N	[ms]	9					
Typ. response time at U_N (depending on phase relation)	[ms]		3 - 12	3 - 12			
Typ. release time at U_N	[ms]	6					
Typ. release time at U_N (depending on phase relation)	[ms]		2 - 8	2 - 8	2 - 8		
Output data							
Contact type		Single contact, 1 PDT				Single contact, 1 PDT	
Contact material		AgNi				AgNi, hard gold-plated	
Max. switching voltage		250 V AC/DC				30 V AC / 36 V DC	
Min. switching voltage		6 V AC/DC				100 mV	
Limiting continuous current		16 A				50 mA	
Max. inrush current		30 A (300 ms)				50 mA	
Min. switching current		100 mA				10 mA	
Max. interrupting rating, ohmic load	250 V AC	4000 VA				-	
General data							
Test voltage (winding / contact)		5 kV AC (50 Hz, 1 min.)					
Test voltage (contact / contact)		-					
Ambient temperature (operation)		-40°C ... 70°C					
Mechanical service life		5 x 10^6 cycles					
Electrical service life		See diagram					
Standards / regulations		DIN EN 61810-1, VDE 0435-201, EN 50178, IEC 62103					

Technical data

		①	②	③	④		
Input data							
Permissible range (with reference to U_N)		Refer to the diagram					
Typ. input current at U_N	[mA]	18	32	7	3.5		
Typ. response time at U_N	[ms]	9					
Typ. response time at U_N (depending on phase relation)	[ms]		3 - 12	3 - 12	3 - 12		
Typ. release time at U_N	[ms]	6					
Typ. release time at U_N (depending on phase relation)	[ms]		2 - 8	2 - 8	2 - 8		
Output data							
Contact type		Single contact, 2 PDT				Single contact, 2 PDT	
Contact material		AgNi				AgNi, hard gold-plated	
Max. switching voltage		250 V AC/DC				30 V AC / 36 V DC	
Min. switching voltage		6 V AC/DC				100 mV	
Limiting continuous current		8 A				50 mA	
Max. inrush current		15 A (300 ms)				50 mA	
Min. switching current		100 mA				10 mA	
Max. interrupting rating, ohmic load	250 V AC	2000 VA				-	
General data							
Test voltage (winding / contact)		5 kV AC (50 Hz, 1 min.)					
Test voltage (contact / contact)		2.5 kV AC (50 Hz, 1 min.)					
Ambient temperature (operation)		-40°C ... 70°C					
Mechanical service life		5 x 10^6 cycles					
Electrical service life		See diagram					
Standards / regulations		DIN EN 61810-1, VDE 0435-201, EN 50178, IEC 62103					

Ordering data

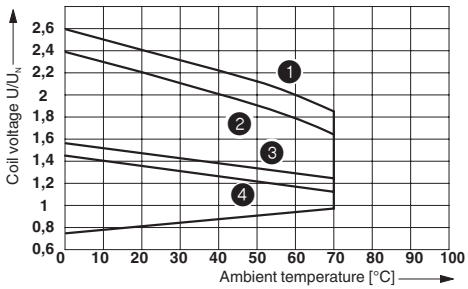
Description		Input voltage U_N	Type	Order No.	Pcs. / Pkt.
Miniature relay with manual checking function					
with power contact	①	24 V DC	**REL-MR- 24DC/21HC/MS**	**2987888**	10
with power contact	②	24 V AC	**REL-MR- 24AC/21HC/MS**	**2987891**	10
with power contact	③	120 V AC	**REL-MR-120AC/21HC/MS**	**2987901**	10
with power contact	④	230 V AC	**REL-MR-230AC/21HC/MS**	**2987914**	10
Plug-in miniature relay with manual checking function					
with gold contact	①	24 V DC	**REL-MR- 24DC/21HC AU/MS**	**2987927**	10
with gold contact	④	230 V AC	**REL-MR-230AC/21HC AU/MS**	**2987930**	10

Ordering data

Type	Order No.	Pcs. / Pkt.
REL-MR- 24DC/21-21/MS	**2987943**	10
REL-MR- 24AC/21-21/MS	**2987956**	10
REL-MR-120AC/21-21/MS	**2987969**	10
REL-MR-230AC/21-21/MS	**2987972**	10
REL-MR- 24DC/21-21AU/MS	**2987985**	10
REL-MR-230AC/21-21AU/MS	**2987998**	10

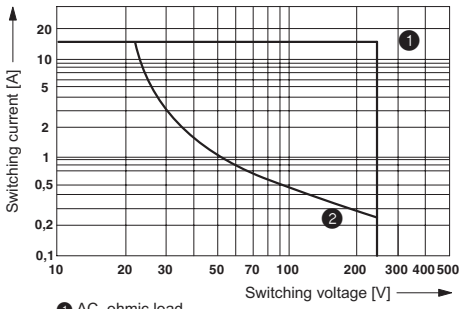
REL-MR...21HC...MS (1 PDT)

Operating voltage range



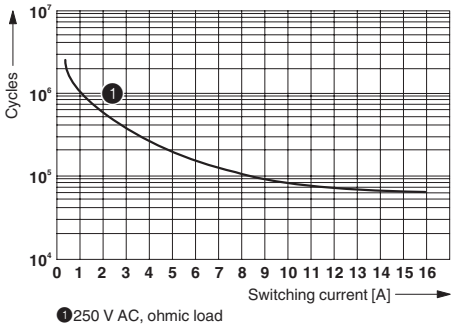
❶DC coils, 0 A contact current
❷DC coils, 16 A contact current
❸AC coils, 0 A contact current
❹AC coils, 16 A contact current

Interrupting rating



❶ AC, ohmic load
❷ DC, ohmic load

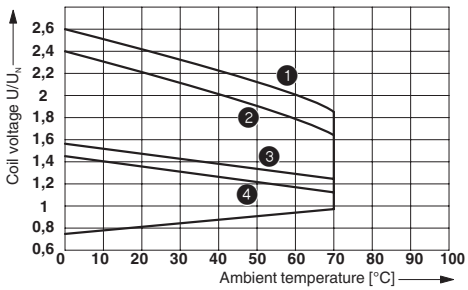
Electrical service life



❶250 V AC, ohmic load

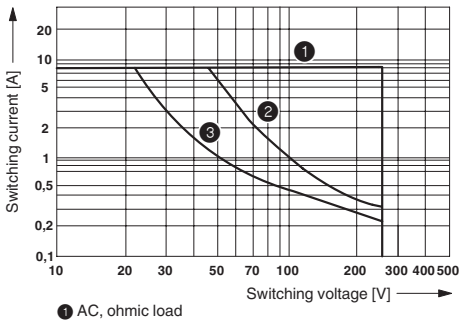
REL-MR...21-21...MS (2 PDTs)

Operating voltage range



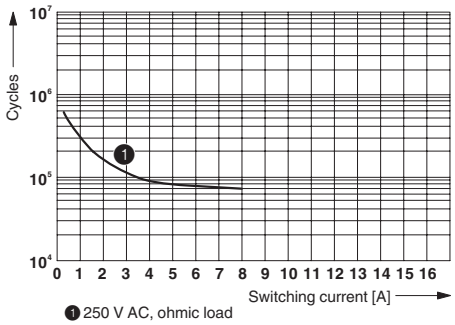
❶DC coils, 0 A contact current
❷DC coils, 16 A contact current
❸AC coils, 0 A contact current
❹AC coils, 16 A contact current

Interrupting rating



❶ AC, ohmic load
❷ DC, ohmic load, contacts in series
❸ DC, ohmic load

Electrical service life

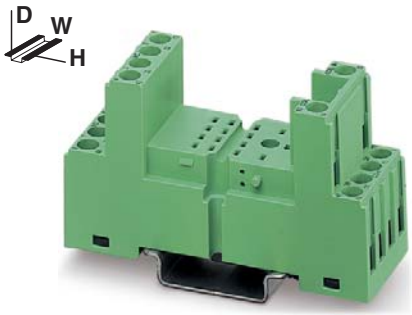


❶ 250 V AC, ohmic load

Modular PR2 relay base

Relay base family that can be fitted with 2 PDT or 4 PDT relays
Range of accessories includes:
- Pluggable input modules/interference suppr. modules
- Relay retaining bracket with labeling field and ejection function
- Marking labels
- Loop bridges

Notes:
Type of housing: Polyamide fiber reinforced PA-F, color: Green.
For marking systems and mounting material, see CLIPLINE catalog, part 2.



2/2-level design with screw connection

Technical data

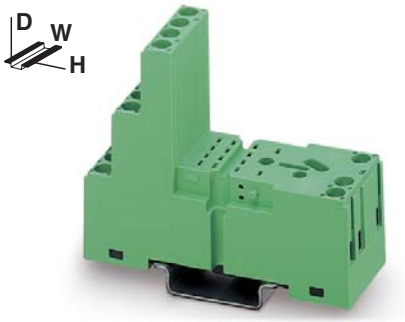
Nominal voltage U_N	300 V AC/DC
Nominal current at U_N	12 A
General data	
Ambient temperature (Operation)	-25°C ... 85°C
Connection data solid / stranded / AWG	0.2 ... 1.5 mm² / 0.2 ... 1.5 mm² / 26 - 16
Dimensions	
Width	27 mm
Depth with retaining bracket	84 mm (EL2-P35) -
Height	75 mm

Ordering data

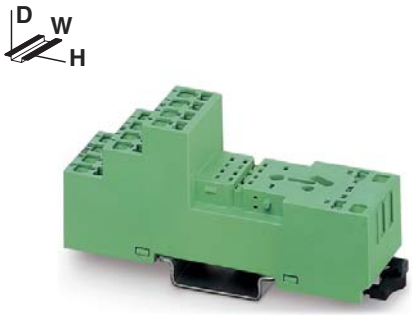
Description	Type	Order No.	Pcs. / Pkt.
Relay base PR2-B, for industrial relay, REL-IR with two or four PDTs, 2/2-level design, connection option for input/interference suppression module, including ten marking labels MP2 per packaging With screw connection	**PR2-BSC2/4X21**	**2833563**	10
Relay base PR2-B, for industrial relay, REL-IR with two or four PDTs, 1/3-level design, connection option for input/interference suppression module, including ten marking labels MP2 per packaging With screw connection			
Relay base PR2-B, for industrial relay, REL-IR with two or four PDTs, 1/3-level design, connection option for input/interference suppression module, including ten marking labels MP1 per packaging With spring-cage connection			
Relay retaining bracket, with eject function and integrated device marking area (8 x 25 mm), to suit relay base PR2, for 35 mm high industrial relay	**EL2-P35**	**2833592**	10

Accessories

Equipment marking label, labeling surface 6 x 15 mm			
Equipment marking label, labeling surface 9 x 25 mm	**MP 2**	**2833644**	10
Device marking label, for thermal transfer printer, labeling surface 6 x 15 mm	**EML (15X6) R YE**	**0819288**	1
Loop bridge, 50-pos., can be separated, max. bridging distance 60 mm, 0.5 mm²			
blue	**DB 50- 90 BU**	**2821180**	1
black	**DB 50- 90 BK**	**2820916**	1
gray	**DB 50- 90 GY**	**2820929**	1



1/3-level design with screw connection



1/3-level design with spring-cage connection

Relay retaining bracket

Technical data		
300 V AC/DC		
12 A		
-25°C ... 85°C		
0.2 ... 1.5 mm² / 0.2 ... 1.5 mm² / 26 - 16		
27 mm		
86 mm (EL2-P35)		
-		
78.5 mm		
Ordering data		
Type	**Order No.**	Pcs. / Pkt.
PR2-BSC3/4X21	**2833576**	10
EL2-P35	**2833592**	10
Accessories		
MP 2	**2833644**	10
EML (15X6) R YE	**0819288**	1
DB 50- 90 BU	**2821180**	1
DB 50- 90 BK	**2820916**	1
DB 50- 90 GY	**2820929**	1

Technical data		
300 V AC/DC		
10 A		
-25°C ... 85°C		
0.2 ... 1.5 mm² / 0.2 ... 1.5 mm² / 24 - 16		
31 mm		
84 mm (EL2-P35)		
-		
95 mm		
Ordering data		
Type	**Order No.**	Pcs. / Pkt.
PR2-BSP3/4X21	**2833589**	10
EL2-P35	**2833592**	10
Accessories		
MP 1	**2833631**	10
EML (15X6) R YE	**0819288**	1
DB 50- 90 BU	**2821180**	1
DB 50- 90 BK	**2820916**	1
DB 50- 90 GY	**2820929**	1

Technical data		
-		
-		
-		
-		
-		
-		
-		
-		
Ordering data		
Type	**Order No.**	Pcs. / Pkt.
EL2-P35	**2833592**	10
Accessories		

Industrial relay to match PR2 relay base

Plug-in industrial relay with 2 or 4 PDT contacts and manual operation

The advantages:

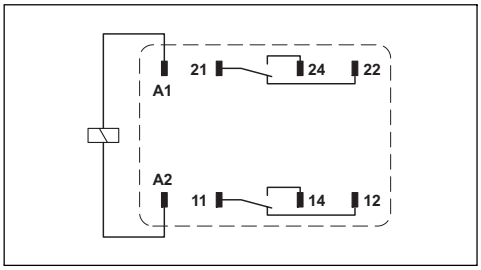
- With lockable manual operation
- Mechanical switch position indicator
- Integrated status LED
- Multi-layer gold contact or power contact
- DC types with integrated free-wheeling diode

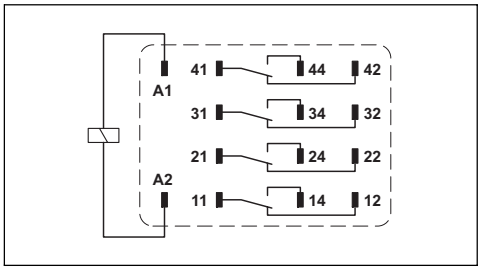
Notes:

For 48 V DC and 60 V DC types, see www.phoenixcontact.net/catalog.

2 PDT relay with power contacts

4 PDT relay with multi-layer gold contact





Technical data

Input data		①	②	③	④	⑤	⑥	⑦	⑧
Permissible range (with reference to U_N)		Refer to the diagram							
Typ. input current at U_N	[mA]	75	38	10	7.2	3.6	54	11	5
Typ. response time at U_N	[ms]	13	13	13	13	13			
Typ. response time at U_N (AC, depending on phase relation)	[ms]						4 - 10	4 - 10	4 - 10
Typ. release time at U_N	[ms]	5	5	5	5	5			
Typ. release time at U_N (AC, depending on phase relation)	[ms]						3 - 12	3 - 12	3 - 12
Output data									
Contact type		Single contact, 2 PDT							
Contact material		Ag							
Max. switching voltage		250 V AC/DC							
Min. switching voltage		5 V							
Limiting continuous current		10 A							
Min. switching current		1 mA							
Max. interrupting rating, ohmic load	250 V AC	2500 VA							
General data									
Test voltage (winding / contact)		2 kV AC (50 Hz, 1 min.)							
Test voltage (contact / contact)		2 kV AC (50 Hz, 1 min.)							
Ambient temperature (operation)		-55°C ... 70°C							
Nominal operating mode		100% operating factor							
Mechanical service life		5 x 10^7 cycles							
Electrical service life		See diagram							
Standards / regulations		DIN EN 61810-1, VDE 0435-201, EN 50178, IEC 62103							
Mounting position / mounting		Any / On relay base PR2							

Technical data

Input data		①	②	③	④	⑤	⑥	⑦	⑧
Permissible range (with reference to U_N)		Refer to the diagram							
Typ. input current at U_N	[mA]	75	38	10	7.2	3.6	54	11	5
Typ. response time at U_N	[ms]	13	13	13	13	13			
Typ. response time at U_N (AC, depending on phase relation)	[ms]						4 - 10	4 - 10	4 - 10
Typ. release time at U_N	[ms]	5	5	5	5	5			
Typ. release time at U_N (AC, depending on phase relation)	[ms]						3 - 12	3 - 12	3 - 12
Output data									
Contact type		Single contact, 4 PDT							
Contact material		AgNi, hard gold-plated							
Max. switching voltage		250 V AC/DC							
Min. switching voltage		1 V							
Limiting continuous current		5 A							
Min. switching current		1 mA							
Max. interrupting rating, ohmic load	250 V AC	1250 VA							
General data									
Test voltage (winding / contact)		2 kV AC (50 Hz, 1 min.)							
Test voltage (contact / contact)		2 kV AC (50 Hz, 1 min.)							
Ambient temperature (operation)		-55°C ... 70°C							
Nominal operating mode		100% operating factor							
Mechanical service life		5 x 10^7 cycles							
Electrical service life		See diagram							
Standards / regulations		DIN EN 61810-1, VDE 0435-201, EN 50178, IEC 62103							
Mounting position / mounting		Any / On relay base PR2							

Ordering data

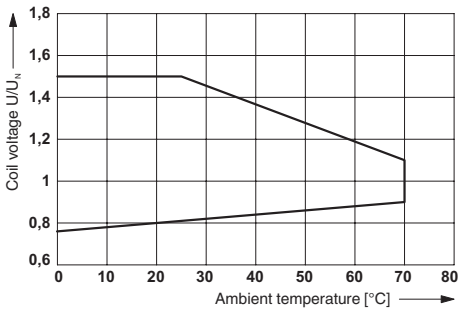
Description		Input voltage U_N	Type	Order No.	Pcs. / Pkt.
Pluggable industrial relay with a test button, status LED, mechanical switch position indicator					
with free-wheeling diode, **A1 +, A2 -**	①	12 V DC	**REL-IR/LDP- 12DC/2X21**	**2834012**	10
with free-wheeling diode, **A1 +, A2 -**	②	24 V DC	**REL-IR/LDP- 24DC/2X21**	**2834025**	10
with free-wheeling diode, **A1 +, A2 -**	③	110 V DC	**REL-IR/LDP-110DC/2X21**	**2834041**	10
	④	125 V DC	**REL-IR/LDP-125DC/2X21**	**2834960**	10
	⑤	220 V DC	**REL-IR/LDP-220DC/2X21**	**2834957**	10
	⑥	24 V AC	**REL-IR/L- 24AC/2X21**	**2834054**	10
	⑦	120 V AC	**REL-IR/L-120AC/2X21**	**2834067**	10
	⑧	230 V AC	**REL-IR/L-230AC/2X21**	**2834070**	10
Pluggable industrial relay with a test button, status LED, mechanical switch position indicator, (Japanese standard)					
with free-wheeling diode, **A1 -, A2 +**	①	12 V DC	**REL-IR/LDM- 12DC/2X21**	**2834151**	10
with free-wheeling diode, **A1 -, A2 +**	②	24 V DC	**REL-IR/LDM- 24DC/2X21**	**2834164**	10
with free-wheeling diode, **A1 -, A2 +**	③	48 V DC	**REL-IR/LDM- 48DC/2X21**	**2834177**	10
with free-wheeling diode, **A1 -, A2 +**	④	110 V DC	**REL-IR/LDM-110DC/2X21**	**2834180**	10

Ordering data

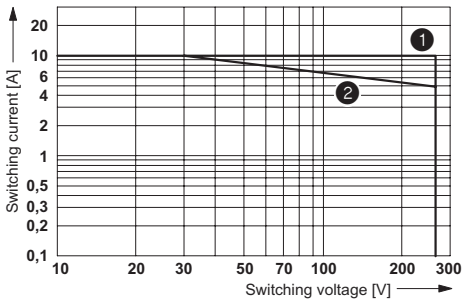
Description		Input voltage U_N	Type	Order No.	Pcs. / Pkt.
Pluggable industrial relay with a test button, status LED, mechanical switch position indicator					
with free-wheeling diode, **A1 +, A2 -**	①	12 V DC	**REL-IR/LDP- 12DC/4X21AU**	**2834083**	10
with free-wheeling diode, **A1 +, A2 -**	②	24 V DC	**REL-IR/LDP- 24DC/4X21AU**	**2834096**	10
with free-wheeling diode, **A1 +, A2 -**	③	110 V DC	**REL-IR/LDP-110DC/4X21AU**	**2834119**	10
	④	125 V DC	**REL-IR/LDP-125DC/4X21AU**	**2834313**	10
	⑤	220 V DC	**REL-IR/LDP-220DC/4X21AU**	**2834973**	10
	⑥	24 V AC	**REL-IR/L- 24AC/4X21AU**	**2834122**	10
	⑦	120 V AC	**REL-IR/L-120AC/4X21AU**	**2834135**	10
	⑧	230 V AC	**REL-IR/L-230AC/4X21AU**	**2834148**	10
Pluggable industrial relay with a test button, status LED, mechanical switch position indicator, (Japanese standard)					
with free-wheeling diode, **A1 -, A2 +**	①	12 V DC	**REL-IR/LDM- 12DC/4X21AU**	**2834193**	10
with free-wheeling diode, **A1 -, A2 +**	②	24 V DC	**REL-IR/LDM- 24DC/4X21AU**	**2834203**	10
with free-wheeling diode, **A1 -, A2 +**	③	48 V DC	**REL-IR/LDM- 48DC/4X21AU**	**2834216**	10
with free-wheeling diode, **A1 -, A2 +**	④	110 V DC	**REL-IR/LDM-110DC/4X21AU**	**2834229**	10

REL-IR...2x21 (2 PDTs)

Operating voltage range

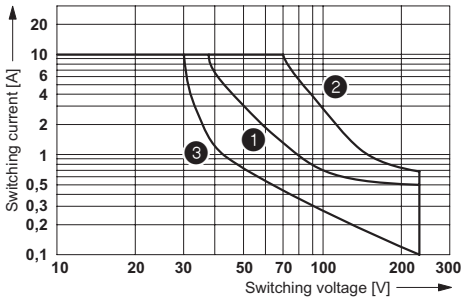


AC interrupting rating



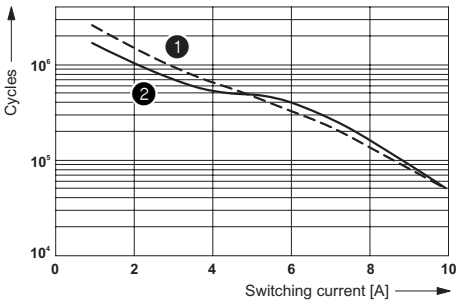
❶ Ohmic load
❷ cos φ = 0.4

DC interrupting rating



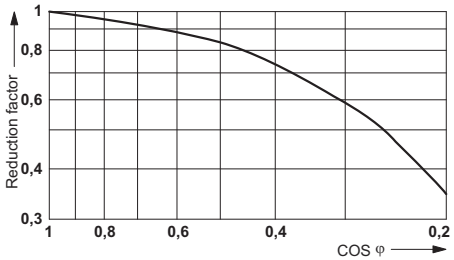
❶ Ohmic load
❷ ohmic load, contacts in series
❸ L/R < 7 ms

Electrical service life



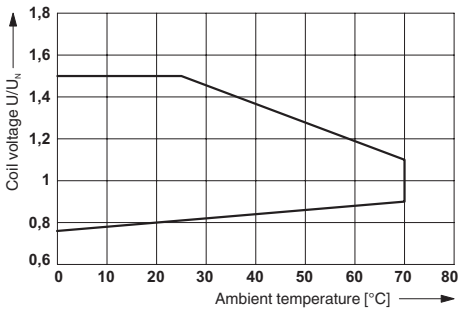
❶ 250 V AC, ohmic load
❷ 30 V DC, ohmic load

Service life reduction factor

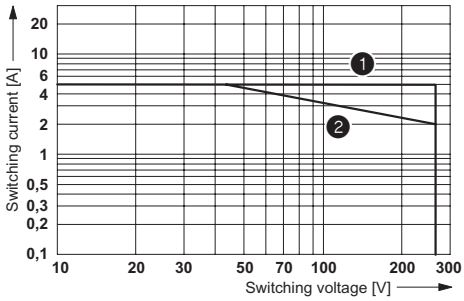


REL-IR...4x21AU (4 PDTs)

Operating voltage range

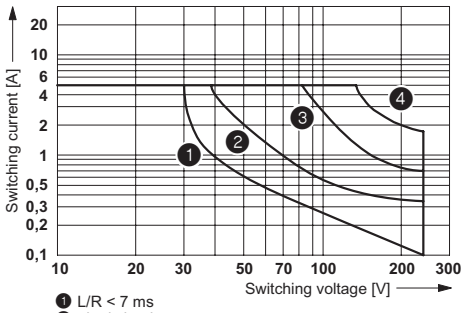


AC interrupting rating



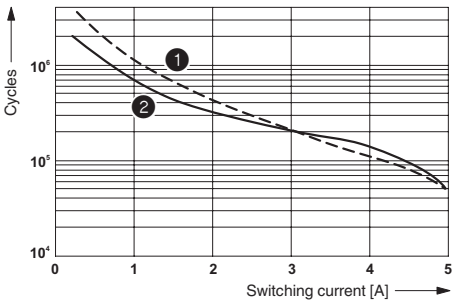
❶ Ohmic load
❷ cos φ = 0.4

DC interrupting rating



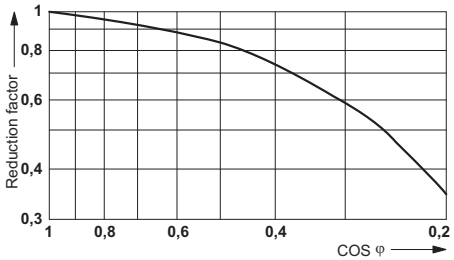
❶ L/R < 7 ms
❷ ohmic load
❸ ohmic load, 2 contacts in series
❹ ohmic load, 4 contacts in series

Electrical service life



❶ 250 V AC, ohmic load
❷ 30 V DC, ohmic load

Service life reduction factor



Modular PR3 relay base

Relay base family that can be fitted with 2 PDT or 3 PDT relays
Range of accessories includes:
– Pluggable input modules/interference suppr. modules
– Relay retaining bracket
– Loop bridges

Notes:
Type of housing: Polyamide fiber reinforced PA-F, color: Green.
For marking systems and mounting material, see CLIPLINE catalog, part 2.

Relay base for 2 PDT octal relay

Technical data

Nominal voltage U_N	400 V AC/DC
Nominal current at U_N	10 A
General data	
Ambient temperature (Operation)	-40°C ... 85°C
Connection data solid / stranded / AWG	0.2 ... 2.5 mm² / 0.2 ... 2.5 mm² / 26 - 14
Dimensions	
Width	38 mm
Depth with retaining bracket	84 mm (EL3-M52) -
Height	75 mm

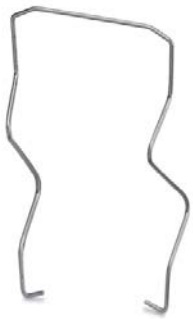
Ordering data

Description	Type	Order No.	Pcs. / Pkt.
Relay base PR3, for octal relay REL-OR with two PDTs, plug-in option for input/interference suppression modules With screw connection	**PR3-BSC1/2X21**	**2833602**	10
Relay base PR3, for octal relay REL-OR with three PDTs, plug-in option for input/interference suppression modules With screw connection			
Relay retaining bracket, wiring to suit relay base PR3, for 52 mm high octal relay	**EL3-M52**	**2833628**	10

Accessories

Loop bridge, 50-pos., can be separated, max. bridging distance 60 mm, 0.5 mm²			
blue	**DB 50- 90 BU**	**2821180**	1
black	**DB 50- 90 BK**	**2820916**	1
gray	**DB 50- 90 GY**	**2820929**	1

Relay base for
3 PDT octal relay



Relay retaining bracket

Technical data	Technical data
400 V AC/DC	-
10 A	-
-40°C ... 85°C	-
0.2 ... 2.5 mm² / 0.2 ... 2.5 mm² / 26 - 14	-
38 mm	-
84 mm (EL3-M52)	-
-	-
75 mm	-

Ordering data			Ordering data		
Type	Order No.	Pcs. / Pkt.	Type	Order No.	Pcs. / Pkt.
PR3-BSC1/3X21	2833615	10			
EL3-M52	2833628	10	EL3-M52	2833628	10

Accessories			Accessories		
DB 50- 90 BU	2821180	1			
DB 50- 90 BK	2820916	1			
DB 50- 90 GY	2820929	1			

Octal relay to match PR3 relay base

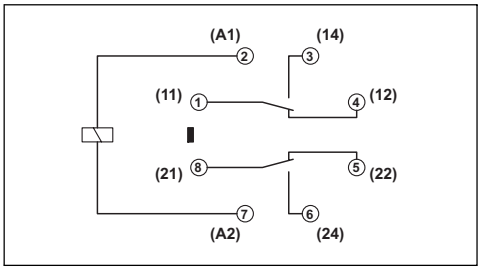
Plug-in octal relay with 2 or 3 PDT contacts and manual operation

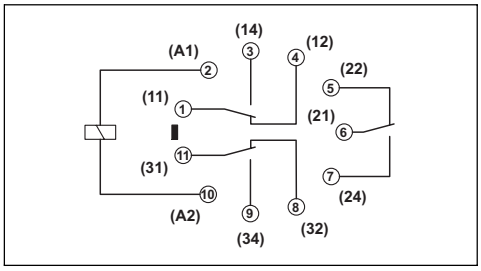
The advantages:

– With lockable manual operation
– Mechanical switch position indicator
– Extremely rugged design

2 PDT relay with power contacts

4 PDT relay with multi-layer gold contact



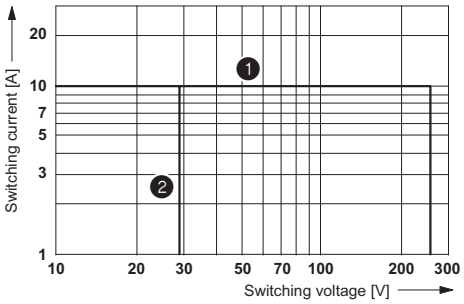


		Technical data				Technical data			
Input data		①	②	③	④	①	②	③	④
Typ. input current at U_N	[mA]	56	98	20	12	56	98	20	12
Typ. response time at U_N	[ms]	12				12			
Typ. response time at U_N (AC, depending on phase relation)	[ms]		5 - 20	5 - 20	5 - 20		5 - 20	5 - 20	5 - 20
Typ. release time at U_N	[ms]	6				6			
Typ. release time at U_N (AC, depending on phase relation)	[ms]		5 - 20	5 - 20	5 - 20		5 - 20	5 - 20	5 - 20
Output data									
Contact type		Single contact, 2 PDT				Single contact, three PDTs			
Contact material		Ag				Ag			
Max. switching voltage		250 V AC/DC				250 V AC/DC			
Min. switching voltage		1 V				1 V			
Limiting continuous current		10 A				10 A			
Min. switching current		10 mA				10 mA			
Max. interrupting rating, ohmic load	250 V AC	2500 VA				2500 VA			
General data									
Test voltage (winding / contact)		2.5 kV AC (50 Hz, 1 min.)				2.5 kV AC (50 Hz, 1 min.)			
Test voltage (contact / contact)		2.5 kV AC (50 Hz, 1 min.)				2.5 kV AC (50 Hz, 1 min.)			
Ambient temperature (operation)		-10°C ... 40°C				-10°C ... 40°C			
Nominal operating mode		100% operating factor				100% operating factor			
Mechanical service life		10 x 10^6 cycles				10 x 10^6 cycles			
Electrical service life		See diagram				See diagram			
Standards / regulations		IEC 60664				IEC 60664			
Mounting position / mounting		Any / On relay base PR3				Any / On relay base PR3			

Description	Input voltage U_N	Ordering data: Type	Order No.	Pcs. / Pkt.	Ordering data: Type	Order No.	Pcs. / Pkt.
Pluggable octal relay with power contacts, with a test button and mechanical switch position indicator							
①	24 V DC	**REL-OR- 24DC/2X21**	**2834232**	10	**REL-OR- 24DC/3X21**	**2834274**	10
②	24 V AC	**REL-OR- 24AC/2X21**	**2834245**	10	**REL-OR- 24AC/3X21**	**2834287**	10
③	120 V AC	**REL-OR-120AC/2X21**	**2834258**	10	**REL-OR-120AC/3X21**	**2834290**	10
④	230 V AC	**REL-OR-230AC/2X21**	**2834261**	10	**REL-OR-230AC/3X21**	**2834300**	10

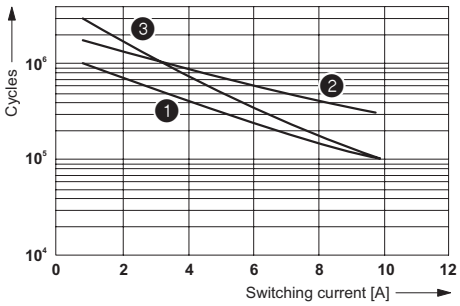
REL-OR...2x21 (2 PDTs)

Interrupting rating



❶ AC, ohmic load
❷ DC, ohmic load

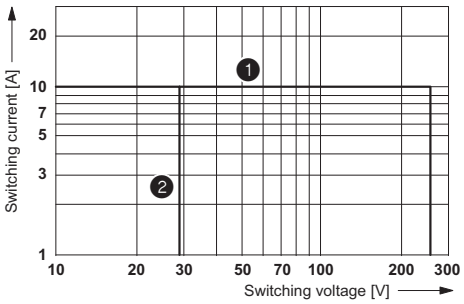
Electrical service life



❶ 250V AC, ohmic load
❷ 120VDC, ohmic load
❸ 28V DC, ohmic load

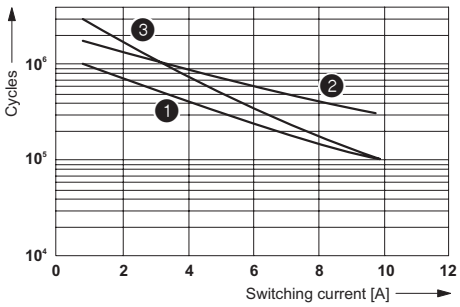
REL-OR...3x21 (3 PDTs)

Interrupting rating



❶ AC, ohmic load
❷ DC, ohmic load

Electrical service life



❶ 250V AC, ohmic load
❷ 120VDC, ohmic load
❸ 28V DC, ohmic load

Input modules/interference suppr. modules for PR1, PR2, and PR3

Pluggable input modules/interference suppression modules for optional fitting of relay base PR...

The advantages:

– Attenuation of reverse voltage induced in coil
– Mechanical keying to protect against incorrect connection

Input/interference suppression module to match PR1 and PR2

Input/interference suppression module to match PR3

	Ordering data			Ordering data		
Description	Type	Order No.	Pcs. / Pkt.	Type	Order No.	Pcs. / Pkt.
Plug-in module, for mounting on PR..., with LED status indicator and free-wheeling diode to limit the coil induction voltage effectively, polarity: **A1 +, A2 –,** Input voltage:						
- 12-24 V DC ±20%	**LDP- 12- 24DC**	**2833657**	10	**LDP3- 12- 24DC**	**2833770**	10
- 48-60 V DC ±20%	**LDP- 48- 60DC**	**2833660**	10	**LDP3- 48- 60DC**	**2833783**	10
- 110 V DC ±20%	**LDP-110DC**	**2833673**	10	**LDP3-110DC**	**2833796**	10
Plug-in module, for mounting on PR..., with LED status indicator and free-wheeling diode to limit the coil induction voltage effectively, polarity: **A1 –, A2 +** (Japanese standard), Input voltage:						
- 12-24 V DC ±20%	**LDM- 12- 24DC**	**2833686**	10	**LDM3- 12- 24DC**	**2833806**	10
- 48-60 V DC ±20%	**LDM- 48- 60DC**	**2833699**	10	**LDM3- 48- 60DC**	**2833819**	10
- 110 V DC ±20%	**LDM-110DC**	**2833709**	10	**LDM3-110DC**	**2833822**	10
Plug-in module, for mounting on PR..., with LED status indicator and varistor to limit the coil induction voltage and/or external interference peaks, Input voltage:						
- 12-24 V AC/DC ±20% (30-V-varistor)	**LV- 12- 24UC**	**2833712**	10	**LV3- 12- 24UC**	**2833835**	10
- 48-60 V AC/DC ±20% (75-V-varistor)	**LV- 48- 60UC**	**2833725**	10	**LV3- 48- 60UC**	**2833848**	10
- 120-230 V AC/110 V DC ±20% (275-V-varistor)	**LV-120-230AC/110DC**	**2833738**	10	**LV3-120-230AC/110DC**	**2833851**	10
Plug-in module, for mounting on PR..., with varistor to limit the coil induction voltage and/or external interference peaks, Input voltage:						
- 12-24 V AC/DC ±20% (30-V-varistor)	**V- 12- 24UC**	**2833864**	10	**V3- 12- 24UC**	**2833929**	10
- 48-60 V AC/DC ±20% (75-V-varistor)	**V- 48- 60UC**	**2833877**	10	**V3- 48- 60UC**	**2833932**	10
- 120-230 V AC/DC ±20% (275-V-varistor)	**V-120-230UC**	**2833880**	10	**V3-120-230UC**	**2833945**	10
Plug-in module, for mounting on PR..., with RD-element to attenuate the coil induction voltage and/or external interference peaks, Input voltage:						
- 12-24 V AC/DC ±20% (220 nF/100 Ω)	**RC- 12- 24UC**	**2833741**	10	**RC3- 12- 24UC**	**2833893**	10
- 48-60 V AC/DC ±20% (220 nF/220 Ω)	**RC- 12- 24UC**	**2833754**	10	**RC3- 48- 60UC**	**2833903**	10
- 120-230 V AC/DC ±20% (100 nF/470 Ω)	**RC-120-230UC**	**2833767**	10	**RC3-120-230UC**	**2833916**	10

Terminal assignment PR1 base / Solid-state relay								
	Terminal blocks, PR1 base							
	A1	A2	11	12	14	21	22	24
Solid-state relays								
SIM-EI...48DC/100	A2 (-)	A1 (+)			A	+		
SIM-EI...TTL/100	A2 (-)	A1 (+)			A	+	0	
SIM-EI...48DC/100RC	A2 (-)	A1 (+)			A	+		
SIM-EI-OV-24DC/24DC/3	A2 (-)	A1 (+)			A	+		
OPT-...24DC/5	A1 (+)	A2 (-)	13		14			
OPT-...230AC/2	A1 (+)	A2 (-)	13		14			

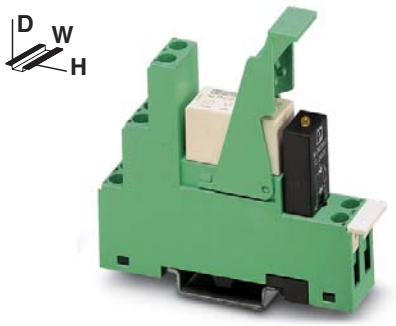
The relay bases of the PR1 series can also be equipped with wear-free solid-state relays (OPT… or SIM-EI...) as an alternative to the electromechanical relay.
Plug-in modules LDP… and LV… cannot be used in conjunction with solid-state relays SIM-EI....

PR1 fully assembled relay modules with screw connection

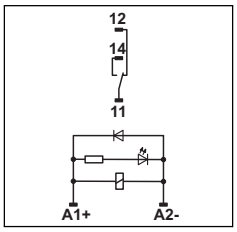
PR1 fully assembled relay modules, comprising:
- Relay base
- 1/2 PDT relay
- Relay retaining bracket
- Input module/interference suppr. module
- Marking labels

The advantages:
- Logical contact arrangement thanks to 1/3-level relay base
- Operational reliability thanks to sealed relay
- Safe isolation between coil and contact side

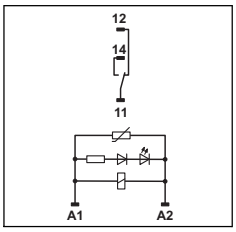
Notes:
Type of housing: Polyamide fiber reinforced PA-F, color: Green.
For the protection of input and output, inductive loads must be dampened with an effective protective circuit.
If the specified maximum values for multi-layer contact relays are exceeded, the gold plating is destroyed. The maximum values of the power contact relay are then valid. This can result in a shorter service life than with a pure power contact.
Other input voltages on request.



PR1 relay module with 1 PDT relay



DC coils



AC coils

Technical data

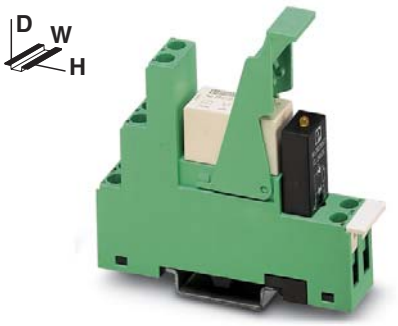
Input data		24 V DC	24 V AC	120 V AC	230 V AC
Permissible range (with reference to U_N)		See diagram			
Typ. input current with U_N (for AC: 50/60 Hz)	[mA]	19	34 / 26	9 / 7	6 / 5.5
Typ. response time at U_N	[ms]	8	3 ... 12	3 ... 12	3 ... 12
Typ. release time at U_N	[ms]	10	1.5 ... 14	1.5 ... 16	2 ... 22
Input protection:	24 V DC	Damping diode, Yellow LED			
	24, 120, 230 V AC	Varistor, Yellow LED			
Output data		PR...		PR...AU	
Contact type		Single contact, 1 PDT		Single contact, 1 PDT	
Contact material		AgNi		AgNi, hard gold-plated	
Maximum switching voltage		250 V AC/DC		30 V AC / 36 V DC	
Minimum switching voltage		12 V (at 10 mA)		100 mV (at 10 mA)	
Limiting continuous current		12 A		50 mA	
Maximum inrush current		30 A (300 ms)		50 mA	
Min. switching current		100 mA		1 mA (at 24 V)	
Interrupting rating (ohmic load) max.		3000 VA (for 250 V AC)		-	
		For more data, see diagram			
General data					
Test voltage	Winding to contact	4 kV (50 Hz, 1 min.)			
	Contact/contact	-			
Ambient temperature (operation)		-25°C ... 60°C			
Nominal operating mode		100% operating factor			
Mechanical service life		3 x 10^7 cycles			
Service life, electrical		See diagram			
Standards / regulations		IEC 60664, EN 50178, IEC 62103			
Pollution degree/surge voltage category		3 / III			
Mounting position / Mounting		Any/can be aligned without spacing			
Connection data solid / stranded / AWG		0.14 - 2.5 mm^2 / 0.14 - 2.5 mm^2 / 26 - 14			
Dimensions	W / H / D	16 mm / 78.5 mm / 71 mm			

Ordering data

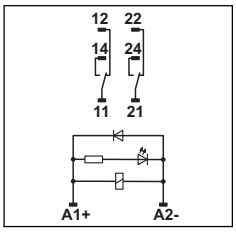
Description	Input voltage U_N	Type	Order No.	Pcs. / Pkt.
Pre-assembled coupling relay modules with miniature power contact relay				
	24 V DC	**PR1-RSC3-LDP-24DC/21**	**2834326**	5
	24 V AC	**PR1-RSC3-LV- 24AC/21**	**2834339**	5
	120 V AC	**PR1-RSC3-LV-120AC/21**	**2834342**	5
	230 V AC	**PR1-RSC3-LV-230AC/21**	**2834355**	5
Pre-fitted coupling relay modules with multi-layer contact relay				
	24 V DC	**PR1-RSC3-LDP-24DC/21AU**	**2834368**	5
	24 V AC	**PR1-RSC3-LV- 24AC/21AU**	**2834371**	5
	120 V AC	**PR1-RSC3-LV-120AC/21AU**	**2834384**	5
	230 V AC	**PR1-RSC3-LV-230AC/21AU**	**2834397**	5

Accessories

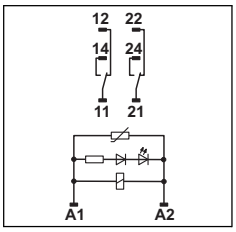
Device marking label, for thermal transfer printer, labeling surface 6 x 15 mm	**EML (15X6) R YE**	**0819288**	1



PR1 relay module with 2 PDT relay



DC coils



AC coils

Technical data

24 V DC	24 V AC	120 V AC	230 V AC
See diagram			
19	34 / 26	9 / 7	6 / 5.5
8	3 ... 12	3 ... 12	3 ... 12
10	1.5 ... 14	1.5 ... 16	2 ... 22
Damping diode, Yellow LED			
Varistor, Yellow LED			
PR...		PR...AU	
Single contact, 2 PDT		Single contact, 2 PDT	
AgNi		AgNi, hard gold-plated	
250 V AC/DC		30 V AC / 36 V DC	
5 V (at 10 mA)		100 mV (at 10 mA)	
8 A		50 mA	
15 A (300 ms)		50 mA	
10 mA (at 5 V)		1 mA (at 24 V)	
2000 VA (for 250 V AC)		-	
For more data, see diagram			
4 kV (50 Hz, 1 min.)			
2.5 kV (50 Hz, 1 min.)			
-25°C ... 60°C			
100% operating factor			
3 x 10^7 cycles			
See diagram			
IEC 60664, EN 50178, IEC 62103			
3 / III			
Any/can be aligned without spacing			
0.14 - 2.5 mm^2 / 0.14 - 2.5 mm^2 / 26 - 14			
16 mm / 78.5 mm / 71 mm			

Ordering data

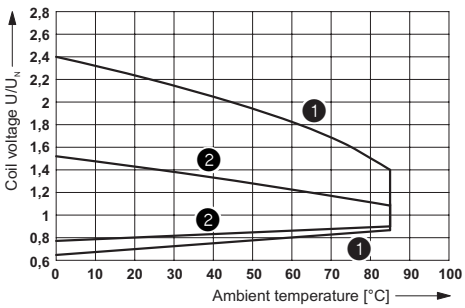
Type	Order No.	Pcs. / Pkt.
PR1-RSC3-LDP-24DC/2X21	**2834481**	5
PR1-RSC3-LV- 24AC/2X21	**2834494**	5
PR1-RSC3-LV-120AC/2X21	**2834504**	5
PR1-RSC3-LV-230AC/2X21	**2834517**	5
PR1-RSC3-LDP-24DC/2X21AU	**2834520**	5
PR1-RSC3-LV- 24AC/2X21AU	**2834533**	5
PR1-RSC3-LV-120AC/2X21AU	**2834546**	5
PR1-RSC3-LV-230AC/2X21AU	**2834559**	5

Accessories

EML (15X6) R YE	**0819288**	1

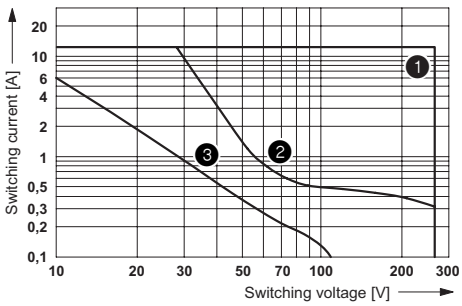
PR1-RSC3.../21 (1 PDT)

Operating voltage range of the relay



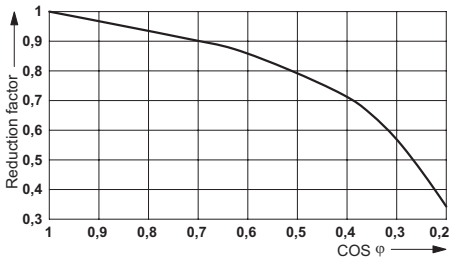
1 DC coils
2 AC coils

Interrupting rating

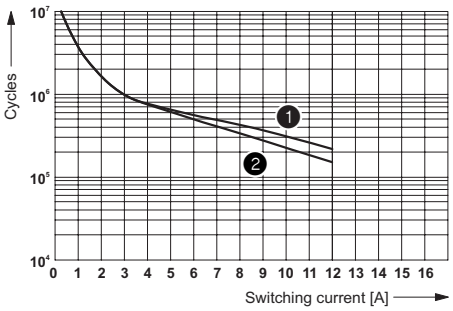


1 AC, ohmic load
2 DC, ohmic load
3 DC, L/R = 40 ms

Service life reduction factor with various cos phi



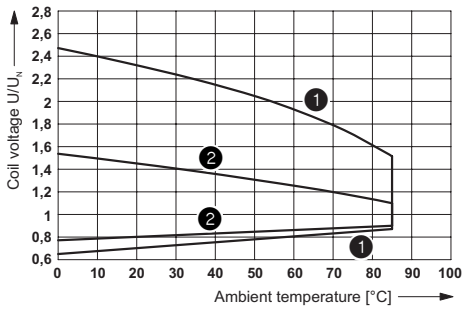
Electrical service life



1 250 V AC, ohmic load (DC coils)
2 250 V AC, ohmic load (AC coils)

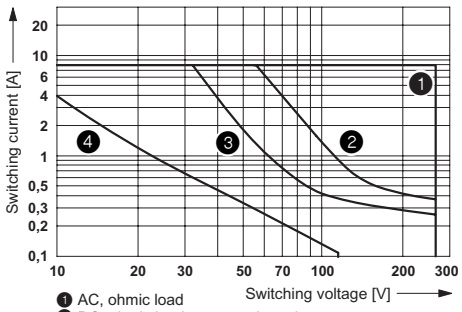
PR1-RSC3.../2x21 (2 PDT)

Operating voltage range of the relay



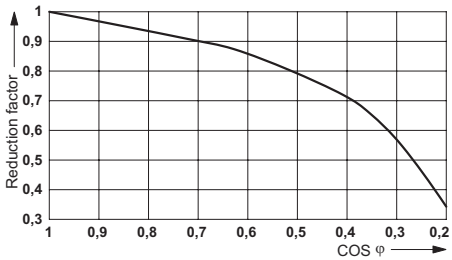
1 DC coils
2 AC coils

Interrupting rating

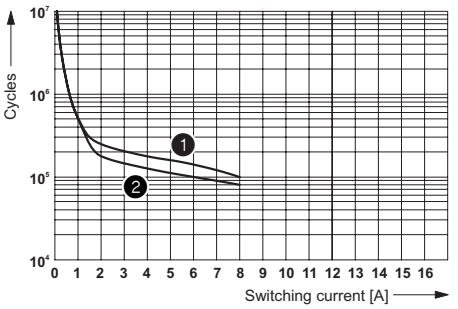


1 AC, ohmic load
2 DC, ohmic load, contacts in series
3 DC, ohmic load
4 DC, L/R = 40 ms

Service life reduction factor with various cos phi



Electrical service life



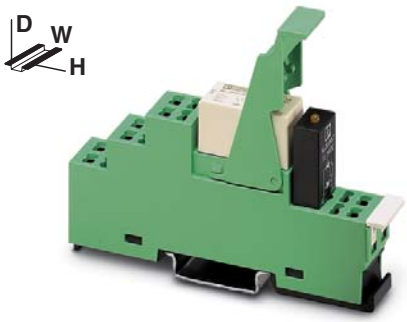
1 250 V AC, ohmic load (DC coils)
2 250 V AC, ohmic load (AC coils)

PR1 fully assembled relay modules with spring-cage connection

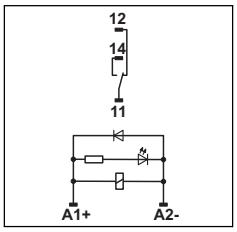
PR1 fully assembled relay modules, comprising:
- Relay base
- 1/2 PDT relay
- Relay retaining bracket
- Input module/interference suppr. module
- Marking labels

The advantages:
- Logical contact arrangement thanks to 1/3-level relay base
- Operational reliability thanks to sealed relay
- Safe isolation between coil and contact side

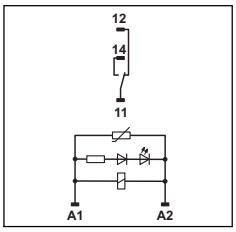
Notes:
Type of housing: Polyamide fiber reinforced PA-F, color: Green.
For the protection of input and output, inductive loads must be dampened with an effective protective circuit.
If the specified maximum values for multi-layer contact relays are exceeded, the gold plating is destroyed. The maximum values of the power contact relay are then valid. This can result in a shorter service life than with a pure power contact.
There is a double spring cage for each terminal point.
Other input voltages on request.



PR1 relay module with 1 PDT relay



DC coils



AC coils

Technical data

Input data		24 V DC	24 V AC	120 V AC	230 V AC
Permissible range (with reference to U_N)		See diagram			
Typ. input current with U_N (for AC: 50/60 Hz)	[mA]	19	34 / 26	9 / 7	6 / 5.5
Typ. response time at U_N	[ms]	8	3 ... 12	3 ... 12	3 ... 12
Typ. release time at U_N	[ms]	10	1.5 ... 14	1.5 ... 16	2 ... 22
Input protection:	24 V DC	Damping diode, Yellow LED			
	24, 120, 230 V AC	Varistor, Yellow LED			

Output data		PR...	PR...AU
Contact type		Single contact, 1 PDT	Single contact, 1 PDT
Contact material		AgNi	AgNi, hard gold-plated
Maximum switching voltage		250 V AC/DC	30 V AC / 36 V DC
Minimum switching voltage		12 V (at 10 mA)	100 mV (at 10 mA)
Limiting continuous current		10 A	50 mA
Maximum inrush current		30 A (300 ms)	50 mA
Min. switching current		100 mA	1 mA (at 24 V)
Interrupting rating (ohmic load) max.		2500 VA	-
		For more data, see diagram	

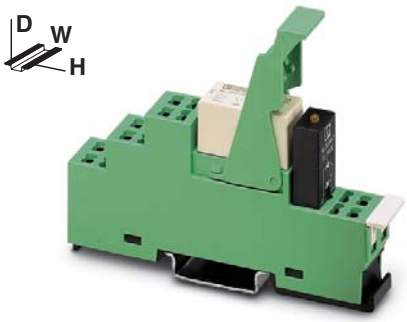
General data		
Test voltage	Winding to contact	4 kV (50 Hz, 1 min.)
	Contact/contact	-
Ambient temperature (operation)		-25°C ... 60°C
Nominal operating mode		100% operating factor
Mechanical service life		3 x 10^7 cycles
Service life, electrical		See diagram
Standards / regulations		IEC 60664, EN 50178, IEC 62103
Pollution degree/surge voltage category		3 / III
Mounting position / Mounting		Any/can be aligned without spacing
Connection data solid / stranded / AWG		0.2 - 1.5 mm^2 / 0.2 - 1.5 mm^2 / 24 - 16
Dimensions	W / H / D	16 mm / 97 mm / 72 mm

Ordering data

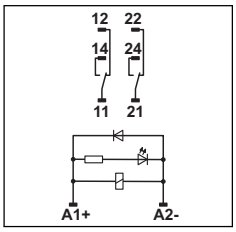
Description	Input voltage U_N	Type	Order No.	Pcs. / Pkt.
Pre-assembled coupling relay modules with miniature power contact relay				
	24 V DC	**PR1-RSP3-LDP-24DC/21**	**2834407**	5
	24 V AC	**PR1-RSP3-LV- 24AC/21**	**2834410**	5
	120 V AC	**PR1-RSP3-LV-120AC/21**	**2834423**	5
	230 V AC	**PR1-RSP3-LV-230AC/21**	**2834436**	5
Pre-fitted coupling relay modules with multi-layer contact relay				
	24 V DC	**PR1-RSP3-LDP-24DC/21AU**	**2834449**	5
	24 V AC	**PR1-RSP3-LV- 24AC/21AU**	**2834452**	5
	120 V AC	**PR1-RSP3-LV-120AC/21AU**	**2834465**	5
	230 V AC	**PR1-RSP3-LV-230AC/21AU**	**2834478**	5

Accessories

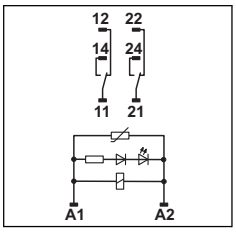
Device marking label, for thermal transfer printer, labeling surface 6 x 15 mm	**EML (15X6) R YE**	**0819288**	1



PR1 relay module with 2 PDT relay



DC coils



AC coils

Technical data

24 V DC	24 V AC	120 V AC	230 V AC
See diagram			
19	34 / 26	9 / 7	6 / 5.5
8	3 ... 12	3 ... 12	3 ... 12
10	1.5 ... 14	1.5 ... 16	2 ... 22
Damping diode, Yellow LED			
Varistor, Yellow LED			
PR...		PR...AU	
Single contact, 2 PDT		Single contact, 2 PDT	
AgNi		AgNi, hard gold-plated	
250 V AC/DC		30 V AC / 36 V DC	
5 V (at 10 mA)		100 mV (at 10 mA)	
8 A		50 mA	
15 A (300 ms)		50 mA	
10 mA (at 5 V)		1 mA (at 24 V)	
2000 VA		-	
For more data, see diagram			
4 kV (50 Hz, 1 min.)			
2.5 kV (50 Hz, 1 min.)			
-25°C ... 60°C			
100% operating factor			
3 x 10^7 cycles			
See diagram			
IEC 60664, EN 50178, IEC 62103			
3 / III			
Any/can be aligned without spacing			
0.2 - 1.5 mm^2 / 0.2 - 1.5 mm^2 / 24 - 16			
16 mm / 97 mm / 72 mm			

Ordering data

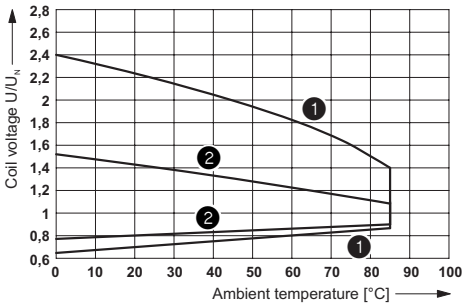
Type	Order No.	Pcs. / Pkt.
PR1-RSP3-LDP-24DC/2X21	**2834562**	5
PR1-RSP3-LV- 24AC/2X21	**2834575**	5
PR1-RSP3-LV-120AC/2X21	**2834588**	5
PR1-RSP3-LV-230AC/2X21	**2834591**	5
PR1-RSP3-LDP-24DC/2X21AU	**2834601**	5
PR1-RSP3-LV- 24AC/2X21AU	**2834614**	5
PR1-RSP3-LV-120AC/2X21AU	**2834627**	5
PR1-RSP3-LV-230AC/2X21AU	**2834630**	5

Accessories

EML (15X6) R YE	**0819288**	1

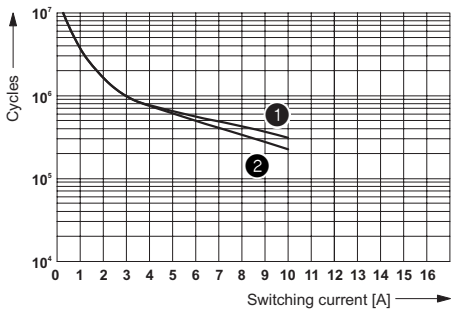
PR1-RSP3.../21 (1 PDT)

Operating voltage range of the relay



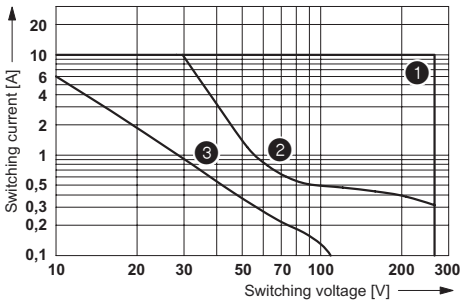
❶ DC coils
❷ AC coils

Electrical service life



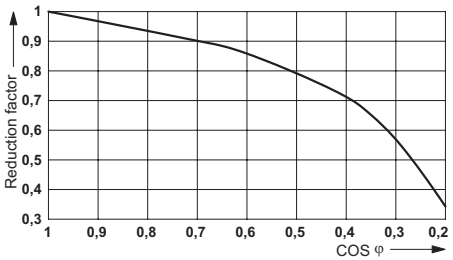
❶ 250 V AC, ohmic load (DC coils)
❷ 250 V AC, ohmic load (AC coils)

Interrupting rating



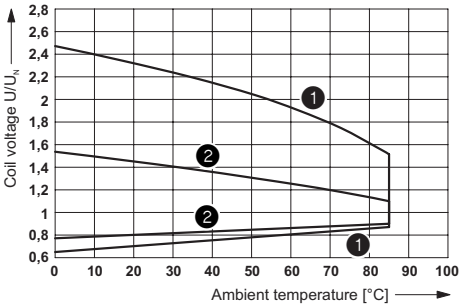
❶ AC, ohmic load
❷ DC, ohmic load
❸ DC, L/R = 40 ms

Service life reduction factor with various cos phi



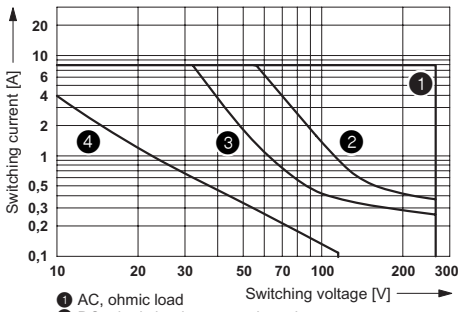
PR1-RSP3.../2x21 (2 PDT)

Operating voltage range of the relay



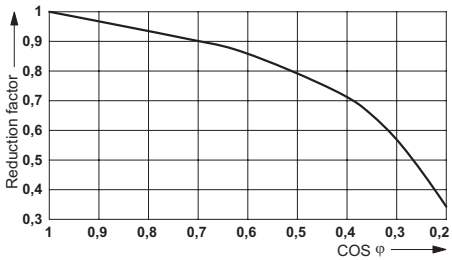
❶ DC coils
❷ AC coils

Interrupting rating

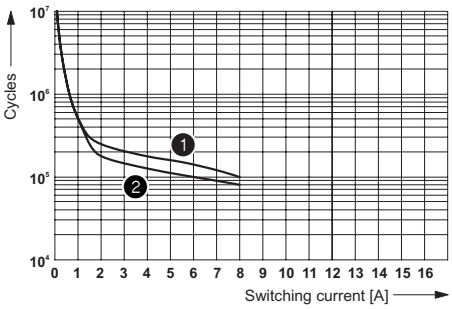


❶ AC, ohmic load
❷ DC, ohmic load, contacts in series
❸ DC, ohmic load
❹ DC, L/R = 40 ms

Service life reduction factor with various cos phi



Electrical service life



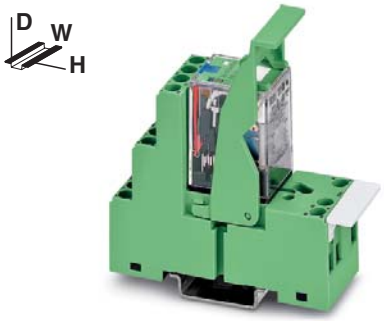
❶ 250 V AC, ohmic load (DC coils)
❷ 250 V AC, ohmic load (AC coils)

PR2 fully assembled relay modules

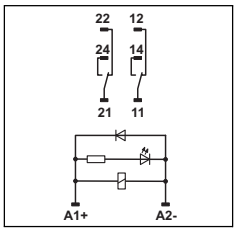
PR2 fully assembled relay modules, comprising:
- Relay base
- 2/4 PDT relay
- Relay retaining bracket
- Input module/interference suppr. module (AC types only)
- Marking labels

The advantages:
- Relay with lockable manual operation and status LED
- With DC types, free-wheeling diode is integrated into relay
- Mechanical switch position indicator
- Logical contact arrangement thanks to 1/3-level relay base
- Screw or spring-cage connection
- 4 PDT types with multi-layer gold contacts

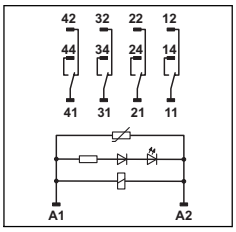
Notes:
Type of housing: Polyamide fiber reinforced PA-F, color: Green.
For the protection of input and output, inductive loads must be dampened with an effective protective circuit.
If the specified maximum values for multi-layer contact relays are exceeded, the gold plating is destroyed. The maximum values of the power contact relay are then valid. This can result in a shorter service life than with a pure power contact.
Other input voltages on request.
The DC types do not have a plug-in module because the status LED and the free-wheeling diode are integrated directly into the relay.



PR2 relay module with screw connection



DC coils



AC coils

Technical data

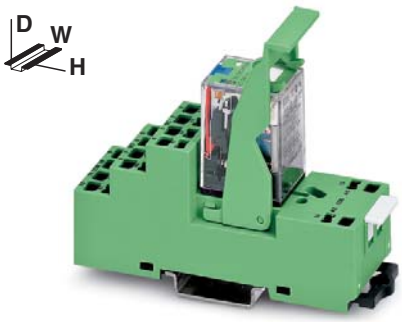
Input data		24 V DC	24 V AC	120 V AC	230 V AC
Permissible range (with reference to U_N)		See diagram			
Typ. input current with U_N (for AC: 50/60 Hz)	[mA]	38	54 / 46	11 / 9	5 / 4
Typ. response time at U_N	[ms]	13	4 ... 10	4 ... 10	4 ... 10
Typ. release time at U_N	[ms]	5	3 ... 12	3 ... 12	3 ... 12
Input protection:	24 V DC	Damping diode, green LED			
	24, 120, 230 V AC	Varistor, red LED			
Output data		PR...		PR...AU	
Contact type		Single contact, 2 PDT		Single contact, 4 PDT	
Contact material		Ag		AgNi, hard gold-plated	
Maximum switching voltage		250 V AC / 125 V DC		250 V AC / 125 V DC	
Minimum switching voltage		5 V		1 V	
Limiting continuous current		10 A		5 A	
Maximum inrush current		20 A (15 ms)		12 A (15 ms)	
Min. switching current		1 mA		1 mA	
Interrupting rating (ohmic load) max.		2500 VA		1250 VA	
		For more data, see diagram			
General data					
Test voltage	Winding to contact	2 kV (50 Hz, 1 min.)			
	Contact/contact	2 kV (50 Hz, 1 min.)			
Ambient temperature (operation)		-25°C ... 60°C			
Nominal operating mode		100% operating factor			
Mechanical service life		5 x 10^7 cycles			
Service life, electrical		See diagram			
Standards / regulations		IEC 60664, EN 50178, IEC 62103			
Pollution degree/surge voltage category		3 / II			
Mounting position / Mounting		Any/can be aligned without spacing			
Connection data solid / stranded / AWG		0.14 - 2.5 mm^2 / 0.14 - 2.5 mm^2 / 26 - 14			
Dimensions	W / H / D	27 mm / 78.5 mm / 86 mm			

Ordering data

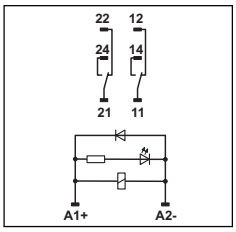
Description	Input voltage U_N	Type	Order No.	Pcs. / Pkt.
Pre-assembled coupling relay modules with 2 PDT contact relay				
	24 V DC	**PR2-RSC3-LDP-24DC/2X21**	**2834643**	5
	24 V AC	**PR2-RSC3-LV- 24AC/2X21**	**2834656**	5
	120 V AC	**PR2-RSC3-LV-120AC/2X21**	**2834669**	5
	230 V AC	**PR2-RSC3-LV-230AC/2X21**	**2834672**	5
Pre-assembled coupling relay modules with 4 PDT contact relay and additional hard gold-plating				
	24 V DC	**PR2-RSC3-LDP-24DC/4X21AU**	**2834724**	5
	24 V AC	**PR2-RSC3-LV- 24AC/4X21AU**	**2834737**	5
	120 V AC	**PR2-RSC3-LV-120AC/4X21AU**	**2834740**	5
	230 V AC	**PR2-RSC3-LV-230AC/4X21AU**	**2834753**	5

Accessories

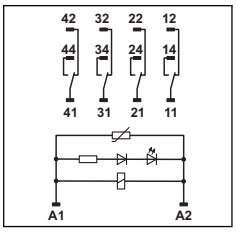
Device marking label, for thermal transfer printer, labeling surface 6 x 15 mm	**EML (15X6) R YE**	**0819288**	1



PR2 relay module with spring-cage connection



DC coils



AC coils

Technical data

24 V DC	24 V AC	120 V AC	230 V AC
See diagram			
38	54 / 46	11 / 9	5 / 4
13	4 ... 10	4 ... 10	4 ... 10
5	3 ... 12	3 ... 12	3 ... 12
Damping diode, green LED			
Varistor, red LED			
PR...		PR...AU	
Single contact, 2 PDT		Single contact, 4 PDT	
Ag		AgNi, hard gold-plated	
250 V AC / 125 V DC		250 V AC / 125 V DC	
5 V		1 V	
10 A		5 A	
20 A (15 ms)		12 A (15 ms)	
1 mA		1 mA	
2500 VA		1250 VA	
For more data, see diagram			
2 kV (50 Hz, 1 min.)			
2 kV (50 Hz, 1 min.)			
-25°C ... 60°C			
100% operating factor			
5 x 10^7 cycles			
See diagram			
IEC 60664, EN 50178, IEC 62103			
3 / II			
Any/can be aligned without spacing			
0.2 - 1.5 mm^2 / 0.2 - 1.5 mm^2 / 24 - 16			
31 mm / 95 mm / 84 mm			

Ordering data

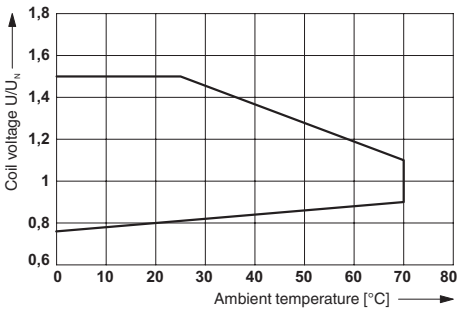
Type	Order No.	Pcs. / Pkt.
PR2-RSP3-LDP-24DC/2X21	**2834685**	5
PR2-RSP3-LV- 24AC/2X21	**2834698**	5
PR2-RSP3-LV-120AC/2X21	**2834708**	5
PR2-RSP3-LV-230AC/2X21	**2834711**	5
PR2-RSP3-LDP-24DC/4X21AU	**2834766**	5
PR2-RSP3-LV- 24AC/4X21AU	**2834779**	5
PR2-RSP3-LV-120AC/4X21AU	**2834782**	5
PR2-RSP3-LV-230AC/4X21AU	**2834795**	5

Accessories

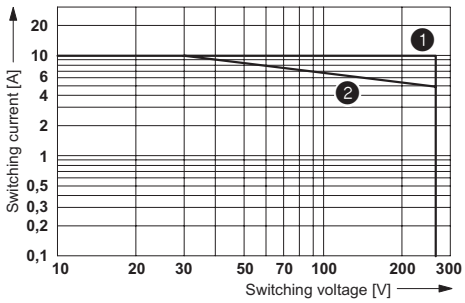
EML (15X6) R YE	**0819288**	1

PR2-RS.../2x21 (2 PDT)

Operating voltage range of relay T_u=T_{coil}

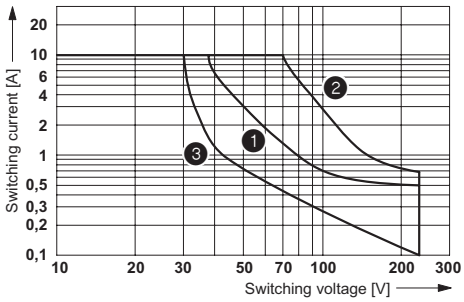


AC interrupting rating



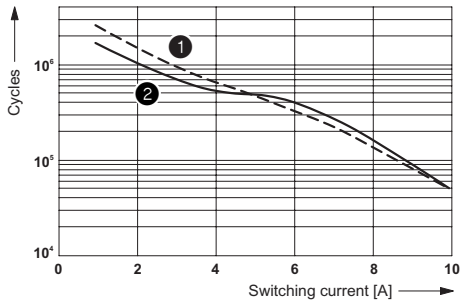
❶ Ohmic load
❷ cos φ = 0.4

DC interrupting rating



❶ Ohmic load
❷ ohmic load, contacts in series
❸ L/R < 7 ms

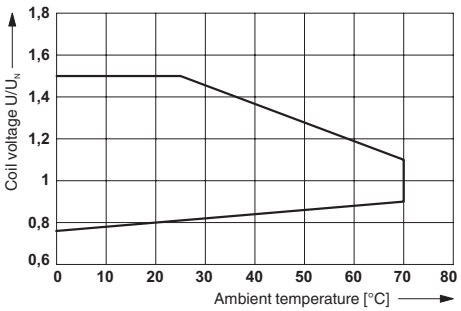
Electrical service life



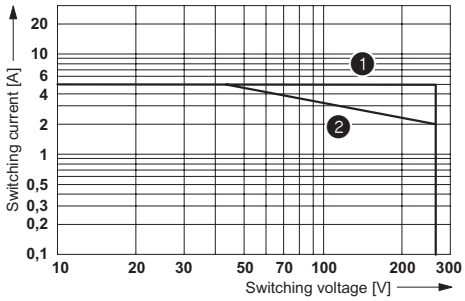
❶ 250 V AC, ohmic load
❷ 30 V DC, ohmic load

PR2-RS.../4x21 (4 PDT)

Operating voltage range of relay T_u=T_{coil}

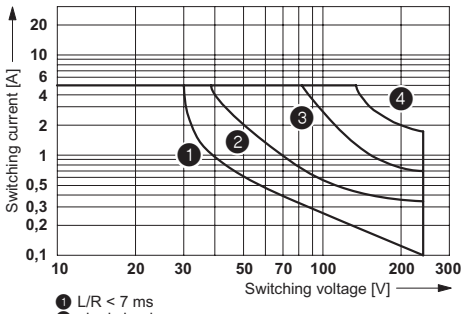


AC interrupting rating



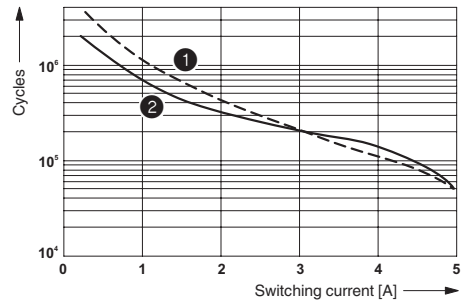
❶ Ohmic load
❷ cos φ = 0.4

DC interrupting rating

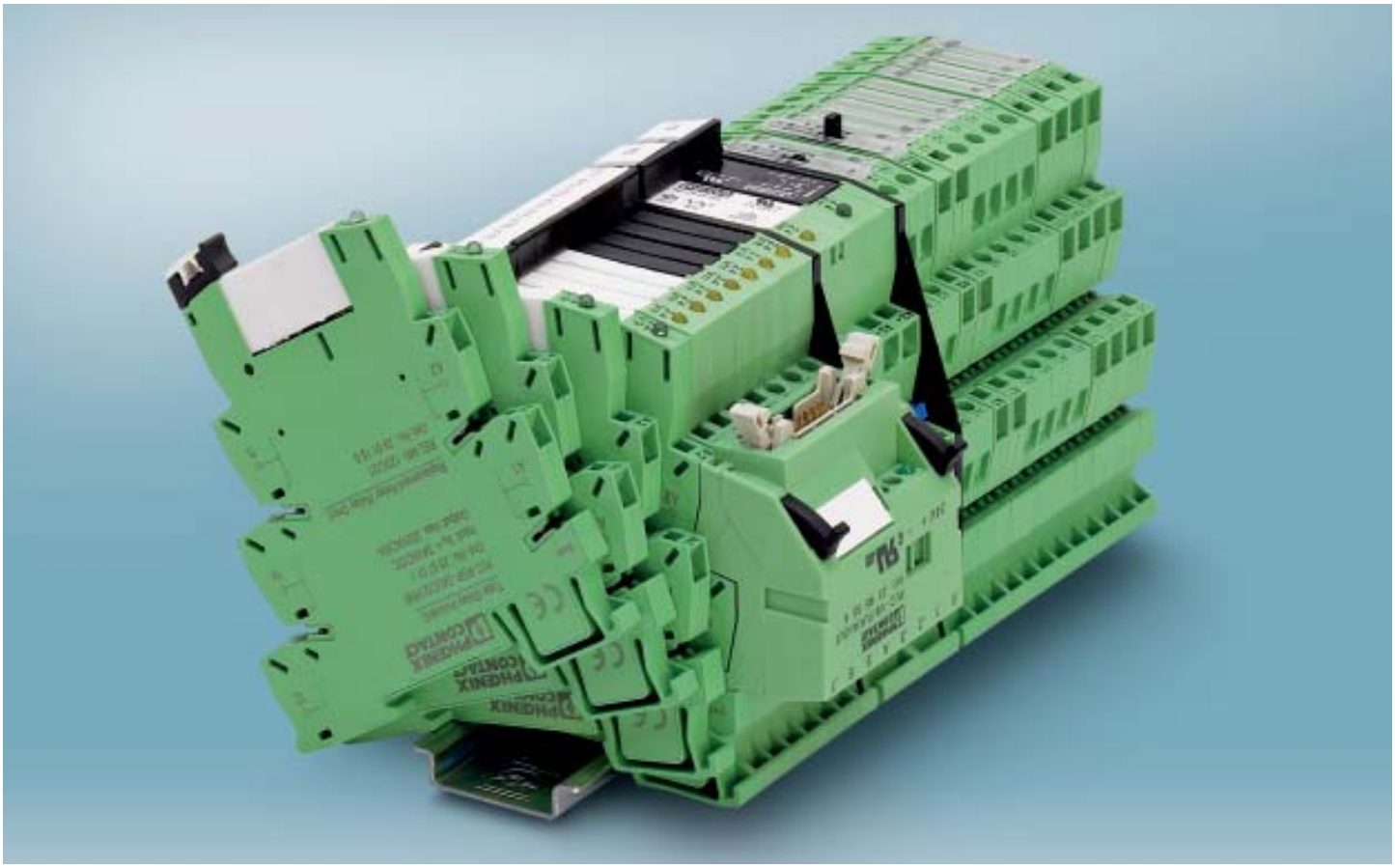


❶ L/R < 7 ms
❷ ohmic load
❸ ohmic load, 2 contacts in series
❹ ohmic load, 4 contacts in series

Electrical service life



❶ 250 V AC, ohmic load
❷ 30 V DC, ohmic load



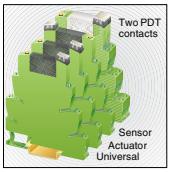
PLC-INTERFACE is

- The interface between automation equipment and system I/O devices with a **high switching capacity**
- Available as a plug-in **relay interface or** a **solid-state relay interface**
- Interface technology with all the benefits of the proven modular terminal block technology

PLC-INTERFACE saves

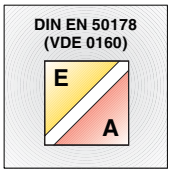
- Wiring overheads thanks to the **convenient pitch-free plug-in bridge system**
- Space on the DIN rail, thereby freeing up more of the control cabinet
- Storage costs and ordering overheads thanks to the universal plug-in PDT relays
- Material costs as a result of inexpensive components
- Power and return conductor terminal blocks for sensor and actuator wiring

PLC-INTERFACE provides comfort and service



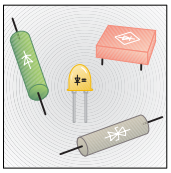
- With **actuator and sensor versions** that can accommodate all sensor and actuator connections directly on the interface
- By allowing you to **simply replace** relays or solid-state relays without having to loosen the wiring
- With an LED status indicator for each channel

PLC-INTERFACE provides safety

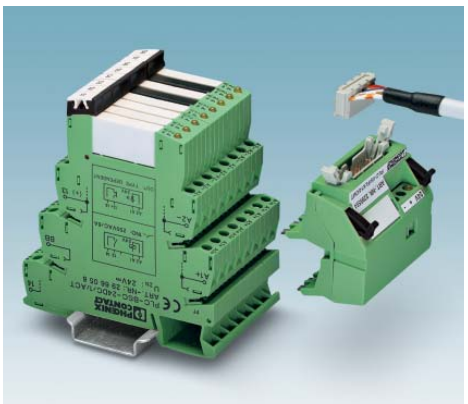


- For protection against environmental influences thanks to RT III (IP67)-protected relays and solid-state relays
- Via relays with **safe isolation** in accordance with DIN EN 50178 (VDE 0160)
- Using high-quality and reliable Phoenix Contact connection method; with a choice of **screw or spring-cage connections**

PLC-INTERFACE simplifies



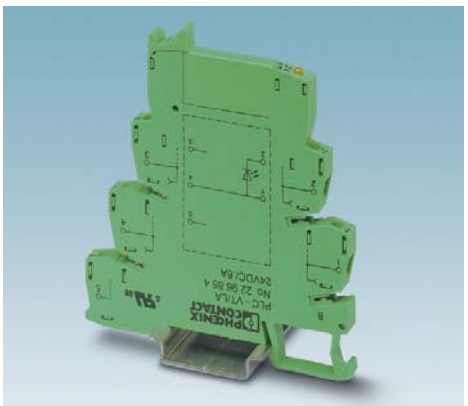
- Installation thanks to the **integrated input and protective circuit**
- Labeling with **standard terminal block marking material**
- Potential connections by allowing you to bridge all important potentials



PLC-V8 adapter
Connecting eight PLC-INTERFACE modules to the PLC system cabling for input and output functions. For more details, see page 125.

PLC-R...21 and PLC-O...
Relay and solid-state relay interfaces with a width of 6.2 mm designed for universal use. With a choice of screw or spring-cage connection.

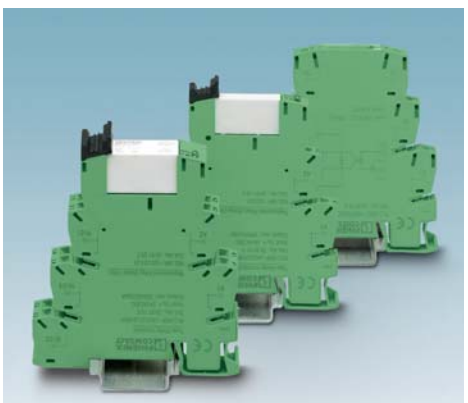
PLC-R...21-21
The PLC-R...21-21 relay series consists of 14 mm wide basic terminal blocks and plug-in miniature relays with 2 PDT contacts for switching capacities up to 250 V AC/6 A.



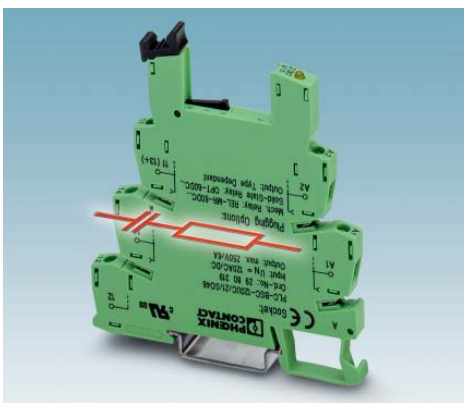
PLC-VT
Feed-through terminal block for PLC-INTERFACE and the system cabling for passive signal transfer. For more details, see page 264.

PLC-...SEN and PLC-...ACT
The specialist in space-saving sensor and actuator wiring without additional power or output terminal blocks. All sensor connections are directly connected to the interface.

PLC-...IC and PLC-...HC
PLC-INTERFACE for high inrush currents (lamp loads) and PLC-INTERFACE for high continuous load current.



PLC-...RW
Relay and/or solid-state relay modules especially for railway engineering applications.



PLC-BS...SO46
PLC-INTERFACE basic terminal block for protection against interference voltages and interference currents on the input side. Can be fitted with relays or solid-state relays.

Accessories
PLC accessories such as power terminal blocks, plug-in bridges, partition plates, etc.

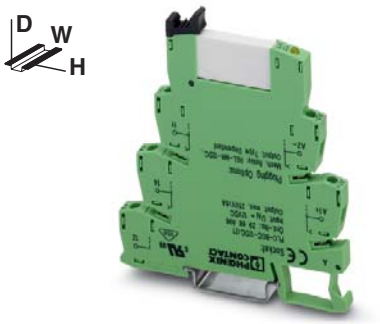
Universal PLC series with PDT relay

PLC-R... is the relay series that can be used universally and consists of basic terminal blocks and plug-in relays with PDT contacts.

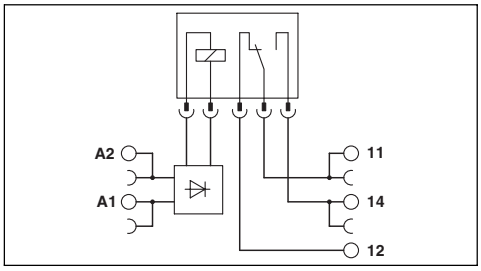
The advantages:

- Slim design
- Screw-type, spring-cage, and push-in technology
- Functional plug-in bridges
- Integrated input and interference suppression circuit
- RT III sealed relay
- Safe isolation according to DIN EN 50178 between coil and contact
- Efficient connection to system cabling using V8 adapter

Notes:
Type of housing: Polyamide PA non-reinforced, color: Green.
For marking systems and mounting material, see CLIPLINE catalog, part 2.
Separating plate PLC-ATP must be installed for voltages larger than 250 V (L1, L2, L3) between identical terminal blocks in adjacent modules. Potential bridging is then carried out with FBST 8-PLC... or FBST 500....
If the specified maximum values for multi-layer contact relays are exceeded, the gold plating is destroyed. The maximum values of the power contact relay are then valid. This can result in a shorter service life than with a pure power contact.
For diagrams of operating voltage ranges, see page 103
[1]) 120 and 230 V types up to 55°C
[2]) 230 V types up to 55°C



1 PDT with power contact



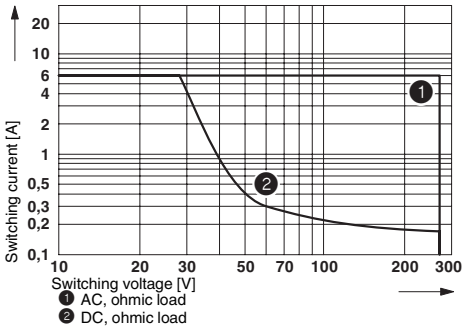
Technical data

Input data		①	②	③	④	⑤	⑥	⑦
Typ. input current at U_N	[mA]	15.3	9	11	9.2	4.8	3.5	3.2
Response/release time at U_N	[ms]	5 / 8	5 / 8	6 / 15	5 / 8	5 / 8	6 / 15	7 / 15
Input circuit DC		Yellow LED, protection against polarity reversal, free-wheeling diode						
Input circuit AC/DC		Yellow LED, bridge rectifier						
Output data								
Contact material		AgSnO						
Max. switching voltage		250 V AC/DC						
Min. switching voltage		5 V (at 100 mA)						
Limiting continuous current		6 A						
Max. inrush current		(On request)						
Min. switching current		10 mA (at 12 V)						
General data								
Test voltage input/output		4 kV AC (50 Hz, 1 min.)						
Ambient temperature (operation)		-40°C ... 60°C[1])						
Mechanical service life		2 x 10^7 cycles						
Standards / regulations		IEC 60664, EN 50178, IEC 62103						
Connection data solid / stranded / AWG		0.14 - 2.5 mm^2 / 0.14 - 2.5 mm^2 / 26 - 14						
Dimensions	W / H / D	6.2 mm / 80 mm / 94 mm						

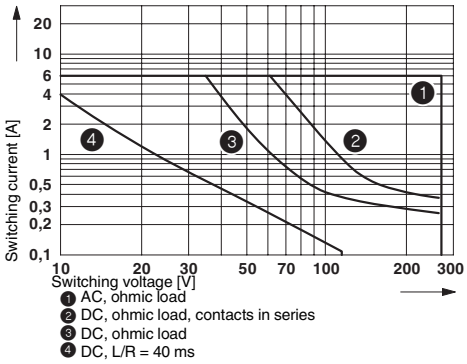
Ordering data

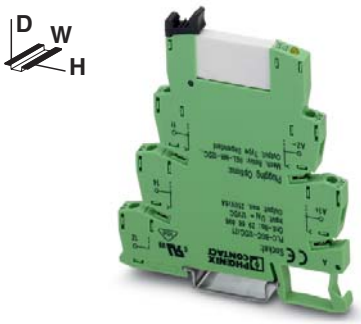
Description		Input voltage U_N	Type	Order No.	Pcs. / Pkt.
PLC-INTERFACE, with **screw connection**					
	①	12 V DC	**PLC-RSC- 12DC/21**	**2966906**	10
	②	24 V DC	**PLC-RSC- 24DC/21**	**2966171**	10
	③	24 V AC/DC	**PLC-RSC- 24UC/21**	**2966184**	10
	④	48 V DC	**PLC-RSC- 48DC/21**	**2966113**	10
	⑤	60 V DC	**PLC-RSC- 60DC/21**	**2966139**	10
	⑥	120 V AC (110 V DC)	**PLC-RSC-120UC/21**	**2966197**	10
	⑦	230 V AC (220 V DC)	**PLC-RSC-230UC/21**	**2966207**	10
PLC-INTERFACE, with **spring-cage connection**					
	①	12 V DC	**PLC-RSP- 12DC/21**	**2967439**	10
	②	24 V DC	**PLC-RSP- 24DC/21**	**2966472**	10
	③	24 V AC/DC	**PLC-RSP- 24UC/21**	**2966485**	10
	④	48 V DC	**PLC-RSP- 48DC/21**	**2966498**	10
	⑤	60 V DC	**PLC-RSP- 60DC/21**	**2966511**	10
	⑥	120 V AC (110 V DC)	**PLC-RSP-120UC/21**	**2966524**	10
	⑦	230 V AC (220 V DC)	**PLC-RSP-230UC/21**	**2966537**	10
PLC-INTERFACE, with **push-in connection**					
	①	12 V DC	**PLC-RPIT- 12DC/21**	**2900316**	10
	②	24 V DC	**PLC-RPIT- 24DC/21**	**2900299**	10
	③	24 V AC/DC	**PLC-RPIT- 24UC/21**	**2900300**	10
	④	48 V DC	**PLC-RPIT- 48DC/21**	**2900301**	10
	⑤	60 V DC	**PLC-RPIT- 60DC/21**	**2900303**	10
	⑥	120 V AC (110 V DC)	**PLC-RPIT-120UC/21**	**2900304**	10
	⑦	230 V AC (220 V DC)	**PLC-RPIT-230UC/21**	**2900305**	10

Electrical interrupting rating for PLC...21 with 1-PDT relay

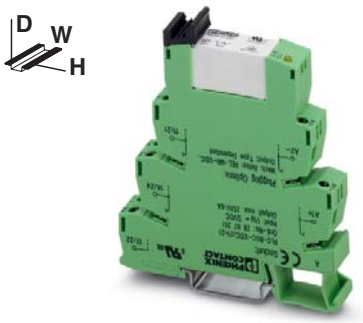


Electrical interrupting rating for PLC...21-21 with 2-PDT relay

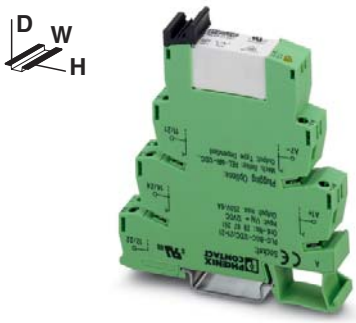




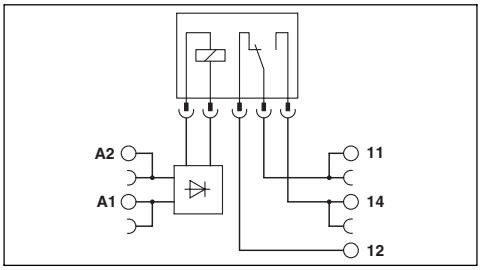
1 PDT with multi-layer gold contact

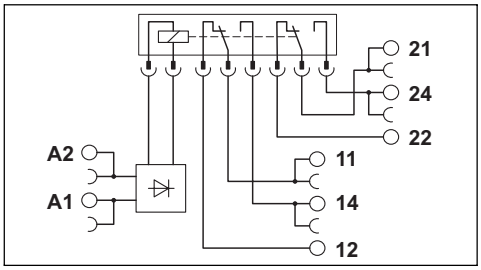


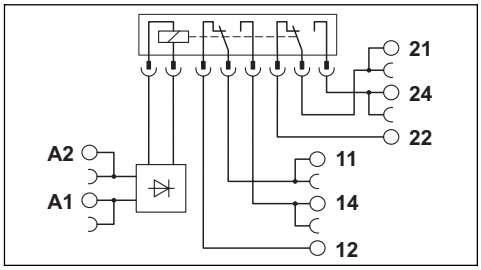
2 PDT with power contact



2 PDT with multi-layer gold contact







Technical data

①	②	③	④	⑤	⑥	⑦
15.3	9	11	9.2	4.8	3.5	3.2
5 / 8	5 / 8	6 / 15	5 / 8	5 / 8	6 / 15	7 / 15

Yellow LED, protection against polarity reversal, free-wheeling diode
Yellow LED, bridge rectifier

AgSnO, hard gold-plated
30 V AC / 36 V DC
100 mV (at 10 mA)
50 mA
50 mA
1 mA (at 24 V)

4 kV AC (50 Hz, 1 min.)
-40°C ... 60°C[1])
2 x 10^7 cycles
IEC 60664, EN 50178, IEC 62103
0.14 - 2.5 mm^2 / 0.14 - 2.5 mm^2 / 26 - 14
6.2 mm / 80 mm / 94 mm

Technical data

①	②	③	④	⑤	⑥	⑦
33	18	17.5	20	10	4.5	4.5
8 / 10	8 / 10	8 / 10	8 / 10	8 / 10	7 / 10	7 / 10

Yellow LED, protection against polarity reversal, free-wheeling diode
Yellow LED, bridge rectifier

AgNi
250 V AC/DC
5 V AC/DC (at 10 mA)
6 A
15 A (300 ms)
10 mA (at 5 V)

4 kV AC (50 Hz, 1 min.)
-40°C ... 60°C[2])
3 x 10^7 cycles
IEC 60664, EN 50178, IEC 62103
0.14 - 2.5 mm^2 / 0.14 - 2.5 mm^2 / 26 - 14
14 mm / 80 mm / 94 mm

Technical data

①	②	③	④	⑤	⑥	⑦
33	18	17.5	20	10	4.5	4.5
8 / 10	8 / 10	8 / 10	8 / 10	8 / 10	7 / 10	7 / 10

Yellow LED, protection against polarity reversal, free-wheeling diode
Yellow LED, bridge rectifier

AgNi, hard gold-plated
30 V AC / 36 V DC
100 mV (at 10 mA)
50 mA
50 mA
1 mA (at 24 V)

4 kV AC (50 Hz, 1 min.)
-40°C ... 60°C[2])
3 x 10^7 cycles
IEC 60664, EN 50178, IEC 62103
0.14 - 2.5 mm^2 / 0.14 - 2.5 mm^2 / 26 - 14
14 mm / 80 mm / 94 mm

Ordering data

Type	Order No.	Pcs. / Pkt.
PLC-RSC- 12DC/21AU	2966919	10
PLC-RSC- 24DC/21AU	2966265	10
PLC-RSC- 24UC/21AU	2966278	10
PLC-RSC- 48DC/21AU	2966126	10
PLC-RSC- 60DC/21AU	2966142	10
PLC-RSC-120UC/21AU	2966281	10
PLC-RSC-230UC/21AU	2966294	10
PLC-RSP- 12DC/21AU	2967442	10
PLC-RSP- 24DC/21AU	2966540	10
PLC-RSP- 24UC/21AU	2966553	10
PLC-RSP- 48DC/21AU	2966566	10
PLC-RSP- 60DC/21AU	2966579	10
PLC-RSP-120UC/21AU	2966582	10
PLC-RSP-230UC/21AU	2966647	10
PLC-RPIT- 12DC/21AU	2900317	10
PLC-RPIT- 24DC/21AU	2900306	10
PLC-RPIT- 24UC/21AU	2900307	10
PLC-RPIT- 48DC/21AU	2900308	10
PLC-RPIT- 60DC/21AU	2900309	10
PLC-RPIT-120UC/21AU	2900310	10
PLC-RPIT-230UC/21AU	2900311	10

Ordering data

Type	Order No.	Pcs. / Pkt.
PLC-RSC- 12DC/21-21	2967235	10
PLC-RSC- 24DC/21-21	2967060	10
PLC-RSC- 24UC/21-21	2967073	10
PLC-RSC- 48DC/21-21	2967248	10
PLC-RSC- 60DC/21-21	2967293	10
PLC-RSC-120UC/21-21	2967086	10
PLC-RSC-230UC/21-21	2967099	10
PLC-RSP- 12DC/21-21	2912497	10
PLC-RSP- 24DC/21-21	2912507	10
PLC-RSP- 24UC/21-21	2912510	10
PLC-RSP- 48DC/21-21	2912523	10
PLC-RSP- 60DC/21-21	2912536	10
PLC-RSP-120UC/21-21	2912549	10
PLC-RSP-230UC/21-21	2912552	10
PLC-RPIT- 12DC/21-21	2900329	10
PLC-RPIT- 24DC/21-21	2900330	10
PLC-RPIT- 24UC/21-21	2900332	10
PLC-RPIT- 48DC/21-21	2900333	10
PLC-RPIT- 60DC/21-21	2900334	10
PLC-RPIT-120UC/21-21	2900335	10
PLC-RPIT-230UC/21-21	2900336	10

Ordering data

Type	Order No.	Pcs. / Pkt.
PLC-RSC- 12DC/21-21AU	2967277	10
PLC-RSC- 24DC/21-21AU	2967125	10
PLC-RSC- 24UC/21-21AU	2967112	10
PLC-RSC- 48DC/21-21AU	2967280	10
PLC-RSC- 60DC/21-21AU	2967303	10
PLC-RSC-120UC/21-21AU	2967138	10
PLC-RSC-230UC/21-21AU	2967141	10
PLC-RSP- 12DC/21-21AU	2912565	10
PLC-RSP- 24DC/21-21AU	2912578	10
PLC-RSP- 24UC/21-21AU	2912581	10
PLC-RSP- 48DC/21-21AU	2912594	10
PLC-RSP- 60DC/21-21AU	2912604	10
PLC-RSP-120UC/21-21AU	2912617	10
PLC-RSP-230UC/21-21AU	2912620	10
PLC-RPIT- 12DC/21-21AU	2900337	10
PLC-RPIT- 24DC/21-21AU	2900338	10
PLC-RPIT- 24UC/21-21AU	2900339	10
PLC-RPIT- 48DC/21-21AU	2900340	10
PLC-RPIT- 60DC/21-21AU	2900341	10
PLC-RPIT-120UC/21-21AU	2900342	10
PLC-RPIT-230UC/21-21AU	2900343	10

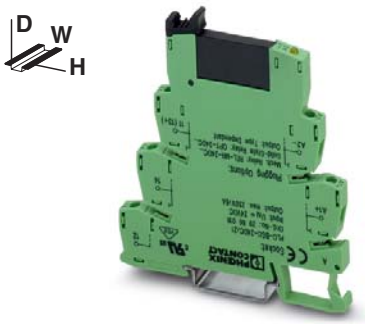
Universal PLC series with solid-state relays

PLC-O... is the solid-state relay series that can be used universally, comprising basic terminal blocks and plug-in solid-state relays.

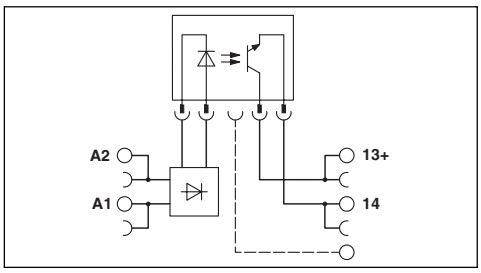
The advantages:

- Slim design
- Screw-type, spring-cage, and push-in technology
- Functional plug-in bridges
- Integrated input circuit
- RT III sealed solid-state relays
- High switching capacity
- Zero voltage switch at AC output,
- Efficient connection to system cabling using V8 adapter

Notes:
Type of housing: Polyamide PA non-reinforced, color: Green.
For marking systems and mounting material, see CLIPLINE catalog, part 2.
Separating plate PLC-ATP must be installed for voltages larger than 250 V (L1, L2, L3) between identical terminal blocks in adjacent modules. Potential bridging is then carried out with FBST 8-PLC... or FBST 500....
For derating curves see page 105



Max. DC voltage output of 100 mA

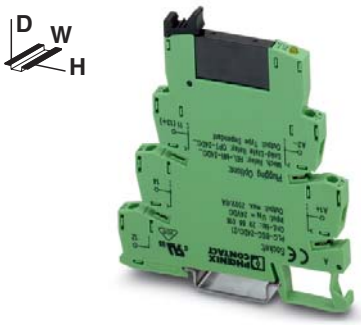


Technical data

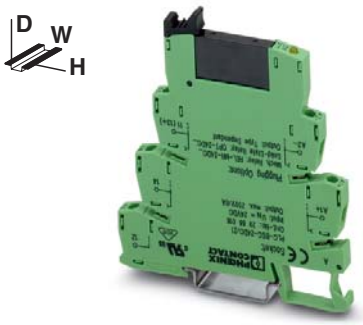
Input data		①	②	③	④	⑤	⑥
Permissible range (with reference to U_N)		0.8 - 1.2	0.8 - 1.2	0.8 - 1.2	0.8 - 1.1	0.9 - 1.1	0.9 - 1.1
Switching level (with reference to U_N)	1 signal ("H")	≥ 0.8	≥ 0.8	≥ 0.8	≥ 0.8	≥ 0.9	≥ 0.8
	0 signal ("L")	≤ 0.4	≤ 0.3	≤ 0.4	≤ 0.4	≤ 0.3	≤ 0.3
Typ. input current at U_N	[mA]	8.5	9	5	3	3.5	3.5
Typ. switch-on time at U_N	[ms]	0.02	0.03	0.04	1	3	3
Typ. switch-off time at U_N	[ms]	0.3	0.3	2	3	4	5
Transmission frequency f_{limit}	[Hz]	300	300	100	50	10	10
Input circuit DC		Yellow LED, protection against polarity reversal, free-wheeling diode					
Input circuit AC/DC		Yellow LED, bridge rectifier					
Output data							
Max. switching voltage		48 V DC					
Min. switching voltage		3 V DC					
Max. inrush current		-					
Min./max. switching current		- / 100 mA					
Output protection		Protection against polarity reversal, surge protection					
Voltage drop at max. limiting continuous current		≤ 1 V					
Leakage current in off state		-					
Phase angle (cos ϕ)		-					
Max. load value		-					
General data							
Test voltage input/output		2.5 kV (50 Hz, 1 min.)					
Ambient temperature (operation)		-25°C ... 60°C					
Standards / regulations		IEC 60664, EN 50178, IEC 62103					
Pollution degree/surge voltage category		2 / III					
Connection data solid / stranded / AWG		0.14 - 2.5 mm² / 0.14 - 2.5 mm² / 26 - 14					
Dimensions	W / H / D	6.2 mm / 80 mm / 94 mm					

Ordering data

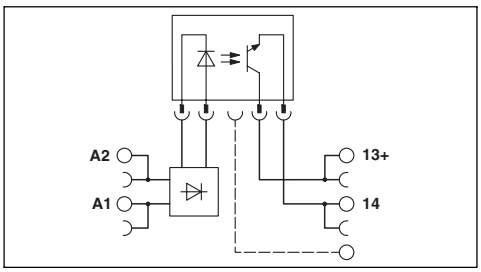
Description		Input voltage U_N	Type	Order No.	Pcs. / Pkt.
PLC-INTERFACE, with **screw connection**					
	①	24 V DC	**PLC-OSC- 24DC/ 48DC/100**	**2966728**	10
	②	48 V DC	**PLC-OSC- 48DC/ 48DC/100**	**2966993**	10
	③	60 V DC	**PLC-OSC- 60DC/ 48DC/100**	**2967455**	10
	④	125 V DC	**PLC-OSC-125DC/ 48DC/100**	**2980047**	10
	⑤	120 V AC (110 V DC)	**PLC-OSC-120UC/ 48DC/100**	**2966744**	10
	⑥	230 V AC (220 V DC)	**PLC-OSC-230UC/ 48DC/100**	**2966757**	10
PLC-INTERFACE, with **spring-cage connection**					
	①	24 V DC	**PLC-OSP- 24DC/ 48DC/100**	**2967549**	10
	②	48 V DC	**PLC-OSP- 48DC/ 48DC/100**	**2967743**	10
	③	60 V DC	**PLC-OSP- 60DC/ 48DC/100**	**2967756**	10
	④	120 V AC (110 V DC)	**PLC-OSP-120UC/ 48DC/100**	**2967552**	10
	⑤	230 V AC (220 V DC)	**PLC-OSP-230UC/ 48DC/100**	**2967565**	10
PLC-INTERFACE, with **push-in connection**					
	①	24 V DC	**PLC-OPIT- 24DC/ 48DC/100**	**2900352**	10
	②	48 V DC	**PLC-OPIT- 48DC/ 48DC/100**	**2900353**	10
	③	60 V DC	**PLC-OPIT- 60DC/ 48DC/100**	**2900354**	10
	④	120 V AC (110 V DC)	**PLC-OPIT-120UC/ 48DC/100**	**2900355**	10
	⑤	230 V AC (220 V DC)	**PLC-OPIT-230UC/ 48DC/100**	**2900356**	10

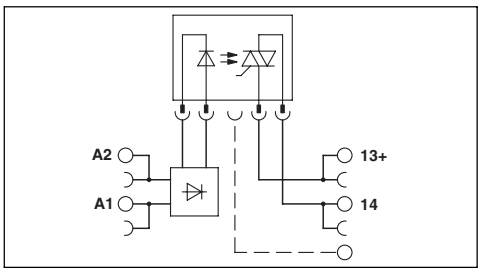


Max. DC voltage output of 3 A



Max. AC voltage output of 750 mA





Technical data

①	②	③	④	⑤	⑥
0.8 - 1.2	0.8 - 1.2	0.8 - 1.2	0.8 - 1.1	0.9 - 1.1	0.9 - 1.1
≥ 0.8	≥ 0.8	≥ 0.8	≥ 0.8	≥ 0.8	≥ 0.8
≤ 0.4	≤ 0.4	≤ 0.3	≤ 0.3	≤ 0.3	≤ 0.3
8.5	9	5	3	3.5	3.5
0.02	0.03	0.04	0.04	3.5	4
0.3	0.3	0.5	0.6	7	7
300	300	100	100	10	10

Yellow LED, protection against polarity reversal, free-wheeling diode
Yellow LED, bridge rectifier

33 V DC
3 V DC
15 A (10 ms)
- / 3 A (see derating curve)
Protection against polarity reversal, surge protection
≤ 200 mV
-
-
-

2.5 kV (50 Hz, 1 min.)
-25°C ... 60°C
IEC 60664, EN 50178, IEC 62103
2 / III
0.14 - 2.5 mm² / 0.14 - 2.5 mm² / 26 - 14
6.2 mm / 80 mm / 94 mm

Technical data

①	②	③	④	⑤	⑥
0.8 - 1.2	0.8 - 1.2	0.8 - 1.2	0.8 - 1.1	0.9 - 1.1	0.8 - 1.1
≥ 0.8	≥ 0.8	≥ 0.8	≥ 0.8	≥ 0.8	≥ 0.8
≤ 0.25	≤ 0.25	≤ 0.3	≤ 0.3	≤ 0.25	≤ 0.25
8	9	6	3.5	4	3.5
10	10	10	10	10	10
10	10	10	10	10	10
10	10	10	10	3	3

Yellow LED, protection against polarity reversal, free-wheeling diode
Yellow LED, bridge rectifier

253 V AC
24 V AC
30 A (10 ms)
10 mA / 0.75 A (see derating curve)
RCV circuit
< 1 V
< 1 mA (in off state)
0.5
4.5 A²s

2.5 kV (50 Hz, 1 min.)
-25°C ... 60°C
IEC 60664, EN 50178, IEC 62103
2 / III
0.14 - 2.5 mm² / 0.14 - 2.5 mm² / 26 - 14
6.2 mm / 80 mm / 94 mm

Ordering data

Type	Order No.	Pcs. / Pkt.
PLC-OSC- 24DC/ 24DC/ 2	**2966634**	10
PLC-OSC- 48DC/ 24DC/ 2	**2967002**	10
PLC-OSC- 60DC/ 24DC/ 2	**2967468**	10
PLC-OSC-125DC/ 24DC/ 2	**2980050**	10
PLC-OSC-120UC/ 24DC/ 2	**2966650**	10
PLC-OSC-230UC/ 24DC/ 2	**2966663**	10
PLC-OSP- 24DC/ 24DC/ 2	**2967471**	10
PLC-OSP- 48DC/ 24DC/ 2	**2967727**	10
PLC-OSP- 60DC/ 24DC/ 2	**2967730**	10
PLC-OSP-120UC/ 24DC/ 2	**2967484**	10
PLC-OSP-230UC/ 24DC/ 2	**2967497**	10
PLC-OPIT- 24DC/ 24DC/2	**2900364**	10
PLC-OPIT- 48DC/ 24DC/2	**2900365**	10
PLC-OPIT- 60DC/ 24DC/2	**2900366**	10
PLC-OPIT-120UC/ 24DC/2	**2900367**	10
PLC-OPIT-230UC/ 24DC/2	**2900368**	10

Ordering data

Type	Order No.	Pcs. / Pkt.
PLC-OSC- 24DC/230AC/ 1	**2967840**	10
PLC-OSC- 48DC/230AC/ 1	**2967853**	10
PLC-OSC- 60DC/230AC/ 1	**2967866**	10
PLC-OSC-125DC/230AC/ 1	**2980063**	10
PLC-OSC-120UC/230AC/ 1	**2967879**	10
PLC-OSC-230UC/230AC/ 1	**2967882**	10
PLC-OSP- 24DC/230AC/ 1	**2967895**	10
PLC-OSP- 48DC/230AC/ 1	**2967905**	10
PLC-OSP- 60DC/230AC/ 1	**2967918**	10
PLC-OSP-120UC/230AC/ 1	**2967921**	10
PLC-OSP-230UC/230AC/ 1	**2967934**	10
PLC-OPIT- 24DC/230AC/1	**2900369**	10
PLC-OPIT- 48DC/230AC/1	**2900370**	10
PLC-OPIT- 60DC/230AC/1	**2900371**	10
PLC-OPIT-120UC/230AC/1	**2900372**	10
PLC-OPIT-230UC/230AC/1	**2900374**	10

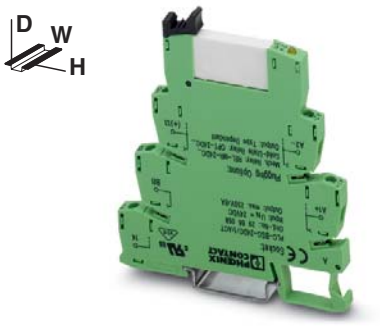
PLC actuator series for output functions

PLC actuator ser. for coupling controller and actuators, such as motors, contactors, valves, etc.

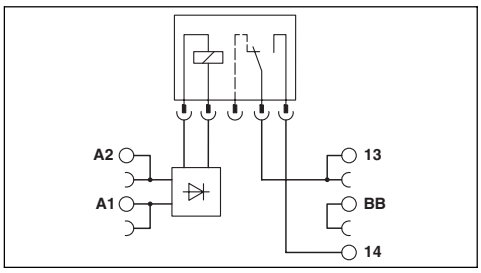
The advantages:

- Actuator connected directly to relay module
- No need for additional modular terminal blocks
- Space savings of up to 80%
- Time savings of up to 60%
- Screw-type, spring-cage, and push-in technology
- Relay modules with safe isolation according to DIN EN 50178 between coil and contact
- Functional plug-in bridges
- Efficient connection to system cabling using V8 adapter

Notes:
Type of housing: Polyamide PA non-reinforced, color: Green.
For marking systems and mounting material, see CLIPLINE catalog, part 2.
Separating plate PLC-ATP must be installed for voltages larger than 250 V (L1, L2, L3) between identical terminal blocks in adjacent modules. Potential bridging is then carried out with FBST 8-PLC... or FBST 500....
For diagrams of operating voltage ranges, see page 103
For derating curves see page 105



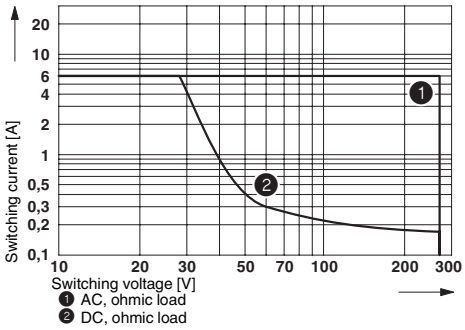
1 N/O contact with power contact



Technical data

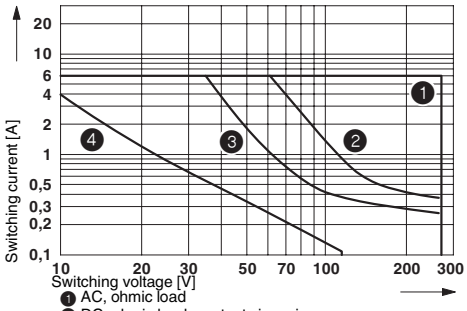
Input data		②
Permissible range (with reference to U_N)		See diagram
Switching level (with reference to U_N)	1 signal ("H") 0 signal ("L")	
Typ. input current at U_N	[mA]	9
Typ. response time/switch-on time at U_N	[ms]	5
Typ. release time/switch-off time at U_N	[ms]	8
Transmission frequency f_{limit}	[Hz]	
Input circuit DC		Yellow LED, protection against polarity reversal, free-wheeling diode
Output data		
Contact material		AgSnO
Max. switching voltage		250 V AC/DC
Min. switching voltage		5 V (at 100 mA)
Limiting continuous current		6 A
Max. inrush current		(On request)
Min. switching current		10 mA (at 12 V)
Output protection		-
Voltage drop at max. limiting continuous current		-
Leakage current in off state		-
Phase angle (cos ϕ)		-
Max. load value		-
General data		
Test voltage input/output		4 kV AC (50 Hz, 1 min.)
Ambient temperature (operation)		-40°C ... 60°C
Mechanical service life		2 x 10^7 cycles
Standards / regulations		IEC 60664, EN 50178, IEC 62103
Pollution degree/surge voltage category		3 / III
Connection data solid / stranded / AWG		0.14 - 2.5 mm^2 / 0.14 - 2.5 mm^2 / 26 - 14
Dimensions	W / H / D	6.2 mm / 80 mm / 94 mm

Electrical interrupting rating for PLC...24DC/1/ACT with 1-N/O relay



❶ AC, ohmic load
❷ DC, ohmic load

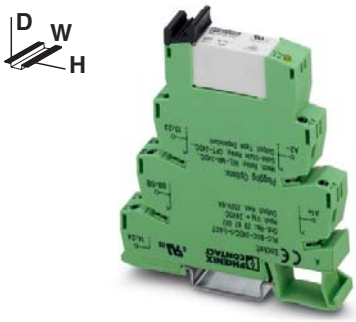
Electrical interrupting rating for PLC...24DC/1-1/ACT with 2-N/O relay



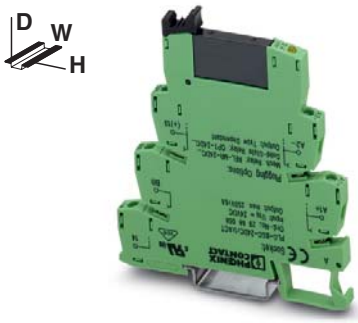
❶ AC, ohmic load
❷ DC, ohmic load, contacts in series
❸ DC, ohmic load
❹ DC, L/R = 40 ms

Ordering data

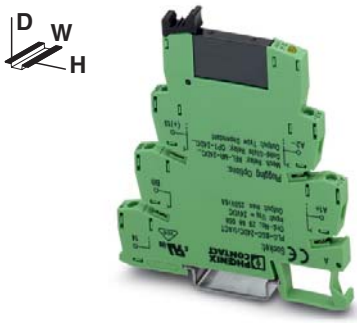
Description	Input voltage U_N	Type	Order No.	Pcs. / Pkt.
PLC-INTERFACE, with **screw connection**				
①	5 V DC			
②	24 V DC	**PLC-RSC- 24DC/ 1/ACT**	**2966210**	10
PLC-INTERFACE, with **spring-cage connection**				
①	5 V DC			
②	24 V DC	**PLC-RSP- 24DC/ 1/ACT**	**2967345**	10
PLC-INTERFACE, with **push-in connection**				
①	5 V DC			
②	24 V DC	**PLC-RPIT- 24DC/ 1/ACT**	**2900312**	10



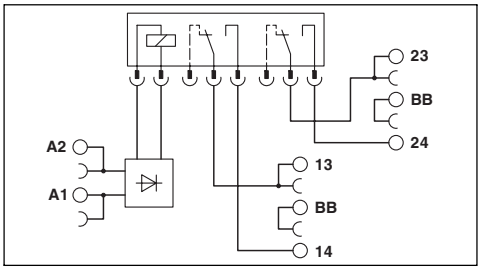
2 N/O contacts with power contact

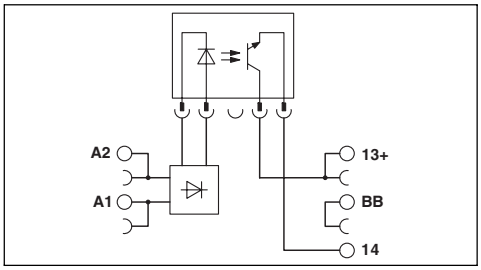


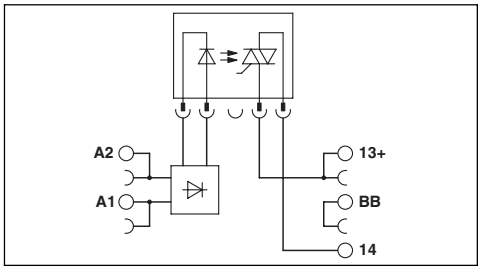
Max. DC voltage output of 3 A



Max. AC voltage output of 750 mA







Technical data

	②
	See diagram
	18
	8
	10
	Yellow LED, protection against polarity reversal, free-wheeling diode
	AgNi
	250 V AC/DC
	5 V AC/DC
	6 A
	8 A
	10 mA
	-
	-
	-
	-
	-
	4 kV AC (50 Hz, 1 min.)
	-40°C ... 60°C
	3 x 10^7 cycles
	IEC 60664, EN 50178, IEC 62103
	3 / III
	0.14 - 2.5 mm^2 / 0.14 - 2.5 mm^2 / 26 - 14
	14 mm / 80 mm / 94 mm

Ordering data

Type	Order No.	Pcs. / Pkt.
PLC-RSC- 24DC/ 1- 1/ACT	**2967109**	10

Technical data

①	②
0.8 - 1.2	0.8 - 1.2
≥ 0.8	≥ 0.8
≤ 0.25	≤ 0.4
9.5	8.5
0.02	0.02
0.3	0.3
300	300
Yellow LED, protection against polarity reversal, free-wheeling diode	
-	
33 V DC	
3 V DC	
3 A (see derating curve)	
15 A (10 ms)	
-	
Protection against polarity reversal, surge protection	
≤ 200 mV	
-	
-	
-	
2.5 kV (50 Hz, 1 min.)	
-25°C ... 60°C	
-	
IEC 60664, EN 50178, IEC 62103	
2 / III	
0.14 - 2.5 mm^2 / 0.14 - 2.5 mm^2 / 26 - 14	
6.2 mm / 80 mm / 94 mm	

Ordering data

Type	Order No.	Pcs. / Pkt.
PLC-OSC- 5DC/ 24DC/ 2/ACT	**2980144**	10
PLC-OSC- 24DC/ 24DC/ 2/ACT	**2966676**	10
PLC-OSP- 5DC/ 24DC/ 2/ACT	**2980157**	10
PLC-OSP- 24DC/ 24DC/ 2/ACT	**2967507**	10
PLC-OPIT- 5DC/ 24DC/2/ACT	**2900375**	10
PLC-OPIT- 24DC/ 24DC/2/ACT	**2900376**	10

Technical data

②
0.8 - 1.2
≥ 0.8
≤ 0.25
9
3
9
10
Yellow LED, protection against polarity reversal, free-wheeling diode
-
253 V AC
24 V AC
0.75 A (see derating curve)
30 A (10 ms)
10 mA
RCV circuit
< 1 V
< 1 mA (in off state)
0.5
4.5 A^2s
2.5 kV (50 Hz, 1 min.)
-25°C ... 60°C
-
IEC 60664, EN 50178, IEC 62103
2 / III
0.14 - 2.5 mm^2 / 0.14 - 2.5 mm^2 / 26 - 14
6.2 mm / 80 mm / 94 mm

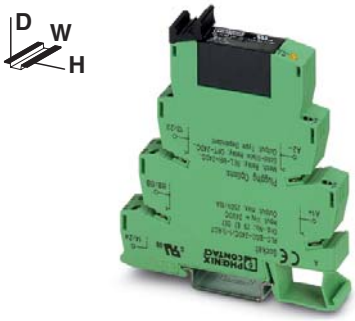
Ordering data

Type	Order No.	Pcs. / Pkt.
PLC-OSC- 24DC/230AC/ 1/ACT	**2967947**	10

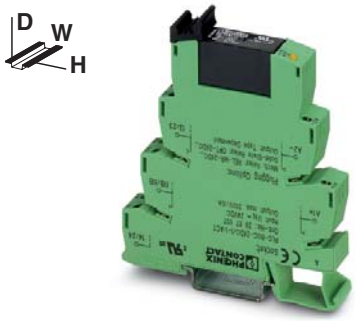
PLC actuator series for output functions

PLC actuator series with solid-state power relays for coupling the controller and actuators, such as motors, contactors, valves, etc.

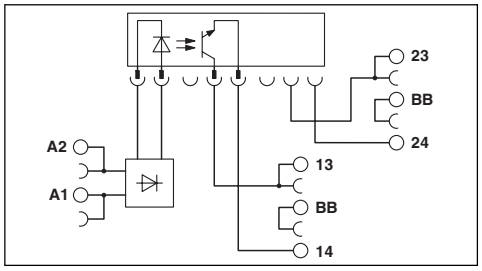
Notes:
Type of housing: Polyamide PA non-reinforced, color: Green.
For marking systems and mounting material, see CLIPLINE catalog, part 2.
Separating plate PLC-ATP must be installed for voltages larger than 250 V (L1, L2, L3) between identical terminal blocks in adjacent modules. Potential bridging is then carried out with FBST 8-PLC... or FBST 500....
For derating curves see page 105

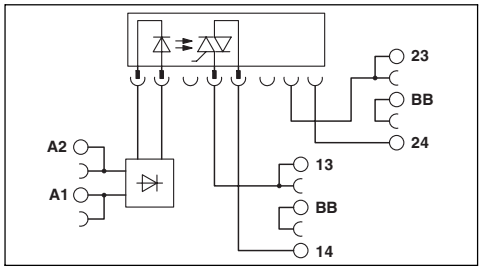


Max. DC voltage output of 5 A



Max. AC voltage output of 2 mA





		Technical data	Technical data
Input data		①	①
Permissible range (with reference to U_N)		0.8 - 1.2	0.8 - 1.2
Switching level (with reference to U_N)	1 signal ("H")	≥ 0.8	≥ 0.8
	0 signal ("L")	≤ 0.4	≤ 0.4
Typ. input current at U_N	[mA]	9	9
Typ. switch-on time at U_N	[ms]	0.02	10
Typ. switch-off time at U_N	[ms]	0.4	10
Transmission frequency f_{limit}	[Hz]	300	10
Input circuit DC		Yellow LED, protection against polarity reversal, free-wheeling diode	Yellow LED, protection against polarity reversal, free-wheeling diode
Output data			
Max. / min. switching voltage		33 V DC / 3 V DC	253 V AC / 24 V AC
Max. inrush current		15 A (10 ms)	30 A (10 ms)
Min./max. switching current		- / 5 A (see derating curve)	25 mA / 2 A (see derating curve)
Output protection		Protection against polarity reversal, surge protection	Surge protection
Voltage drop at max. limiting continuous current		≤ 200 mV	≤ 1 V
Leakage current in off state		-	Typ. 1 mA
Phase angle (cos ϕ)		-	0.5
Max. load value		-	4 A²s (tp = 10 ms, at 25°C)
General data			
Rated insulation voltage		100 V DC	250 V AC
Rated surge voltage		1.5 kV, basic insulation	4 kV / basic insulation
Ambient temperature (operation)		-20°C ... 60°C	-20°C ... 60°C
Standards / regulations		IEC 60664, EN 50178, IEC 62103	IEC 60664, EN 50178, IEC 62103
Pollution degree/surge voltage category		2 / III	2 / III
Mounting position / mounting		Refer to derating / In rows with zero spacing	Refer to derating / In rows with zero spacing
Connection data solid / stranded / AWG		0.14 - 2.5 mm² / 0.14 - 2.5 mm² / 26 - 14	0.14 - 2.5 mm² / 0.14 - 2.5 mm² / 26 - 14
Dimensions	W / H / D	14 mm / 80 mm / 94 mm	14 mm / 80 mm / 94 mm

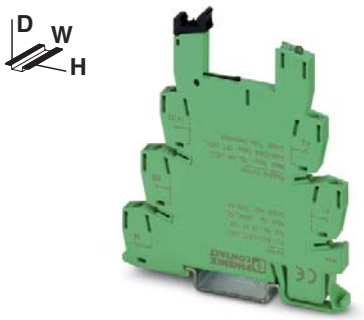
Description	Input voltage U_N	Ordering data: Type	Order No.	Pcs. / Pkt.	Ordering data: Type	Order No.	Pcs. / Pkt.
PLC-INTERFACE, with **screw connection**							
①	24 V DC	**PLC-OSC- 24DC/ 24DC/ 5/ACT**	**2982786**	10	**PLC-OSC- 24DC/230AC/ 2/ACT**	**2982760**	10

PLC actuator series for output functions

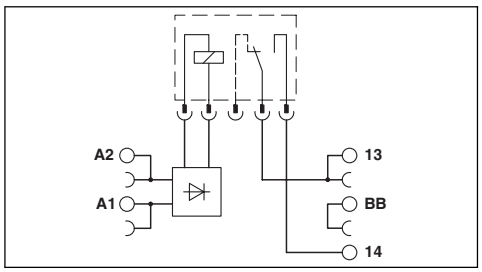
PLC actuator basic terminal blocks that can be fitted with a mechanical or solid-state relay. For coupling the controller and actuators, such as motors, contactors, valves, etc.

Notes:
Maximum interrupting rating diagrams, see page 106
For derating curves see page 105

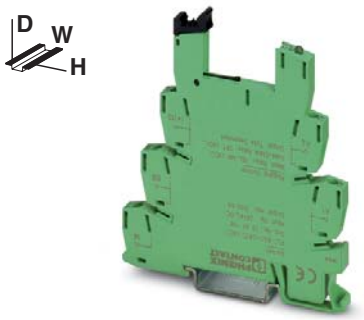
N



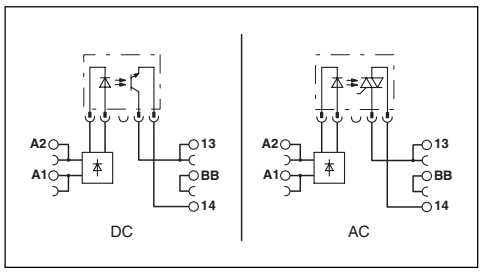
Basic terminal block that can be fitted with mech. relay



N



Basic terminal block that can be fitted with solid-state relay



	Technical data		Technical data		
Input data					
Permissible range (with reference to U_N)	0.8 ... 1.2		0.8 ... 1.2		
Typ. input current with U_N (50 /60 Hz)	15.6 mA / 8.5 mA		15 mA / 8.3 mA		
Typ. response time at U_N	5 ms		10 ms		
Typ. release time at U_N	30 ms		20 ms		
Input circuit	Yellow LED, bridge rectifier		Yellow LED, bridge rectifier		
Output data with:	REL-MR-24DC/21AU	REL-MR-24DC/21	OPT...48DC/...	OPT...24DC/...	OPT...230AC/...
Contact type	Single contact, 1 N/O contact	Single contact, 1 N/O contact	-	-	-
Contact material	AgSnO, hard gold-plated	AgSnO	-	-	-
Max. switching voltage	30 V AC / 36 V DC	250 V AC/DC	48 V DC	33 V DC	253 V AC
Min. switching voltage	100 mV (at 10 mA)	5 V (at 100 mA)	3 V DC	3 V DC	24 V AC
Limiting continuous current	50 mA	6 A	100 mA	3 A (see derating curve)	0.75 A (see derating curve)
Min. switching current	1 mA (at 24 V)	10 mA (at 12 V)			-
Output protection	-	-	Protection against polarity reversal, surge protection	Protection against polarity reversal, surge protection	RCV circuit
Voltage drop at limiting continuous current	-	-	≤ 1 V	≤ 150 mV	≤ 1 V
Leakage current in off state	-	-	-	-	≤ 1 mA
Max. load value I^2 x t (t = 10 ms)	-	-	-	-	4.5 A^2s (tp = 10 ms, at 25°C)
General data					
Rated insulation voltage	250 V AC		250 V AC		
Rated surge voltage / insulation	6 kV / safe isolation, increased insulation		6 kV / safe isolation, increased insulation		
Ambient temperature (operation)	-20°C ... 60°C		-20°C ... 60°C		
Air and creepage distances	EN 50178, IEC 62103		EN 50178, IEC 62103		
Pollution degree / surge voltage category	2 / III		2 / III		
Connection data solid / stranded / AWG	0.14 - 2.5 mm^2 / 0.14 - 2.5 mm^2 / 26 - 14		0.14 - 2.5 mm^2 / 0.14 - 2.5 mm^2 / 26 - 14		
Dimensions W / H / D	6.2 mm / 80 mm / 94 mm		6.2 mm / 80 mm / 94 mm		

Description	Voltage U_N	Ordering data: Type	Order No.	Pcs. / Pkt.	Ordering data: Type	Order No.	Pcs. / Pkt.
PLC-INTERFACE, with **screw connection**	24 V AC/DC	**PLC-BSC- 24UC/ 1/ACT**	**2982799**	10	**PLC-BSC- 24UC/ 1/ACT**	**2982799**	10
PLC-INTERFACE, with **spring-cage connection**	24 V AC/DC	**PLC-BSP- 24UC/ 1/ACT**	**2982809**	10	**PLC-BSP- 24UC/ 1/ACT**	**2982809**	10
PLC-INTERFACE, with **push-in connection**	24 V AC/DC	**PLC-BPIT- 24UC/ 1/ACT**	**2900450**	10	**PLC-BPIT- 24UC/ 1/ACT**	**2900450**	10

	Accessories			Accessories		
Pluggable miniature relays						
with gold contact	**REL-MR- 24DC/21AU**	**2961121**	10			
with power contact	**REL-MR- 24DC/21**	**2961105**	10			
Pluggable solid-state relays						
Solid-state input relays				**OPT-24DC/ 48DC/100**	**2966618**	10
Solid-state power relays				**OPT-24DC/ 24DC/ 2**	**2966595**	10
Solid-state power relays				**OPT-24DC/230AC/ 1**	**2967950**	10

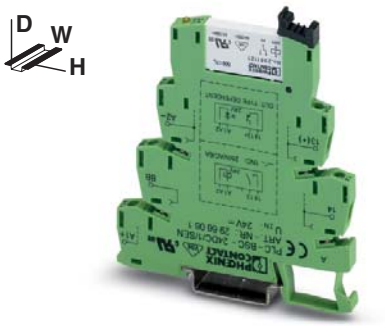
PLC sensor series for input functions

PLC sensor series for coupling controller and sensors, such as proximity switches, limit switches or auxiliary contacts

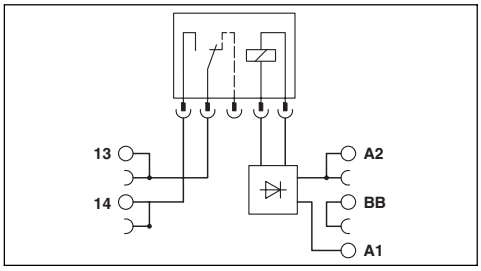
The advantages:

- Direct connection of sensor to relay module
- No need for additional modular terminal blocks
- Space savings of up to 80%
- Time savings of up to 60%
- Screw-type, spring-cage, and push-in technology
- Relay modules with safe isolation according to DIN EN 50178 between coil and contact
- Functional plug-in bridges
- Efficient connection to system cabling using V8 adapter

Notes:
Type of housing: Polyamide PA non-reinforced, color: Green.
For marking systems and mounting material, see CLIPLINE catalog, part 2.
Separating plate PLC-ATP must be installed for voltages larger than 250 V (L1, L2, L3) between identical terminal blocks in adjacent modules. Potential bridging is then carried out with FBST 8-PLC... or FBST 500....
If the specified maximum values for multi-layer contact relays are exceeded, the gold plating is destroyed. The maximum values of the power contact relay are then valid. This can result in a shorter service life than with a pure power contact.
For diagrams of operating voltage ranges, see page 103
[1]) 120 and 230 V types up to 55°C



Relay module
1 N/O contact

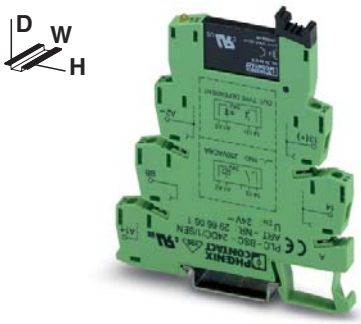


Technical data

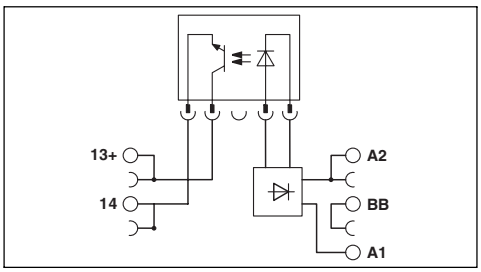
		①	②	③
Input data				
Permissible range (with reference to U_N)		See diagram		
Switching level (with reference to U_N)	1 signal ("H") 0 signal ("L")			
Typ. input current at U_N	[mA]	9	3.5	3.2
Typ. response time/switch-on time at U_N	[ms]	5	6	7
Typ. release time/switch-off time at U_N	[ms]	8	15	15
Transmission frequency f_{limit}	[Hz]			
Input circuit DC		Yellow LED, protection against polarity reversal, free-wheeling diode		
Input circuit AC/DC		Yellow LED, bridge rectifier		
Output data				
Contact material		AgSnO, hard gold-plated		
Max. switching voltage		30 V AC / 36 V DC		
Min. switching voltage		100 mV (at 10 mA)		
Limiting continuous current		50 mA		
Max. inrush current		50 mA		
Min. switching current		1 mA (at 24 V)		
Output protection		-		
Voltage drop at max. limiting continuous current		-		
General data				
Test voltage input/output		4 kV AC (50 Hz, 1 min.)		
Ambient temperature (operation)		-40°C ... 60°C[1])		
Mechanical service life		2×10^7 cycles		
Standards / regulations		IEC 60664, EN 50178, IEC 62103		
Pollution degree/surge voltage category		3 / III		
Connection data solid / stranded / AWG		0.14 - 2.5 mm^2 / 0.14 - 2.5 mm^2 / 26 - 14		
Dimensions	W / H / D	6.2 mm / 80 mm / 94 mm		

Ordering data

Description		Input voltage U_N	Type	Order No.	Pcs. / Pkt.
PLC-INTERFACE, with **screw connection**					
	①	24 V DC	**PLC-RSC- 24DC/ 1AU/SEN**	**2966317**	10
	②	120 V AC (110 V DC)	**PLC-RSC-120UC/ 1AU/SEN**	**2966320**	10
	③	230 V AC (220 V DC)	**PLC-RSC-230UC/ 1AU/SEN**	**2966333**	10
PLC-INTERFACE, with **spring-cage connection**					
	①	24 V DC	**PLC-RSP- 24DC/ 1AU/SEN**	**2967374**	10
	②	120 V AC (110 V DC)	**PLC-RSP-120UC/ 1AU/SEN**	**2967390**	10
	③	230 V AC (220 V DC)	**PLC-RSP-230UC/ 1AU/SEN**	**2967413**	10
PLC-INTERFACE, with **push-in connection**					
	①	24 V DC	**PLC-RPIT- 24DC/ 1AU/SEN**	**2900313**	10
	②	120 V AC (110 V DC)	**PLC-RPIT-120UC/ 1AU/SEN**	**2900314**	10
	③	230 V AC (220 V DC)	**PLC-RPIT-230UC/ 1AU/SEN**	**2900315**	10



Max. DC voltage output of 100 mA



Technical data

①	②	③
0.8 - 1.2	0.8 - 1.1	0.8 - 1.1
≥ 0.8	≥ 0.8	≥ 0.8
≤ 0.4	≤ 0.3	≤ 0.3
8.5	3.5	3.5
0.02	6	3
0.3	10	5
300	10	10

Yellow LED, protection against polarity reversal, free-wheeling diode
Yellow LED, bridge rectifier

-
48 V DC
3 V DC
100 mA
-
-
Protection against polarity reversal, surge protection
≤ 1 V

2.5 kV (50 Hz, 1 min.)
-25°C ... 60°C
-
IEC 60664, EN 50178, IEC 62103
2 / III
0.14 - 2.5 mm² / 0.14 - 2.5 mm² / 26 - 14
6.2 mm / 80 mm / 94 mm

Ordering data

Type	Order No.	Pcs. / Pkt.
PLC-OSC- 24DC/ 48DC/100/SEN	**2966773**	10
PLC-OSC-120UC/ 48DC/100/SEN	**2966799**	10
PLC-OSC-230UC/ 48DC/100/SEN	**2966809**	10
PLC-OSP- 24DC/ 48DC/100/SEN	**2967578**	10
PLC-OSP-120UC/ 48DC/100/SEN	**2967581**	10
PLC-OSP-230UC/ 48DC/100/SEN	**2967594**	10
PLC-OPIT- 24DC/ 48DC/100/SEN	**2900358**	10
PLC-OPIT-120UC/ 48DC/100/SEN	**2900359**	10
PLC-OPIT-230UC/ 48DC/100/SEN	**2900361**	10

N

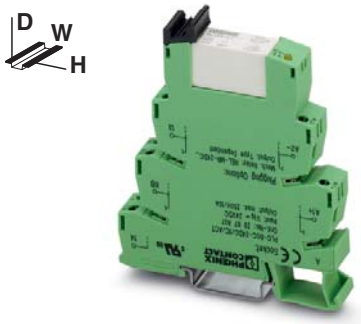
PLC-INTERFACE for high inrush currents

PLC relay modules for high inrush currents due, for example, to capacitive loads

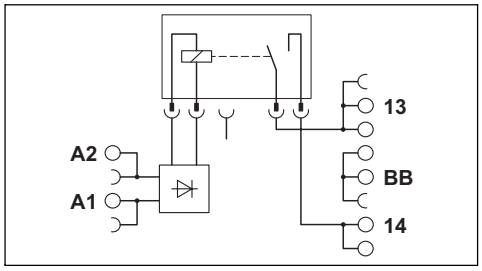
The advantages:

- Max. inrush current of 130 A
- Direct connection of load return line thanks to actuator type
- Screw-type, spring-cage, and push-in technology
- Safe isolation according to DIN EN 50178 between coil and contact
- Functional plug-in bridges
- Efficient connection to system cabling using V8 adapter

Notes:
Type of housing: Polyamide PA non-reinforced, color: Green.
For marking systems and mounting material, see CLIPLINE catalog, part 2.
Separating plate PLC-ATP must be installed for voltages larger than 250 V (L1, L2, L3) between identical terminal blocks in adjacent modules. Potential bridging is then carried out with FBST 8-PLC... or FBST 500....
For diagrams of operating voltage ranges, see page 103



1 N/O contact of up to 130 A peak

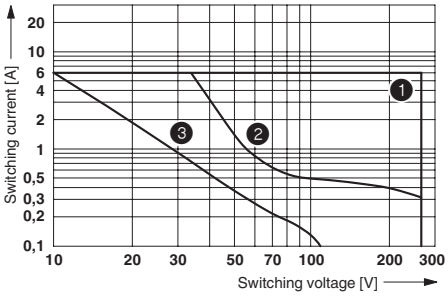


Technical data

Input data		①
Typ. input current at U_N	[mA]	18
Response/release time at U_N	[ms]	8 / 10
Input circuit DC		Yellow LED, protection against polarity reversal, free-wheeling diode
Output data		
Contact material		AgSnO
Max. switching voltage		250 V AC/DC
Min. switching voltage		12 V AC/DC (at 100 mA)
Max. inrush current		80 A (for 20 ms) / 130 A (peak, at capacitive load, 230 V AC, 24 µF)
General data		
Test voltage input/output		4 kV AC (50 Hz, 1 min.)
Ambient temperature (operation)		-40°C ... 60°C
Mechanical service life		3 x 10^7 cycles
Standards / regulations		IEC 60664, EN 50178, IEC 62103
Connection data solid / stranded / AWG		0.14 - 2.5 mm^2 / 0.14 - 2.5 mm^2 / 26 - 14
Dimensions	W / H / D	14 mm / 80 mm / 94 mm

Ordering data

Description	Input voltage U_N	Type	Order No.	Pcs. / Pkt.
PLC-INTERFACE, with **screw connection** ①	24 V DC	**PLC-RSC- 24DC/ 1IC/ACT**	**2967604**	10
PLC-INTERFACE, with **spring-cage connection** ①	24 V DC	**PLC-RSP- 24DC/ 1IC/ACT**	**2912413**	10
PLC-INTERFACE, with **push-in connection** ①	24 V DC	**PLC-RPIT- 24DC/ 1IC/ACT**	**2900298**	10



❶ AC, ohmic load
❷ DC, ohmic load
❸ DC, L/R = 40 ms

Max. interrupting rating

N

PLC-INTERFACE for high continuous currents

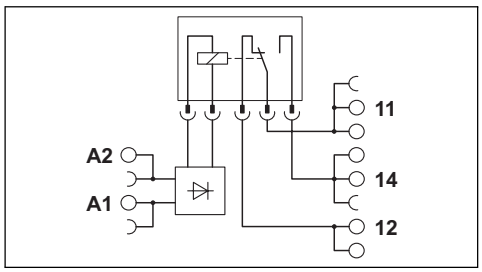
PLC relay modules for high continuous switching currents

The advantages:

- Max. continuous current of 10 A
- Safe isolation according to DIN EN 50178 between coil and contact
- Screw-type, spring-cage, and push-in technology
- Functional plug-in bridges
- Efficient connection to system cabling using V8 adapter
- Long electrical service life thanks to 16 A relay
- All common input voltages of 12 V DC to 230 V AC

Notes:
Type of housing: Polyamide PA non-reinforced, color: Green.
For marking systems and mounting material, see CLIPLINE catalog, part 2.
Separating plate PLC-ATP must be installed for voltages larger than 250 V (L1, L2, L3) between identical terminal blocks in adjacent modules. Potential bridging is then carried out with FBST 8-PLC... or FBST 500....
For diagrams of operating voltage ranges, see page 103
[1]) 230 V types up to 55°C

1 PDT up to 10 A

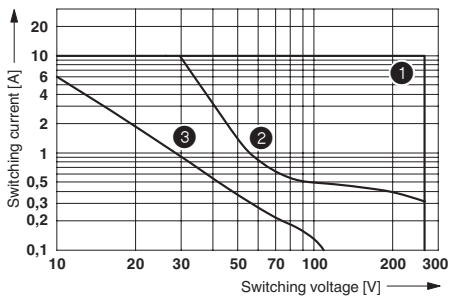


Technical data

Input data		①	②	③	④	⑤	⑥	⑦
Typ. input current at U_N	[mA]	33	18	17.5	20	10	4.5	4.5
Response/release time at U_N	[ms]	8 / 10	8 / 10	8 / 10	8 / 10	8 / 10	7 / 10	7 / 10
Input circuit DC		Yellow LED, protection against polarity reversal, free-wheeling diode						
Input circuit AC/DC		Yellow LED, bridge rectifier						
Output data								
Contact material		AgNi						
Max. switching voltage		250 V AC/DC						
Min. switching voltage		12 V AC/DC						
Limiting continuous current		10 A						
Max. inrush current		30 A (300 ms)						
Min. switching current		100 mA						
General data								
Test voltage input/output		4 kV AC (50 Hz, 1 min.)						
Ambient temperature (operation)		-40°C ... 60°C[1])						
Mechanical service life		3 x 10^7 cycles						
Standards / regulations		IEC 60664, EN 50178, IEC 62103						
Connection data solid / stranded / AWG		0.14 - 2.5 mm^2 / 0.14 - 2.5 mm^2 / 26 - 14						
Dimensions	W / H / D	14 mm / 80 mm / 94 mm						

Ordering data

Description		Input voltage U_N	Type	Order No.	Pcs. / Pkt.
PLC-INTERFACE, with **screw connection**					
	①	12 V DC	**PLC-RSC- 12DC/21HC**	**2967617**	10
	②	24 V DC	**PLC-RSC- 24DC/21HC**	**2967620**	10
	③	24 V AC/DC	**PLC-RSC- 24UC/21HC**	**2967633**	10
	④	48 V DC	**PLC-RSC- 48DC/21HC**	**2967646**	10
	⑤	60 V DC	**PLC-RSC- 60DC/21HC**	**2967659**	10
	⑥	120 V AC (110 V DC)	**PLC-RSC-120UC/21HC**	**2967662**	10
	⑦	230 V AC (220 V DC)	**PLC-RSC-230UC/21HC**	**2967675**	10
PLC-INTERFACE, with **spring-cage connection**					
	①	12 V DC	**PLC-RSP- 12DC/21HC**	**2912264**	10
	②	24 V DC	**PLC-RSP- 24DC/21HC**	**2912277**	10
	③	24 V AC/DC	**PLC-RSP- 24UC/21HC**	**2912280**	10
	④	48 V DC	**PLC-RSP- 48DC/21HC**	**2912293**	10
	⑤	60 V DC	**PLC-RSP- 60DC/21HC**	**2912303**	10
	⑥	120 V AC (110 V DC)	**PLC-RSP-120UC/21HC**	**2912316**	10
	⑦	230 V AC (220 V DC)	**PLC-RSP-230UC/21HC**	**2912329**	10
PLC-INTERFACE, with **push-in connection**					
	①	12 V DC	**PLC-RPIT- 12DC/21HC**	**2900290**	10
	②	24 V DC	**PLC-RPIT- 24DC/21HC**	**2900291**	10
	③	24 V AC/DC	**PLC-RPIT- 24UC/21HC**	**2900293**	10
	④	48 V DC	**PLC-RPIT- 48DC/21HC**	**2900294**	10
	⑤	60 V DC	**PLC-RPIT- 60DC/21HC**	**2900295**	10
	⑥	120 V AC (110 V DC)	**PLC-RPIT-120UC/21HC**	**2900296**	10
	⑦	230 V AC (220 V DC)	**PLC-RPIT-230UC/21HC**	**2900297**	10



❶ AC, ohmic load
❷ DC, ohmic load
❸ DC, L/R = 40 ms

Max. interrupting rating

N

Basic terminal blocks with interference current filter that can be fitted with relays

PLC basic terminal blocks with integrated filter to protect against interference voltages or currents due, for example, to long control lines

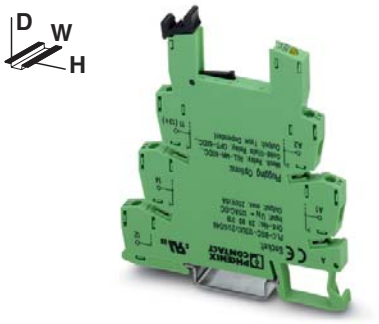
The advantages:

– Resistant to interference currents
– High relay release voltage

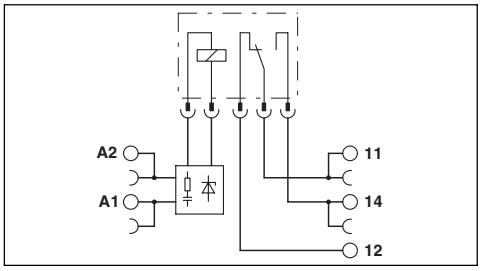
Typical applications:

– Applications with long control lines
– Use of AC output boards, resulting in residual AC currents

Notes:
Type of housing: Polyamide PA non-reinforced, color: Green.
For marking systems and mounting material, see CLIPLINE catalog, part 2.
Separating plate PLC-ATP must be installed for voltages larger than 250 V (L1, L2, L3) between identical terminal blocks in adjacent modules. Potential bridging is then carried out with FBST 8-PLC... or FBST 500....
For diagrams of operating voltage ranges, see page 103
Maximum interrupting rating diagrams, see page 106



Universal design



Technical data

Input data		
Nominal input voltage U_N	120 V AC	230 V AC
Permissible range (with reference to U_N)	0.8 ... 1.4	0.78 ... 1.14
Typ. release voltage (with relay)	50 V AC	80 V AC
Typ. input current with U_N (50 /60 Hz)	7 mA / 8 mA	8.8 mA / 10 mA
Typ. response time at U_N	7 ms	7 ms
Typ. release time at U_N	20 ms	20 ms
Input circuit	Yellow LED, bridge rectifier, filter	
Output data with:	REL-MR-60DC/21	REL-MR-60DC/21AU
Contact type	Single contact, 1 PDT	Single contact, 1 PDT
Contact material	AgSnO	AgSnO, hard gold-plated
Max. switching voltage	250 V AC/DC	30 V AC / 36 V DC
Min. switching voltage	5 V (at 100 mA)	100 mV (at 10 mA)
Limiting continuous current	6 A	50 mA
Max. inrush current	(On request)	50 mA
Min. switching current	10 mA (at 12 V)	1 mA (at 24 V)
General data		
Test voltage input/output	4 kV (50 Hz, 1 min.)	
Ambient temperature (operation)	-20°C ... 55°C	
Mechanical service life	2 x 10^7 cycles	
Standards / regulations	IEC 60664, EN 50178, IEC 62103	
Pollution degree / surge voltage category	3 / III	
Connection data solid / stranded / AWG	0.14 - 2.5 mm^2 / 0.14 - 2.5 mm^2 / 26 - 14	
Dimensions W / H / D	6.2 mm / 80 mm / 94 mm	

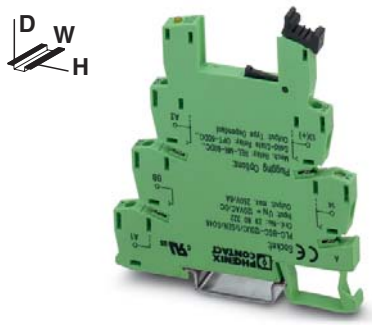
Ordering data

Description	Voltage U_N	Type	Order No.	Pcs. / Pkt.
PLC-INTERFACE basic terminal block, for pluggable miniature relays or solid-state relays				
With screw connection	120 V AC	**PLC-BSC-120UC/21/SO46**	**2980319**	10
With screw connection	230 V AC	**PLC-BSC-230UC/21/SO46**	**2980335**	10
With spring-cage connection	120 V AC	**PLC-BSP-120UC/21/SO46**	**2980351**	10
With spring-cage connection	230 V AC	**PLC-BSP-230UC/21/SO46**	**2980377**	10
With push-in connection	120 V AC	**PLC-BPIT-120UC/21/SO46**	**2900453**	10
With push-in connection	230 V AC	**PLC-BPIT-230UC/21/SO46**	**2900455**	10

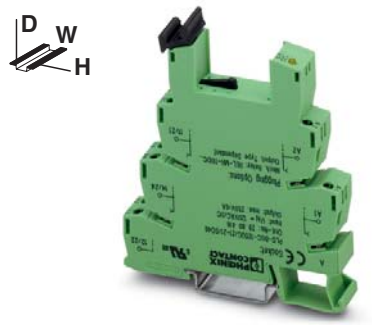
Accessories

Pluggable miniature relays			
with gold contact	**REL-MR- 60DC/21AU**	**2961134**	10
with power contact	**REL-MR- 60DC/21**	**2961118**	10

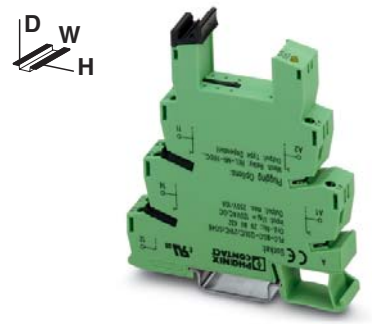
N



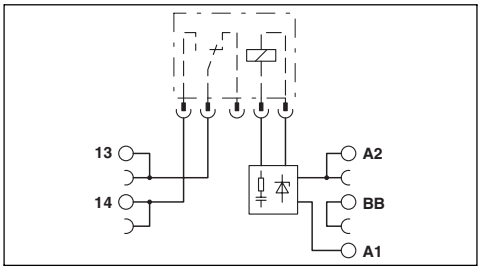
Sensor design

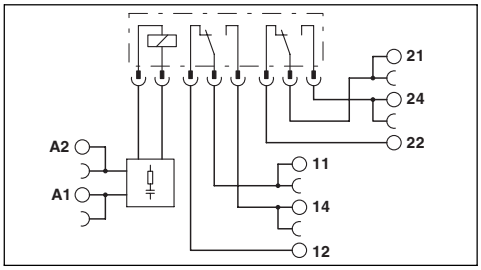


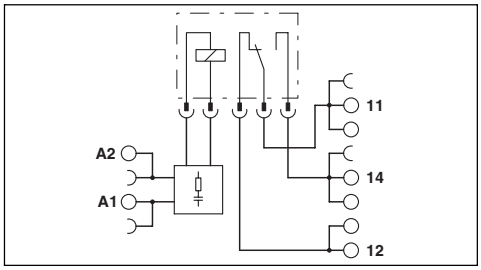
2 PDT universal design



1 PDT, for high continuous currents







Technical data

120 V AC	230 V AC	120 V AC	230 V AC	120 V AC	230 V AC
0.8 ... 1.4	0.78 ... 1.14	0.78 ... 1.4	0.78 ... 1.14	0.85 ... 1.4	0.78 ... 1.14
50 V AC	80 V AC	16 V AC	70 V AC	16 V AC	70 V AC
7 mA / 8 mA	8.8 mA / 10 mA	6 mA / 7 mA	8.5 mA / 10 mA	6 mA / 7 mA	8.5 mA / 10 mA
7 ms	7 ms	7 ms	7 ms	7 ms	7 ms
20 ms	20 ms	10 ms	10 ms	20 ms	20 ms
Yellow LED, bridge rectifier, filter		Yellow LED, bridge rectifier, filter		Yellow LED, bridge rectifier, filter	
REL-MR-60DC/21	REL-MR-60DC/21AU	REL-MR-110DC/21-21	REL-MR-110DC/21-21AU	REL-MR-110DC/21HC	
Single contact, 1 N/O contact	Single contact, 1 N/O contact	Single contact, 2 PDT	Single contact, 2 PDT	Single contact, 1 PDT	
AgSnO	AgSnO, hard gold-plated	AgNi	AgNi, + 5 µm Au	AgNi	
250 V AC/DC	30 V AC / 36 V DC	250 V AC/DC	30 V AC / 36 V DC	250 V AC/DC	
5 V (at 100 mA)	100 mV (at 10 mA)	5 V AC/DC	100 mV	12 V AC/DC	
6 A	50 mA	6 A	50 mA	10 A	
(On request)	50 mA	15 A (300 ms)	50 mA	30 A (300 ms)	
10 mA (at 12 V)	1 mA (at 24 V)	10 mA	1 mA	100 mA	
4 kV (50 Hz, 1 min.)		4 kV (50 Hz, 1 min.)		4 kV (50 Hz, 1 min.)	
-20°C ... 55°C		-20°C ... 55°C		-20°C ... 55°C	
2 x 10^7 cycles		3 x 10^7 cycles		3 x 10^7 cycles	
IEC 60664, EN 50178, IEC 62103		IEC 60664, EN 50178, IEC 62103		IEC 60664, EN 50178, IEC 62103	
3 / III		3 / III		3 / III	
0.14 - 2.5 mm^2 / 0.14 - 2.5 mm^2 / 26 - 14		0.14 - 2.5 mm^2 / 0.14 - 2.5 mm^2 / 26 - 14		0.14 - 2.5 mm^2 / 0.14 - 2.5 mm^2 / 26 - 14	
6.2 mm / 80 mm / 94 mm		14 mm / 80 mm / 94 mm		14 mm / 80 mm / 94 mm	

Ordering data

Type	Order No.	Pcs. / Pkt.
PLC-BSC-120UC/ 1/SEN/SO46	**2980322**	10
PLC-BSC-230UC/ 1/SEN/SO46	**2980348**	10
PLC-BSP-120UC/ 1/SEN/SO46	**2980364**	10
PLC-BSP-230UC/ 1/SEN/SO46	**2980380**	10
PLC-BPIT-120UC/ 1/SEN/SO46	**2900456**	10
PLC-BPIT-230UC/ 1/SEN/SO46	**2900457**	10

Accessories

REL-MR- 60DC/21AU	**2961134**	10
REL-MR- 60DC/21	**2961118**	10

Ordering data

Type	Order No.	Pcs. / Pkt.
PLC-BSC-120UC/21-21/SO46	**2980416**	10
PLC-BSC-230UC/21-21/SO46	**2980429**	10

Accessories

REL-MR-110DC/21-21AU	**2961228**	10
REL-MR-110DC/21-21	**2961202**	10

Ordering data

Type	Order No.	Pcs. / Pkt.
PLC-BSC-120UC/21HC/SO46	**2980432**	10
PLC-BSC-230UC/21HC/SO46	**2980445**	10

Accessories

REL-MR-110DC/21HC	**2961338**	10

N

Basic terminal blocks with interference current filter that can be fitted with solid-state relays

PLC basic terminal blocks with integrated filter to protect against interference voltages or currents due, for example, to long control lines

The advantages:

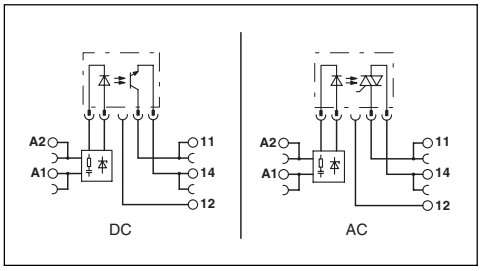
– Resistant to interference currents
– High relay release voltage

Typical applications:

– Applications with long control lines
– Use of AC output boards, resulting in residual AC currents

Notes:
Type of housing: Polyamide PA non-reinforced, color: Green.
For marking systems and mounting material, see CLIPLINE catalog, part 2.
Separating plate PLC-ATP must be installed for voltages larger than 250 V (L1, L2, L3) between identical terminal blocks in adjacent modules. Potential bridging is then carried out with FBST 8-PLC... or FBST 500....
For derating curves see page 105

Universal design



Technical data

Input data			
Nominal input voltage U_N	120 V AC		230 V AC
Permissible range (with reference to U_N)	0.85 ... 1.1		0.8 ... 1.1
Switching level (with optocoupler) 0 signal ("L")	≤ 0.4		≤ 0.4
Typ. input current with U_N (50 /60 Hz)	7 mA / 8 mA		8.8 mA / 10 mA
Typ. response time/switch-on time at U_N	6 ms		6 ms
Typ. switch-off time at U_N	10 ms		10 ms
Input circuit	Yellow LED, bridge rectifier, filter		
Output data with:	OPT...48DC/...	OPT...24DC/...	OPT...230AC/...
Max. switching voltage	48 V DC	30 V DC	253 V AC
Min. switching voltage	3 V DC	3 V DC	24 V AC
Limiting continuous current	100 mA	3 A	0.75 A
Max. inrush current		15 A (10 ms)	30 A (10 ms)
Output protection	Protection against polarity reversal, surge protection	Protection against polarity reversal, surge protection	RCV circuit
Voltage drop at limiting continuous current	< 1 V DC	< 200 mV	< 1 V AC
Leakage current in off state	-	-	< 1 mA
Max. phase shift (inductive consumer)	-	-	0.5
Max. load value I^2 x t (t = 10 ms)	-	-	4.5 A^2s
General data			
Test voltage input/output	2.5 kV (50 Hz, 1 min.)		
Ambient temperature (operation)	-20°C ... 55°C		
Standards / regulations	IEC 60664, EN 50178, IEC 62103		
Pollution degree / surge voltage category	2 / III		
Connection data solid / stranded / AWG	0.14 - 2.5 mm^2 / 0.14 - 2.5 mm^2 / 26 - 14		
Dimensions W / H / D	6.2 mm / 80 mm / 94 mm		

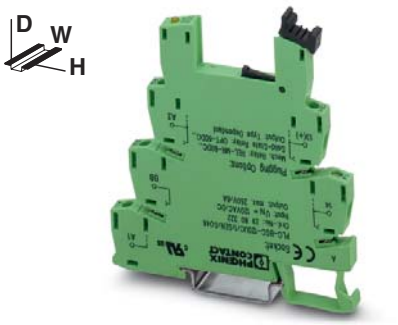
Ordering data

Description	Voltage U_N	Type	Order No.	Pcs. / Pkt.
PLC-INTERFACE basic terminal block, for pluggable miniature relays or solid-state relays				
With screw connection	120 V AC	**PLC-BSC-120UC/21/SO46**	**2980319**	10
With screw connection	230 V AC	**PLC-BSC-230UC/21/SO46**	**2980335**	10
With spring-cage connection	120 V AC	**PLC-BSP-120UC/21/SO46**	**2980351**	10
With spring-cage connection	230 V AC	**PLC-BSP-230UC/21/SO46**	**2980377**	10
With push-in connection	120 V AC	**PLC-BPIT-120UC/21/SO46**	**2900453**	10
With push-in connection	230 V AC	**PLC-BPIT-230UC/21/SO46**	**2900455**	10

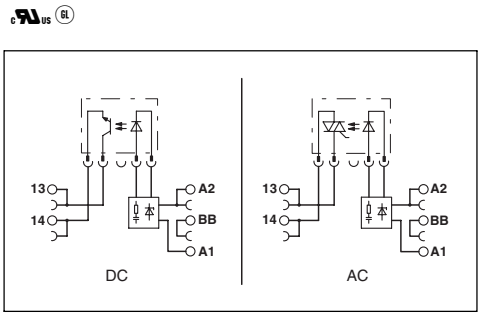
Accessories

Pluggable solid-state relays			
Solid-state input relays	**OPT-60DC/ 48DC/100**	**2966621**	10
Solid-state power relays	**OPT-60DC/ 24DC/ 2**	**2966605**	10
Solid-state power relays	**OPT-60DC/230AC/ 1**	**2967963**	10

N



Sensor design



Technical data

120 V AC		230 V AC
0.85 ... 1.1		0.8 ... 1.1
≤ 0.4		≤ 0.4
7 mA / 8 mA		8.8 mA / 10 mA
6 ms		6 ms
10 ms		10 ms
Yellow LED, bridge rectifier, filter		
OPT...48DC/...	OPT...24DC/...	OPT...230AC/...
48 V DC	30 V DC	253 V AC
3 V DC	3 V DC	24 V AC
100 mA	3 A	0.75 A
	15 A (10 ms)	30 A (10 ms)
Protection against polarity reversal, surge protection	Protection against polarity reversal, surge protection	RCV circuit
< 1 V	< 200 mV	< 1 V
-	-	< 1 mA
-	-	0.5
-	-	4.5 A^2s
2.5 kV (50 Hz, 1 min.)		
-20°C ... 55°C		
IEC 60664, EN 50178, IEC 62103		
2 / III		
0.14 - 2.5 mm^2 / 0.14 - 2.5 mm^2 / 26 - 14		
6.2 mm / 80 mm / 94 mm		

Ordering data

Type	Order No.	Pcs. / Pkt.
PLC-BSC-120UC/ 1/SEN/SO46	**2980322**	10
PLC-BSC-230UC/ 1/SEN/SO46	**2980348**	10
PLC-BSP-120UC/ 1/SEN/SO46	**2980364**	10
PLC-BSP-230UC/ 1/SEN/SO46	**2980380**	10
PLC-BPIT-120UC/ 1/SEN/SO46	**2900456**	10
PLC-BPIT-230UC/ 1/SEN/SO46	**2900457**	10

Accessories

OPT-60DC/ 48DC/100	**2966621**	10
OPT-60DC/ 24DC/ 2	**2966605**	10
OPT-60DC/230AC/ 1	**2967963**	10

Plug-in power relays

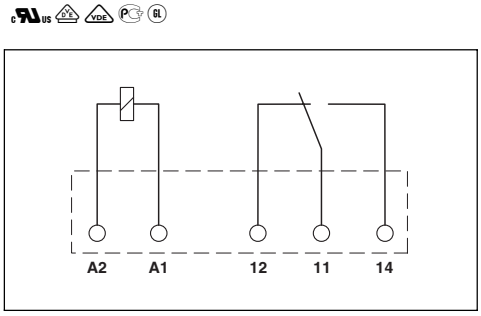
Plug-in power relays to match PLC-INTERFACE and PR1 relay base

The advantages:

- Power contacts up to 16 A
- Multi-layer gold contact or power contact
- High degree of protection up to RT III (comparable with IP67) depending on type
- Safe isolation according to DIN EN 50178 between coil and contact

Notes:
If the specified maximum values for multi-layer contact relays are exceeded, the gold plating is destroyed. The maximum values of the power contact relay are then valid. This can result in a shorter service life than with a pure power contact.
Dimensional drawings, perforations for assembly, and operating voltage ranges, see page 104
Maximum interrupting rating diagrams, see page 106

1 PDT



Technical data

Input data		①	②	③	④	⑤
Permissible range (with reference to U_N)		Refer to the diagram				
Typ. input current at U_N	[mA]	38	14	9	7	3
Typ. response time at U_N	[ms]	5	5	5	5	5
Typ. release time at U_N	[ms]	2.5	2.5	2.5	2.5	2.5

Output data			
Contact type		Single contact, 1 PDT	Single contact, 1 PDT
Contact material		AgSnO	AgSnO, hard gold-plated
Max. switching voltage		250 V AC/DC	30 V AC / 36 V DC
Min. switching voltage		5 V (at 100 mA)	100 mV (at 10 mA)
Limiting continuous current		6 A	50 mA
Max. inrush current		(On request)	(On request)
Min. switching current		10 mA (at 12 V)	1 mA (at 24 V)
Max. interrupting rating, ohmic load			
	24 V DC	140 W	1.2 W
	48 V DC	20 W	-
	60 V DC	18 W	-
	110 V DC	23 W	-
	220 V DC	40 W	-
	250 V AC	1500 VA	-

General data		
Test voltage (winding / contact)		4 kV AC (50 Hz, 1 min.)
Ambient temperature (operation)		-40°C ... 85°C
Nominal operating mode		100% operating factor
Mechanical service life		2 x 10^7 cycles
Standards / regulations		IEC 60664, EN 50178, IEC 62103
Mounting position / mounting		Any/can be aligned without spacing
Dimensions	W / H / D	5 mm / 28 mm / 15 mm

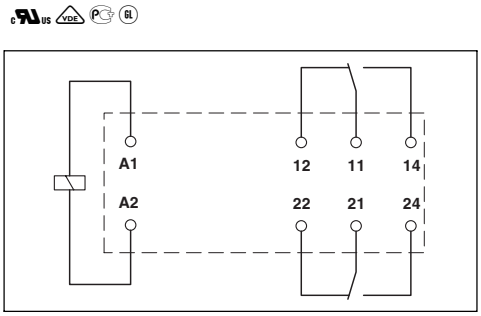
Ordering data

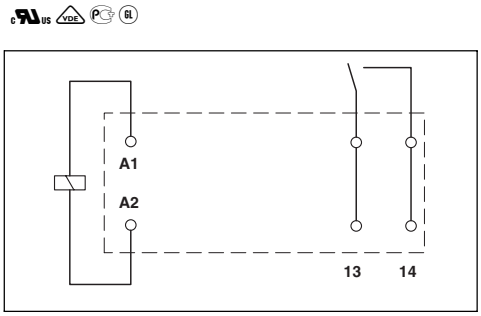
Description		Input voltage U_N	Type	Order No.	Pcs. / Pkt.
Pluggable miniature relays					
with power contact	①	4.5 V DC	**REL-MR- 4,5DC/21**	**2961367**	10
with power contact	②	12 V DC	**REL-MR- 12DC/21**	**2961150**	10
with power contact	③	18 V DC	**REL-MR- 18DC/21**	**2961383**	10
with power contact	④	24 V DC	**REL-MR- 24DC/21**	**2961105**	10
with power contact	⑤	60 V DC	**REL-MR- 60DC/21**	**2961118**	10
with power contact	⑥	110 V DC			
Pluggable miniature relays					
with gold contact	①	4.5 V DC	**REL-MR- 4,5DC/21AU**	**2961370**	10
with gold contact	②	12 V DC	**REL-MR- 12DC/21AU**	**2961163**	10
with gold contact	③	18 V DC	**REL-MR- 18DC/21AU**	**2961493**	10
with gold contact	④	24 V DC	**REL-MR- 24DC/21AU**	**2961121**	10
with gold contact	⑤	60 V DC	**REL-MR- 60DC/21AU**	**2961134**	10
with gold contact	⑥	110 V DC			

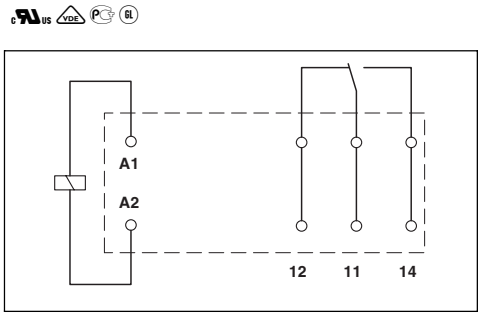
2 PDT

1 N/O contact, for high inrush currents

1 PDT, for high continuous currents







Technical data

②	④	⑤	⑥
Refer to the diagram			
33	17	8.2	4.1
7	7	7	7
3	3	3	3
Single contact, 2 PDT	Single contact, 2 PDT		
AgNi	AgNi, hard gold-plated		
250 V AC/DC	30 V AC / 36 V DC		
5 V (at 10 mA)	100 mV (at 10 mA)		
8 A	50 mA		
15 A (300 ms)	50 mA		
10 mA (at 5 V)	1 mA (at 24 V)		
190 W	1.2 W		
85 W	-		
60 W	-		
44 W	-		
60 W	-		
2000 VA	-		
5 kV AC (50 Hz, 1 min.)			
-40°C ... 85°C			
100% operating factor			
3 x 10^7 cycles			
IEC 60664, EN 50178, IEC 62103			
Any / can be aligned without spacing (> 70°C ≥ 2.5 mm)			
12.7 mm / 29 mm / 15.7 mm			

Ordering data

Type	Order No.	Pcs. / Pkt.
REL-MR- 12DC/21-21	**2961257**	10
REL-MR- 24DC/21-21	**2961192**	10
REL-MR- 60DC/21-21	**2961273**	10
REL-MR-110DC/21-21	**2961202**	10
REL-MR- 12DC/21-21AU	**2961299**	10
REL-MR- 24DC/21-21AU	**2961215**	10
REL-MR- 60DC/21-21AU	**2961286**	10
REL-MR-110DC/21-21AU	**2961228**	10

Technical data

④
Refer to the diagram
17
8
3
Single contact, 1 N/O contact
AgSnO
250 V AC/DC
12 V (at 100 mA)
16 A
80 A (20 ms)
100 mA (for 12 V DC)
384 W
58 W
48 W
50 W
80 W
4000 VA
5 kV AC (50 Hz, 1 min.)
-40°C ... 85°C
100% operating factor
3 x 10^7 cycles
IEC 60664, EN 50178, IEC 62103
Any / can be aligned without spacing (> 70°C ≥ 2.5 mm)
12.7 mm / 29 mm / 15.7 mm

Ordering data

Type	Order No.	Pcs. / Pkt.
REL-MR- 24DC/ 1IC	**2961341**	10

Technical data

②	④	⑤	⑥
Refer to the diagram			
33	17	8.2	4.1
7	7	7	7
3	3	3	3
Single contact, 1 PDT			
AgNi			
250 V AC/DC			
12 V (at 10 mA)			
16 A			
30 A (300 ms)			
100 mA			
384 W			
58 W			
48 W			
50 W			
80 W			
4000 VA			
5 kV AC (50 Hz, 1 min.)			
-40°C ... 85°C			
100% operating factor			
3 x 10^7 cycles			
IEC 60664, EN 50178, IEC 62103			
Any / can be aligned without spacing (> 70°C ≥ 2.5 mm)			
12.7 mm / 29 mm / 15.7 mm			

Ordering data

Type	Order No.	Pcs. / Pkt.
REL-MR- 12DC/21HC	**2961309**	10
REL-MR- 24DC/21HC	**2961312**	10
REL-MR- 60DC/21HC	**2961325**	10
REL-MR-110DC/21HC	**2961338**	10

Pluggable solid-state relays

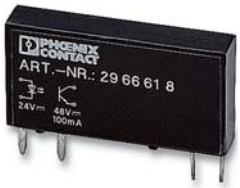
Plug-in solid-state relays to match PLC-INTERFACE and PR1 relay base

The advantages:

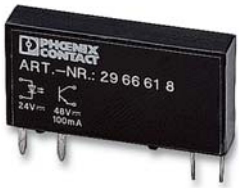
- Switching capacity of up to 24 V DC/5 A
- RT III wash tight (comparable to IP67)
- Vibration- and shock-resistant
- Wear-free and long-lasting
- Zero voltage switch at AC output,
- Can be soldered in on PCB

Notes:

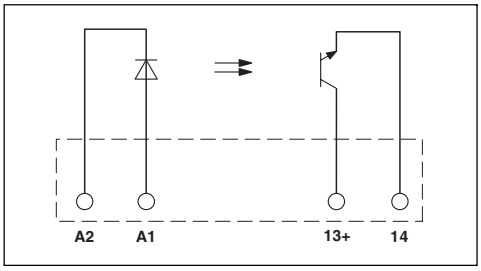
Dimensional drawings, perforations for assembly, and derating curves, see page 105

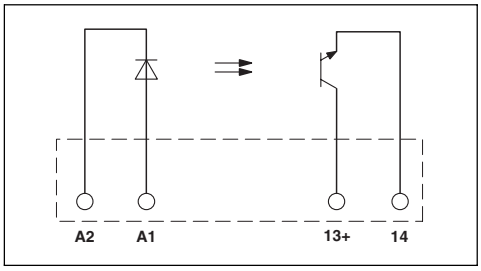


Max. DC voltage output of 3 A



Max. DC voltage output of 100 mA





Technical data

Input data		①	②	③
Permissible range (with reference to U_N)		0.8 - 1.2	0.8 - 1.2	0.8 - 1.2
Switching level	1 signal ("H") [V DC] ≥	2.5	16	35
	0 signal ("L") [V DC] ≤	0.8	10	20
Typ. input current at U_N	[mA]	9	7	3
Typ. switch-on time at U_N	[µs]	20	20	40
Typ. switch-off time at U_N	[µs]	300	300	500
Transmission frequency f_{limit}	[Hz]	300	300	300
Output data				
Max. switching voltage		33 V DC		
Min. switching voltage		3 V DC		
Limiting continuous current		3 A (see derating curve)		
Min. load current		-		
Max. inrush current		15 A (10 ms)		
Leakage current in off state		-		
Phase angle (cos ϕ)		-		
Output circuit		2-wire, floating		
Max. load value		-		
Output protection		Protection against polarity reversal, surge protection		
Voltage drop at max. limiting continuous current		≤ 150 mV		
General data				
Rated surge voltage		Basic insulation		
Test voltage input/output		2.5 kV (50 Hz, 1 min.)		
Ambient temperature (operation)		-25°C ... 60°C		
Nominal operating mode		100% operating factor		
Standards / regulations		IEC 60664, EN 50178, IEC 62103		
Pollution degree/surge voltage category		2 / III		
Mounting position / mounting		Any/can be aligned without spacing		
Dimensions	W / H / D	5 mm / 28 mm / 15 mm		

Technical data

Input data		①	②	③
Permissible range (with reference to U_N)		0.8 - 1.2	0.8 - 1.2	0.9 - 1.1
Switching level	1 signal ("H") [V DC] ≥	2.5	16	52
	0 signal ("L") [V DC] ≤	0.8	10	40
Typ. input current at U_N	[mA]	4	7	3
Typ. switch-on time at U_N	[µs]	20	20	50
Typ. switch-off time at U_N	[µs]	300	300	800
Transmission frequency f_{limit}	[Hz]	300	300	100
Output data				
Max. switching voltage		48 V DC		
Min. switching voltage		3 V DC		
Limiting continuous current		100 mA		
Min. load current		-		
Max. inrush current		-		
Leakage current in off state		-		
Phase angle (cos ϕ)		-		
Output circuit		2-wire, floating		
Max. load value		-		
Output protection		Protection against polarity reversal, surge protection		
Voltage drop at max. limiting continuous current		≤ 1 V		
General data				
Rated surge voltage		Basic insulation		
Test voltage input/output		2.5 kV (50 Hz, 1 min.)		
Ambient temperature (operation)		-25°C ... 60°C		
Nominal operating mode		100% operating factor		
Standards / regulations		IEC 60664, EN 50178, IEC 62103		
Pollution degree/surge voltage category		2 / III		
Mounting position / mounting		Any/can be aligned without spacing		
Dimensions	W / H / D	5 mm / 28 mm / 15 mm		

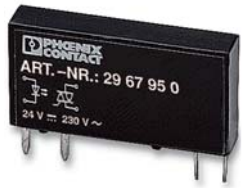
Ordering data

Description		Input voltage U_N	Type	Order No.	Pcs. / Pkt.
Pluggable solid-state relays					
Solid-state power relays	①	5 V DC	**OPT- 5DC/ 24DC/ 2**	**2967989**	10
Solid-state power relays	②	24 V DC	**OPT-24DC/ 24DC/ 2**	**2966595**	10
Solid-state power relays	③	60 V DC	**OPT-60DC/ 24DC/ 2**	**2966605**	10
Pluggable solid-state relays					
Solid-state input relays	①	5 V DC			
Solid-state input relays	②	24 V DC			
Solid-state input relays	③	60 V DC			

Ordering data

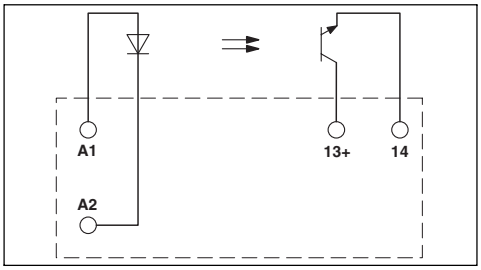
Type	Order No.	Pcs. / Pkt.
OPT- 5DC/ 48DC/100	**2967992**	10
OPT-24DC/ 48DC/100	**2966618**	10
OPT-60DC/ 48DC/100	**2966621**	10

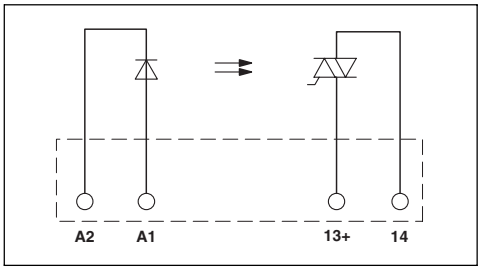
Max. DC voltage output of 5 A

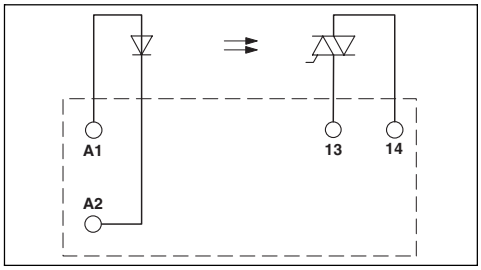


Max. AC voltage output of 750 mA

Max. AC voltage output of 2 mA







Technical data

①	②	③
0.8 - 1.2	0.8 - 1.2	0.9 - 1.1
2.5	16	35
0.8	10	20
9	7	3
10	20	25
400	400	400
300	300	300

33 V DC
3 V DC
5 A (see derating curve)
-
15 A (10 ms)
-
-
2-wire, floating
-
Protection against polarity reversal, surge protection
≤ 200 mV

Basic insulation
2.5 kV (50 Hz, 1 min.)
-25°C ... 60°C
100% operating factor
IEC 60664, EN 50178, IEC 62103
2 / III
Any/can be aligned without spacing
12.7 mm / 29 mm / 15.7 mm

Ordering data

Type	Order No.	Pcs. / Pkt.
OPT- 5DC/ 24DC/ 5	**2982113**	10
OPT-24DC/ 24DC/ 5	**2982100**	10
OPT-60DC/ 24DC/ 5	**2982126**	10

Technical data

②	③
0.8 - 1.2	0.9 - 1.1
10	30
5	15
3	3
6000	9000
500	700
10	10

253 V AC
24 V AC
0.75 A (see derating curve)
10 mA
30 A (10 ms)
< 1 mA
0.5
2-wire floating, zero voltage switch
4.5 A²s
RCV circuit
< 1 V

Basic insulation
2.5 kV (50 Hz, 1 min.)
-25°C ... 60°C
100% operating factor
IEC 60664, EN 50178, IEC 62103
2 / III
Any/can be aligned without spacing
5 mm / 28 mm / 15 mm

Ordering data

Type	Order No.	Pcs. / Pkt.
OPT-24DC/230AC/ 1	**2967950**	10
OPT-60DC/230AC/ 1	**2967963**	10

Technical data

①	②	③
0.8 - 1.2	0.8 - 1.2	0.9 - 1.1
3	18	40
1	8.4	20
15	7	2.6
10000	10000	10000
10000	10000	10000
10	10	10

253 V AC
24 V AC
2 A (see derating curve)
25 mA
30 A (10 ms)
< 1 mA
-
2-wire floating, zero voltage switch
4 A²s (tp = 10 ms, at 25°C)
Surge protection
≤ 1 V

Basic insulation
2.5 kV (50 Hz, 1 min.)
-25°C ... 60°C
100% operating factor
IEC 60664
2 / III
Any / See derating curve
12.7 mm / 29 mm / 15.7 mm

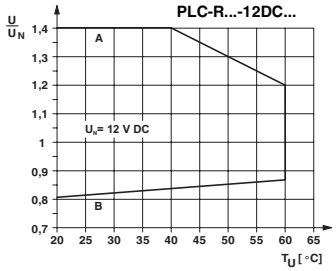
Ordering data

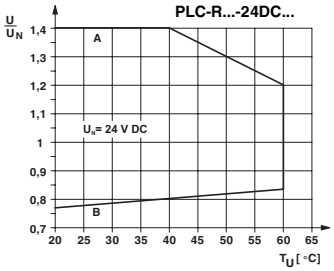
Type	Order No.	Pcs. / Pkt.
OPT- 5DC/230AC/ 2	**2982168**	10
OPT-24DC/230AC/ 2	**2982171**	10
OPT-60DC/230AC/ 2	**2982184**	10

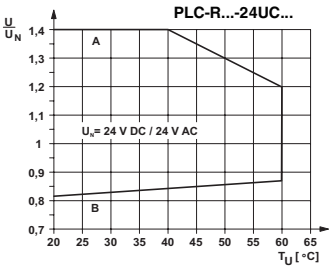
Relay options for PLC basic terminal blocks

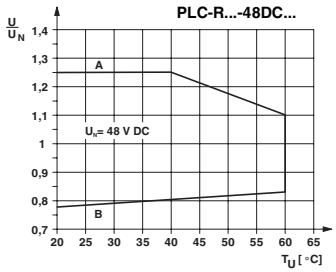
Relay and solid-state relay options		1 PDT basic terminal block									2 PDT basic terminal block								HC basic terminal block								Sensor basic terminal block					Actuator basic terminal block					IC basic terminal block	
	Push-in connection		PLC-BPT-5DC/21	PLC-BPT-12DC/21	PLC-BPT-24DC/21	PLC-BPT-24UC/21	PLC-BPT-48DC/21	PLC-BPT-60DC/21	PLC-BPT-120DC/21		PLC-BPT-230DC/21		PLC-BPT-12DC/21-21	PLC-BPT-24DC/21-21	PLC-BPT-24UC/21-21	PLC-BPT-48DC/21-21	PLC-BPT-60DC/21-21	PLC-BPT-120DC/21-21	PLC-BPT-230DC/21-21		PLC-BPT-12DC/21HC	PLC-BPT-24DC/21HC	PLC-BPT-24UC/21HC	PLC-BPT-48DC/21HC	PLC-BPT-60DC/21HC	PLC-BPT-120DC/21HC	PLC-BPT-230DC/21HC											
	Spring-cage connection		PLC-BSP-5DC/21	PLC-BSP-12DC/21	PLC-BSP-24DC/21	PLC-BSP-24UC/21	PLC-BSP-48DC/21	PLC-BSP-60DC/21	PLC-BSP-120DC/21		PLC-BSP-230DC/21		PLC-BSP-12DC/21-21	PLC-BSP-24DC/21-21	PLC-BSP-24UC/21-21	PLC-BSP-48DC/21-21	PLC-BSP-60DC/21-21	PLC-BSP-120DC/21-21	PLC-BSP-230DC/21-21		PLC-BSP-12DC/21HC	PLC-BSP-24DC/21HC	PLC-BSP-24UC/21HC	PLC-BSP-48DC/21HC	PLC-BSP-60DC/21HC	PLC-BSP-120DC/21HC	PLC-BSP-230DC/21HC											
	Screw connection		PLC-BSC-5DC/21	PLC-BSC-12DC/21	PLC-BSC-24DC/21	PLC-BSC-24UC/21	PLC-BSC-48DC/21	PLC-BSC-60DC/21	PLC-BSC-120DC/21	PLC-BSC-125DC/21	PLC-BSC-230DC/21		PLC-BSC-12DC/21-21	PLC-BSC-24DC/21-21	PLC-BSC-24UC/21-21	PLC-BSC-48DC/21-21	PLC-BSC-60DC/21-21	PLC-BSC-120DC/21-21	PLC-BSC-230DC/21-21		PLC-BSC-12DC/21HC	PLC-BSC-24DC/21HC	PLC-BSC-24UC/21HC	PLC-BSC-48DC/21HC	PLC-BSC-60DC/21HC	PLC-BSC-120DC/21HC	PLC-BSC-230DC/21HC		PLC-BSC-5DC/1/SEN	PLC-BSC-24DC/1/SEN	PLC-BSC-120UC/1/SEN	PLC-BSC-230UC/1/SEN		PLC-BSC-5DC/1/ACT	PLC-BSC-24DC/1/ACT	PLC-BSC-24UC/1/ACT		PLC-BSC-24DC/1IC/ACT
			2900443	2900444	2900445	2900446	2900447	2900279	2900280		2900281		2900282	2900283	2900284	2900285	2900286	2900287	2900288		2900253	2900254	2900255	2900256	2900257	2900258	2900259							2900448	2900449	2900450	2900261		2900260
			2980238	2967426	2967219	2967222	2967329	2967332	2967167		2967183		2912426	2912439	2912442	2912455	2912468	2912471	2912484		2912332	2912345	2912358	2912361	2912374	2912387	2912390							2980254	2967196	2982809	2961396		2912400
			2980225	2966896	2966016	2966029	2966090	2966100	2966032	2980018	2966045		2967251	2967015	2967028	2967264	2967316	2967031	2967044		2967769	2967772	2967785	2967798	2967808	2967811	2967824		2980267	2966061	2966074	2966087		2980241	2966058	2982799			2967837
REL-MR-4,5DC/21	2961367		X																										X					X					
REL-MR-4,5DC/21AU	2961370		X																										X					X					
REL-MR-12DC/21	2961150			X																															X				
REL-MR-12DC/21AU	2961163			X																																			
REL-MR-24DC/21	2961105				X	X	X																							X						X			
REL-MR-24DC/21AU	2961121				X	X	X																							X					X	X			
REL-MR-60DC/21	2961118							X	X	X	X																				X	X							
REL-MR-60DC/21AU	2961134							X	X	X	X																				X	X							
REL-MR-24DC/1IC	2961341																																						X
REL-MR-18DC/21	2961383																																				X		
REL-MR-18DC/21AU	2961493																																				X		
REL-MR-12DC/21-21	2961257												X																										
REL-MR-12DC/21-21AU	2961299												X																										
REL-MR-24DC/21-21	2961192													X	X	X																							
REL-MR-24DC/21-21AU	2961215													X	X	X																							
REL-MR-60DC/21-21	2961273																X																						
REL-MR-60DC/21-21AU	2961286																X																						
REL-MR-110DC/21-21	2961202																	X	X																				
REL-MR-110DC/21-21AU	2961228																	X	X																				
REL-MR-12DC/21HC	2961309																				X																		
REL-MR-24DC/21HC	2961312																					X	X	X															
REL-MR-60DC/21HC	2961325																								X														
REL-MR-110DC/21HC	2961338																									X	X												
OPT-24DC/230AC/1	2967950				X		X																							X					X	X			
OPT-60DC/230AC/1	2967963							X	X		X																				X	X							
OPT-5DC/24DC/2	2967989		X																										X					X					
OPT-24DC/24DC/2	2966595				X		X																							X					X	X			
OPT-60DC/24DC/2	2966605							X	X		X																				X	X							
OPT-5DC/48DC/100	2967992		X																										X					X					
OPT-24DC/48DC/100	2966618				X		X																							X					X	X			
OPT-60DC/48DC/100	2966621							X	X		X																				X	X							
OPT-24DC/24DC/5	2982100													X		X						X		X															X
OPT-60DC/24DC/5	2982126																X								X														
OPT-24DC/230AC/2	2982171													X		X						X		X															X
OPT-60DC/230AC/2	2982184																X								X														

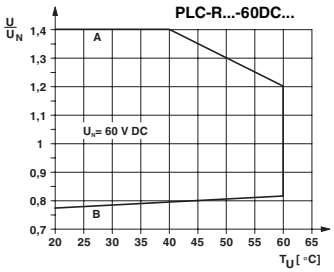
Operating voltage ranges for PLC-INTERFACE, 6.2 mm versions, equipped with relay

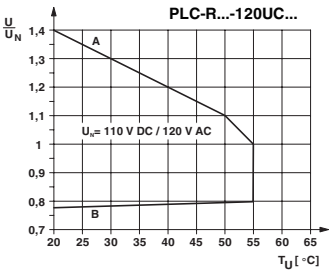


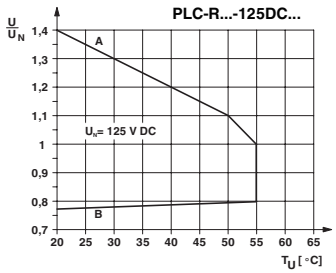


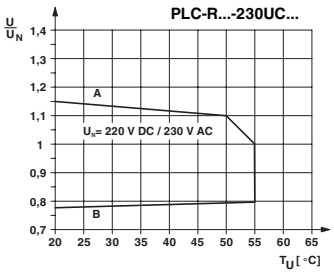




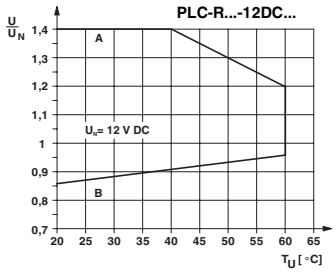


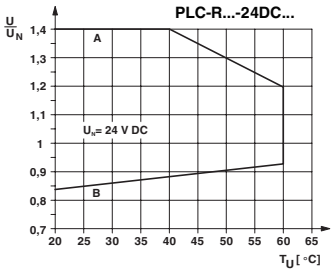


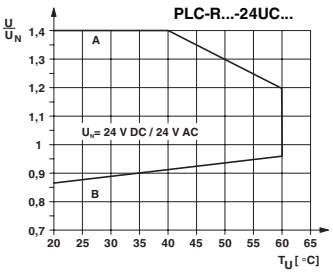


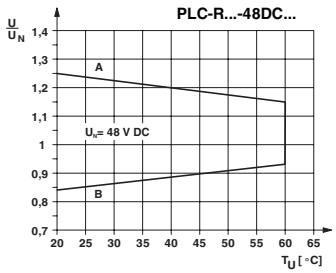


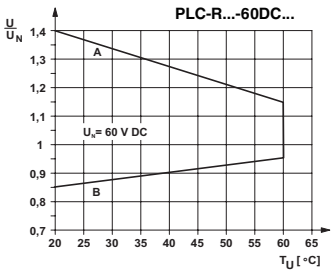
Operating voltage ranges for PLC-INTERFACE, 14 mm versions, equipped with relay

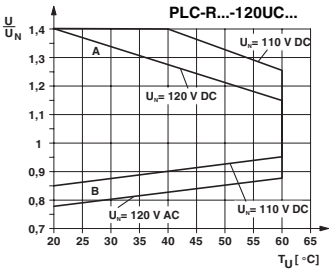


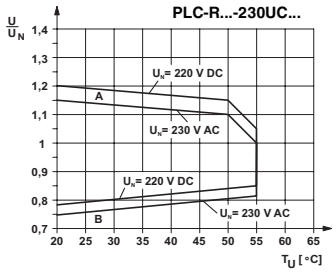












General conditions:
Direct alignment in the block, all devices 100% operating time, horizontal or vertical mounting.

Curve A
Maximum permissible continuous voltage Umax with limiting continuous current on the contact side (see respective technical data).

Curve B
Minimum permissible operating voltage Uop after pre-excitation[1]) (see respective technical data).

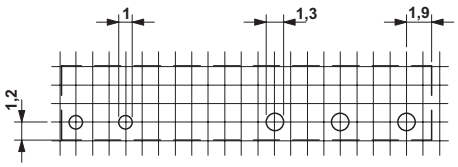
[1]) **Pre-excitation**: Relay has been operated in a thermally steady state at the ambient temperature T_A with nominal voltage U_N and limiting continuous current on the contact side (see respective technical data) (warm coil). After being switched off for a short time, the relay must reliably pick up again at U_{op}. The U_{op} values for cold coils ($T_{coil} = T_A = 20°C$) indicated by other manufacturers yield better values, but are not practical.

Plug-in miniature relays

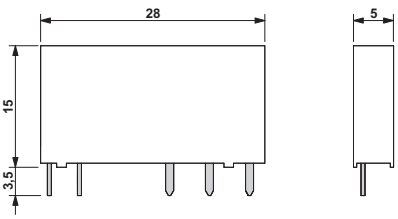
REL-MR...21

5 mm design width

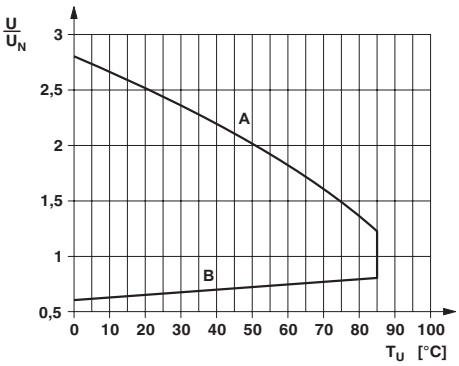
Perforations for assembly: View of the connections



Basic grid dimension: 1.25 mm and 1.27 mm



Permissible input voltage range for REL-MR...21



General conditions:
Direct alignment in the block, all devices 100% operating time, horizontal or vertical mounting.

Curve A
Maximum permissible continuous voltage U_{max} with limiting continuous current on the contact side (see respective technical data).

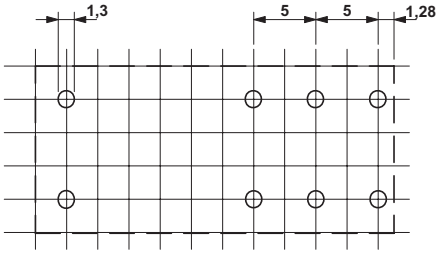
Curve B
Minimum permissible operating voltage U_{op} after pre-excitation[1]) (see respective technical data).

[1]) **Pre-excitation**: Relay has been operated in a thermally steady state at the ambient temperature T_A with nominal voltage U_N and limiting continuous current on the contact side (see respective technical data) (warm coil). After being switched off for a short time, the relay must reliably pick up again at U_{op}. The U_{op} values for cold coils ($T_{coil} = T_A = 20°C$) indicated by other manufacturers yield better values, but are not practical.

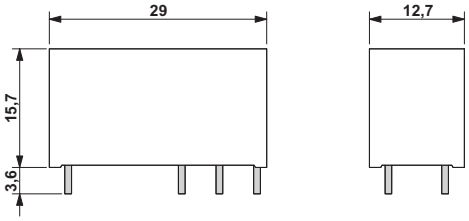
REL-MR...21-21

12.7 mm design width

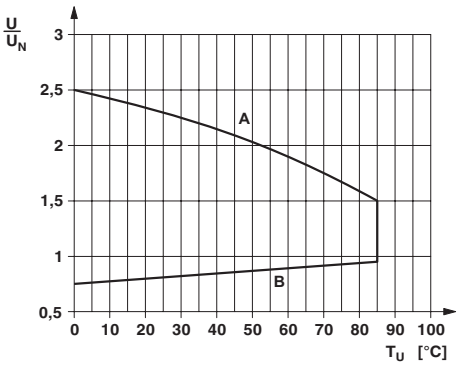
Perforations for assembly: View of the connections



Basic grid dimension: 2.5 mm



Permissible input voltage range for REL-MR...21-21, REL-MR-24DC/1IC, REL-MR...21HC

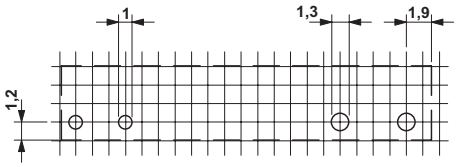


Plug-in solid-state relays

OPT...DC/24DC/2
OPT...DC/230AC/1

5 mm design width

Perforations for assembly: View of the connections

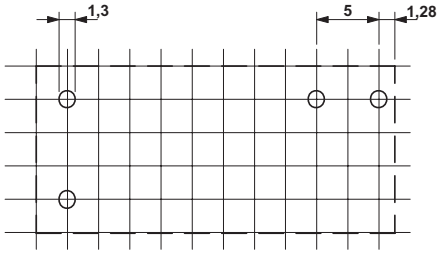


Basic grid dimension: 1.25 mm and 1.27 mm

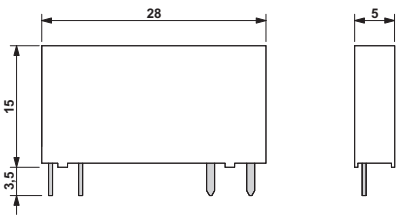
OPT...DC/24DC/5
OPT...DC/230AC/2

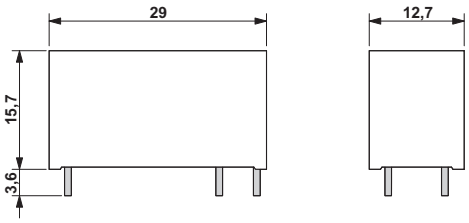
12.7 mm design width

Perforations for assembly: View of the connections

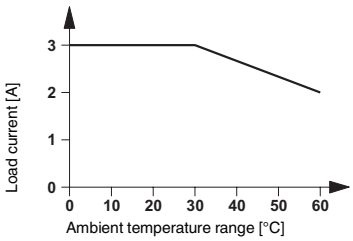


Basic grid dimension: 2.5 mm

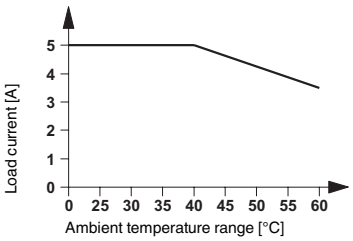




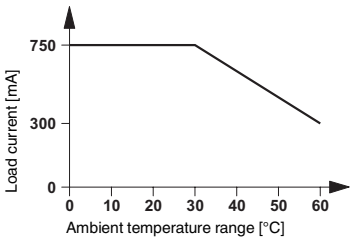
Derating curve for OPT...DC/24DC/2 and PLC-OS.../24DC/2 solid-state relays



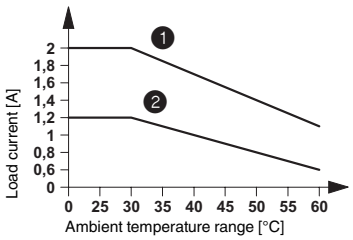
Derating curve for OPT...DC/24DC/5 and PLC-OS.../24DC/5/ACT solid-state relays



Derating curve for OPT...DC/230AC/1 and PLC-OS.../230AC/1 solid-state relays



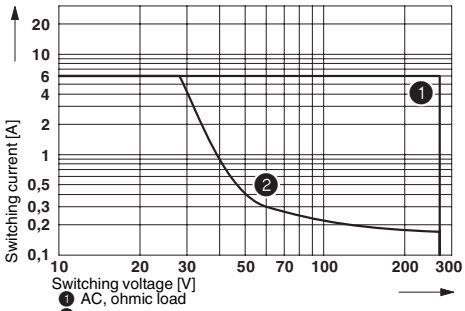
Derating curve for OPT...DC/230AC/2 and PLC-OS.../230AC/2/ACT solid-state relays



❶ Aligned with > 10 mm spacing
❷ Aligned without spacing

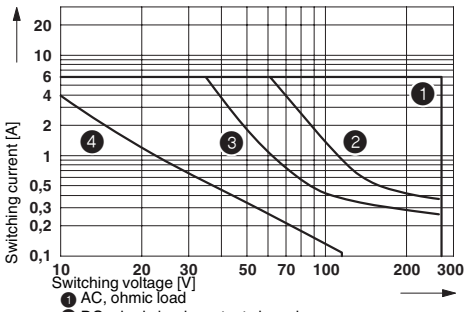
Electrical interrupting rating for PLC-INTERFACE

Electrical interrupting rating for PLC...21 with 1 PDT relays



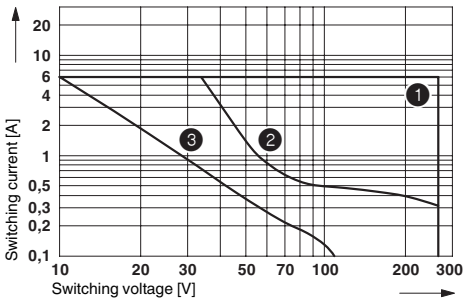
❶ AC, ohmic load
❷ DC, ohmic load

Electrical interrupting rating for PLC...21-21 with 2 PDT relays



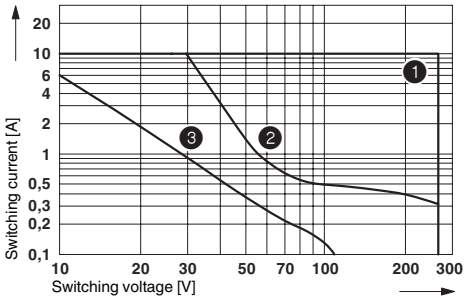
❶ AC, ohmic load
❷ DC, ohmic load, contacts in series
❸ DC, ohmic load
❹ DC, L/R = 40 ms

Electrical interrupting rating for PLC...1IC/ACT for high inrush currents



❶ AC, ohmic load
❷ DC, ohmic load
❸ DC, L/R = 40 ms

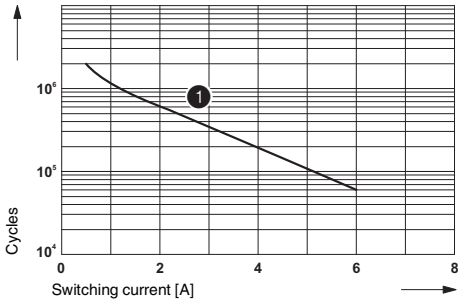
Electrical interrupting rating for PLC...21HC for high continuous currents



❶ AC, ohmic load
❷ DC, ohmic load
❸ DC, L/R = 40 ms

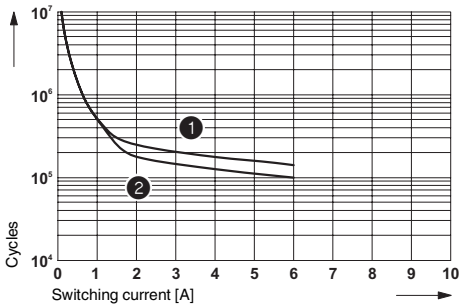
PLC-INTERFACE for railway applications

Electrical service life for PLC-RSP...UC/21RW



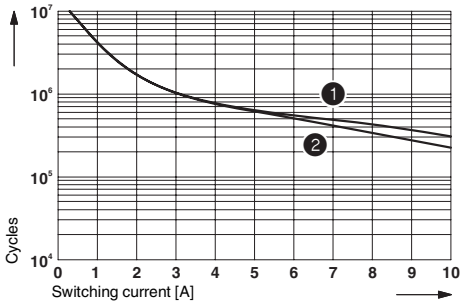
❶ 250 V AC, ohmic load

Electrical service life for PLC-RSP...UC/21-21/RW



❶ 250 V AC, ohmic load (DC coils)
❷ 250 V AC, ohmic load (AC coils)

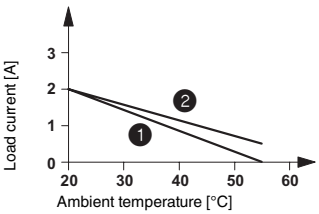
Electrical service life for PLC-RSP...UC/21HC/RW



❶ 250 V AC, ohmic load (DC coils)
❷ 250 V AC, ohmic load (AC coils)

EMG-OV solid-state power relays

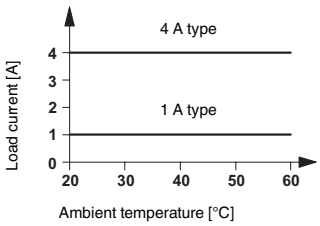
Derating curve for EMG 17-OV...48DC/2



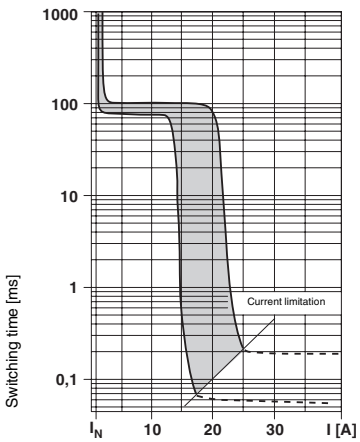
1 Aligned without spacing
2 Stand-alone device

ST-OV 4-24DC/24DC...PRO power circuit breaker solid-state relays with signal logic

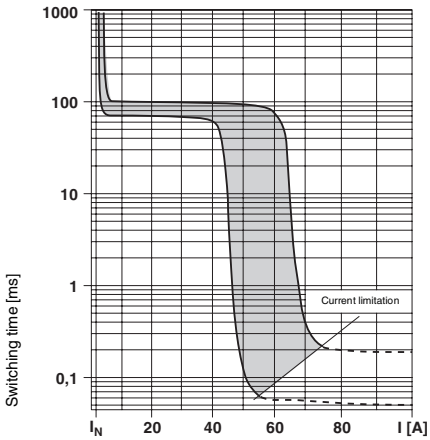
Derating curve for ST-OV 4-24DC/24DC...PRO



Time-current characteristic, 1 A version



Time-current characteristic, 4 A version



State diagram

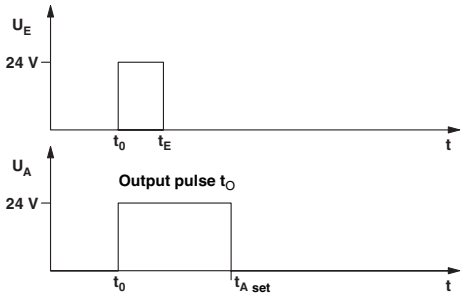
Operating state	Switching level of input	Light indicator, yellow LED	Light indicator, red LED	Alarm contact/ CONTROL
Not activated	L	L	L	
Normal operation	H	H	L	
Overload/ short circuit	H	H	H	
Open circuit	L	L	H	

UEGM-OE/AV logic pulse expansion module

Time diagrams for UEGM-OE/AV-24DC/24DC/100

Scenario 1: Input pulse t_I < output pulse $t_{O\ set}$

Operating voltage present



Scenario 2: Input pulse $t_I \geq$ output pulse $t_{O\ set}$ $t_I = t_O$

Operating voltage present

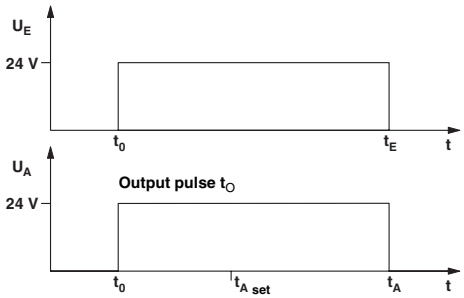


Table of adjustable output pulse lengths

	DIP switches[1])							
	S1	S2	S3	S4	S5	S6	S7	S8
Length of output pulses [ms] (when switch is set to "ON")	10	–	–	–	–	–	–	–
	–	20	–	–	–	–	–	–
	–	–	50	–	–	–	–	–
	–	–	–	100	–	–	–	–
	–	–	–	–	200	–	–	–
	–	–	–	–	–	500	–	–
	–	–	–	–	–	–	1000	–
	–	–	–	–	–	–	–	1500

[1]) If no switch is actuated, the output voltage is not defined.

If the input pulse is longer than the set time, the output is switched off almost simultaneously with the input.

Intermediate values can be obtained by combining several DIP switches according to the following formula:

$$T_{tot} = \frac{1}{\frac{1}{t_1} + \frac{1}{t_2} + \ldots + \frac{1}{t_n}}$$

N

PLC-INTERFACE with two integrated relays

Relay module with two permanently soldered-in power relays

The advantages:

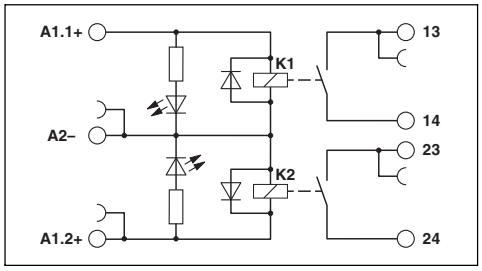
- 100% more channel density than the conventional 6.2 mm relay
- Two switching channels in a 6.2 mm housing
- Integrated input circuit/protective circuit
- Safe isolation according to DIN EN 50178 between coil and contacts and between contacts
- Screw-type, spring-cage, and push-in technology

Notes:

Type of housing:
Polyamide PA non-reinforced, color: Green.

For marking systems and mounting material, see CLIPLINE catalog, part 2.

Two integrated relays



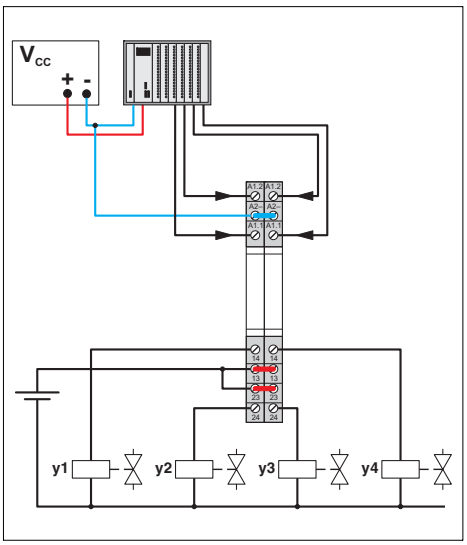
Technical data

Input data		①
Typ. input current at U_N	[mA]	7
Response/release time at U_N	[ms]	4 / 6
Input circuit DC		Yellow LED, protection against polarity reversal, free-wheeling diode
Output data		
Contact material		AgNi
Max. switching voltage		250 V AC/DC
Min. switching voltage		24 V AC/DC
Limiting continuous current		3.5 A
Min. switching current		5 mA
General data		
Test voltage input/output		3 kV AC (50 Hz, 1 min.)
Test voltage output/output		3 kV AC (50 Hz, 1 min.)
Ambient temperature (operation)		-20°C ... 60°C
Mechanical service life		2 x 10^7 cycles
Standards / regulations		IEC 60664, EN 50178, IEC 62103
Connection data solid / stranded / AWG		0.14 - 2.5 mm^2 / 0.14 - 2.5 mm^2 / 26 - 14
Dimensions	W / H / D	6.2 mm / 80 mm / 86 mm

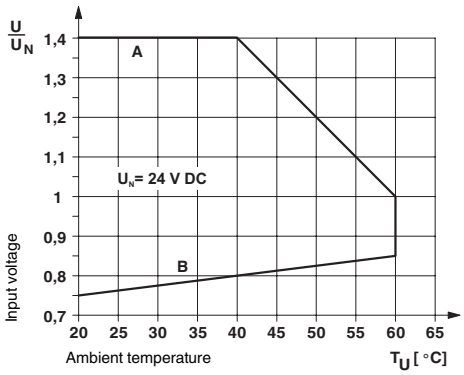
Ordering data

Description	Input voltage U_N	Type	Order No.	Pcs. / Pkt.
PLC-INTERFACE, with **screw connection** ①	24 V DC	**PLC-2RSC-24DC/ 1**	**2987309**	10
PLC-INTERFACE, with **spring-cage connection** ①	24 V DC	**PLC-2RSP-24DC/ 1**	**2987312**	10
PLC-INTERFACE, with **push-in connection** ①	24 V DC	**PLC-2RPIT-24DC/1**	**2901639**	10

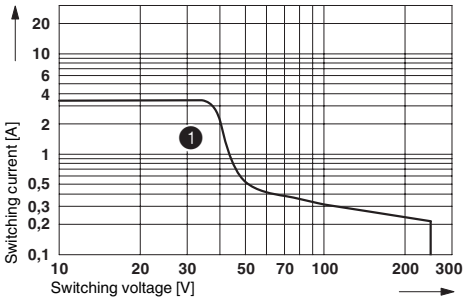
Application example PLC-2RS...24DC/1



Operating voltage range



Interrupting rating



❶ DC, ohmic load

N

PLC-INTERFACE with manual switch and relay

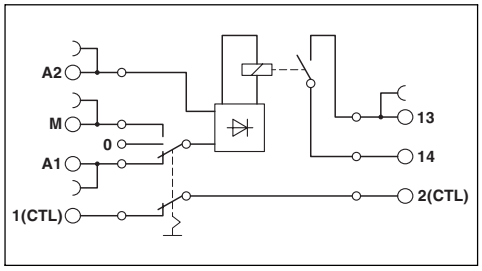
Relay module with manual switch and integrated power relay for manual, zero, and automatic functions

The advantages are:

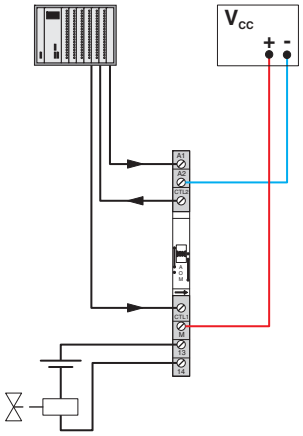
- Max. switching current of 6 A
- Only 6.2 mm wide
- Floating confirmation contact
- Safe isolation according to DIN EN 50178 between coil and contact
- Screw-type, spring-cage, and push-in technology

Notes:
Type of housing: Polyester PBT non-reinforced, color: Green.
For marking systems and mounting material, see CLIPLINE catalog, part 2.
For the protection of input and output, inductive loads must be dampened with an effective protective circuit.
Separating plate PLC-ATP is to be used in the following cases: always at the start and end of a PLC terminal strip, for voltages greater than 250 V (L1, L2, L3) between the same terminal points of neighboring modules (potential bridging then takes place with FBST 8-PLC... or FBST 500...) and with safe isolation between neighboring modules.
Module height: PLC-...-S/H = 90 mm; PLC-...-S/L: = 86 mm
PLC...**H** - manual operation PLC...**L** - operation using screwdriver

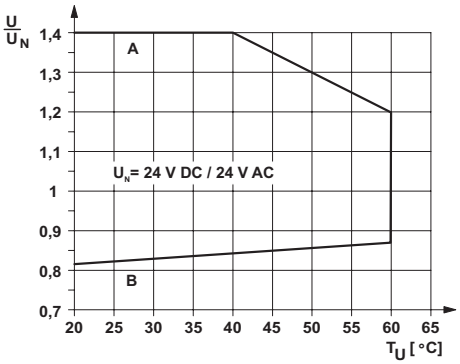
Relay module with manual switch and integrated relay



Application example PLC-RS...24UC/1/S...



Permissible input voltage range for PLC-RS...24UC/1/S...



Curve A
maximum continuous voltage at limiting continuous current = 6 A

Curve B
minimum operating voltage for pre-excitation with U_N and limiting continuous current = 6 A

Technical data

		①	②
Input data			
Typ. input current at U_N	[mA]	11	11
Response/release time at U_N	[ms]	6 / 15	6 / 15
Input circuit AC/DC		Yellow LED, bridge rectifier	
Output data			
Contact material		AgSnO	
Max. switching voltage		250 V AC/DC	
Min. switching voltage		5 V (at 100 mA)	
Limiting continuous current		6 A	
Max. inrush current		(On request)	
Min. switching current		10 mA (at 12 V)	
Feedback			
Operating mode "Automatic", floating		Max. 30 V AC/DC / 50 mA Min. 2 V AC/DC / 1 mA	
General data			
Rated insulation voltage		250 V AC	
Rated surge voltage		6 kV	
Ambient temperature (operation)		-20°C ... 60°C	
Standards / regulations		IEC 60664, EN 50178, IEC 62103	
Pollution degree/surge voltage category		2 / III	
Connection data solid / stranded / AWG		0.14 - 2.5 mm² / 0.14 - 2.5 mm² / 26 - 14	
Dimensions	W / H / D	6.2 mm / 80 mm / 90 mm	

Ordering data

Description		Input voltage U_N	Type	Order No.	Pcs. / Pkt.
PLC-INTERFACE, with **screw connection**					
	①	24 V AC/DC	**PLC-RSC- 24UC/ 1/S/H**	**2982236**	10
	②	24 V AC/DC	**PLC-RSC- 24UC/ 1/S/L**	**2834876**	10
PLC-INTERFACE, with **spring-cage connection**					
	①	24 V AC/DC	**PLC-RSP- 24UC/ 1/S/H**	**2982249**	10
	②	24 V AC/DC	**PLC-RSP- 24UC/ 1/S/L**	**2834889**	10
PLC-INTERFACE, with **push-in connection**					
	①	24 V AC/DC	**PLC-RPIT- 24UC/ 1/S/H**	**2900328**	10
	②	24 V AC/DC	**PLC-RPIT- 24UC/ 1/S/L**	**2900327**	10

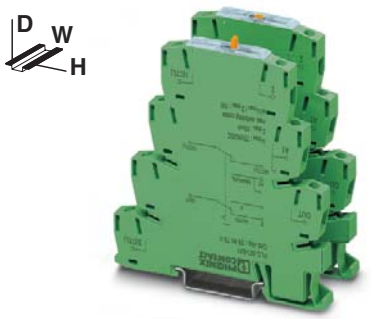
PLC-INTERFACE with manual switch without relay

Switching module without relay for manual, zero, and automatic functions

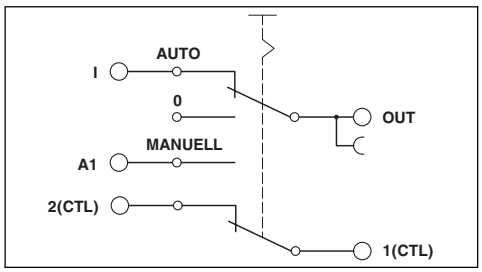
The advantages:

– Only 6.2 mm wide
– Floating confirmation contact
– Screw-type, spring-cage, and push-in technology

Notes:
Type of housing: Polyester PBT non-reinforced, color: Green.
For marking systems and mounting material, see CLIPLINE catalog, part 2.
For the protection of input and output, inductive loads must be dampened with an effective protective circuit.
Separating plate PLC-ATP is to be used in the following cases: always at the start and end of a PLC terminal strip, for voltages greater than 250 V (L1, L2, L3) between the same terminal points of neighboring modules (potential bridging then takes place with FBST 8-PLC... or FBST 500...) and with safe isolation between neighboring modules.
Module height: PLC-...-S/H = 90 mm; PLC-...-S/L: = 86 mm
PLC...**H** - manual operation PLC...**L** - operation using screwdriver



Module with manual switch without relay



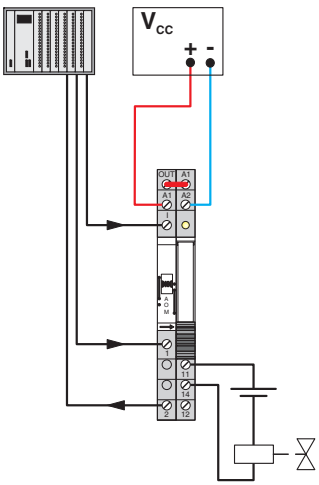
Technical data

Max. switching voltage		72 V DC
Min. switching voltage		2 V DC
Max. inrush current		50 mA
Min. switching current		1 mA
Cycles, max.		100 (at 72 V DC / 50 mA) / 10000 (at 12 V DC / 100 mA)
Feedback		
Operating mode "Automatic", floating		≤ 72 V DC / 50 mA
General data		
Rated insulation voltage		85 V AC
Rated surge voltage		0.5 kV / basic insulation
Ambient temperature (operation)		-20°C ... 60°C
Standards / regulations		IEC 60664, EN 50178, IEC 62103
Pollution degree/surge voltage category		2 / III
Dimensions	W / H / D	6.2 mm / 80 mm / 90 mm

Ordering data

Description	Type	Order No.	Pcs. / Pkt.
PLC-INTERFACE, with **screw connection**			
	PLC-SC-S/H	**2980733**	10
	PLC-SC-S/L	**2980775**	10
PLC-INTERFACE, with **spring-cage connection**			
	PLC-SP-S/H	**2980746**	10
	PLC-SP-S/L	**2980788**	10

Application example PLC-S...S...



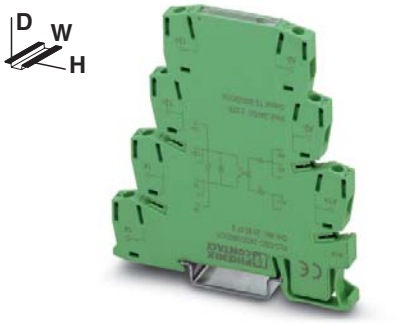
N

PLC-INTERFACE with an integrated solid-state relay

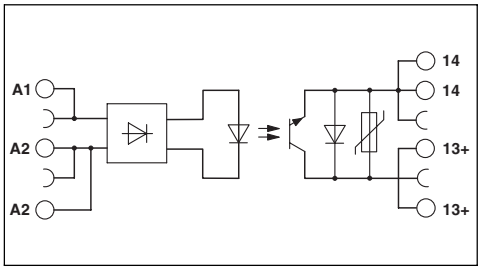
The slim 6.2 mm PLC housing with integrated electronics in various versions offers the following advantages:

- Option of bridging adjacent modules
- Status indicator
- Protective circuits in input and output
- Wear-resistant and bounce-free switching
- Integrated protective circuit
- DC outputs of up to 300 V DC/1 A or up to 24 V DC/10 A
- Electronic PDT output of up to 48 V DC/500 mA

Notes:
Type of housing: Polyester PBT non-reinforced, color: Green.
For marking systems and mounting material, see CLIPLINE catalog, part 2.
For the protection of input and output, inductive loads must be dampened with an effective protective circuit.
Separating plate PLC-ATP is to be used in the following cases: always at the start and end of a PLC terminal strip, for voltages greater than 250 V (L1, L2, L3) between the same terminal points of neighboring modules (potential bridging then takes place with FBST 8-PLC... or FBST 500...) and with safe isolation between neighboring modules.
The housings of the following modules are open on one side: - PLC-OS...-...-300DC/1 - PLC-OS...-24DC/24DC/10/R



Power solid-state relay with DC voltage output, max 1 A



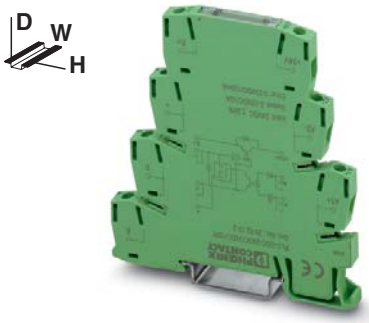
Technical data

		①	②	③	④	⑤	⑥	⑦	⑧
Input data									
Permissible range (with reference to U_N)		0.8 - 1.2	0.8 - 1.2	0.8 - 1.2	0.8 - 1.2	0.8 - 1.2	0.8 - 1.2	0.8 - 1.1	0.8 - 1.1
Switching level (with reference to U_N)	1 signal ("H")	≥ 0.8	≥ 0.8	≥ 0.8	≥ 0.8	≥ 0.8	≥ 0.8	≥ 0.8	≥ 0.8
	0 signal ("L")	≤ 0.4	≤ 0.4	≤ 0.4	≤ 0.4	≤ 0.4	≤ 0.4	≤ 0.4	≤ 0.4
Typ. input current at U_N	[mA]	5	6	8	5	5	3	3	3
Transmission frequency f_{limit}	[Hz]	50	50	50	50	50	50	10	10
Alarm output									
Operating range		- / -							
Output data									
Max. / min. switching voltage		300 V DC / 12 V DC							
Limiting continuous current		1 A (see derating curve)							
Voltage drop at max. limiting continuous current		< 500 mV							
General data									
Rated insulation voltage		300 V							
Rated surge voltage		4 kV / basic insulation							
Ambient temperature (operation)		-25°C ... 60°C							
Standards / regulations		IEC 60664, EN 50178, IEC 62103							
Connection data solid / stranded / AWG		0.14 - 2.5 mm² / 0.14 - 2.5 mm² / 26 - 14							
Dimensions	W / H / D	6.2 mm / 80 mm / 86 mm							

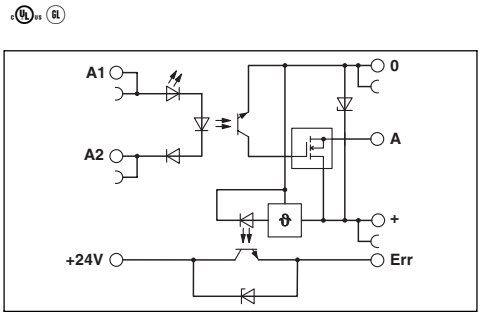
Ordering data

Description		Input voltage U_N	Type	Order No.	Pcs. / Pkt.
PLC-INTERFACE, with **screw connection**					
	①	5 V DC	**PLC-OSC- 5DC/300DC/ 1**	**2980652**	10
	②	12 V DC	**PLC-OSC- 12DC/300DC/ 1**	**2980665**	10
	③	24 V DC	**PLC-OSC- 24DC/300DC/ 1**	**2980678**	10
48 V DC ... 60 V DC	④	60 V DC	**PLC-OSC- 60DC/300DC/ 1**	**2980681**	10
	⑤	110 V DC	**PLC-OSC-110DC/300DC/ 1**	**2980694**	10
	⑥	220 V DC	**PLC-OSC-220DC/300DC/ 1**	**2980704**	10
	⑦	120 V AC	**PLC-OSC-120AC/300DC/ 1**	**2980717**	10
	⑧	230 V AC	**PLC-OSC-230AC/300DC/ 1**	**2980720**	10
PLC-INTERFACE, with **spring-cage connection**					
	①	5 V DC	**PLC-OSP- 5DC/300DC/ 1**	**2980814**	10
	②	12 V DC	**PLC-OSP- 12DC/300DC/ 1**	**2980827**	10
	③	24 V DC	**PLC-OSP- 24DC/300DC/ 1**	**2980830**	10
48 V DC ... 60 V DC	④	60 V DC	**PLC-OSP- 60DC/300DC/ 1**	**2980843**	10
	⑤	110 V DC	**PLC-OSP-110DC/300DC/ 1**	**2980856**	10
	⑥	220 V DC	**PLC-OSP-220DC/300DC/ 1**	**2980869**	10
	⑦	120 V AC	**PLC-OSP-120AC/300DC/ 1**	**2980872**	10
	⑧	230 V AC	**PLC-OSP-230AC/300DC/ 1**	**2980885**	10
PLC-INTERFACE, with **push-in connection**					
	①	5 V DC	**PLC-OPIT- 5DC/300DC/1**	**2900381**	10
	②	12 V DC	**PLC-OPIT- 12DC/300DC/1**	**2900382**	10
	③	24 V DC	**PLC-OPIT- 24DC/300DC/1**	**2900383**	10
48 V DC ... 60 V DC	④	60 V DC	**PLC-OPIT- 60DC/300DC/1**	**2900384**	10
	⑤	110 V DC	**PLC-OPIT-110DC/300DC/1**	**2900385**	10
	⑥	220 V DC	**PLC-OPIT-220DC/300DC/1**	**2900387**	10
	⑦	120 V AC	**PLC-OPIT-120AC/300DC/1**	**2900388**	10
	⑧	230 V AC	**PLC-OPIT-230AC/300DC/1**	**2900389**	10

N



Power solid-state relay with short-circuit-proof DC voltage output, max. 10 A, with feedback



Technical data

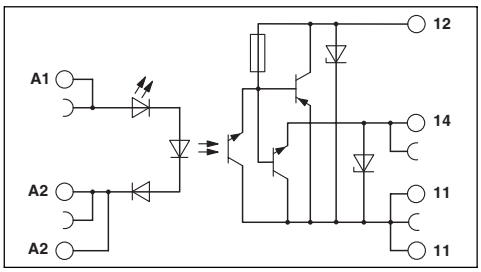
③	
0.8 - 1.2	
≥ 0.8	
≤ 0.4	
3	
100	
3 V DC ... 33 V DC (High active) / 100 mA	
33 V DC / 5 V DC	
10 A (see derating curve)	
≤ 50 mV	
300 V	
4 kV / basic insulation	
-25°C ... 60°C	
IEC 60664, EN 50178, IEC 62103	
0.14 - 2.5 mm² / 0.14 - 2.5 mm² / 26 - 14	
6.2 mm / 80 mm / 86 mm	

Ordering data

Type	Order No.	Pcs. / Pkt.
PLC-OSC- 24DC/ 24DC/ 10/R	**2982702**	10
PLC-OSP- 24DC/ 24DC/ 10/R	**2982715**	10
PLC-OPIT- 24DC/ 24DC/10/R	**2900398**	10

N

Input solid-state relay with DC voltage output, max 500 mA, with electronic PDT



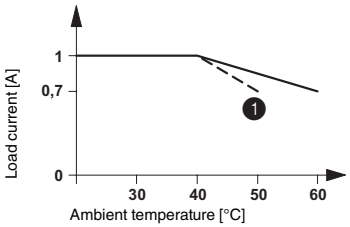
Technical data

③	
0.8 - 1.2	
≥ 0.8	
≤ 0.4	
3	
1000	
- / -	
48 V DC / 3 V DC	
500 mA (see derating curve)	
< 1.2 mV	
300 V	
4 kV / basic insulation	
-25°C ... 60°C	
IEC 60664, EN 50178, IEC 62103	
0.14 - 2.5 mm² / 0.14 - 2.5 mm² / 26 - 14	
6.2 mm / 80 mm / 86 mm	

Ordering data

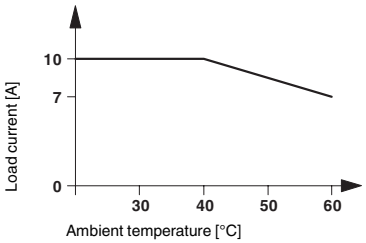
Type	Order No.	Pcs. / Pkt.
PLC-OSC- 24DC/ 48DC/500/W	**2980636**	10
PLC-OSP- 24DC/ 48DC/500/W	**2980649**	10
PLC-OPIT- 24DC/ 48DC/500/W	**2900378**	10

Derating curve for PLC...300DC/1

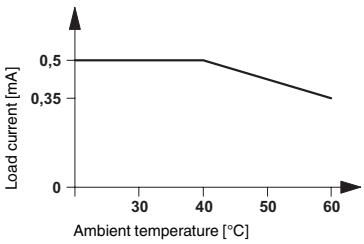


1 For input voltages 220 V DC and 230 V AC

Derating curve for PLC-...24DC/24DC/10/R



Derating curve for PLC...24DC/48DC/500/W



N

PLC-INTERFACE for the TTL signal at input

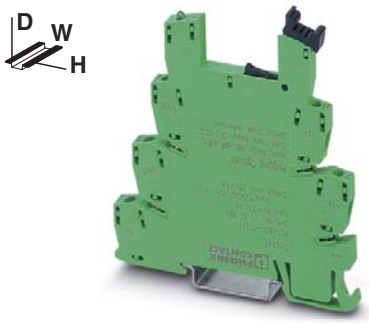
The PLC-BS…TTL/1 basic terminal block is controlled using a TTL (5 V) input signal and can be optionally equipped with a mechanical relay or a solid-state relay. The basic terminal block equipped with a rugged miniature relay has the following features:

- 6.2 mm slim design width
- Bridging options
- Status indicator
- Screw and spring-cage connection
- RT III degree of protection
- Safe isolation in accordance with EN 50178 (VDE 0160)
- 4 kV_{rms} electrical isolation between coil and contact.

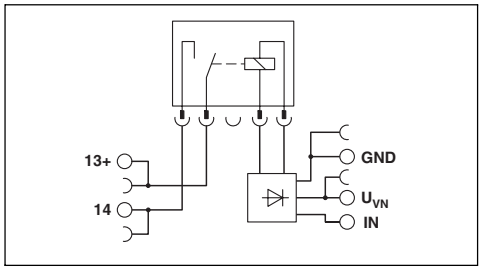
Notes:

Type of housing:
Polyester PBT non-reinforced, color: Green.

For marking systems and mounting material, see CLIPLINE catalog, part 2.



Basic terminal block, for fitting with relay for TTL (5 V)



Technical data

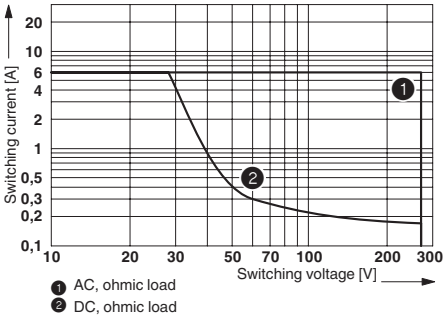
Input data		
Rated control supply voltage U_{VN}	5 V DC	
Rated control supply voltage range with reference to U_{VN}	0.9 ... 1.2	
Rated control supply current I_{VN}	41 mA	
Rated actuating voltage U_c (IN)	5 V DC (TTL)	
Rated actuating voltage range with reference to U_C	0.9 ... 1.2	
Rated actuating current I_C	2.5 mA	
Typ. response time at U_c	4.5 ms	
Typ. release time for U_c	3.5 ms	
Input circuit	Yellow LED, protection against polarity reversal, surge protection	
Output data with:	REL-MR-4,5DC/21 AU	REL-MR-4,5DC/21
Contact type	Single contact, 1 N/O contact	Single contact, 1 N/O contact
Contact material	AgSnO, hard gold-plated	AgSnO
Max. switching voltage	30 V AC / 36 V DC	250 V AC/DC
Min. switching voltage	100 mV (at 10 mA)	5 V (at 100 mA)
Limiting continuous current	50 mA	6 A
Max. inrush current	50 mA	(On request)
Min. switching current	1 mA (at 24 V)	10 mA (at 12 V)
General data		
Rated insulation voltage	250 V	
Rated surge voltage / insulation	6 kV	
Ambient temperature (operation)	-20°C ... 60°C	
Mechanical service life	2 x 10^7 cycles	
Air and creepage distances between the power circuits	IEC 60664, EN 50178, IEC 62103	
Pollution degree / surge voltage category	2 / III	
Mounting position / Assembly	Any/can be aligned without spacing	
Connection data solid / stranded / AWG	0.14 - 2.5 mm^2 / 0.14 - 2.5 mm^2 / 26 - 14	
Dimensions W / H / D	6.2 mm / 80 mm / 94 mm	

Ordering data

Description	Type	Order No.	Pcs. / Pkt.
PLC-INTERFACE			
With screw connection	**PLC-BSC-TTL/1**	**2982689**	10
With spring-cage connection	**PLC-BSP-TTL/1**	**2982692**	10
With push-in connection	**PLC-BPIT-TTL/1**	**2900458**	10

Accessories

Pluggable miniature relays			
with gold contact	**REL-MR 4,5DC/21AU**	**2961370**	10
with power contact	**REL-MR- 4,5DC/21**	**2961367**	10



Max. interrupting rating

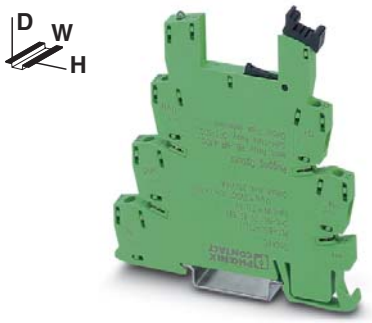
N

PLC-INTERFACE for the TTL signal at input

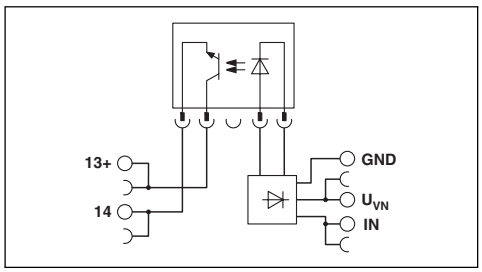
The PLC-BS…TTL/1 basic terminal block is controlled using a TTL (5 V) input signal and can be optionally equipped with a mechanical relay or a solid-state relay. The basis terminal block equipped with a solid-state relay has the following features:

- 6.2 mm slim design width
- Bridging options
- Status indicator
- Screw and spring-cage connection
- IP67-protected solid-state relay electronics
- Switching capacity of up to 24 V DC/3 A
- Alternative input or power solid-state relay
- Wear-free and output-free
- Resistant to vibration and impact
- Integrated protective circuit
- 2.5 kV_{rms} electrical isolation between input and output

Notes:
Type of housing: Polyester PBT non-reinforced, color: Green.
For marking systems and mounting material, see CLIPLINE catalog, part 2.
For derating curves see page 105



Basic terminal block for fitting with solid-state relay for TTL (5 V)



Technical data

Input data		
Rated control supply voltage U_{VN}	5 V DC	
Rated control supply voltage range with reference to U_{VN}	0.9 ... 1.2	
Rated control supply current I_{VN}	11.5 mA	
Rated actuating voltage U_c (IN)	5 V DC (TTL)	
Switching level 1 signal ("H") (TTL signal)	> 2 V DC	
Switching level 0 signal ("L") (TTL signal)	< 0.8 V DC	
Rated actuating current I_C	2.5 mA	
Typ. response time/switch-on time at U_c	35 µs	
Typ. switch-off time at U_C	320 µs	
Input circuit	Yellow LED, protection against polarity reversal, surge protection	
Output data with:	OPT-5DC/48DC/100	OPT-5DC/24DC/2
Max. switching voltage	48 V DC	33 V DC
Min. switching voltage	3 V DC	3 V DC
Limiting continuous current	100 mA	3 A
Output protection	Protection against polarity reversal, surge protection	Protection against polarity reversal, surge protection
Voltage drop at limiting continuous current	< 1 V	< 200 mV
General data		
Rated insulation voltage	250 V	
Rated surge voltage / insulation	6 kV / basic insulation	
Ambient temperature (operation)	-20°C ... 60°C	
Air and creepage distances between the power circuits	IEC 60664, EN 50178, IEC 62103	
Pollution degree / surge voltage category	2 / III	
Connection data solid / stranded / AWG	0.14 - 2.5 mm^2 / 0.14 - 2.5 mm^2 / 26 - 14	
Dimensions W / H / D	6.2 mm / 80 mm / 94 mm	

Ordering data

Description	Type	Order No.	Pcs. / Pkt.
PLC-INTERFACE			
With screw connection	**PLC-BSC-TTL/1**	**2982689**	10
With spring-cage connection	**PLC-BSP-TTL/1**	**2982692**	10
With push-in connection	**PLC-BPIT-TTL/1**	**2900458**	10

Accessories

Pluggable solid-state relays			
Solid-state input relays	**OPT- 5DC/ 48DC/100**	**2967992**	10
Solid-state power relays	**OPT- 5DC/ 24DC/ 2**	**2967989**	10

N

PLC-INTERFACE for the TTL signal at output

The PLC-OS…24DC/TTL with a built-in solid-state relay can be used for fast and wear-free switching of TTL (5 V) signals.

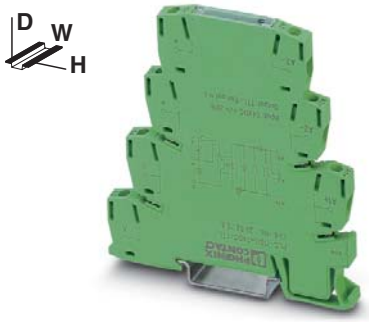
This module has the following features:

- Switching capacity TTL (5 V), fan out = 1
- 6.2 mm slim design width
- Bridging options
- Status indicator
- Screw and spring-cage connection
- Resistant to vibration and impact
- Integrated protective circuit

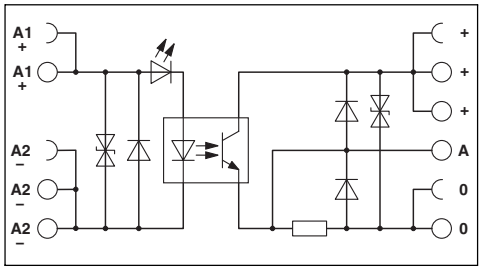
Notes:

Type of housing:
Polyester PBT non-reinforced, color: Green.

For marking systems and mounting material, see CLIPLINE catalog, part 2.



Input solid state relays with TTL (5 V) output



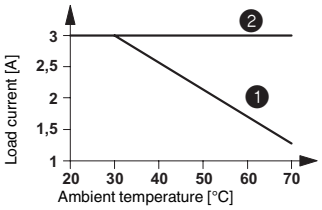
Technical data

Input data		
Rated actuating voltage U_C		24 V DC
Rated actuating voltage range with reference to U_C		0.8 ... 1.2
Switching level 1 signal ("H")		> 0.8
Switching level 0 signal ("L")		< 0.4
Rated actuating current I_C		3.4 mA
Typ. switch-on time for U_c		35 µs
Typ. switch-off time at U_C		35 µs
Transmission frequency f_{limit}		1 kHz
Input circuit DC		Yellow LED, protection against polarity reversal, surge protection
Output data with:		
Rated control supply voltage U_S		5 V DC
Rated control supply voltage range with reference to U_S		0.9 ... 1.2
Limiting continuous current		a TTL load (Fan out = 1) / 50 mA for switching mode
Output protection		Protection against polarity reversal, surge protection
Voltage drop at max. limiting continuous current		< 80 mV
General data		
Rated insulation voltage		250 V DC
Rated surge voltage / insulation		4 kV / basic insulation
Ambient temperature (operation)		-25°C ... 60°C
Air and creepage distances between the power circuits		IEC 60664, EN 50178, IEC 62103
Pollution degree/surge voltage category		2 / III
Connection data solid / stranded / AWG		0.14 - 2.5 mm² / 0.14 - 2.5 mm² / 26 - 14
Dimensions	W / H / D	6.2 mm / 80 mm / 86 mm

Ordering data

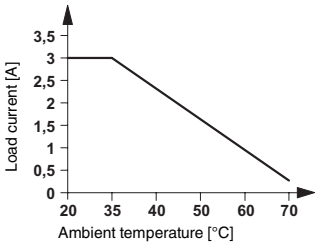
Description	Type	Order No.	Pcs. / Pkt.
PLC-INTERFACE			
With screw connection	**PLC-OSC- 24DC/TTL**	**2982728**	10
With spring-cage connection	**PLC-OSP- 24DC/TTL**	**2982731**	10
With push-in connection	**PLC-OPIT- 24DC/TTL**	**2900363**	10

Derating curve for PLC-OSP...24DC/3RW



❶ Aligned without spacing
❷ Aligned with ≥ 20 mm spacing

Derating curve for PLC-OSP...110DC/3RW



PLC-INTERFACE with solid-state relays for railway applications

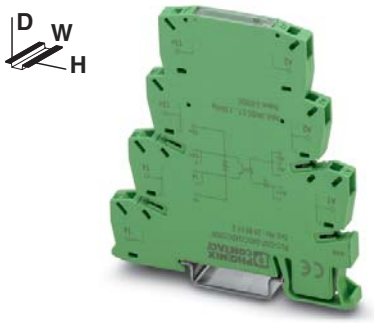
The PLC-OSP...RW interface modules are intended for use as per DIN EN 50155 (VDE 0115 part 200) "Railway applications, Part 200: Electronic devices in rail vehicles".

Its main features are:

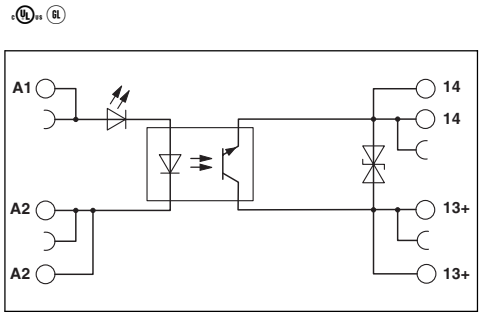
– Temperature range -25°C to +70°C,
– Input voltage range 0.7-1.25 x U_N,
– Shock resistance in acc. with DIN 50155 (requirements in acc. with EN 61373).

Notes:
Type of housing: Polyester PBT non-reinforced, color: Green.
For marking systems and mounting material, see CLIPLINE catalog, part 2 .
For derating curves see page 116

N



Power solid-state relay with DC voltage output, max 3 A



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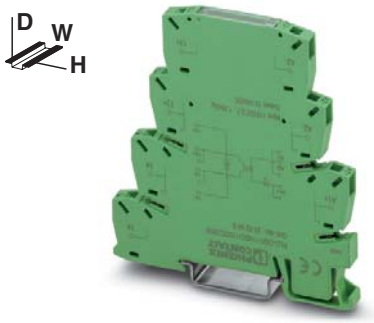
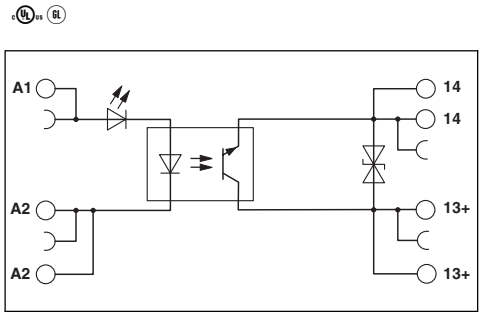


Power solid-state relay with DC voltage output, max 3 A



Technical data

		①	⑥
Input data			
Permissible range (with reference to U_N)		0.7 - 1.25	0.7 - 1.25
Switching level (with reference to U_N)	1 signal ("H")	≥ 0.6	≥ 0.6
	0 signal ("L")	≤ 0.3	≤ 0.3
Typ. input current at U_N	[mA]	8.5	3
Typ. switch-on time at U_N	[ms]	0.04	0.08
Typ. switch-off time at U_N	[ms]	0.2	0.6
Transmission frequency f_{limit}	[Hz]	300	100
Input circuit DC		Yellow LED, protection against polarity reversal	
Output data			
Max. switching voltage		33 V DC	
Min. switching voltage		3 V DC	
Limiting continuous current		3 A (see derating curve)	
Output protection		Protection against polarity reversal, surge protection	
Voltage drop at max. limiting continuous current		< 200 mV	
General data			
Rated insulation voltage		250 V	
Rated surge voltage		4 kV / basic insulation	
Ambient temperature (operation)		-25°C ... 70°C	
Standards / regulations		IEC 60664, EN 50178, IEC 62103	
Pollution degree/surge voltage category		2 / III	
Connection data solid / stranded / AWG		0.14 - 2.5 mm² / 0.14 - 2.5 mm² / 26 - 14	
Dimensions	W / H / D	6.2 mm / 80 mm / 86 mm	

Technical data

		①	②	③	④	⑤	⑥
Input data							
Permissible range (with reference to U_N)		0.7 - 1.25	0.7 - 1.25	0.7 - 1.25	0.7 - 1.25	0.7 - 1.25	0.7 - 1.25
Switching level (with reference to U_N)	1 signal ("H")	> 0.6	> 0.6	> 0.6	> 0.6	> 0.6	> 0.6
	0 signal ("L")	< 0.4	< 0.4	< 0.3	< 0.3	< 0.3	< 0.3
Typ. input current at U_N	[mA]	12	12	5.5	5.5	5.5	5.5
Typ. switch-on time at U_N	[ms]	0.4	0.4	0.04	0.04	0.04	0.4
Typ. switch-off time at U_N	[ms]	0.2	0.1	0.2	0.2	0.2	0.2
Transmission frequency f_{limit}	[Hz]	50	50	300	300	300	300
Input circuit DC		Yellow LED, protection against polarity reversal, surge protection					
Output data							
Max. switching voltage		140 V DC					
Min. switching voltage		12 V DC					
Limiting continuous current		3 A (see derating curve)					
Output protection		Protection against polarity reversal, surge protection					
Voltage drop at max. limiting continuous current		< 150 mV					
General data							
Rated insulation voltage		160 V DC					
Rated surge voltage		4 kV / basic insulation					
Ambient temperature (operation)		-25°C ... 70°C					
Standards / regulations		IEC 60664, EN 50178, IEC 62103					
Pollution degree/surge voltage category		2 / III					
Connection data solid / stranded / AWG		0.14 - 2.5 mm² / 0.14 - 2.5 mm² / 26 - 14					
Dimensions	W / H / D	6.2 mm / 80 mm / 86 mm					

Ordering data

Description	Input voltage U_N	Type	Order No.	Pcs. / Pkt.
PLC-INTERFACE, with **spring-cage connection**				
①	24 V DC	**PLC-OSP- 24DC/ 24DC/ 3RW**	**2980513**	10
②	36 V DC			
③	48 V DC			
④	72 V DC			
⑤	96 V DC			
⑥	110 V DC	**PLC-OSP-110DC/ 24DC/ 3RW**	**2980526**	10
PLC-INTERFACE, with **push-in connection**				
①	24 V DC	**PLC-OPIT- 24DC/ 24DC/3RW**	**2900379**	10
②	36 V DC			
③	48 V DC			
④	72 V DC			
⑤	96 V DC			
⑥	110 V DC	**PLC-OPIT-110DC/ 24DC/3RW**	**2900380**	10

Ordering data

Type	Order No.	Pcs. / Pkt.
PLC-OSP- 24DC/110DC/ 3RW	**2982511**	10
PLC-OSP- 36DC/110DC/ 3RW	**2982524**	10
PLC-OSP- 48DC/110DC/ 3RW	**2982537**	10
PLC-OSP- 72DC/110DC/ 3RW	**2982540**	10
PLC-OSP- 96DC/110DC/ 3RW	**2982553**	10
PLC-OSP-110DC/110DC/ 3RW	**2982566**	10
PLC-OPIT- 24DC/110DC/3RW	**2900391**	10
PLC-OPIT- 36DC/110DC/3RW	**2900392**	10
PLC-OPIT- 48DC/110DC/3RW	**2900393**	10
PLC-OPIT- 72DC/110DC/3RW	**2900394**	10
PLC-OPIT- 96DC/110DC/3RW	**2900395**	10
PLC-OPIT-110DC/110DC/3RW	**2900396**	10

N

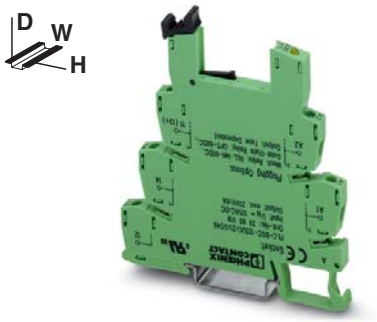
PLC-INTERFACE for railway applications

Relay modules with extended input voltage and temperature range, specifically for use in railway applications

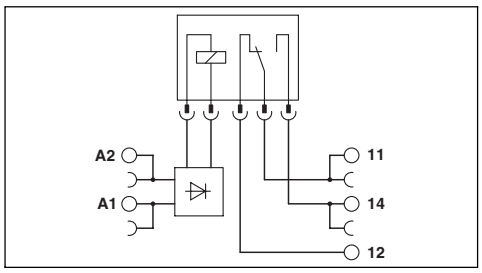
The advantages:

- Temperature range -25°C to + 70°C
- Input voltage range 0.7 to 1.25 x UN
- Vibration and shock resistance to EN 50155
- Safe isolation according to DIN EN 50178 between coil and contact
- Spring cage and push-in connection method

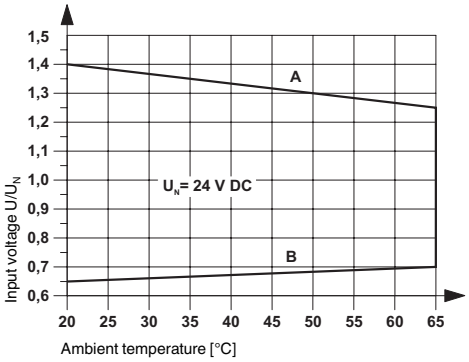
Notes:
Type of housing: Polyamide PA non-reinforced, color: Green.
For marking systems and mounting material, see CLIPLINE catalog, part 2.
Separating plate PLC-ATP must be installed for voltages larger than 250 V (L1, L2, L3) between identical terminal blocks in adjacent modules. Potential bridging is then carried out with FBST 8-PLC... or FBST 500....
If the specified maximum values for multi-layer contact relays are exceeded, the gold plating is destroyed. The maximum values of the power contact relay are then valid. This can result in a shorter service life than with a pure power contact.



Basic terminal block that can be fitted with 1 PDT relay



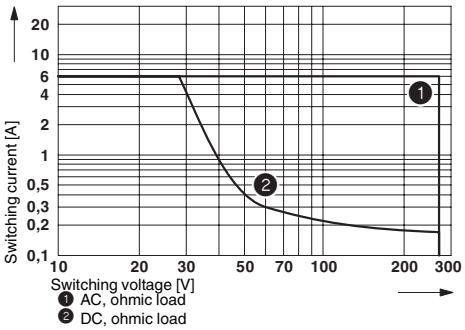
Permissible input voltage range for PLC-BSP-24DC/21RW (with relay REL-MR-18DC/21...)



Curve A
maximum continuous voltage at limiting continuous current = 3 A

Curve B
minimum operating voltage for pre-excitation with U_N and limiting continuous current = 3 A

Electrical interrupting rating for PLC...21 with 1-PDT relay



Technical data

Input data		
Nominal input voltage U_N	24 V DC	
Permissible range (with reference to U_N)	See diagram	
Typ. input current at U_N	12 mA	
Typ. response time at U_N	5 ms	
Typ. release time at U_N	8 ms	
Input circuit	Yellow LED, protection against polarity reversal, free-wheeling diode	
Output data with:	REL-MR-18DC/21	REL-MR-18DC/21AU
Contact type	Single contact, 1 PDT	Single contact, 1 PDT
Contact material	AgSnO	AgSnO, hard gold-plated
Max. switching voltage	250 V AC/DC	30 V AC / 36 V DC
Min. switching voltage	5 V (at 100 mA)	100 mV (at 10 mA)
Limiting continuous current	3 A	50 mA
Max. inrush current	(On request)	50 mA
Min. switching current	10 mA (at 12 V)	1 mA (at 24 V)
General data		
Test voltage input/output	4 kV (50 Hz, 1 min.)	
Ambient temperature (operation)	-25°C ... 70°C	
Mechanical service life	2 x 10^7 cycles	
Standards / regulations	IEC 60664, EN 50178, IEC 62103	
Pollution degree / surge voltage category	3 / III	
Connection data solid / stranded / AWG	0.14 - 2.5 mm^2 / 0.14 - 2.5 mm^2 / 26 - 14	
Dimensions W / H / D	6.2 mm / 80 mm / 94 mm	

Ordering data

Description	Voltage U_N	Type	Order No.	Pcs. / Pkt.
PLC-INTERFACE basic terminal block, for pluggable miniature relay				
With spring-cage connection	24 V DC	**PLC-BSP- 24DC/21RW**	**2961396**	10
With push-in connection	24 V DC	**PLC-BPIT- 24DC/21RW**	**2900261**	10

Accessories

Pluggable miniature relays			
with power contact		**REL-MR- 18DC/21**	**2961383**	10
with gold contact		**REL-MR- 18DC/21AU**	**2961493**	10

N

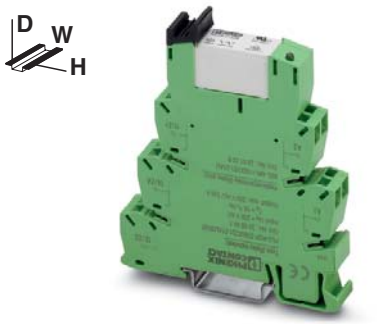
PLC-INTERFACE for railway applications

Relay module for input voltages with a nominal frequency of 16.7 Hz

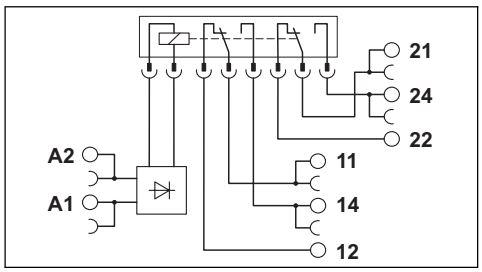
The advantages:

- Input nominal frequency 16.7 Hz
- Vibration and shock resistance to EN 50155
- Safe isolation according to DIN EN 50178 between coil and contact
- Spring cage and push-in connection method

Notes:
Type of housing: Polyamide PA non-reinforced, color: Green.
For marking systems and mounting material, see CLIPLINE catalog, part 2.
Separating plate PLC-ATP must be installed for voltages larger than 250 V (L1, L2, L3) between identical terminal blocks in adjacent modules. Potential bridging is then carried out with FBST 8-PLC... or FBST 500....
If the specified maximum values for multi-layer contact relays are exceeded, the gold plating is destroyed. The values in parentheses then apply for further operation. This can result in a shorter service life than with a pure power contact.



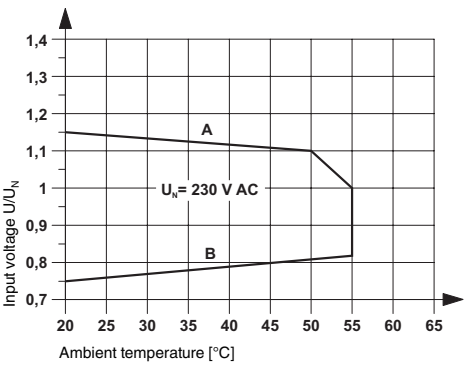
For 16.7 Hz input frequency with 2 PDTs



Technical data

Input data		
Nominal input voltage U_N	230 V AC	
Input nominal frequency	16.67 Hz	
Permissible range (with reference to U_N)	See diagram	
Typ. input current at U_N	4.8 mA (with AC)	
Typ. response time at U_N	20 ms	
Typ. release time at U_N	60 ms	
Input circuit	Yellow LED, bridge rectifier	
Output data		
Contact type	Single contact, 2 PDT	
Contact material	AgNi, hard gold-plated	
Max. switching voltage	30 V AC / 36 V DC	(250 V AC/DC)
Min. switching voltage	100 mV	(5 V AC/DC)
Limiting continuous current	50 mA	(6 A)
Max. inrush current	50 mA	(8 A)
Min. switching current	1 mA	(10 mA)
General data		
Test voltage input/output	6 kV	
Ambient temperature (operation)	-25°C ... 60°C	
Mechanical service life	Approx. 3 x 10^7 cycles	
Standards / regulations	IEC 60664, EN 50178, IEC 62103	
Pollution degree / surge voltage category	2 / III	
Connection data solid / stranded / AWG	0.14 - 2.5 mm^2 / 0.14 - 2.5 mm^2 / 26 - 14	
Dimensions W / H / D	14 mm / 80 mm / 94 mm	

Permissible input voltage range for PLC-RSP-230UC/21-21AU/RWF



Curve A
maximum continuous voltage at limiting continuous current = 6 A

Curve B
minimum operating voltage for pre-excitation with U_N and limiting continuous current = 6 A

Ordering data

Description	Voltage U_N	Type	Order No.	Pcs. / Pkt.
PLC-INTERFACE				
With spring-cage connection	230 V AC	**PLC-RSP-230UC/21-21AU/RWF**	**2968001**	10
With push-in connection	230 V AC	**PLC-RPIT-230UC/21-21AU/RWF**	**2900345**	10

N

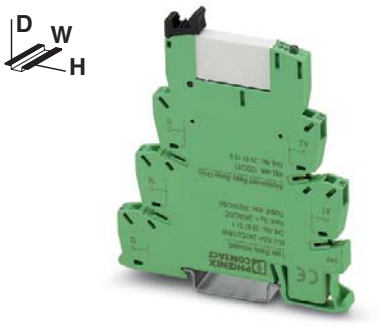
PLC-INTERFACE for railway applications

Relay modules with extended input voltage and temperature range, specifically designed for railway applications

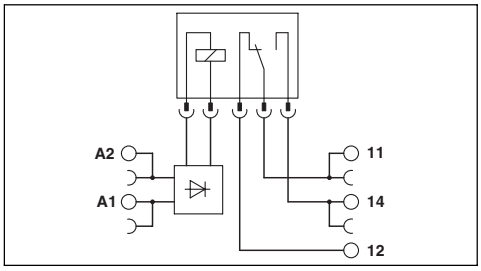
The advantages:

- Certified to EN 50155
- Optimum relay operation thanks to wide-range electronics
- Temperature range from -40°C to +70°C (short-term 85°C)
- Input voltage range 0.7 to 1.25 x U_N (short-term 1.4 x U_N)
- Vibration and shock resistance to EN 50155
- Safe isolation according to DIN EN 50178 between coil and contact
- Spring cage and push-in connection method

Notes:
Type of housing: Polyamide PA non-reinforced, color: Green.
For marking systems and mounting material, see CLIPLINE catalog, part 2.
Separating plate PLC-ATP must be installed for voltages larger than 250 V (L1, L2, L3) between identical terminal blocks in adjacent modules. Potential bridging is then carried out with FBST 8-PLC... or FBST 500....
If the specified maximum values for multi-layer contact relays are exceeded, the gold plating is destroyed. The maximum values of the power contact relay are then valid. This can result in a shorter service life than with a pure power contact.
Electrical service life diagrams, see page 106



1 PDT



Technical data

Input data		①	②	③
Permissible range (with reference to U_N)		0.7 - 1.25	0.7 - 1.25	0.7 - 1.25
Typ. input current at U_N	[mA]	5.1	2.9	1.5
Typ. response time at U_N	[ms]	8	8	8
Typ. release time at U_N	[ms]	11	11	11
Input protection:		Yellow LED, bridge rectifier, free-wheeling diode		

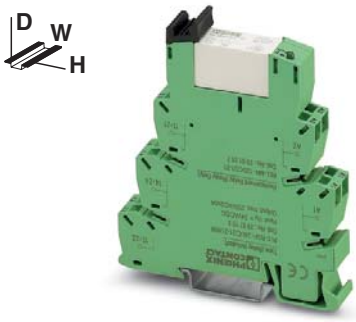
Output data		
Contact type	Single contact, 1 PDT	Single contact, 1 PDT
Contact material	AgSnO	AgSnO, hard gold-plated
Max. switching voltage	250 V AC/DC	30 V AC / 36 V DC
Min. switching voltage	5 V (at 100 mA)	100 mV
Limiting continuous current	6 A	50 mA
Max. inrush current	(On request)	50 mA
Min. switching current	10 mA (at 12 V)	1 mA

General data		
Test voltage (winding / contact)		4 kV_{rms} (50 Hz, 1 min.)
Ambient temperature (operation)		-40°C ... 70°C (Temperature class TX)
Mechanical service life		Approx. 2 x 10^7 cycles
Standards / regulations		EN 50155 (VDE 0115 part 200), EN 50178, IEC 62103, EN 61373, EN 50121
Connection data solid / stranded / AWG		0.14 - 2.5 mm^2 / 0.14 - 2.5 mm^2 / 26 - 14
Dimensions	W / H / D	6.2 mm / 80 mm / 94 mm

Ordering data

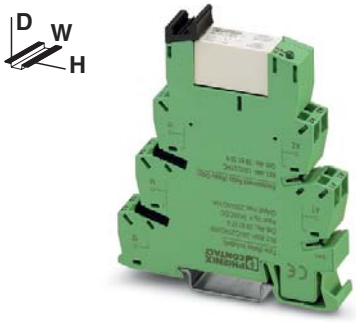
Description		Input voltage U_N	Type	Order No.	Pcs. / Pkt.
PLC-INTERFACE, with **power contact**					
With spring-cage connection	①	24 V DC	**PLC-RSP- 24UC/21/RW**	**2987011**	10
	②	72 V DC	**PLC-RSP- 72UC/21/RW**	**2987037**	10
	③	110 V DC	**PLC-RSP-110UC/21/RW**	**2987053**	10
With push-in connection	①	24 V DC	**PLC-RPIT- 24UC/21/RW**	**2900318**	10
	②	72 V DC	**PLC-RPIT- 72UC/21/RW**	**2900319**	10
	③	110 V DC	**PLC-RPIT-110UC/21/RW**	**2900320**	10
PLC-INTERFACE, with **hard gold-plated contact**					
With spring-cage connection	①	24 V DC	**PLC-RSP- 24UC/21AU/RW**	**2987024**	10
	②	72 V DC	**PLC-RSP- 72UC/21AU/RW**	**2987040**	10
	③	110 V DC	**PLC-RSP-110UC/21AU/RW**	**2987066**	10
With push-in connection	①	24 V DC	**PLC-RPIT- 24UC/21AU/RW**	**2900321**	10
	②	72 V DC	**PLC-RPIT- 72UC/21AU/RW**	**2900322**	10
	③	110 V DC	**PLC-RPIT-110UC/21AU/RW**	**2900323**	10

N

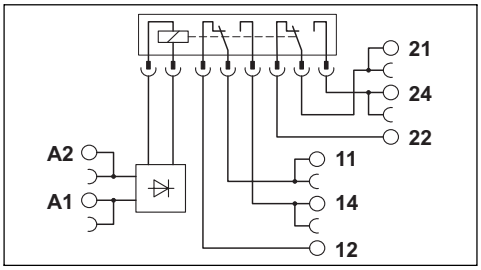


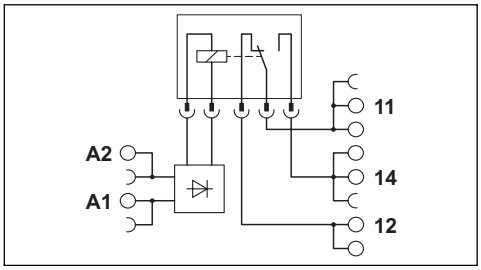
2 PDT

N



1 PDT up to 10 A





Technical data

①	②	③
0.7 - 1.25	0.7 - 1.25	0.7 - 1.25
12	5.9	4
8	8	8
11	11	11

Yellow LED, bridge rectifier, free-wheeling diode

Single contact, 2 PDT	Single contact, 2 PDT
AgNi	AgNi, hard gold-plated
250 V AC/DC	30 V AC / 36 V DC
5 V (at 100 mA)	100 mV
2x 6 A	50 mA
15 A (300 ms)	50 mA
10 mA (at 12 V)	1 mA

5 kV_{rms} (50 Hz, 1 min.)
-40°C ... 70°C (Temperature class TX)
Approx. 3 x 10^7 cycles
EN 50155 (VDE 0115 part 200), EN 50178, IEC 62103, EN 61373, EN 50121
0.14 - 2.5 mm^2 / 0.14 - 2.5 mm^2 / 26 - 14
14 mm / 80 mm / 94 mm

Technical data

①	②	③
0.7 - 1.25	0.7 - 1.25	0.7 - 1.25
12	5.9	4
8	8	8
11	11	11

Yellow LED, bridge rectifier, free-wheeling diode

Single contact, 1 PDT
AgNi
250 V AC/DC
12 V AC/DC
10 A (with inserted bridge 2967691)
30 A (300 ms)
10 mA

5 kV_{rms} (50 Hz, 1 min.)
-40°C ... 70°C (temperature class TX)
Approx. 3 x 10^7 cycles
EN 50155 (VDE 0115 part 200), EN 50178, IEC 62103, EN 61373, EN 50121
0.14 - 2.5 mm^2 / 0.14 - 2.5 mm^2 / 26 - 14
14 mm / 80 mm / 94 mm

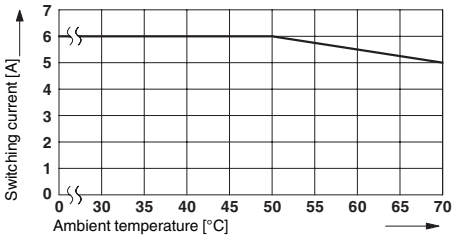
Ordering data

Type	Order No.	Pcs. / Pkt.
PLC-RSP- 24UC/21-21/RW	**2987105**	10
PLC-RSP- 72UC/21-21/RW	**2987121**	10
PLC-RSP-110UC/21-21/RW	**2987147**	10
PLC-RPIT- 24UC/21-21/RW	**2900346**	10
PLC-RPIT- 72UC/21-21/RW	**2900347**	10
PLC-RPIT-110UC/21-21/RW	**2900348**	10
PLC-RSP- 24UC/21-21AU/RW	**2987118**	10
PLC-RSP- 72UC/21-21AU/RW	**2987134**	10
PLC-RSP-110UC/21-21AU/RW	**2987150**	10
PLC-RPIT- 24UC/21-21AU/RW	**2900349**	10
PLC-RPIT- 72UC/21-21AU/RW	**2900350**	10
PLC-RPIT-110UC/21-21AU/RW	**2900351**	10

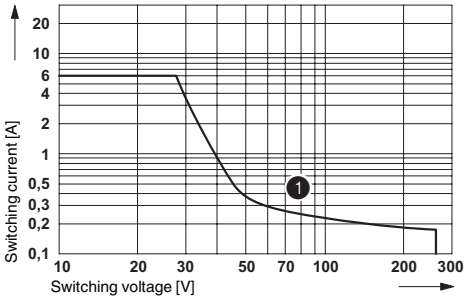
Ordering data

Type	Order No.	Pcs. / Pkt.
PLC-RSP- 24UC/21HC/RW	**2987079**	10
PLC-RSP- 72UC/21HC/RW	**2987082**	10
PLC-RSP-110UC/21HC/RW	**2987095**	10
PLC-RPIT- 24UC/21HC/RW	**2900324**	10
PLC-RPIT- 72UC/21HC/RW	**2900325**	10
PLC-RPIT-110UC/21HC/RW	**2900326**	10

Derating curve for **PLC-RSP...21/RW**
PLC-RSP...21AU/RW
PLC-RSP...21-21/RW
PLC-RSP...21-21AU/RW

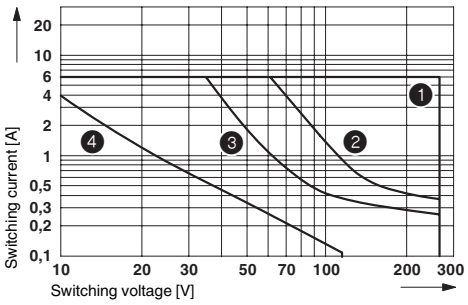


Interrupting rating for PLC-RSP...UC/21RW



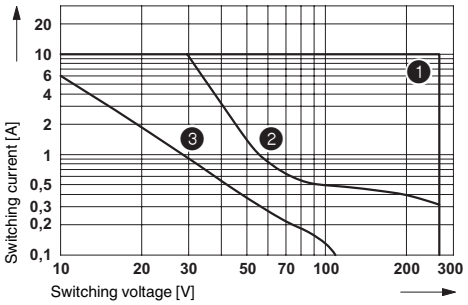
❶ Ohmic load

Interrupting rating for PLC-RSP...UC/21-21/RW



❶ AC, ohmic load
❷ DC, ohmic load, contacts in series
❸ DC, ohmic load
❹ DC, L/R = 40 ms

Interrupting rating for PLC-RSP...UC/21HC/RW



❶ AC, ohmic load
❷ DC, ohmic load
❸ DC, L/R = 40 ms

N

PLC electronic sensor terminal block for NAMUR proximity sensors

The electronic sensor terminal block, PLC-...-EIK 1-SVN from Phoenix converts the changeable resistance of a NAMUR sensor unit into a digital signal that can be read by all PLCs.

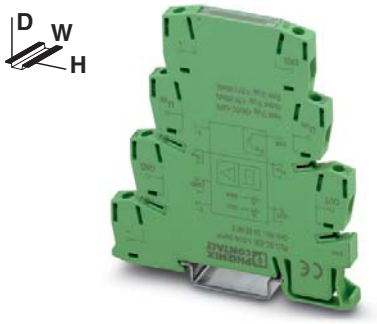
In addition, the electronics unit monitors the sensor side for short circuits or wire breaks and reports this error via an integrated LED.

Due to a corresponding resistance circuit, the PLC-...-EIK 1-SVN can be used to monitor all mechanical switches (N/C contact or N/O contact) for short circuits and/or wire breaks.

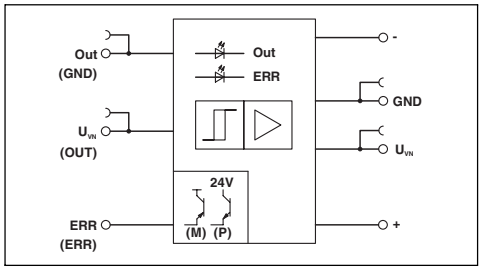
In addition to a high packing density, this switching amplifier features the following:

– Regulated power supply for the NAMUR proximity switch,
– 24 V/50 mA digital output for directly connecting programmable logic controls,
– Connection option for PLC-V8 adapter,

Notes:
Type of housing: Polyamide PA non-reinforced, color: Green.
For marking systems and mounting material, see CLIPLINE catalog, part 2.
Separating plate PLC-ATP is to be used in the following cases: always at the start and end of a PLC terminal strip, for voltages greater than 250 V (L1, L2, L3) between the same terminal points of neighboring modules (potential bridging then takes place with FBST 8-PLC... or FBST 500...) and with safe isolation between neighboring modules.
Pin configuration PLC-NAMUR, see circuit diagram: For **positive switching (P)**, data without parentheses applies, both +24 V connection terminals are connected internally. For **minus switching (M)**, data in parentheses applies, both GND connection terminals are connected internally.



For inductive proximity sensors according to NAMUR, with light indicators for sensor signal and faults



Technical data

Supply	
Input supply nominal voltage U_{VN}	24 V DC ±20% (U_{VN})
Typ. input current at U_{VN}	Approx. 14 mA
Transmission frequency f_{limit}	Approx. 350 Hz
Input circuit	Green LED, protection against polarity reversal, surge protection
Control circuit	
No-load voltage	8.2 V DC ±10%
Switching points in accordance with EN 60947-5-6:	≥ 2.1 mA (In conductive state) ≤ 1.2 mA (In blocking state) 6.3 mA ... 10 mA (in the event of a short circuit) 0 mA ... 0.35 mA (In the event of a wire break)
Protective circuit	Surge protection
Alarm output	
Operating voltage range (positive switching)	U_{VN} - U_{Rest}
Operating voltage range (negative switching)	3 V DC ... 33 V DC
Limiting continuous current	50 mA
Voltage drop at max. limiting continuous current	≤ 1.5 V (U_R)
Output protection	Red LED, surge protection
Signal output	
Limiting continuous current	50 mA
Voltage drop U_R at max. limiting continuous current	≤ 1.5 V (U_R)
Output protection	Surge protection
General data	
Rated insulation voltage	50 V DC
Rated surge voltage / insulation	0.4 kV / basic insulation
Ambient temperature (operation)	-25°C ... 50°C
Standards / regulations	IEC 60664, EN 50178, IEC 62103
Pollution degree / surge voltage category	2 / I
Connection data solid / stranded / AWG	0.14 - 2.5 mm² / 0.14 - 2.5 mm² / 26 - 12
Dimensions W / H / D	6.2 mm / 80 mm / 86 mm

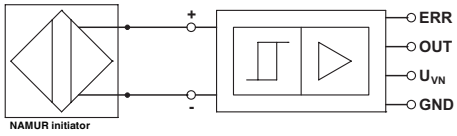
Ordering data

Description	Type	Order No.	Pcs. / Pkt.
Switching amplifier electronic terminal block, positive switching			
With screw connection	**PLC-SC-EIK 1-SVN 24P/P**	**2982663**	10
With spring-cage connection	**PLC-SP-EIK 1-SVN 24P/P**	**2982676**	10
With push-in connection	**PLC-PIT-EIK 1-SVN 24P/P**	**2900397**	10
Switching amplifier electronic terminal block, negative switching			
With screw connection	**PLC-SC-EIK 1-SVN 24M**	**2982595**	10
With spring-cage connection	**PLC-SP-EIK 1-SVN 24M**	**2982605**	10
With push-in connection	**PLC-PIT-EIK 1-SVN 24M**	**2900362**	10

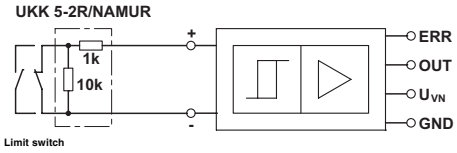
Accessories

Double-level terminal block, with pre-assembled resistors			
With screw connection	**UKK 5-2R/NAMUR**	**2941662**	50

Application 1



Application 2



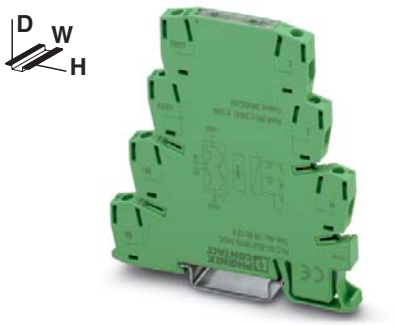
Initiator state	Switching level		LED	
	OUT	ERR	Green	Red
conductive	L	L	OFF	OFF
blocking	H	L	ON	OFF
short circuit	L	H	OFF	ON
open circuit	L	H	OFF	ON

PLC series
Electronic reversing load relay for DC motors

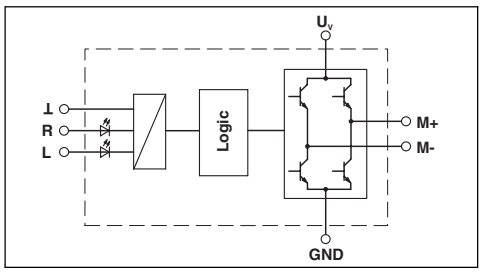
The PLC-S...-ELR W 1/2-24DC electronic reversing load relays are used to switch mechanically commutated DC motors up to 24 V/2 A.

- Wear-free reversing
- Braking by controlling both inputs
- Short-circuit and surge and overload-proof output
- Integrated locking circuit and load wiring
- Screw or spring-cage connection

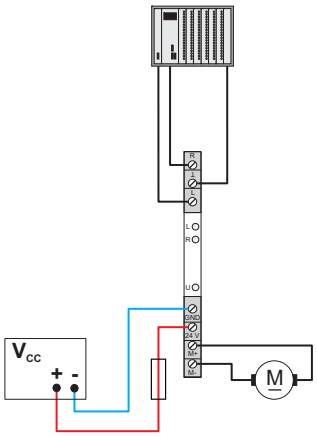
Notes:
Type of housing: Polyester PBT non-reinforced, color: Green.
For marking systems and mounting material, see CLIPLINE catalog, part 2.
Separating plate PLC-ATP is to be used in the following cases: always at the start and end of a PLC terminal strip, for voltages greater than 250 V (L1, L2, L3) between the same terminal points of neighboring modules (potential bridging then takes place with FBST 8-PLC... or FBST 500...) and with safe isolation between neighboring modules.
For the protection of input and output, inductive loads must be dampened with an effective protective circuit.
PWM = Pulse Width Modulation



With overload and short-circuit-proof output



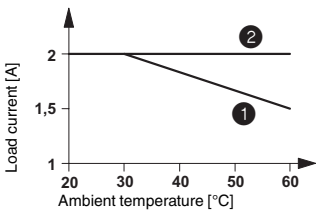
Application example PLC-S...ELR W 1/2-24DC



Status table

Input		Output	
right	left	M +	M –
0	0	high resistance	high resistance
1	0	24 V	GND
0	1	GND	24 V
1	1	GND	GND

Derating curve for PLC-S...ELR W 1/2-24DC



❶ Aligned without spacing
❷ Aligned with > 20 mm spacing

Technical data

Input data		
Control voltage U_{ST} right/left		24 V DC ±20%
Control input current I_{ST} right/left		Approx. 3 mA
Input protection:		Yellow LED, protection against polarity reversal, surge protection
PWM option		
Max. clock frequency of the PWM at the control inputs		1000 Hz
Pulse width repetition rate of the PWM		0% ... 100%
Output data		
Supply voltage range U_V		10 V DC ... 30 V DC
Quiescent current		10 mA
Output protection		Green LED, protection against polarity reversal, surge protection
Motor switching output		
Continuous current I_A max.		2 A (see derating curve)
Current limitation at short circuits		15 A (during braking)
General data		
Rated insulation voltage		50 V DC
Rated surge voltage / insulation		0.5 kV / basic insulation
Ambient temperature (operation)		-25°C ... 60°C
Standards / regulations		IEC 60664, EN 50178, IEC 62103
Pollution degree / surge voltage category		2 / II
Mounting position		Vertical (horizontal DIN rail)
Mounting		In rows with zero spacing
Connection data solid / stranded / AWG		0.14 - 2.5 mm² / 0.14 - 2.5 mm² / 26 - 14
Dimensions	W / H / D	6.2 mm / 80 mm / 86 mm

Ordering data

Description	Type	Order No.	Pcs. / Pkt.
Electronic reversing load relays, for driving DC motors, with light indicator and protective circuit			
With screw connection	**PLC-SC-ELR W1/ 2-24DC**	**2980539**	1
With spring-cage connection	**PLC-SP-ELR W1/ 2-24DC**	**2980555**	1

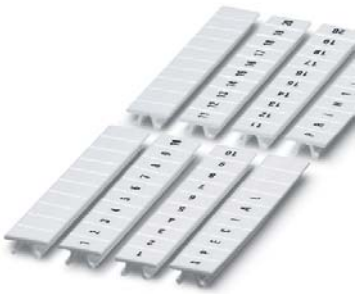
PLC accessories

The power terminal **PLC-ESK** helps to supply the bridge potentials; the partition plate **PLC-ATP** helps with optical and safe disconnection of the adjacent PLC modules. The passive feed-through bridge **PLC-BP (A1-14)** is used instead of a relay and connects the A1 and 14 terminal points.

Description	Color	Ordering data: Type	Order No.	Pcs. / Pkt.	Ordering data: Type	Order No.	Pcs. / Pkt.
Power terminal, for supply of up to four potentials, with the same shape as PLC standard series, max. 32 A/250 V AC	gray	**PLC-ESK GY**	**2966508**	5			
Separating plate, thickness 2 mm, required at the start and end of a PLC terminal strip. It is also used for visual separation of groups, safe isolation of different voltages of neighboring PLC interfaces as per DIN EN 50178/VDE0160, separation of neighboring bridges of different potentials, and separation of PLC interfaces at voltages >250 V	black	**PLC-ATP BK**	**2966841**	25			
Screwdriver Blade: 0.6 x 3.5 x 100 mm, length: 181 mm		**SZF 1-0,6X3,5**	**1204517**	10			
Passive feed-through bridge, can be plugged in instead of relay or solid-state relay, bridges terminal points A1 and 14	black				**PLC-BP A1-14**	**2980283**	10

PLC accessories

The colored isolated FBST plug-in bridges reduce wiring time with the PLC-INTERFACE by up to 70%. The 500 mm long "continuous bridges" **FBST 500-PLC** are especially effective. The 2-pole single plug-in bridges **FBST 6** are especially suited for bridging a smaller number of PLC modules.

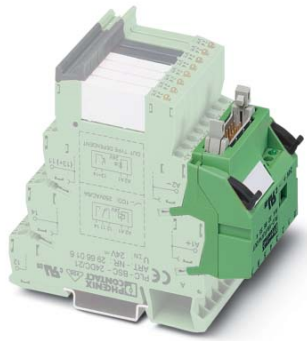


Description	Color	Ordering data: Type	Order No.	Pcs. / Pkt.	Ordering data: Type	Order No.	Pcs. / Pkt.
Cont. plug-in bridge, 500 mm long, isolated, can be cut to length, for potential distribution Nominal current: 32 A	red	**FBST 500-PLC RD**	**2966786**	20			
	blue	**FBST 500-PLC BU**	**2966692**	20			
	gray	**FBST 500-PLC GY**	**2966838**	20			
Plug-in bridge, 2-pole, 6 mm long, for potential distribution Nominal current: 6 A	red	**FBST 6-PLC RD**	**2966236**	50			
	blue	**FBST 6-PLC BU**	**2966812**	50			
	gray	**FBST 6-PLC GY**	**2966825**	50			
Plug-in bridge, 2-pole, 8 mm long, for potential distribution with a partition plate Nominal current: 6 A	gray	**FBST 8-PLC GY**	**2967688**	50			
Plug-in bridge, 2-pole, 14 mm long, insulated, for potential distribution Nominal current: 10 A	black	**FBST 14-PLC BK**	**2967691**	50			
Zack marker strip, printed horizontally, 10-section, with consecutive numbers, e.g., 1-10, 11-20, etc. up to 91-100					**ZB 6,LGS:FORTL.ZAHLEN**	**1051016**	10

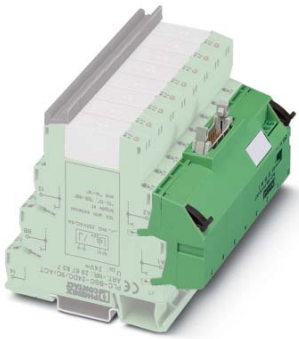
Adapter for PLC-INTERFACE

PLC-V8/... are VARIOFACE adapters which connect the 6.2 mm wide PLC-INTERFACE modules to the VARIOFACE system cabling:

Notes:
Cross-reference list with matching PLC-INTERFACE modules, see page 266



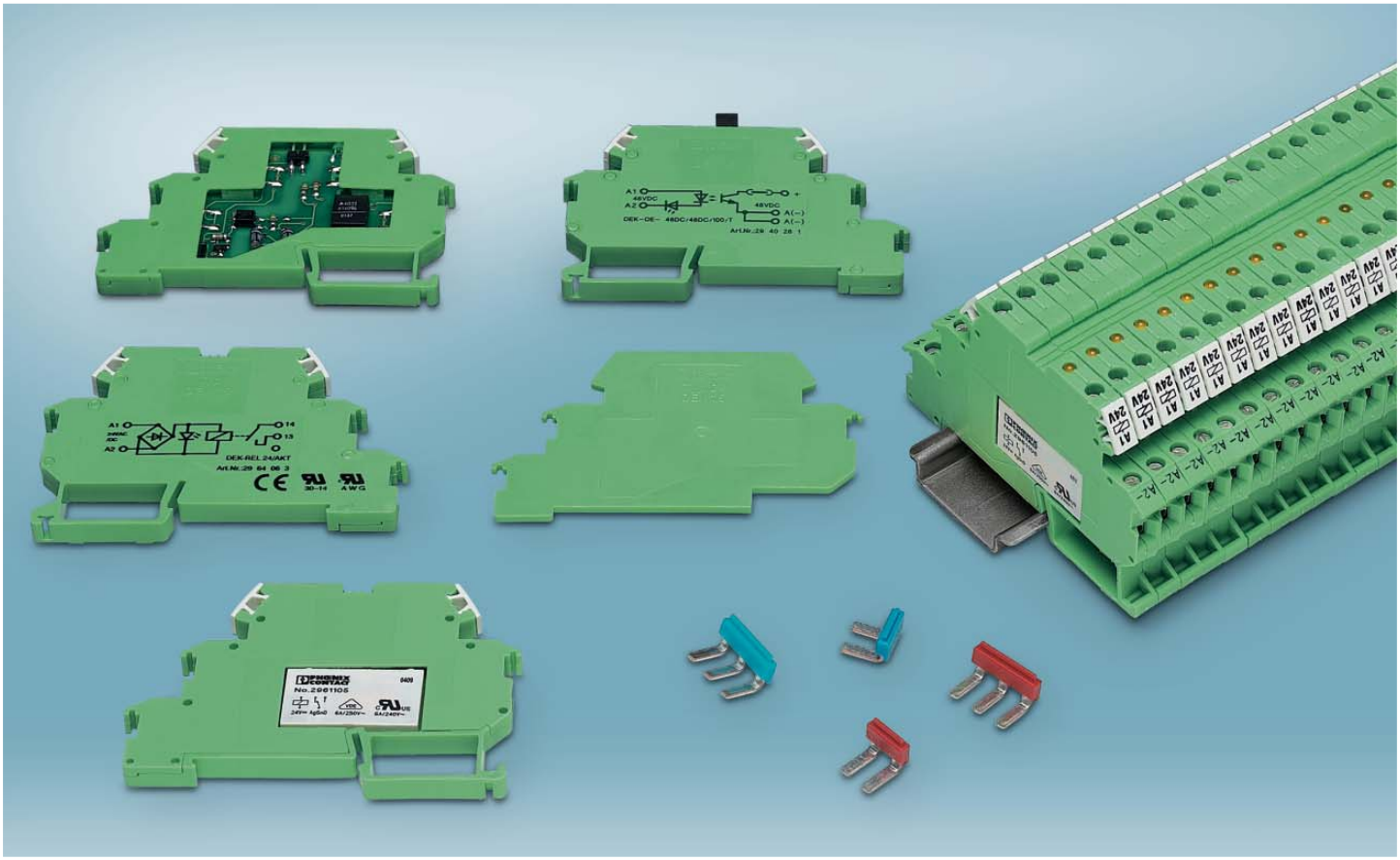
VARIOFACE adapter for 6.2 mm PLC-INTERFACE



VARIOFACE adapter for 14 mm PLC-INTERFACE

		Technical data	Technical data
Max. perm. operating voltage		24 V DC ±25%	24 V DC ±25%
Max. perm. current (per branch)		1 A (per signal path)	1 A (per signal path)
Max. total current (voltage supply)		3 A	3 A
Test voltage		500 V AC (50 Hz, 1 min.)	500 V (50 Hz, 1 min.)
Ambient temperature (operation)		-40°C ... 70°C	-40°C ... 70°C
Standards / regulations		IEC 60664, DIN EN 50178, IEC 62103	IEC 60664, DIN EN 50178, IEC 62103
Connection method	Power supply	Screw connection	Screw connection
	Signal level	Flat-ribbon cable connector, in acc. with IEC 60603-13 (engagement catches based on IEC 60603-13)	Flat-ribbon cable connector, in acc. with IEC 60603-13 (engagement catches based on IEC 60603-13)
Connection data solid / stranded / AWG		0.2 ... 4 mm² / 0.2 ... 2.5 mm² / 24 - 12	0.2 ... 4 mm² / 0.2 ... 2.5 mm² / 24 - 12
Dimensions	H / D	100 mm / 94 mm	100 mm / 94 mm

Description	No. of poles	Module width W	Ordering data: Type	Order No.	Pcs. / Pkt.	Ordering data: Type	Order No.	Pcs. / Pkt.
V8 adapter, for 8 PLC interfaces (6.2 mm), with FLK connection, for PLC system cabling, **positive switching**								
OUTPUT	14	49.6 mm	**PLC-V8/FLK14/OUT**	**2295554**	1			
INPUT	14	49.6 mm	**PLC-V8/FLK14/IN**	**2296553**	1			
V8 adapter, for 8 PLC interfaces (6.2 mm), with FLK connection, for PLC system cabling, **negative switching**								
OUTPUT	14	49.6 mm	**PLC-V8/FLK14/OUT/M**	**2304102**	1			
INPUT	14	49.6 mm	**PLC-V8/FLK14/IN/M**	**2304115**	1			
V8 output adapter, for 8 PLC interfaces (6.2 mm), with 15-pole D-SUB connection								
Pin strip	15	49.6 mm	**PLC-V8/D15S/OUT**	**2296058**	1			
Socket strip	15	49.6 mm	**PLC-V8/D15B/OUT**	**2296061**	1			
V8 input adapter, for 8 PLC interfaces (6.2 mm), with 15-pole D-SUB connection								
Pin strip	15	49.6 mm	**PLC-V8/D15S/IN**	**2296074**	1			
Socket strip	15	49.6 mm	**PLC-V8/D15B/IN**	**2296087**	1			
V8 adapter, for 8 PLC interfaces (14 mm), with FLK connection, for PLC system cabling, **positive switching**								
	14	112.3 mm				**PLC-V8L/FLK14/OUT**	**2299660**	1
V8 adapter, for 8 PLC interfaces (14 mm), with FLK connection, for PLC system cabling, **negative switching**								
	14	112.3 mm				**PLC-V8L/FLK14/OUT/M**	**2304306**	1



The Phoenix Contact interface terminal blocks DEK provide complete interface functions in modular terminal block housing that is just 6.2 mm wide. In conjunction with standard terminal block accessories, these high capacitance interfaces have not only the design but also the high level of user convenience of modular terminal blocks.

The main common feature of all Phoenix Contact interface terminal blocks is their constructional width of just 6.2 mm. This saves 60% space in the control cabinet in comparison to conventional 15 mm wide coupling relays from modular systems.

The DEK range offers the best solution for all industrial voltages both for signal input and output.

High switching capacities are a matter of course for the relay terminal block DEK-REL... and the solid-state relay terminal block DEK-OV....

The wear-free power solid-state relay terminal block DEK-OV... is used for applications that require a greater switching frequency in which electromechanical relays reach the end of their service life in a short time.

Integrated LEDs clearly indicate the switching status of the electronic terminal blocks and provide an excellent overview of the coupling level and the system.

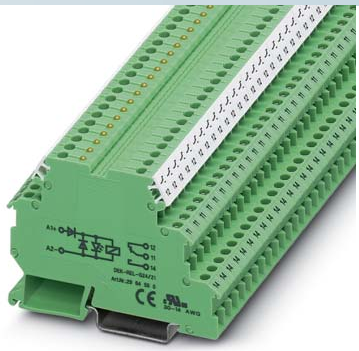
Colored insertion bridges EB-DIK for the supply and ground signals make it possible to design the circuit simply and effectively.

Integrated protective circuits such as freewheeling diodes, polarity reversal protection diodes and surge protection elements protect the coupling modules and ensure optimum availability of the system.

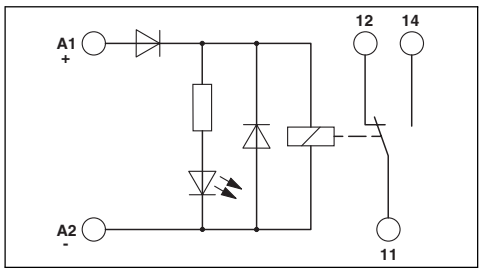
Relay terminal block DEK-REL-...

The Phoenix relay terminal block with PDT contact offers the following advantages:
- Width of only 6.2 mm,
- High switching capacity of 250 V AC / 6 A,
- Less storage, since PDT, N/O or N/C contacts can be wired,
- Little wiring expense, due to the use of EB-DIK insertion bridges,
- IP67-protected relay housing,
- Cadmium-free relay contacts,
- 4 kV electrical isolation of input and output,
- Safe isolation in acc. with DIN EN 50178 (VDE 0160)
- Light indicator for signalizing the switching status.

Notes:
Type of housing: Polyamide PA non-reinforced, color: Green.
For marking systems and mounting material, see CLIPLINE catalog, part 2.
For the protection of relay coils and contacts, inductive loads must be dampened with an efficient protective circuit.
Other insertion bridges EB...DIK... refer to page 143



For medium to large power
1 PDT (21)



Technical data

Input data		①
Permissible range (with reference to U_N)		0.8 - 1.1
Typ. input current at U_N	[mA]	9
Response/release time at U_N	[ms]	8 / 5
Input protection:		Yellow LED, protection against polarity reversal, free-wheeling diode
Output data		
Contact type		Single contact, 1 PDT
Contact material		AgSnO
Max. switching voltage		250 V AC/DC
Min. switching voltage		12 V AC/DC
Limiting continuous current		6 A
Max. inrush current		6 A
Min. switching current		10 mA
Max. interrupting rating, ohmic load		
	24 V DC	140 W
	48 V DC	20 W
	60 V DC	18 W
	110 V DC	23 W
	220 V DC	40 W
	250 V AC	1500 VA
General data		
Test voltage (winding / contact)		4 kV AC (50 Hz, 1 min.)
Ambient temperature (operation)		-20°C ... 50°C
Mechanical service life		Approx. 10^7 cycles
Standards / regulations		IEC 60664, EN 50178, IEC 62103
Connection data solid / stranded / AWG		0.2 - 2.5 mm^2 / 0.2 - 2.5 mm^2 / 24 - 14
Dimensions	W / H / D	6.2 mm / 80 mm / 56 mm

Ordering data

Description		Input voltage U_N	Type		Order No.	Pcs. / Pkt.
Relay terminal block with power relay	①	24 V DC	**DEK-REL-G24/21**		**2964500**	10

Accessories

Cover			**D-DEK 1,5 GN**		**2716949**	10
Insertion bridge, for middle and lower levels	No. of poles	Color				
	80	blue	**EB 80- DIK BU**	26 A	**2715940**	1
	80	red	**EB 80- DIK RD**	26 A	**2715953**	1
	80	white	**EB 80- DIK WH**	26 A	**2715788**	1

Input interface DEK-REL-24/1/SEN and output interface DEK-REL-24/1/AKT

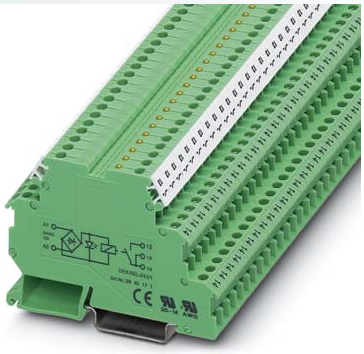
In addition to the familiar advantages of the electronic terminal blocks DEK-REL...
- 2-layer contact with hard gold-plating for universal applications from 1 mA to 5 A continuous current,
- 2 kV_{rms} electrical isolation of input and output,
- Integrated input circuit.

With this terminal block, "ALL" connections for a sensor or actuator are provided over a width of just 6.2 mm!

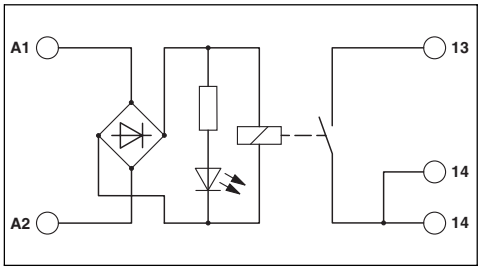
This means that 16 outputs take up a total constructional width of just 105.4 mm (including the power terminal block).

Advantages:
- Lower costs as the N terminal block is no longer required,
- Wiring is reduced to a minimum,
- Up to 73% more space.

Notes:
Type of housing: Polyamide PA non-reinforced, color: Green.
For marking systems and mounting material, see CLIPLINE catalog, part 2.
For the protection of relay coils and contacts, inductive loads must be dampened with an efficient protective circuit.
Other insertion bridges EB...DIK... refer to page 143



for small to medium loads
1 N/O contact (1)



Technical data

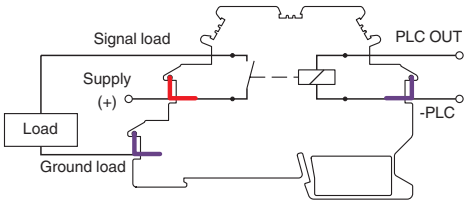
		①	②
Input data			
Permissible range (with reference to U_N)		0.9 - 1.1	0.8 - 1.1
Typ. input current at U_N	[mA]	23	6.5
Response/release time at U_N	[ms]	8 / 15	5 / 15
Input protection:		Yellow LED, bridge rectifier	
Output data			
Contact type		Double contact, 1 N/O contact	
Contact material		AgNi, 5 µm hard gold-plated	
Max. switching voltage		250 V AC / 125 V DC	
Min. switching voltage		0.1 V	
Limiting continuous current		3 A (5 A up to 35°C at 24 V DC)	
Max. inrush current		5 A	
Min. switching current		1 mA	
Max. interrupting rating, ohmic load			
	24 V DC	72 W	
	48 V DC	60 W	
	60 V DC	50 W	
	110 V DC	50 W	
	250 V AC	750 VA	
General data			
Test voltage (winding / contact)		2 kV AC (50 Hz, 1 min.)	
Ambient temperature (operation)		-20°C ... 50°C	
Mechanical service life		Approx. 2 x 10^7 cycles	
Standards / regulations		IEC 60664, EN 50178, IEC 62103	
Connection data solid / stranded / AWG		0.2 - 2.5 mm^2 / 0.2 - 2.5 mm^2 / 24 - 14	
Dimensions	W / H / D	6.2 mm / 80 mm / 56 mm	

Ordering data

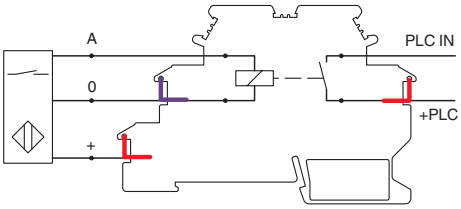
Description		Input voltage U_N	Type	Order No.	Pcs. / Pkt.
Relay terminal block with miniature relay					
	①	5 V AC/DC	**DEK-REL- 5/I/1**	**2941183**	10
	②	24 V AC/DC	**DEK-REL- 24/I/1**	**2940171**	10

Accessories

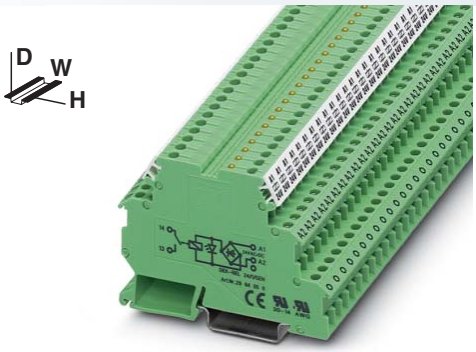
Terminal block, with three through contacts, for mounting on NS 35... For busbar feeding **Cover**			**D-DEK 1,5 GN**	**2716949**	10
Insertion bridge, for middle and lower levels	No. of poles	Color			
	80	blue	**EB 80- DIK BU**	26 A	**2715940**	1
	80	red	**EB 80- DIK RD**	26 A	**2715953**	1
	80	white	**EB 80- DIK WH**	26 A	**2715788**	1



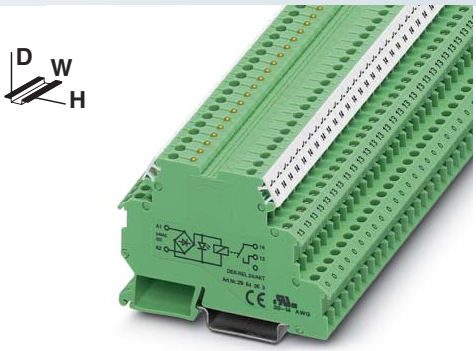
Pin configuration, DEK-REL-...AKT



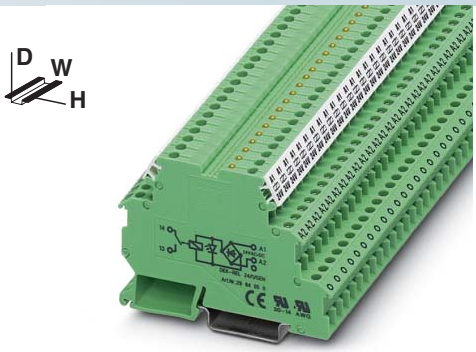
Pin configuration DEK-REL-...SEN



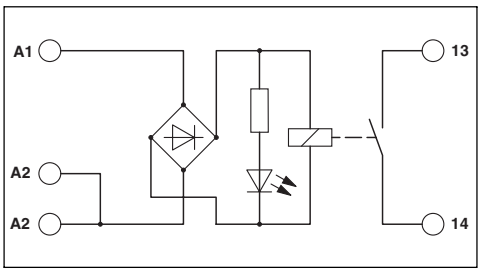
for small to medium loads
1 N/O contact (1)

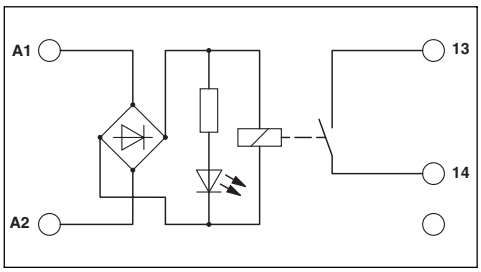


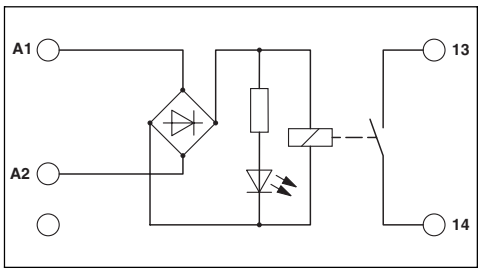
for small to medium loads
1 N/O contact (1)



for small to medium loads
1 N/O contact (1)







Technical data

①	②
0.9 - 1.1	0.8 - 1.1
23	6.5
8 / 15	5 / 15
Yellow LED, bridge rectifier	
Double contact, 1 N/O contact	
AgNi, 5 µm hard gold-plated	
250 V AC / 125 V DC	
0.1 V	
3 A (5 A up to 35°C at 24 V DC)	
5 A	
1 mA	
72 W	
60 W	
50 W	
50 W	
750 VA	
2 kV AC (50 Hz, 1 min.)	
-20°C ... 50°C	
Approx. 2 x 10^7 cycles	
IEC 60664, EN 50178, IEC 62103	
0.2 - 2.5 mm^2 / 0.2 - 2.5 mm^2 / 24 - 14	
6.2 mm / 80 mm / 56 mm	

Ordering data

Type	Order No.	Pcs. / Pkt.
DEK-REL- 5/O/1	**2941170**	10
DEK-REL- 24/O/1	**2941154**	10

Accessories

D-DEK 1,5 GN		**2716949**	10
EB 80- DIK BU	26 A	**2715940**	1
EB 80- DIK RD	26 A	**2715953**	1
EB 80- DIK WH	26 A	**2715788**	1

Technical data

①
0.8 - 1.1
6.5
5 / 15
Yellow LED, bridge rectifier
Double contact, 1 N/O contact
AgNi, 5 µm hard gold-plated
250 V AC / 125 V DC
0.1 V
3 A (5 A up to 35°C at 24 V DC)
5 A
1 mA
72 W
60 W
50 W
50 W
750 VA
2 kV AC (50 Hz, 1 min.)
-20°C ... 50°C
Approx. 2 x 10^7 cycles
IEC 60664, EN 50178, IEC 62103
0.2 - 2.5 mm^2 / 0.2 - 2.5 mm^2 / 24 - 14
6.2 mm / 80 mm / 56 mm

Ordering data

Type	Order No.	Pcs. / Pkt.
DEK-REL- 24/1/AKT	**2964063**	10

Accessories

DIKD 1,5		**2715979**	50
D-DEK 1,5 GN		**2716949**	10
EB 80- DIK BU	26 A	**2715940**	1
EB 80- DIK RD	26 A	**2715953**	1
EB 80- DIK WH	26 A	**2715788**	1

Technical data

①
0.8 - 1.1
6.5
5 / 15
Yellow LED, bridge rectifier
Double contact, 1 N/O contact
AgNi, 5 µm hard gold-plated
250 V AC / 125 V DC
0.1 V
3 A (5 A up to 35°C at 24 V DC)
5 A
1 mA
72 W
60 W
50 W
50 W
750 VA
2 kV AC (50 Hz, 1 min.)
-20°C ... 50°C
Approx. 2 x 10^7 cycles
IEC 60664, EN 50178, IEC 62103
0.2 - 2.5 mm^2 / 0.2 - 2.5 mm^2 / 24 - 14
6.2 mm / 80 mm / 56 mm

Ordering data

Type	Order No.	Pcs. / Pkt.
DEK-REL- 24/1/SEN	**2964050**	10

Accessories

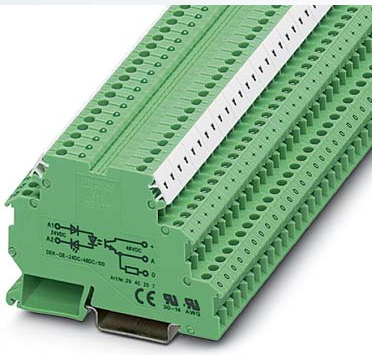
DIKD 1,5		**2715979**	50
D-DEK 1,5 GN		**2716949**	10
EB 80- DIK BU	26 A	**2715940**	1
EB 80- DIK RD	26 A	**2715953**	1
EB 80- DIK WH	26 A	**2715788**	1

Solid-state relay terminal blocks DEK-OE... and DEK-OV...

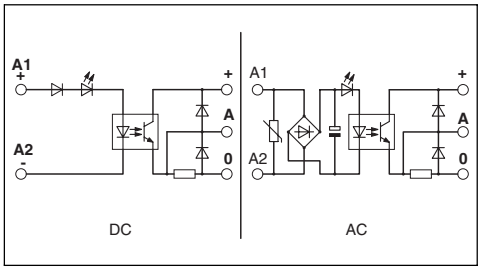
Phoenix Contact DEK-OE and DEK-OV interface terminal blocks are only 6.2 mm wide but still provide a complete input or output interface with:

- Electrical isolation between input and output at up to 2.5 kV_{rms}
- Integrated input circuit
- Status display,
- Insertion bridges EB-DIK
- Labeling and mounting with modular terminal block convenience
- Wear-free switching up to 24 V DC/10 A and 240 V AC/800 mA
- Integrated output protective circuit
- Zero voltage switch at AC output,
- Actuator version available.

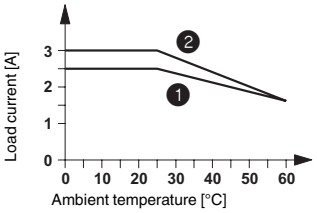
Notes:
Type of housing: Polyamide PA non-reinforced, color: Green.
For marking systems and mounting material, see CLIPLINE catalog, part 2.
For the protection of input and output, inductive loads must be dampened with an effective protective circuit.
Other insertion bridges EB...DIK... refer to page 143



with DC voltage output max. = 100 mA

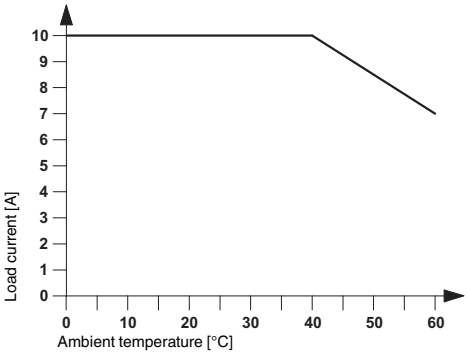


Derating curve for DEK-OV...24DC/3 and DEK-OV-24DC/24DC/3/AKT

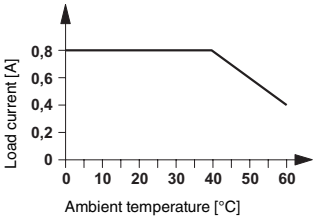


❶ Horizontal mounting
❷ Vertical mounting

Derating curve for DEK-OV-24DC/24DC/10



Derating curve for DEK-OV...240AC/800



Technical data

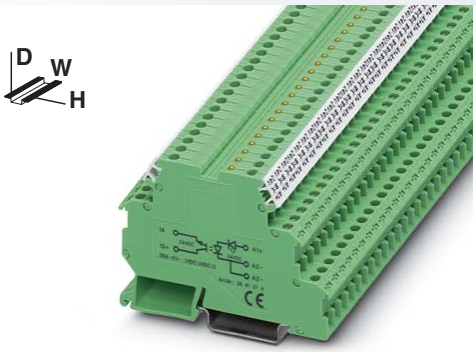
Input data		①	②	③	④	⑤	⑥
Permissible range (with reference to U_N)		0.9 - 1.1	0.8 - 1.2	0.8 - 1.2	0.8 - 1.2	0.9 - 1.1	0.9 - 1.1
Switching level with reference to U_N	1 signal ("H")	≥ 0.8	≥ 0.8	≥ 0.8	≥ 0.8	≥ 0.8	≥ 0.9
	0 signal ("L")	≤ 0.4	≤ 0.4	≤ 0.4	≤ 0.4	≤ 0.4	≤ 0.4
Typ. input current at U_N	[mA]	6.5	11	7	4	3.2	2.5
Transmission frequency f_{limit}	[Hz]	300	300	300	300	3	3
Input circuit AC		Yellow LED, protection against polarity reversal, surge protection					
Input circuit DC		Yellow LED, protection against polarity reversal					
Output data							
Operating voltage range		3 V DC ... 48 V DC					
Periodic peak reverse voltage		-					
Limiting continuous current		100 mA					
Min. load current		-					
Surge current		-					
Leakage current in off state		-					
Max. load value		-					
Output protection		Protection against polarity reversal, free-wheeling diode					
Voltage drop at max. limiting continuous current		≤ 0.9 V					
General data							
Test voltage input/output		2.5 kV (50 Hz, 1 min.)					
Ambient temperature (operation)		-20°C ... 60°C					
Standards / regulations		IEC 60664, EN 50178, IEC 62103					
Pollution degree/surge voltage category		2 / III					
Connection data solid / stranded / AWG		0.2 - 2.5 mm^2 / 0.2 - 2.5 mm^2 / 24 - 14					
Dimensions	W / H / D	6.2 mm / 80 mm / 56 mm					

Ordering data

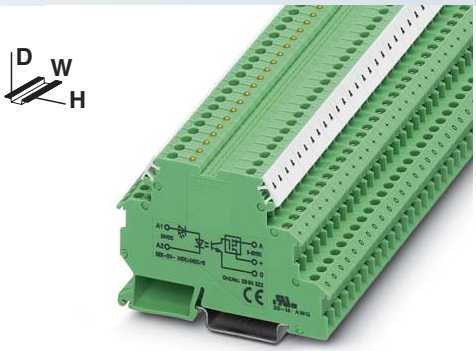
Description		Input voltage U_N	Type	Order No.	Pcs. / Pkt.
Solid-state input relays					
	①	5 V DC	**DEK-OE- 5DC/ 48DC/100**	**2940223**	10
	②	12 V DC	**DEK-OE- 12DC/ 48DC/100**	**2964487**	10
	③	24 V DC	**DEK-OE- 24DC/ 48DC/100**	**2940207**	10
	④	60 V DC	**DEK-OE- 60DC/ 48DC/100**	**2941536**	10
	⑤	120 V AC	**DEK-OE-120AC/ 48DC/100**	**2941659**	10
	⑥	230 V AC	**DEK-OE-230AC/ 48DC/100**	**2940210**	10
Solid-state power relays					
	①	5 V DC			
	②	12 V DC			
	③	24 V DC			
Actuator principle	⑦	24 V DC			

Accessories

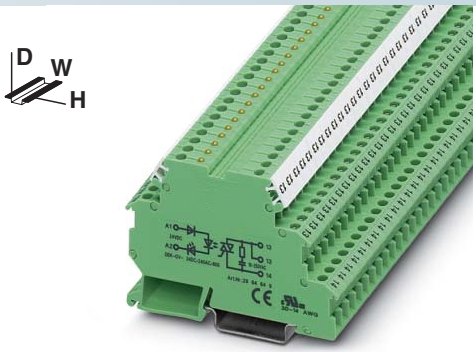
Insertion bridge, for middle and lower levels	No. of poles	Color				
	80	blue	**EB 80- DIK BU**	26 A	**2715940**	1
	80	red	**EB 80- DIK RD**	26 A	**2715953**	1
	80	white	**EB 80- DIK WH**	26 A	**2715788**	1



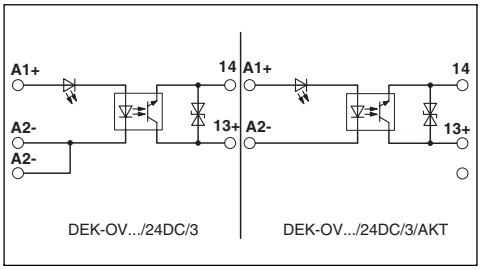
with DC voltage output
max. = 3 A

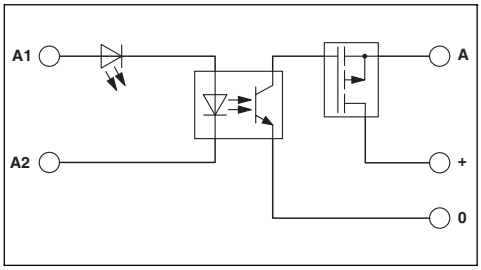


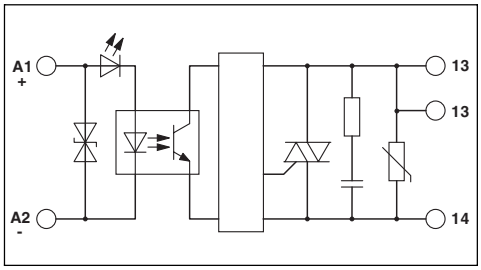
with DC voltage output
max. = 10 A



with AC voltage output
max. = 800 mA







Technical data

①	②	③	⑦
0.8 - 1.2	0.8 - 1.2	0.8 - 1.2	0.8 - 1.2
≥ 0.8	≥ 0.8	≥ 0.8	≥ 0.8
≤ 0.4	≤ 0.4	≤ 0.4	≤ 0.4
11	8.5	7	7
300	300	300	300

Yellow LED, protection against polarity reversal

3 V DC ... 30 V DC
-
3 A (see derating curve)
-
-
-
-
Protection against polarity reversal, surge protection
≤ 0.2 V

2.5 kV (50 Hz, 1 min.)
-20°C ... 60°C
IEC 60664, EN 50178, IEC 62103
2 / III
0.2 - 2.5 mm² / 0.2 - 2.5 mm² / 24 - 14
6.2 mm / 80 mm / 56 mm

Ordering data

Type	Order No.	Pcs. / Pkt.
DEK-OV- 5DC/ 24DC/ 3	2941361	10
DEK-OV- 12DC/ 24DC/ 3	2941387	10
DEK-OV- 24DC/ 24DC/ 3	2941374	10
DEK-OV- 24DC/ 24DC/ 3/AKT	2964296	10

Accessories

EB 80- DIK BU	26 A	2715940	1
EB 80- DIK RD	26 A	2715953	1
EB 80- DIK WH	26 A	2715788	1

Technical data

①	②	③
0.8 - 1.2	0.8 - 1.2	0.8 - 1.2
≥ 0.8	≥ 0.8	≥ 0.8
≤ 0.4	≤ 0.4	≤ 0.4
5.1	4.7	3.5
100	100	100

Yellow LED, protection against polarity reversal, surge protection

5 V DC ... 30 V DC
-
10 A (see derating curve)
-
100 A (t = 20 ms)
-
-
Protection against polarity reversal, surge protection
< 50 mV

2.5 kV (50 Hz, 1 min.)
-20°C ... 60°C
IEC 60664, EN 50178, IEC 62103
2 / III
0.2 - 2.5 mm² / 0.2 - 2.5 mm² / 24 - 14
6.2 mm / 80 mm / 56 mm

Ordering data

Type	Order No.	Pcs. / Pkt.
DEK-OV- 5DC/ 24DC/ 10	2961752	10
DEK-OV- 12DC/ 24DC/ 10	2961749	10
DEK-OV- 24DC/ 24DC/ 10	2964322	10

Accessories

EB 80- DIK BU	26 A	2715940	1
EB 80- DIK RD	26 A	2715953	1
EB 80- DIK WH	26 A	2715788	1

Technical data

①	②	③
0.8 - 1.2	0.8 - 1.2	0.8 - 1.2
≥ 0.8	≥ 0.8	≥ 0.8
≤ 0.4	≤ 0.4	≤ 0.4
10.2	10.5	10.7
10	10	10

Yellow LED, protection against polarity reversal, surge protection

10 V AC ... 253 V AC (50/60 Hz)
600 V
0.8 A (see derating curve)
10 mA
30 A (t = 10 ms)
1.2 mA
4.5 A²s
RCV circuit
≤ 1 V

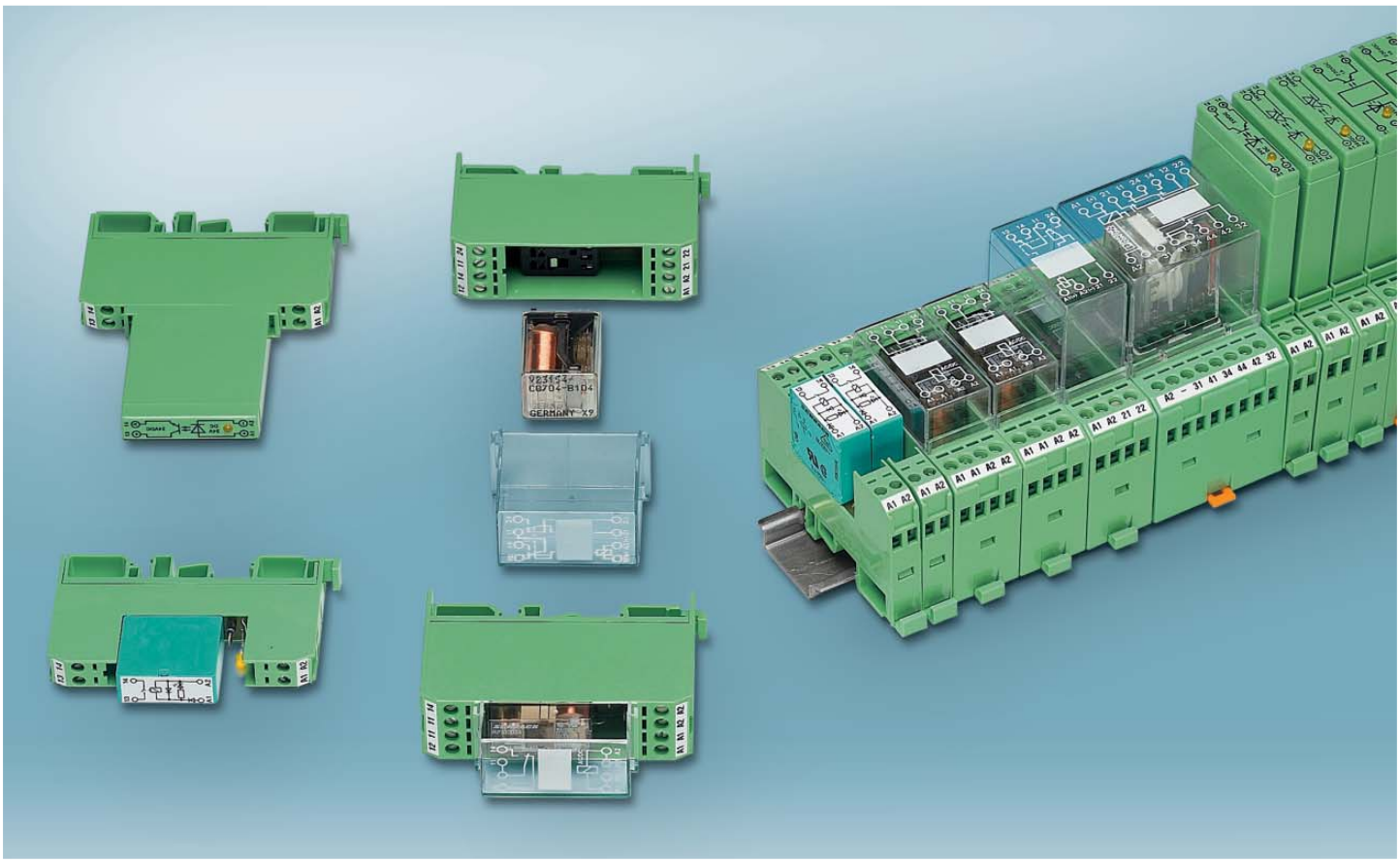
2.5 kV (50 Hz, 1 min.)
-20°C ... 60°C
IEC 60664, EN 50178, IEC 62103
2 / III
0.2 - 4 mm² / 0.2 - 2.5 mm² / 24 - 12
6.2 mm / 80 mm / 56 mm

Ordering data

Type	Order No.	Pcs. / Pkt.
DEK-OV- 5DC/240AC/800	2964623	10
DEK-OV- 12DC/240AC/800	2964636	10
DEK-OV- 24DC/240AC/800	2964649	10

Accessories

EB 80- DIK BU	26 A	2715940	1
EB 80- DIK RD	26 A	2715953	1
EB 80- DIK WH	26 A	2715788	1



The EMG series is an extensive range of flexibly combinable interface modules.

It provides a large choice of relay and solid-state relay interfaces in a robust, rail-mountable housing system for many areas of application.

The circuit diagram of the respective component is printed on all modules. The function of the modules can therefore be easily recognized even when the DIN rail is equipped to capacitance and the cables are connected. This is an advantage which saves time and costs when servicing and expanding the system.

Extremely narrow constructions enable the interfaces to be used in applications where the complexity of the system leaves little space. The modules can be mounted in rows with zero spacing on EN DIN rails.

The circuit variants of the interfaces of the EMG series offer all the possibilities of process and control-related signal processing.

All common industrial voltages

The EMG series offers the right solutions for signal input and output for all common industrial voltages.

Integrated protective circuit

The protective circuit integrated in the coupling modules, such as a free-wheeling diode and reverse polarity protection diode and surge protection elements, provides protection for the EMG modules and ensures optimum system availability.

Switching status indication

The switching status is signaled clearly and visibly via integrated LEDs, giving a good overview of the coupling level and of the system.

High switching capacity

Along with your EMG-REL... and EMG...OV modules, the EMG series provides coupling elements for high switching capacities.

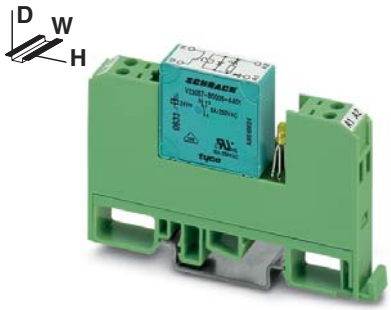
EMG-REL universal relay module

EMG is a relay series suitable for universal use.

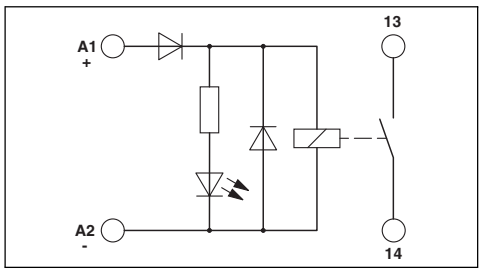
The advantages:

– Integrated input and interference suppression circuit
– Safe isolation according to DIN EN 50178 between coil and contact

Notes:
Type of housing: Polycarbonate fiber reinforced PC-F, color: Green.
For marking systems and mounting material, see CLIPLINE catalog, part 2.
For the protection of relay coils and contacts, inductive loads must be dampened with an efficient protective circuit.



1 N/O contact



Technical data

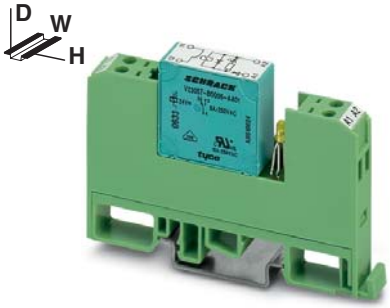
Input data		①	②	③	④
Permissible range (with reference to U_N)		0.8 - 1.1	0.8 - 1.1	0.8 - 1.1	0.8 - 1.1
Typ. input current at U_N	[mA]	21	10	5	4.8
Response/release time at U_N	[ms]	7 / 11	7 / 11	7 / 11	7 / 11
Input protection:		Yellow LED, protection against polarity reversal, free-wheeling diode			
Output data					
Contact type		Single contact, 1 N/O contact		Double contact, 1 N/O contact	
Contact material		AgNi		AgPd60 5 µm hard gold-plated	
Max. switching voltage		250 V AC/DC		36 V AC / 30 V DC	
Limiting continuous current		6 A		0.5 A	
Max. inrush current		8 A		0.2 A	
Max. interrupting rating, ohmic load					
	24 V DC	140 W		5 W	
	48 V DC	60 W		-	
	60 V DC	45 W		-	
	110 V DC	35 W		-	
	220 V DC	55 W		-	
	250 V AC	1500 VA		-	
General data					
Test voltage (winding / contact)		4 kV AC (50 Hz, 1 min.)			
Ambient temperature (operation)		-20°C ... 40°C			
Mechanical service life		Approx. 2 x 10^7 cycles			
Standards / regulations		IEC 60664, EN 50178, IEC 62103			
Pollution degree/surge voltage category		2 / III			
Connection data solid / stranded / AWG		0.2 - 4 mm^2 / 0.2 - 2.5 mm^2 / 24 - 12			
Dimensions	W / H / D	10.6 mm / 75 mm / 53.5 mm			

Ordering data

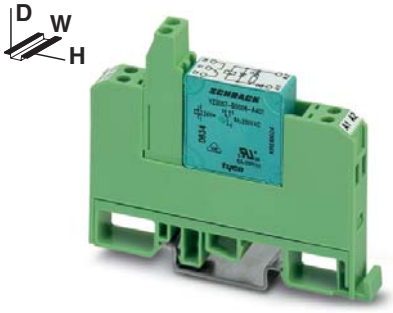
Description		Input voltage U_N	Type	Order No.	Pcs. / Pkt.
Relay module with multi-layer contact relay					
	①	24 V DC	**EMG 10-REL/KSR-G 24/ 1-LC AU**	**2940087**	10
	②	60 V DC	**EMG 10-REL/KSR-G 60/ 1-LC AU**	**2941400**	10
Relay module same as before, structure turned by 180°					
	①	24 V DC	**EMG 10-REL/KSR-G 24/ 1-LCU AU**	**2940362**	10
Relay module with multi-layer contact relay					
	③	120 V AC/DC	**EMG 10-REL/KSR-120/ 1-LC AU**	**2964461**	10
	④	230 V AC/DC	**EMG 10-REL/KSR-230/ 1-LC AU**	**2964416**	10
Relay module with power contact relay					
	①	24 V DC	**EMG 10-REL/KSR-G 24/ 1-LC**	**2942108**	10
	②	60 V DC	**EMG 10-REL/KSR-G 60/ 1-LC**	**2941303**	10
Relay module same as before, structure turned by 180°					
	①	24 V DC	**EMG 10-REL/KSR-G 24/ 1-LCU**	**2942807**	10
Relay module with power contact relay					
	③	120 V AC/DC	**EMG 10-REL/KSR-120/ 1-LC**	**2964432**	10
	④	230 V AC/DC	**EMG 10-REL/KSR-230/ 1-LC**	**2964403**	10

Relay modules with miniature switching relay

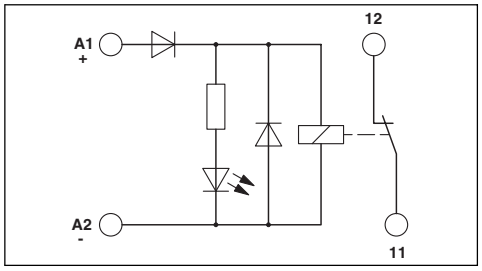
Notes:
Type of housing: Polycarbonate fiber reinforced PC-F, color: Green.
For marking systems and mounting material, see CLIPLINE catalog, part 2.
For the protection of relay coils and contacts, inductive loads must be dampened with an efficient protective circuit.

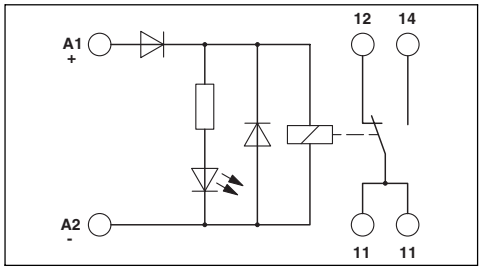


1 N/C contact



1 PDT





Technical data

Input data		①	
Permissible range (with reference to U_N)		0.8 - 1.1	
Typ. input current at U_N	[mA]	21	
Response/release time at U_N	[ms]	7 / 11	
Input protection:		Yellow LED, protection against polarity reversal, free-wheeling diode	
Output data			
Contact type		Single contact, 1 N/C contact	Double contact, 1 N/C contact
Contact material		AgNi	AgPd60 5 µm hard gold-plated
Max. switching voltage		250 V AC/DC	30 V AC / 36 V DC
Limiting continuous current		6 A	0.5 A
Max. inrush current		8 A	0.2 A
Max. interrupting rating, ohmic load			
	24 V DC	140 W	5 W
	250 V AC	1500 VA	-
General data			
Test voltage (winding / contact)		4 kV AC (50 Hz, 1 min.)	
Ambient temperature (operation)		-20°C ... 40°C	
Mechanical service life		Approx. 2 x 10^7 cycles	
Standards / regulations		IEC 60664, EN 50178, IEC 62103	
Pollution degree/surge voltage category		2 / III	
Connection data solid / stranded / AWG		0.2 - 4 mm^2 / 0.2 - 2.5 mm^2 / 24 - 12	
Dimensions	W / H / D	10.6 mm / 75 mm / 53.5 mm	

Technical data

Input data	①	②	③	④
Permissible range (with reference to U_N)	0.8 - 1.1	0.9 - 1.1	0.8 - 1.1	0.8 - 1.1
Typ. input current at U_N [mA]	21	8	5	5
Response/release time at U_N [ms]	7 / 11	7 / 11	7 / 11	7 / 11
Input protection:	Yellow LED, protection against polarity reversal, free-wheeling diode			
Output data				
Contact type	Single contact, 1 PDT		Double contact, 1 PDT	
Contact material	AgNi		AgPd60 5 µm hard gold-plated	
Max. switching voltage	250 V AC/DC		30 V AC / 36 V DC	
Limiting continuous current	6 A		0.5 A	
Max. inrush current	8 A		0.2 A	
Max. interrupting rating, ohmic load				
24 V DC	140 W		5 W	
250 V AC	1500 VA		-	
General data				
Test voltage (winding / contact)	4 kV AC (50 Hz, 1 min.)			
Ambient temperature (operation)	-20°C ... 40°C			
Mechanical service life	Approx. 2 x 10^7 cycles			
Standards / regulations	IEC 60664, EN 50178, IEC 62103			
Pollution degree/surge voltage category	2 / III			
Connection data solid / stranded / AWG	0.2 - 4 mm^2 / 0.2 - 2.5 mm^2 / 24 - 12			
Dimensions W / H / D	10.6 mm / 75 mm / 62.5 mm			

Ordering data

Description	Input voltage U_N	Type	Order No.	Pcs. / Pkt.
Relay module with multi-layer contact relay				
①	24 V DC	**EMG 10-REL/KSR-G 24/ 2-LC AU**	**2940126**	10
②	48 V DC			
①	24 V DC			
Relay module with multi-layer contact relay				
②	48 V AC/DC			
③	120 V AC/DC			
④	230 V AC/DC			
Relay module with power contact relay				
①	24 V DC	**EMG 10-REL/KSR-G 24/ 2-LC**	**2942111**	10
②	48 V DC			
Relay module same as before, structure turned by 180°				
①	24 V DC	**EMG 10-REL/KSR-G 24/ 2-LCU**	**2940346**	10
Relay module with power contact relay				
①	24 V AC/DC			
②	48 V AC/DC			
③	120 V AC/DC			
④	230 V AC/DC			

Ordering data

Type	Order No.	Pcs. / Pkt.
EMG 10-REL/KSR-G 24/21-LC AU	**2940090**	10
EMG 10-REL/KSR-G 48/21-LC AU	**2964225**	10
EMG 10-REL/KSR-G 24/21-LCU AU	**2940388**	10
EMG 10-REL/KSR- 48/21-LC AU	**2964762**	10
EMG 10-REL/KSR-120/21-LC AU	**2964458**	10
EMG 10-REL/KSR-230/21-LC AU	**2964393**	10
EMG 10-REL/KSR-G 24/21-LC	**2942153**	10
EMG 10-REL/KSR-G 48/21-LC	**2963019**	10
EMG 10-REL/KSR-G 24/21-LCU	**2940359**	10
EMG 10-REL/KSR- 24/21-LC	**2942658**	10
EMG 10-REL/KSR- 48/21-LC	**2964526**	10
EMG 10-REL/KSR-120/21-LC	**2964445**	10
EMG 10-REL/KSR-230/21-LC	**2964380**	10

Accessories

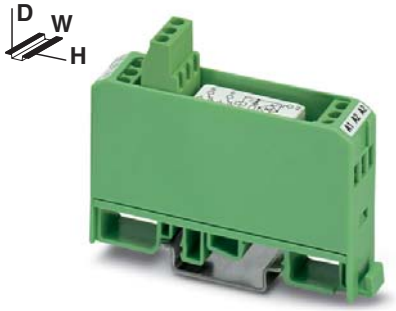
Equipment marker	**EMG-SGKS 10**	**2947585**	50

Accessories

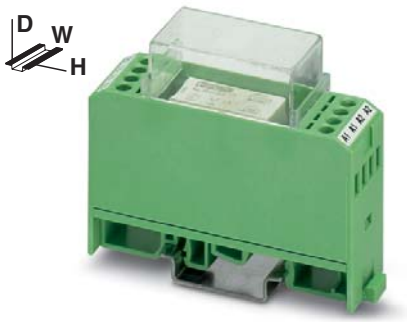
EMG-SGKS 10	**2947585**	50

Relay modules with miniature switching relay

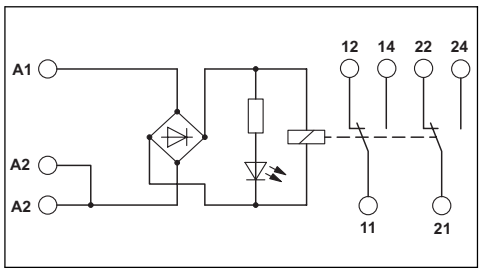
Notes:
Type of housing: Polycarbonate fiber reinforced PC-F, color: Green.
For marking systems and mounting material, see CLIPLINE catalog, part 2.
For the protection of relay coils and contacts, inductive loads must be dampened with an efficient protective circuit.
[1]) Varistor only in 120 V and 230 V types
[2]) 230 V types with AC voltage relays without bridge rectifier

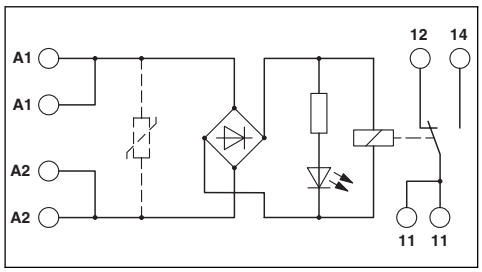


2 PDT



1 PDT





Technical data

Input data		①	②	③	④	⑥
Permissible range (with reference to U_N)		0.8 - 1.1	0.8 - 1.1	0.8 - 1.1	0.8 - 1.1	0.85 - 1.1
Typ. input current at U_N	[mA]	18	10	8	6	4
Response/release time at U_N	[ms]	8 / 10	8 / 10	8 / 10	8 / 10	7 / 3
Input protection:		Yellow LED, bridge rectifier				
Output data						
Contact type		Single contact, 2 PDT		Single contact, 2 PDT		
Contact material		AgNi		AgNi, hard gold-plated		
Max. switching voltage		250 V AC/DC		30 V AC / 36 V DC		
Limiting continuous current		5 A		50 mA		
Max. interrupting rating, ohmic load						
	24 V DC	120 W		1.2 W		
	48 V DC	95 W		-		
	60 V DC	60 W		-		
	110 V DC	40 W		-		
	220 V DC	55 W		-		
	250 V AC	1250 VA		-		
General data						
Test voltage (winding / contact)		4 kV AC (50 Hz, 1 min.)				
Test voltage (contact / contact)		1 kV AC (50 Hz, 1 min.)				
Ambient temperature (operation)		-20°C ... 40°C				
Mechanical service life		Approx. 5 x 10^7 cycles				
Standards / regulations		IEC 60664, EN 50178, IEC 62103				
Pollution degree/surge voltage category		2 / III				
Connection data solid / stranded / AWG		0.2 - 4 mm^2 / 0.2 - 2.5 mm^2 / 24 - 12				
Dimensions	W / H / D	17.5 mm / 75 mm / 62.5 mm				

Technical data

Input data		①	②	③	④	⑤
Permissible range (with reference to U_N)		0.9 - 1.1	0.9 - 1.1	0.8 - 1.1	0.85 - 1.06	0.9 - 1.06
Typ. input current at U_N	[mA]	18	10	8	4	5
Response/release time at U_N	[ms]	8 / 10	8 / 10	8 / 10	8 / 10	8 / 10
Input protection:		Yellow LED, bridge rectifier, Varistor[1])				
Output data						
Contact type		Single contact, 1 PDT		Single contact, 1 PDT		
Contact material		AgNi		AgNi, hard gold-plated		
Max. switching voltage		250 V AC/DC		30 V AC / 36 V DC		
Limiting continuous current		6 A		50 mA		
Max. interrupting rating, ohmic load						
	24 V DC	140 W		1.2 W		
	48 V DC	60 W		-		
	60 V DC	50 W		-		
	110 V DC	50 W		-		
	220 V DC	80 W		-		
	250 V AC	1500 VA		-		
General data						
Test voltage (winding / contact)		4 kV AC (50 Hz, 1 min.)				
Test voltage (contact / contact)		1 kV AC (50 Hz, 1 min.)				
Ambient temperature (operation)		-20°C ... 50°C				
Mechanical service life		Approx. 5 x 10^7 cycles				
Standards / regulations		IEC 60664, EN 50178, IEC 62103				
Pollution degree/surge voltage category		2 / III				
Connection data solid / stranded / AWG		0.2 - 4 mm^2 / 0.2 - 2.5 mm^2 / 24 - 12				
Dimensions	W / H / D	22.5 mm / 75 mm / 62.5 mm				

Ordering data

Description		Input voltage U_N	Type	Order No.	Pcs. / Pkt.
Relay connector with miniature multi-layer contact relay					
	①	24 V AC/DC	**EMG 17-REL/KSR- 24/21-21-LC AU**	**2941439**	10
	②	48 V AC/DC	**EMG 17-REL/KSR- 48/21-21-LC AU**	**2941332**	10
	③	60 V AC/DC	**EMG 17-REL/KSR- 60/21-21-LC AU**	**2941442**	10
	④	120 V AC/DC	**EMG 17-REL/KSR-120/21-21-LC AU**	**2941455**	10
	⑤	230 V AC/DC			
	⑥	230 V AC[2])	**EMG 17-REL/KSR-W230/21-21-LCAU**	**2941468**	10
Relay module with power contact relay					
	①	24 V AC/DC	**EMG 17-REL/KSR- 24/21-21-LC**	**2940391**	10
	②	48 V AC/DC	**EMG 17-REL/KSR- 48/21-21-LC**	**2940401**	10
	③	60 V AC/DC	**EMG 17-REL/KSR- 60/21-21-LC**	**2940414**	10
	④	120 V AC/DC	**EMG 17-REL/KSR-120/21-21-LC**	**2940427**	10
	⑤	230 V AC/DC			
	⑥	230 V AC[2])	**EMG 17-REL/KSR-W230/21-21-LC**	**2940430**	10

Ordering data

Type	Order No.	Pcs. / Pkt.
EMG 22-REL/KSR- 24/21AU	**2947721**	10
EMG 22-REL/KSR-230/21/AU	**2949295**	10
EMG 22-REL/KSR- 24/21	**2951885**	10
EMG 22-REL/KSR- 48/21	**2951908**	10
EMG 22-REL/KSR- 60/21	**2951911**	10
EMG 22-REL/KSR-120/21	**2953964**	10
EMG 22-REL/KSR-230/21	**2952855**	10

Accessories

Equipment marker	**EMG-GKS 12**	**2947035**	50

Accessories

EMG-GKS 12	**2947035**	50

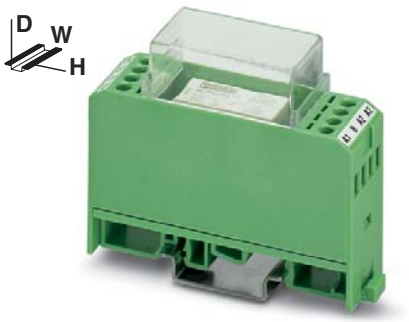
Hybrid Relay Modules

With its integrated transistor level, the hybrid relay module is able to amplify weak input signals. This serves as the basis for reliable relay operation.

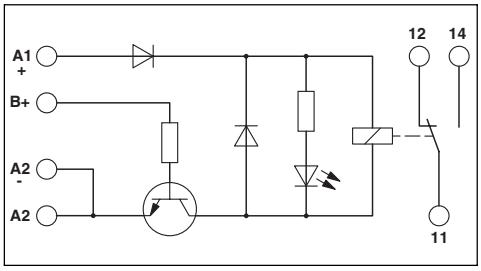
The advantages:

- Low control current (terminal B), type-dependent as of 0.5 mA
- Type-dependent positive or negative control current
- Integrated input and interference suppression circuit
- Safe isolation according to DIN EN 50178 between coil and contact

Notes:
Type of housing: Polycarbonate fiber reinforced PC-F, color: Green.
For marking systems and mounting material, see CLIPLINE catalog, part 2.
For the protection of relay coils and contacts, inductive loads must be dampened with an efficient protective circuit.



Positive switching hybrid relay



Technical data

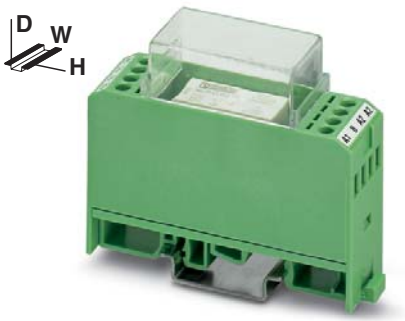
Input data		①	②	③
Relay supply voltage U_N ±10%	[V DC]	24	24	24
Min. control voltage	[V DC]	2.7	5	15
Max. control voltage	[V DC]	5.25	13.2	35
Min. control current	[mA]	2.6	0.5	0.5
Max. control current	[mA]	7.7	1	1
Typ. input current at U_N	[mA]	21	21	21
Response/release time at U_N	[ms]	9 / 10	9 / 10	9 / 10
Input protection:		Yellow LED, protection against polarity reversal, free-wheeling diode		
Output data				
Contact type		Single contact, 1 PDT		
Contact material		AgNi		
Max. switching voltage		250 V AC/DC		
Limiting continuous current		5 A		
Max. inrush current		8 A		
Max. interrupting rating, ohmic load				
	24 V DC	120 W		
	48 V DC	60 W		
	60 V DC	50 W		
	110 V DC	50 W		
	220 V DC	80 W		
	250 V AC	1250 VA		
General data				
Test voltage (winding / contact)		4 kV AC (50 Hz, 1 min.)		
Ambient temperature (operation)		-20°C ... 50°C		
Mechanical service life		Approx. 5 x 10^7 cycles		
Standards / regulations		IEC 60664, EN 50178, IEC 62103		
Pollution degree/surge voltage category		2 / III		
Connection data solid / stranded / AWG		0.2 - 4 mm^2 / 0.2 - 2.5 mm^2 / 24 - 12		
Dimensions	W / H / D	22.5 mm / 75 mm / 62.5 mm		

Ordering data

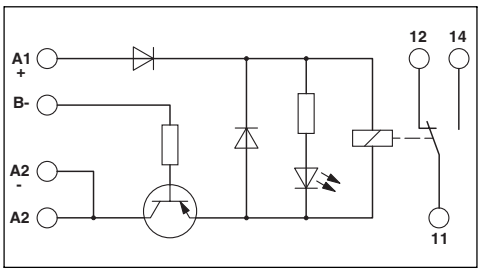
Description		Nominal control voltage	Type	Order No.	Pcs. / Pkt.
Relay module with miniature power contact relay with integrated NPN transistor control, for low control currents					
	①	5 V DC	**EMG 22-REL/KSR-G 24/TRN 5**	**2949787**	10
	②	12 V DC	**EMG 22-REL/KSR-G 24/TRN12**	**2952363**	10
	③	24 V DC	**EMG 22-REL/KSR-G 24/TRN35**	**2952350**	10
Relay module with miniature power contact relay with integrated PNP transistor control, for low control currents					
	①	5 V DC			
	②	12 V DC			
	③	24 V DC			

Accessories

Equipment marker	**EMG-GKS 12**	**2947035**	50



Negative switching hybrid relay



Technical data

①	②	③
24	24	24
-2.4	-6.9	-17.5
-5.25	-13.2	-38.5
1.2	0.6	0.6
1.7	1	1.4
21	21	21
9 / 10	9 / 10	9 / 10

Yellow LED, protection against polarity reversal, free-wheeling diode

Single contact, 1 PDT
AgNi
250 V AC/DC
5 A
8 A

120 W
60 W
50 W
50 W
80 W
1250 VA

4 kV AC (50 Hz, 1 min.)
-20°C ... 50°C
Approx. 5 x 10^7 cycles
IEC 60664, EN 50178, IEC 62103
2 / III
0.2 - 4 mm^2 / 0.2 - 2.5 mm^2 / 24 - 12
22.5 mm / 75 mm / 62.5 mm

Ordering data

Type	Order No.	Pcs. / Pkt.
EMG 22-REL/KSR-G 24/TRP 5	**2949790**	10
EMG 22-REL/KSR-G 24/TRP12	**2952156**	10
EMG 22-REL/KSR-G 24/TRP35	**2952169**	10

Accessories

EMG-GKS 12	**2947035**	50

Solid-state power relays EMG-OV

Due to their rugged design, the solid-state relays are used in all areas of production and process engineering.

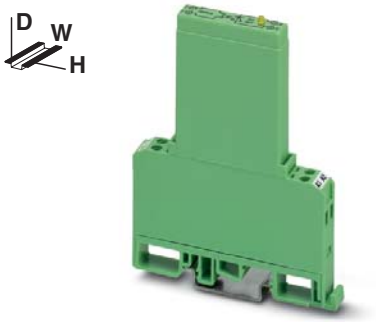
Their most important electrical features are:

– Protective circuits in input and output,
– Direct control with switching levels from 5 V to 230 V and up to 2 A,
– Status display,
– Electrical isolation,
– EMG-17-OV, short-circuit-proof with indicator LED.

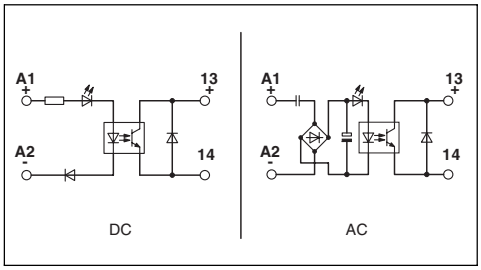
Solid-state relay with AC voltage output also includes:

– Zero voltage switch,
– RC protective circuit.

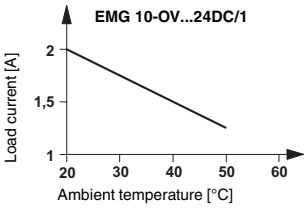
Notes:
Type of housing: Polycarbonate fiber reinforced PC-F, color: Green.
For marking systems and mounting material, see CLIPLINE catalog, part 2.
For the protection of input and output, inductive loads must be dampened with an effective protective circuit.

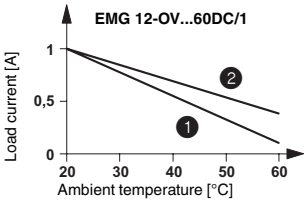


with DC voltage output max. = 1 A

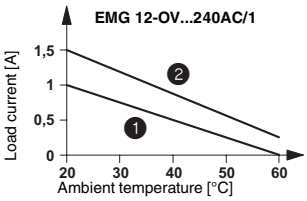


Derating curves

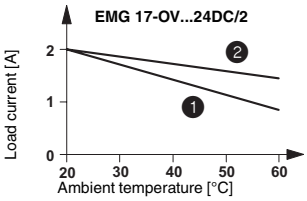




❶ Aligned without spacing
❷ Aligned with ≥ 20 mm spacing



❶ Aligned without spacing
❷ Aligned with ≥ 20 mm spacing



❶ Aligned without spacing
❷ Aligned with ≥ 20 mm spacing

Technical data

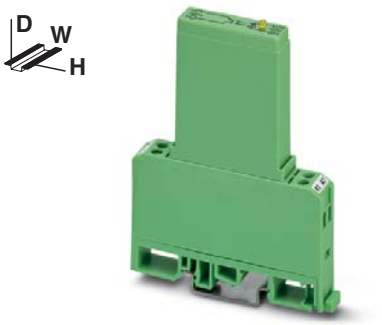
Input data		①	②	③	④	⑤	⑥	⑦	⑧
Permissible range (with reference to U_N)		0.9 - 1.1	0.9 - 1.1	0.9 - 1.1	0.9 - 1.1	0.9 - 1.1	0.9 - 1.1	0.8 - 1.1	0.9 - 1.1
Switching level with reference to U_N	1 signal ("H")	≥ 0.9	≥ 0.9	≥ 0.9	≥ 0.9	≥ 0.9	≥ 0.9	≥ 0.8	≥ 0.45
	0 signal ("L")	≤ 0.6	≤ 0.33	≤ 0.21	≤ 0.18	≤ 0.23	≤ 0.27	≤ 0.25	≤ 0.27
Typ. input current at U_N	[mA]	4.2	4	4.4	4.7	4	3.5	4	4
Transmission frequency f_{limit}	[Hz]	500	500	500	500	500	500	10	10
Input circuit AC		Protection against polarity reversal							
Input circuit DC		Protection against polarity reversal							
Output data									
Operating voltage range		5 V DC ... 36 V DC							
Periodic peak reverse voltage		45 V DC							
Limiting continuous current		1 A (see derating curve)							
Current limitation at short circuits		-							
Min. load current		-							
Surge current		2 A (t = 1 s)							
Switching time t_{in} /t_{out}	DC input	0.1 ms / 0.2 ms							
	AC input	25 ms / 25 ms							
Leakage current in off state		-							
Phase angle (cos φ)		-							
Output circuit		2-wire, floating							
Max. load value		-							
Output protection		Protection against polarity reversal							
Voltage drop at max. limiting continuous current		≤ 1 V							
General data									
Test voltage input/output		3.5 kV AC							
Ambient temperature (operation)		-20°C ... 50°C							
Standards / regulations		IEC 60664, EN 50178, IEC 62103							
Connection data solid / stranded / AWG		0.2 - 4 mm² / 0.2 - 2.5 mm² / 24 - 12							
Dimensions	W / H / D	10 mm / 75 mm / 102 mm							

Ordering data

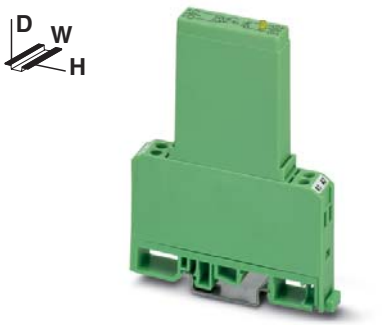
Description		Input voltage U_N	Type	Order No.	Pcs. / Pkt.
Solid-state power relays					
48 V DC ... 60 V DC	①	5 V DC	**EMG 10-OV- 5DC/24DC/1**	**2944203**	10
	②	12 V DC	**EMG 10-OV- 12DC/24DC/1**	**2944216**	10
	③	24 V DC	**EMG 10-OV- 24DC/24DC/1**	**2944229**	10
	④	60 V DC	**EMG 10-OV- 60DC/24DC/1**	**2944232**	10
	⑤	110 V DC	**EMG 10-OV-110DC/24DC/1**	**2944245**	10
	⑥	220 V DC	**EMG 10-OV-220DC/24DC/1**	**2944258**	10
	⑦	120 V AC	**EMG 10-OV-120AC/24DC/1**	**2944261**	10
	⑧	230 V AC	**EMG 10-OV-230AC/24DC/1**	**2944274**	10

Accessories

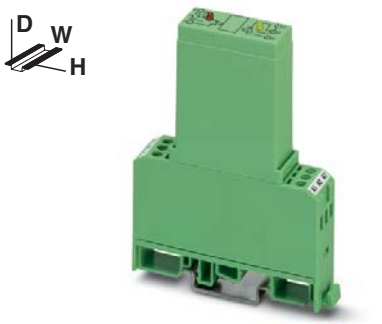
Equipment marker	**EMG-SGKS 10**	**2947585**	50



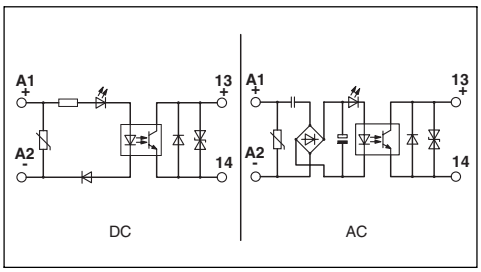
with DC voltage output
max. = 1 A

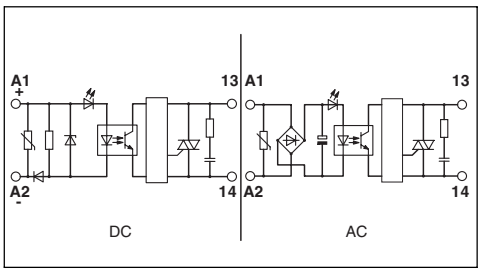


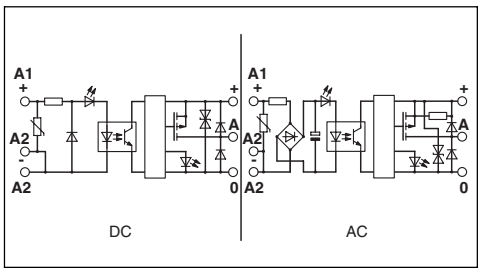
with AC voltage output
max. = 1 A



with short-circuit-proof DC voltage output
max. = 2 A







Technical data

①	②	③	④	⑤	⑥	⑦	⑧
0.8 - 1.2	0.8 - 1.2	0.8 - 1.2	0.64 - 1.2	0.8 - 1.2	0.8 - 1.2	0.9 - 1.1	0.8 - 1.2
≥ 0.8	≥ 0.8	≥ 0.8	≥ 0.64	≥ 0.8	≥ 0.8	≥ 0.9	≥ 0.9
≤ 0.4	≤ 0.4	≤ 0.4	≤ 0.4	≤ 0.4	≤ 0.4	≤ 0.4	≤ 0.4
7	7	7	6.5	6.5	4.5	4	4
500	500	500	500	300	300	10	10
Protection against polarity reversal, surge protection							
Protection against polarity reversal, surge protection							

12 V DC ... 60 V DC
60 V DC
1 A (see derating curve)
-
-
-
20 µs / 200 µs

3 ms / 13 ms

-
-
2-wire, floating
-
Protection against polarity reversal, surge protection
1.2 V

3.5 kV AC
-20°C ... 60°C
IEC 60664, EN 50178, IEC 62103
0.2 - 4 mm² / 0.2 - 2.5 mm² / 24 - 12
12.5 mm / 75 mm / 102 mm

Ordering data

Type	Order No.	Pcs. / Pkt.
EMG 12-OV- 5DC/ 60DC/1	**2948720**	10
EMG 12-OV- 12DC/ 60DC/1	**2948733**	10
EMG 12-OV- 24DC/ 60DC/1	**2948746**	10
EMG 12-OV- 60DC/ 60DC/1	**2948759**	10
EMG 12-OV-110DC/ 60DC/1	**2948762**	10
EMG 12-OV-220DC/ 60DC/1	**2948775**	10
EMG 12-OV-120AC/ 60DC/1	**2948788**	10
EMG 12-OV-230AC/ 60DC/1	**2948791**	10

Accessories

EMG-GKS 12	**2947035**	50

Technical data

①	②	③	④	⑤	⑥	⑦	⑧
0.8 - 1.1	0.8 - 1.1	0.8 - 1.2	0.64 - 1.1	0.8 - 1.1	0.8 - 1.1	0.8 - 1.08	0.8 - 1.05
≥ 0.8	≥ 0.8	≥ 0.8	≥ 0.64	≥ 0.8	≥ 0.8	≥ 0.8	≥ 0.8
≤ 0.4	≤ 0.4	≤ 0.4	≤ 0.32	≤ 0.4	≤ 0.4	≤ 0.36	≤ 0.29
10	7	6.8	4.5	3	3	5.5	3
25	25	10	25	25	25	10	10
Protection against polarity reversal, surge protection							
Protection against polarity reversal, surge protection							

24 V AC ... 280 V AC (50 Hz ... 60 Hz)
600 V
1 A (see derating curve)
-
50 mA
125 A (t = 10 ms)
(Max. one half cycle - zero-voltage crossing) / (max. one half cycle - zero-current crossing)

24 ms (max. one half cycle - zero-voltage crossing) / (max. one half cycle - zero-current crossing)

3.5 mA
0.5
2-wire, floating
78 A²s (I² x t where t = 10 ms)
RC element
≤ 1.5 V

3.5 kV AC
-20°C ... 60°C
IEC 60664, EN 50178, IEC 62103
0.2 - 4 mm² / 0.2 - 2.5 mm² / 24 - 12
12.5 mm / 75 mm / 102 mm

Ordering data

Type	Order No.	Pcs. / Pkt.
EMG 12-OV- 5DC/240AC/1	**2948801**	10
EMG 12-OV- 12DC/240AC/1	**2948814**	10
EMG 12-OV- 24DC/240AC/1	**2948827**	10
EMG 12-OV- 60DC/240AC/1	**2948830**	10
EMG 12-OV-110DC/240AC/1	**2948843**	10
EMG 12-OV-220DC/240AC/1	**2948856**	10
EMG 12-OV-120AC/240AC/1	**2948869**	10
EMG 12-OV-230AC/240AC/1	**2948872**	10

Accessories

EMG-GKS 12	**2947035**	50

Technical data

①	②	③	④	⑤	⑥	⑦	⑧
0.8 - 1.2	0.8 - 1.2	0.8 - 1.2	0.64 - 1.2	0.8 - 1.2	0.8 - 1.2	0.8 - 1.16	0.8 - 1.2
≥ 0.8	≥ 0.8	≥ 0.8	≥ 0.64	≥ 0.8	≥ 0.8	≥ 0.8	≥ 0.8
≤ 0.4	≤ 0.4	≤ 0.4	≤ 0.32	≤ 0.4	≤ 0.4	≤ 0.4	≤ 0.4
4.5	4.6	3.5	2.1	1.7	1.7	2.1	2
1000	1000	1000	1000	1000	1000	10	10
Protection against polarity reversal, surge protection							
Protection against polarity reversal, surge protection							

10 V DC ... 30 V DC
33 V DC
2 A (see derating curve)
> 2 A (short-circuit-proof)
-
-
120 µs / 230 µs

50 ms / 12 ms

150 µA
-
3-wire, ground-referenced
-
Protection against polarity reversal, free running
≤ 0.3 V

2.5 kV AC
-20°C ... 60°C
IEC 60664, EN 50178, IEC 62103
0.2 - 4 mm² / 0.2 - 2.5 mm² / 24 - 12
17.5 mm / 75 mm / 102 mm

Ordering data

Type	Order No.	Pcs. / Pkt.
EMG 17-OV- 5DC/ 24DC/2	**2946780**	10
EMG 17-OV- 12DC/ 24DC/2	**2946793**	10
EMG 17-OV- 24DC/ 24DC/2	**2946803**	10
EMG 17-OV- 60DC/ 24DC/2	**2946816**	10
EMG 17-OV-110DC/ 24DC/2	**2946829**	10
EMG 17-OV-220DC/ 24DC/2	**2946832**	10
EMG 17-OV-120AC/ 24DC/2	**2946845**	10
EMG 17-OV-230AC/ 24DC/2	**2946858**	10

Accessories

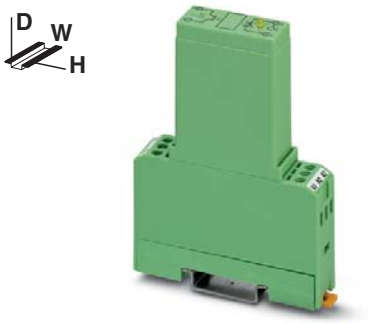
EMG-GKS 12	**2947035**	50

Solid-state power relays EMG-OV

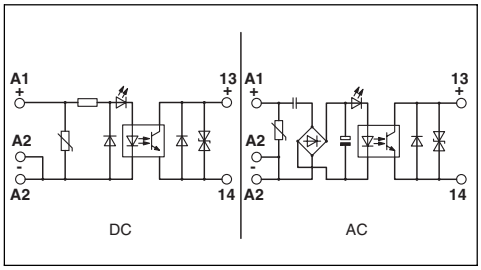
Their most important electrical features are:
- Defined switching levels (TTL/CMOS logic levels)
- Protective circuits in input and output,
- Status display,
- Electrical isolation,
- EMG-17-OV, short-circuit-proof with indicator LED.

Solid-state relay with AC voltage output also includes:
- Zero voltage switch,
- RC protective circuit.

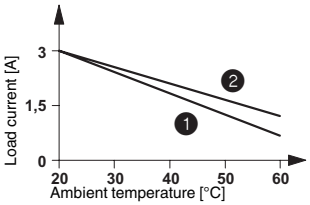
Notes:
Type of housing: Polycarbonate fiber reinforced PC-F, color: Green.
For marking systems and mounting material, see CLIPLINE catalog, part 2.
For the protection of input and output, inductive loads must be dampened with an effective protective circuit.



with DC voltage output max. = 3 A

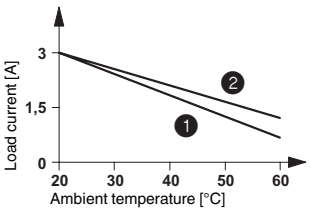


Derating curve for EMG 17-OV...60DC/3



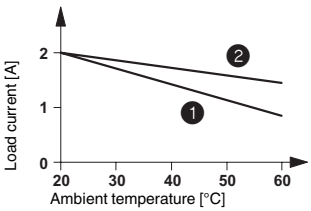
❶ Aligned without spacing
❷ Aligned with ≥ 20 mm spacing

Derating curve for EMG 17-OV...240AC/3



❶ Aligned without spacing
❷ Aligned with ≥ 20 mm spacing

Derating curve for EMG 17-OV-TTL/24DC/2



❶ Aligned without spacing
❷ Aligned with ≥ 20 mm spacing

Technical data

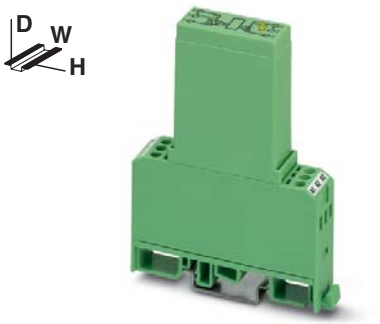
Input data		①	②	③	④	⑤	⑥	⑦	⑧
Permissible range (with reference to U_N)		0.8 - 1.2	0.8 - 1.2	0.8 - 1.2	0.8 - 1.2	0.8 - 1.2	0.8 - 1.2	0.9 - 1.1	0.9 - 1.1
Switching level with reference to U_N	1 signal ("H")	≥ 0.8	≥ 0.8	≥ 0.8	≥ 0.64	≥ 0.8	≥ 0.8	≥ 0.8	≥ 0.8
	0 signal ("L")	≤ 0.4	≤ 0.4	≤ 0.4	≤ 0.4	≤ 0.4	≤ 0.4	≤ 0.4	≤ 0.4
Typ. input current at U_N	[mA]	7	7	7	6.5	5.5	4.5	4	4
Transmission frequency f_{limit}	[Hz]	500	500	500	500	300	300	10	10
Input circuit AC		Protection against polarity reversal, surge protection							
Input circuit DC		Protection against polarity reversal, surge protection							
Auxiliary voltage		-							
Auxiliary current		-							
Output data									
Operating voltage range		12 V DC ... 60 V DC							
Periodic peak reverse voltage		60 V DC							
Limiting continuous current		3 A (see derating curve)							
Min. load current		-							
Surge current		-							
Switching time t_{in} /t_{out}	DC input	20 µs / 200 µs							
	AC input	3 ms / 13 ms							
Leakage current in off state		-							
Max. load value		-							
Output protection		Protection against polarity reversal, surge protection							
Voltage drop at max. limiting continuous current		1.2 V							
General data									
Test voltage input/output		3.5 kV AC							
Ambient temperature (operation)		-20°C ... 60°C							
Standards / regulations		IEC 60664, EN 50178, IEC 62103							
Connection data solid / stranded / AWG		0.2 - 4 mm² / 0.2 - 2.5 mm² / 24 - 12							
Dimensions	W / H / D	17.5 mm / 75 mm / 102 mm							

Ordering data

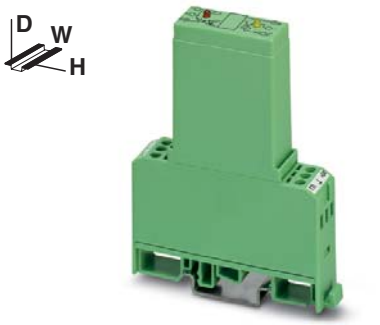
Description		Input voltage U_N	Type	Order No.	Pcs. / Pkt.
Solid-state power relays					
48 V DC ... 60 V DC	①	5 V DC	**EMG 17-OV- 5DC/ 60DC/3**	**2954138**	10
	②	12 V DC	**EMG 17-OV- 12DC/ 60DC/3**	**2954141**	10
	③	24 V DC	**EMG 17-OV- 24DC/ 60DC/3**	**2954154**	10
	④	60 V DC	**EMG 17-OV- 60DC/ 60DC/3**	**2954167**	10
	⑤	110 V DC	**EMG 17-OV-110DC/ 60DC/3**	**2954170**	10
	⑥	220 V DC	**EMG 17-OV-220DC/ 60DC/3**	**2954183**	10
	⑦	120 V AC	**EMG 17-OV-120AC/ 60DC/3**	**2954196**	10
	⑧	230 V AC	**EMG 17-OV-230AC/ 60DC/3**	**2954206**	10

Accessories

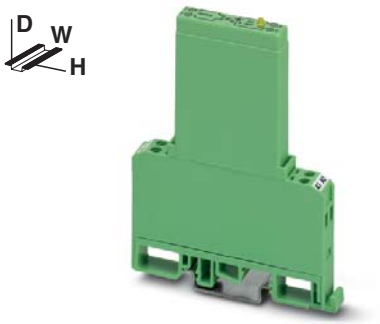
Equipment marker	**EMG-GKS 12**	**2947035**	50



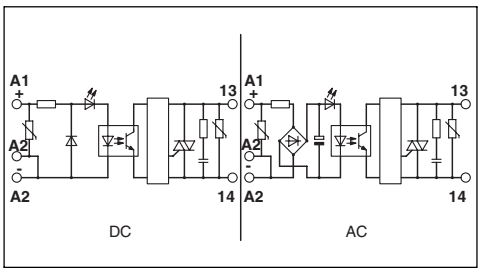
with AC voltage output
max. = 3 A

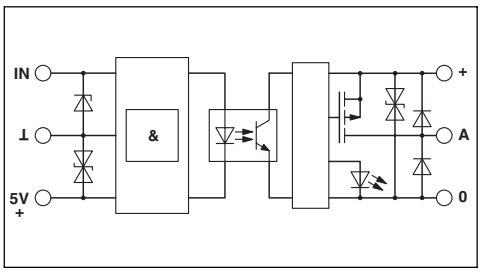


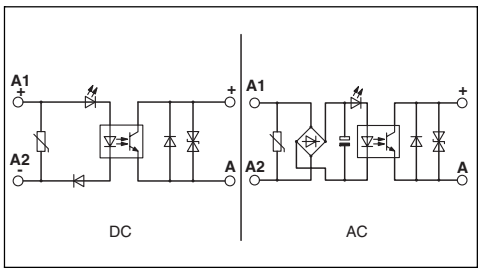
with short-circuit-proof DC voltage output
max. = 2 A



with DC voltage output
max. = 100 mA







Technical data

①	②	③	④	⑤	⑥	⑦	⑧
0.8 - 1.2	0.8 - 1.2	0.8 - 1.2	0.64 - 1.2	0.8 - 1.2	0.8 - 1.2	0.8 - 1.2	0.8 - 1.2
≥ 0.8	≥ 0.8	≥ 0.8	≥ 0.64	≥ 0.8	≥ 0.8	≥ 0.8	≥ 0.8
≤ 0.4	≤ 0.4	≤ 0.4	≤ 0.32	≤ 0.4	≤ 0.4	≤ 0.4	≤ 0.4
4.2	4.1	3.6	6	3.6	4.7	3.2	3
25	25	25	25	25	25	10	10

Yellow LED, protection against polarity reversal, surge protection
Yellow LED, protection against polarity reversal, surge protection
-
-

48 V AC ... 280 V AC (50 Hz ... 60 Hz)
600 V
3 A (see derating curve)
50 mA
160 A (t = 10 ms)
10 ms / 10 ms
10 ms / 10 ms
4 mA (in off state)
128 A²s (I² x t where t = 10 ms)
RC element, surge protection
≤ 1 V

3.5 kV AC
-20°C ... 60°C
IEC 60664, EN 50178, IEC 62103
0.2 - 4 mm² / 0.2 - 2.5 mm² / 24 - 12
17.5 mm / 75 mm / 102 mm

Ordering data

Type	Order No.	Pcs. / Pkt.
EMG 17-OV- 5DC/240AC/3	**2954219**	10
EMG 17-OV- 12DC/240AC/3	**2954222**	10
EMG 17-OV- 24DC/240AC/3	**2954235**	10
EMG 17-OV- 60DC/240AC/3	**2954248**	10
EMG 17-OV-110DC/240AC/3	**2954251**	10
EMG 17-OV-220DC/240AC/3	**2954264**	10
EMG 17-OV-120AC/240AC/3	**2954277**	10
EMG 17-OV-230AC/240AC/3	**2954280**	10

Accessories

EMG-GKS 12	**2947035**	50

Technical data

③
0.8 - 1.2
TTL (2 V)
TTL (0.8 V)
2.6
1000

Protection against polarity reversal, surge protection, free running
5 V DC ±20%
2.8 mA

10 V DC ... 30 V DC
33 V DC
2 A (see derating curve)
-
-
170 µs / 190 µs
- / -
150 µA
-
Protection against polarity reversal, free-wheeling diode
≤ 0.3 V

2.5 kV AC
-20°C ... 60°C
IEC 60664, EN 50178, IEC 62103
0.2 - 4 mm² / 0.2 - 2.5 mm² / 24 - 12
17.5 mm / 75 mm / 102 mm

Ordering data

Type	Order No.	Pcs. / Pkt.
EMG 17-OV-TTL/ 24DC/2	**2943259**	10

Accessories

EMG-GKS 12	**2947035**	50

Technical data

①	②	③	④	⑤	⑥	⑦	⑧
0.8 - 1.2	0.8 - 1.2	0.8 - 1.2	0.8 - 1.2	0.8 - 1.2	0.8 - 1.2	0.9 - 1.1	0.9 - 1.1
≥ 0.8	≥ 0.8	≥ 0.8	≥ 0.8	≥ 0.8	≥ 0.8	≥ 0.8	≥ 0.8
≤ 0.4	≤ 0.4	≤ 0.4	≤ 0.4	≤ 0.4	≤ 0.4	≤ 0.4	≤ 0.4
12	10	8.5	7.5	4.5	4	4.8	3.5
500	500	500	500	500	500	10	10

Protection against polarity reversal, surge protection
Protection against polarity reversal, surge protection
-
-

4 V DC ... 48 V DC
-
100 mA
-
-
20 µs / 100 µs
10 ms / 10 ms
-
-
Protection against polarity reversal, surge protection
0.9 V

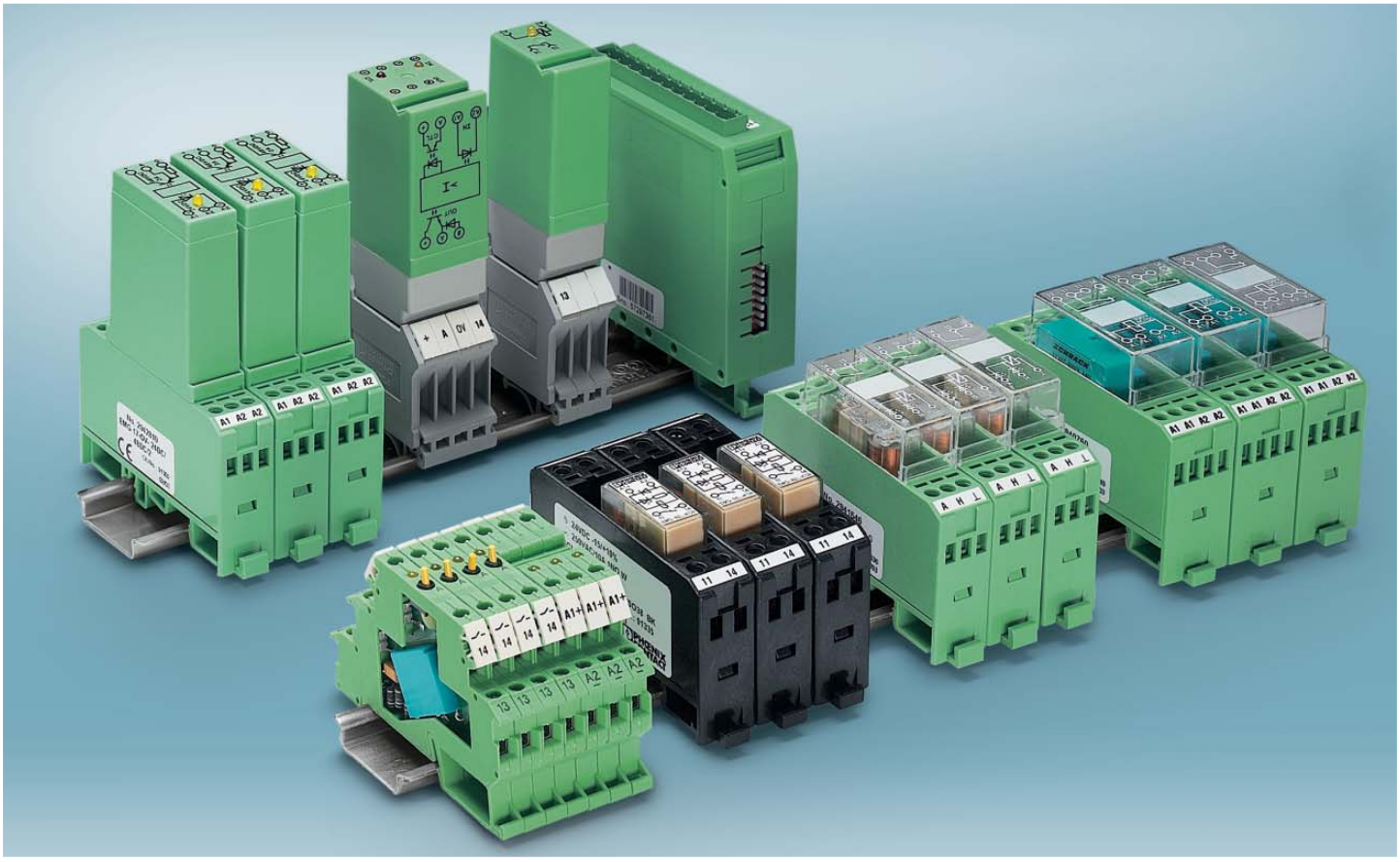
3.5 kV AC
-20°C ... 60°C
IEC 60664, EN 50178, IEC 62103
0.2 - 4 mm² / 0.2 - 2.5 mm² / 24 - 12
10 mm / 75 mm / 102 mm

Ordering data

Type	Order No.	Pcs. / Pkt.
EMG 10-OE- 5DC/ 48DC/100	**2948885**	10
EMG 10-OE- 12DC/ 48DC/100	**2948898**	10
EMG 10-OE- 24DC/ 48DC/100	**2948908**	10
EMG 10-OE- 60DC/ 48DC/100	**2948911**	10
EMG 10-OE-110DC/ 48DC/100	**2948924**	10
EMG 10-OE-220DC/ 48DC/100	**2948937**	10
EMG 10-OE-120AC/ 48DC/100	**2948940**	10
EMG 10-OE-230AC/ 48DC/100	**2948953**	10

Accessories

EMG-GKS 12	**2947035**	50



Switch/relay terminal block DEK-REL-24/1/S

The functions "Manual", "0", "Automatic" are provided in a 6.2 mm narrow relay terminal block.

Interference-free relay and solid-state relay interfaces

Coupled interference voltages on the coil lines or leakage currents can cause malfunctions in conventional modules. These special interface modules, equipped with high switching thresholds and/or effective filters, ensure good functioning.

Relay interfaces for switching lamp loads ST-REL... and EMG 17-REL...

Lamp loads and capacitive consumers produce extremely high inrush currents which weld conventional relay contacts. To prevent this, Phoenix Contact uses an arc-resistant contact optimized for these applications, which keeps these peaks under control.

Pluggable solid-state power relays ST-OV 3-24DC/400/3

The output of this component, dimensioned with a peak reverse voltage of 800 V, allows, for example, 230 V motors to be driven in simple reversible mode.

Power circuit breaker solid-state relay, with signal logic

These modules combine the features of a short-circuit-proof power solid-state relay and those of a thermomagnetic protection element.

100-kHz input solid-state relay DEK-OE-...100KHZ

Input solid-state relay for reliable transmission of high frequency signals of the type that occur with, for example, incremental encoders.

Electronic sensor terminal block for NAMUR proximity sensors

For converting the changeable resistance of a NAMUR sensor into a digital signal that can be read by a PLC.

Inverter module DEK-TR/INV

Module for converting NPN outputs to PNP outputs and PNP to NPN.

Logic pulse expansion module UEGM-OE/AV

Input signals can be extended from 10 to 1500 ms.

Remanence relay

Bistable relay with one connection each to "Set" and "Reset".

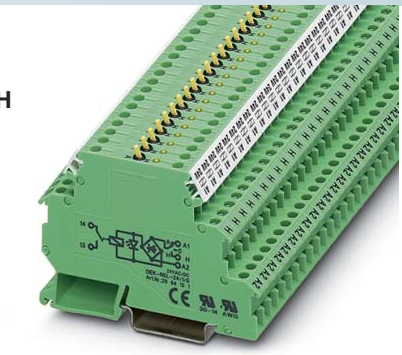
Relay module with manual switch

Relay module with manual switch and integrated power relay for manual, zero, and automatic functions

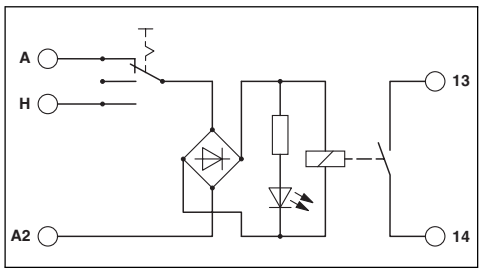
The advantages:

- Max. switching current of 5 A
- Only 6.2 mm wide
- Increased contact stability thanks to double contact
- Safe isolation according to DIN EN 50178 between coil and contact

Notes:
Type of housing: Polyamide PA non-reinforced, color: Green.
For marking systems and mounting material, see CLIPLINE catalog, part 2.
For the protection of input and output, inductive loads must be dampened with an effective protective circuit.



Relay module with manual switch and integrated relay



Technical data

Input data		①
Permissible range (with reference to U_N)		0.8 - 1.1
Typ. input current at U_N	[mA]	6.5
Response/release time at U_N	[ms]	5 / 15
Input protection:		Yellow LED, bridge rectifier
Output data		
Contact type		Double contact, 1 N/O contact
Contact material		AgNi, 5 µm hard gold-plated
Max. switching voltage		250 V AC / 125 V DC
Min. switching voltage		0.1 V
Limiting continuous current		3 A (5 A up to 35°C at 24 V DC)
Max. inrush current		5 A
Min. switching current		1 mA
Max. interrupting rating, ohmic load		
	24 V DC	72 W
	48 V DC	60 W
	60 V DC	50 W
	110 V DC	50 W
	250 V AC	750 VA
General data		
Test voltage (winding / contact)		2 kV AC (50 Hz, 1 min.)
Ambient temperature (operation)		-20°C ... 50°C
Mechanical service life		Approx. 2 x 10^7 cycles
Standards / regulations		IEC 60664, EN 50178, IEC 62103
Connection data solid / stranded / AWG		0.2 - 2.5 mm^2 / 0.2 - 2.5 mm^2 / 24 - 14
Dimensions	W / H / D	6.2 mm / 80 mm / 61 mm

Ordering data

Description		Input voltage U_N	Type	Order No.	Pcs. / Pkt.
Relay module with power relay					
	①	24 V AC/DC	**DEK-REL- 24/1/S**	**2964131**	10

Accessories

Cover			**D-DEK 1,5 GN**	**2716949**	10
Insertion bridge	No. of poles	Color			
	2	red	**EB 2- DIK RD**	**2716693**	10
	3	red	**EB 3- DIK RD**	**2716745**	10
	4	red	**EB 4- DIK RD**	**2716758**	10
	5	red	**EB 5- DIK RD**	**2716761**	10
	10	red	**EB 10- DIK RD**	**2716774**	10
	2	blue	**EB 2- DIK BU**	**2716648**	10
	3	blue	**EB 3- DIK BU**	**2716651**	10
	4	blue	**EB 4- DIK BU**	**2716664**	10
	5	blue	**EB 5- DIK BU**	**2716677**	10
	10	blue	**EB 10- DIK BU**	**2716680**	10
	80	blue	**EB 80- DIK BU**	**2715940**	1
	80	red	**EB 80- DIK RD**	**2715953**	1
	80	white	**EB 80- DIK WH**	**2715788**	1

Relay modules with interference current filter

Relay and solid-state relay modules with integrated filter to protect against interference voltages or currents due, for example, to long control lines

The advantages:

– Resistant to interference currents
– High relay release voltage

Typical applications:

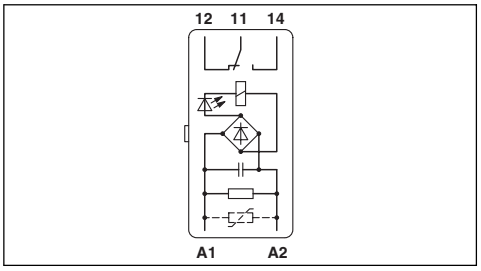
– Applications with long control lines
– Use of AC output boards, resulting in residual AC currents

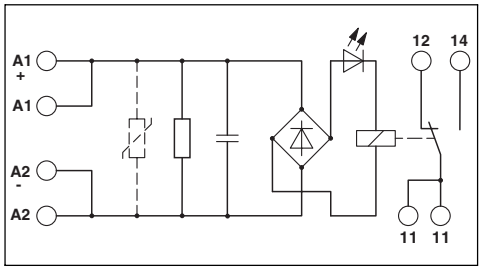
Notes:

Load current diagrams, see page 107

1 PDT, plug-in relay

1 PDT, soldered-in relay





Technical data

Input data		①	②	③
Permissible range (with reference to U_N)		0.9 - 1.1	0.85 - 1.1	0.9 - 1.1
Typ. input current at U_N	[mA]	26	19	18
Response/release time at U_N	[ms]	8 / 10	8 / 11	10 / 8
Input protection:		Yellow LED, bridge rectifier, surge protection		

Output data			
Contact type		Single contact, 1 PDT	Double contact, 1 PDT
Contact material		AgNi	Gold (Au)
Max. switching voltage		250 V AC/DC	30 V AC / 36 V DC
Limiting continuous current		6 A	0.5 A
Max. inrush current		8 A	0.2 A
Max. interrupting rating, ohmic load			
	24 V DC	140 W	5 W
	48 V DC	60 W	-
	60 V DC	45 W	-
	110 V DC	35 W	-
	220 V DC	55 W	-
	250 V AC	1500 VA	-
General data			
Test voltage (winding / contact)		2.5 kV AC (50 Hz, 1 min.)	
Ambient temperature (operation)		-20°C ... 50°C	
Mechanical service life		Approx. 2 x 10^7 cycles	
Standards / regulations		IEC 60664, EN 50178, IEC 62103	
Connection data solid / stranded / AWG		- / - / -	
Dimensions	W / H / D	20.8 mm / 42.5 mm / 112 mm	

Technical data

Input data		③
Permissible range (with reference to U_N)		0.9 - 1.1
Typ. input current at U_N	[mA]	18
Response/release time at U_N	[ms]	10 / 8
Input protection:		Yellow LED, bridge rectifier, surge protection

Output data			
Contact type		Single contact, 1 PDT	Double contact, 1 PDT
Contact material		AgNi	AgPd60 5 µm hard gold-plated
Max. switching voltage		250 V AC/DC	30 V AC / 36 V DC
Limiting continuous current		6 A	0.5 A
Max. inrush current		8 A	0.2 A
Max. interrupting rating, ohmic load			
	24 V DC	95 W	5 W
	48 V DC	50 W	-
	60 V DC	45 W	-
	110 V DC	35 W	-
	220 V DC	55 W	-
	250 V AC	1500 VA	-
General data			
Test voltage (winding / contact)		2.5 kV AC (50 Hz, 1 min.)	
Ambient temperature (operation)		-20°C ... 40°C	
Mechanical service life		Approx. 2 x 10^7 cycles	
Standards / regulations		IEC 60664, EN 50178, IEC 62103	
Connection data solid / stranded / AWG		0.2 - 4 mm^2 / 0.2 - 2.5 mm^2 / 24 - 12	
Dimensions	W / H / D	22.5 mm / 75 mm / 62.5 mm	

Ordering data

Description	Input voltage U_N	Type	Order No.	Pcs. / Pkt.
Relay module with power contact relay				
①	24 V AC/DC	**ST-REL3-KG 24/21/SO46**	**2826091**	10
②	120 V AC/DC	**ST-REL3-KG120/21/SO46**	**2833026**	10
③	230 V AC/DC	**ST-REL3-KG230/21/SO46**	**2832027**	10
Relay module with multi-layer contact relay				
①	24 V AC/DC	**ST-REL3-KG 24/21/AU/SO46**	**2826981**	10
②	120 V AC/DC	**ST-REL3-KG120/21/AU/SO46**	**2829797**	10
③	230 V AC/DC	**ST-REL3-KG230/21/AU/SO46**	**2826266**	10

Ordering data

Type	Order No.	Pcs. / Pkt.
EMG 22-REL/KSR-230/21/ SO46	**2940760**	10
EMG 22-REL/KSR-230/21/AU/SO46	**2940061**	10

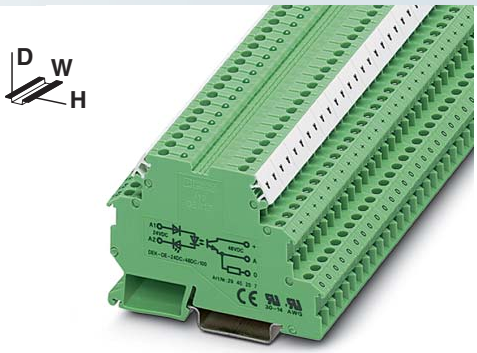
Accessories

Basic terminal block, complete with end cover	**URELG 3**	**2820136**	10
Equipment marker			

Accessories

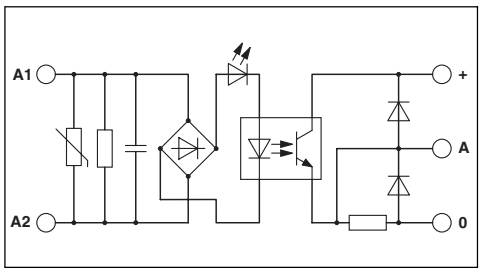
EMG-GKS 12	**2947035**	50

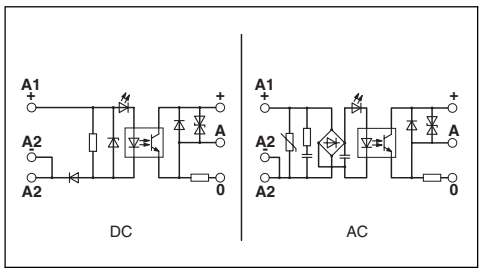
Notes:
Type of housing: **ST-REL:** Polyamide non-reinforced PA, color: Bottom part gray, hood green **EMG:** Polyamide fiber reinforced PA-F, color: Green. **DEK:** Polyamide non-reinforced PA, color: Green.
For marking systems and mounting material, see CLIPLINE catalog, part 2.
For derating curve, refer to page 105



Solid-state input relay
Max. 100 mA

Solid-state power relay
Max. 2 A





		Technical data	Technical data	
Input data		②	①	②
Permissible range (with reference to U_N)		0.9 - 1.1	0.8 - 1.2	0.8 - 1.1
Switching level	1 signal ("H") [V DC] ≥	207	16.8	180
	0 signal ("L") [V DC] ≤	92	16	155
Typ. input current at U_N	[mA]	2.5	8	9
Typ. switch-on time at U_N	[ms]	4.4	0.02	25
Typ. switch-off time at U_N	[ms]	14	0.2	35
Transmission frequency f_{limit}	[Hz]	5	300	3
Input circuit AC		Yellow LED, surge protection, RC element	Protection against polarity reversal	
Input circuit DC			Protection against polarity reversal	
Output data				
Max. switching voltage		48 V DC	48 V DC	
Min. switching voltage		3 V DC	12 V DC	
Limiting continuous current		100 mA	2 A (see derating curve)	
Max. inrush current		-	5 A (t = 1 s)	
Output circuit		3-wire, ground-referenced	3-wire, ground-referenced	
Output protection		Protection against polarity reversal, free running	Protection against polarity reversal, surge protection	
Voltage drop at max. limiting continuous current		≤ 0.9 V	1.1 V	
General data				
Test voltage input/output		2.5 kV AC	3.5 kV AC	
Ambient temperature (operation)		0°C ... 50°C	-10°C ... 55°C	
Standards / regulations		IEC 60664, EN 50178, IEC 62103	IEC 60664, EN 50178, IEC 62103	
Pollution degree/surge voltage category		2 / III	2 / III	
Mounting position / mounting		Any/can be aligned without spacing	- / Mounted in rows with zero spacing: Horizontal/not in rows: Any	
Connection data solid / stranded / AWG		0.2 - 4 mm² / 0.2 - 2.5 mm² / 24 - 12	0.2 - 4 mm² / 0.2 - 2.5 mm² / 24 - 12	
Dimensions	W / H / D	6.2 mm / 80 mm / 56 mm	17.5 mm / 75 mm / 102 mm	

Description		Input voltage U_N	Ordering data Type	Order No.	Pcs. / Pkt.	Ordering data Type	Order No.	Pcs. / Pkt.
Solid-state power relays								
	①	24 V DC				**EMG 17-OV- 24DC/ 48DC/2**	**2942810**	10
	②	230 V AC	**DEK-OE-230AC/ 48DC/100/SO 46**	**2964678**	10	**EMG 17-OV-230AC/ 48DC/2**	**2942823**	10

	Accessories			Accessories		
Equipment marker				**EMG-GKS 12**	**2947035**	50

Relay Modules for High Inrush Currents

The Phoenix Contact relay modules of the type SO 38 have been designed for switching electrical equipment with high inrush currents.

Areas of application are:
- Inductive loads (motors, power contactors etc.)
- Inductive/capacitive loads (fluorescent lamps etc.)
- Ohmic loads (glow lamps, heaters).

The module is based on a relay with a special arc-resistant tungsten lead contact. This takes over the high inrush and interrupting current capacitively. The inductive main contact made of AgCdO takes over the continuous current up to 10 A reliably. With the model EMG 17-REL...2E/SO38, this switching capacity is reached using a power relay with a set of silver tin oxide (AgSnO) contacts.

The module is available in two versions:
- Modular, rail-mountable housing EMG with a constructional width of 17.5 mm,
- Convenient plug-in housing ST-REL from the Phoenix ST series for mounting on the basic terminal blocks URELG or UDK-RELG.

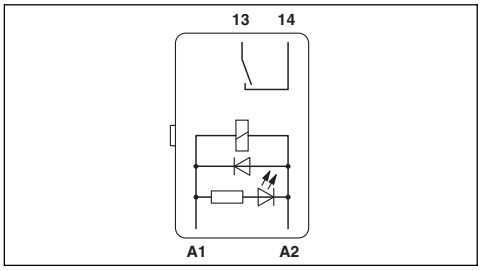
Further features are:
- Snap-on mounting on the common EN rails,
- Easy maintenance,
- Clear labeling of the terminal blocks using Phoenix Contact marking material.

Notes:

Type of housing:
Polycarbonate fiber reinforced PC-F, color: Green or black.

For marking systems and mounting material, see CLIPLINE catalog, part 2.

medium to large powers
1 N/O contact (1)



Technical data

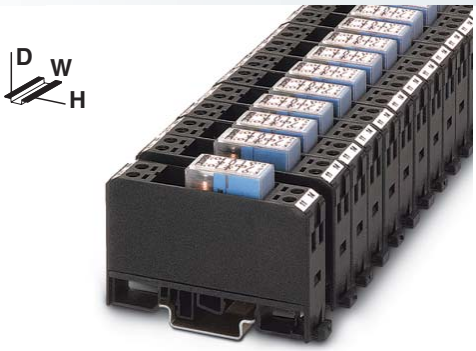
Input data		①
Permissible range (with reference to U_N)		0.85 - 1.1
Typ. input current at U_N	[mA]	28
Response/release time at U_N	[ms]	13 / 15
Input protection:		Yellow LED, free-wheeling diode
Output data		
Contact type		1 N/O contact with lead contact
Contact material		Main contact, silver cadmium oxide (AgCdO): Lead contact, tungsten
Max. switching voltage		250 V AC
Limiting continuous current		10 A
Max. inrush current		80 A (20 ms)
Max. interrupting rating, ohmic load		
	24 V DC	-
	48 V DC	-
	60 V DC	-
	110 V DC	-
	220 V DC	-
	250 V AC	2500 VA
General data		
Test voltage (winding / contact)		2.5 kV AC (50 Hz, 1 min.)
Ambient temperature (operation)		-20°C ... 50°C
Mechanical service life		Approx. 10^7 cycles
Standards / regulations		IEC 60664, EN 50178, IEC 62103
Mounting position / mounting		- / Horizontal with zero spacing, vertical with spacing
Connection data solid / stranded / AWG		- / - / -
Dimensions	W / H / D	20.8 mm / 42.5 mm / 112 mm

Ordering data

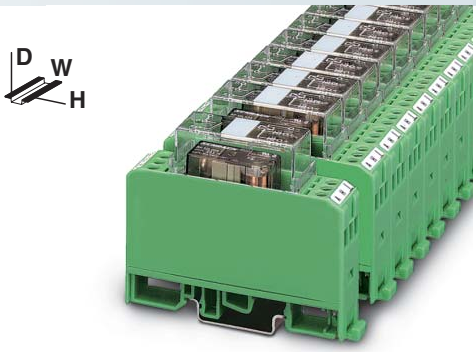
Description	Input voltage U_N	Type	Order No.	Pcs. / Pkt.
Relay module with power contact relay + tungsten lead contact				
①	24 V DC	**ST-REL3-KG 24/ 1/SO38**	**2829564**	10
Relay module with power contact relay, with two inputs for manual, automatic				
①	24 V DC			

Accessories

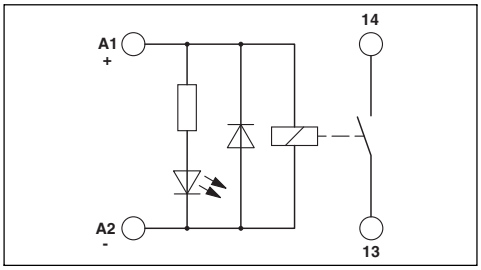
Basic terminal block, complete with end cover		**URELG 3**	**2820136**	10
Equipment marker				

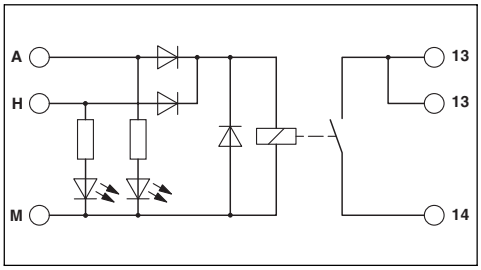


medium to large powers
1 N/O contact (1)



medium to large powers
1 N/O contact (1)





Technical data

①	①
0.85 - 1.1	0.9 - 1.1
28	23
13 / 15	9 / 10
Yellow LED, free-wheeling diode	Automatic: Yellow LED, Manual: Red LED, free-wheeling diode, protection against polarity reversal
1 N/O contact with lead contact	Single contact, 1 N/O contact
Main contact, silver cadmium oxide (AgCdO): Lead contact, tungsten	AgSnO
250 V AC	250 V AC/DC
10 A	10 A
80 A (20 ms)	120 A (20 ms)
-	240 W
-	120 W
-	85 W
-	70 W
-	90 W
2500 VA	2500 VA
4 kV AC (50 Hz, 1 min.)	4 kV AC (50 Hz, 1 min.)
-20°C ... 50°C	-20°C ... 50°C
Approx. 10^7 cycles	3 x 10^7 cycles
IEC 60664, EN 50178, IEC 62103	IEC 60664, EN 50178, IEC 62103
Any	Any
0.2 - 4 mm² / 0.2 - 2.5 mm² / 24 - 12	0.2 - 4 mm² / 0.2 - 2.5 mm² / 24 - 12
17.5 mm / 75 mm / 62.5 mm	17.5 mm / 75 mm / 62.5 mm

Ordering data

Type	Order No.	Pcs. / Pkt.
EMG 17-REL/KSR-G 24/SO38 BK	**2949994**	10

Accessories

EMG-GKS 12	**2947035**	50

Ordering data

Type	Order No.	Pcs. / Pkt.
EMG 17-REL/KSR-G 24/2E/SO38	**2941646**	10

Accessories

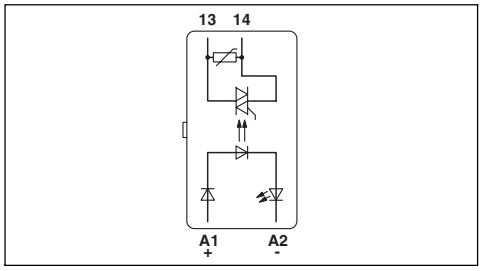
EMG-GKS 12	**2947035**	50

Pluggable solid-state power relays ST-OV 3

The pluggable version of the module provides all the advantages of the ST series, such as:
- Switching of up to 400 V AC/3 A
- Control of 230 V motors in straightforward reversing mode (e.g., synchronous motor in single-phase operation, see illustration)
- Pluggable

Notes:
Type of insulating housing: Polyamide PA non-reinforced, color: Bottom part gray, hood green.
Ground (minus) potential from the input and output of the optocoupler should not be connected.
AC loads must be protected with a varistor or an RC element.

with AC voltage output max. = 3 A



Technical data

Input data		①
Switching level with reference to U_N	1 signal ("H")	≥ 0.8
	0 signal ("L")	≤ 0.4
Typ. input current at U_N	[mA]	7
Transmission frequency f_{limit}	[Hz]	10
Input protection:		Yellow LED, protection against polarity reversal, RC element
Output data		
Operating voltage		400 V AC
Operating voltage range		24 V AC ... 420 V AC
Periodic peak reverse voltage		800 V
Limiting continuous current		3 A (see derating curve)
Min. load current		50 mA
Surge current		125 A (t = 10 ms)
Residual voltage drop at "H"		≤ 1.2 V
Leakage current in off state		Approx. 12 mA
Output protection		Surge protection, RC element
General data		
Test voltage input/output		2.5 kV AC
Ambient temperature (operation)		0°C ... 60°C
Standards / regulations		IEC 60664, EN 50178, IEC 62103
Pollution degree/surge voltage category		2 / III
Mounting position / mounting		Horizontal DIN rail / -
Dimensions	W / H / D	20.8 mm / 42.5 mm / 112 mm

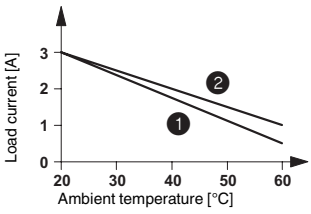
Ordering data

Description		Input voltage U_N	Type	Order No.	Pcs. / Pkt.
Solid-state power relays					
	①	24 V DC	**ST-OV3- 24DC/400AC/3**	**2905417**	10

Accessories

Basic terminal block, complete with end cover	**URELG 3**	**2820136**	10

Derating curve for ST-OV 3-24DC/400AC/3



❶ Aligned without spacing
❷ Aligned with ≥ 20 mm spacing

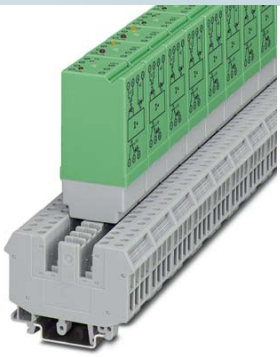
Power protective circuit solid-state relay with signal logic
ST-OV 4-24DC/24DC/...-PRO

The ST-OV 4-...PRO provides protection and monitoring functions that are otherwise only known from thermomagnetic protection elements.

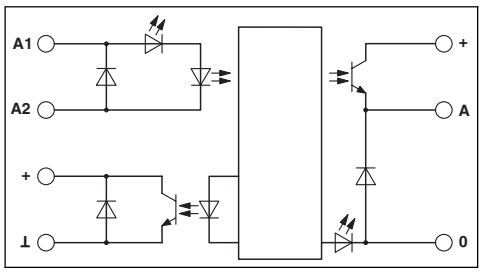
The PROtect modules have the following features:

- Fast disconnection with short circuits and simultaneous current limitation
- Time-dependent overload shutdown for reliable protection against continuous overloads
- Brief inrush peaks are ignored
- After an overload or short circuit has been triggered, a defined reset of the control voltage must be carried out
- Reliable recognition and indication of a line break on the load side
- Feedback in the event of an error

Notes:
Type of housing: Polyamide PA non-reinforced, color: Bottom part gray, hood green
For marking systems and mounting material, see CLIPLINE catalog, part 2.
For load current diagram, see page 107
Derating curve, time/current characteristic curves, and state diagram, see page 107



with short-circuit-proof DC voltage output max. = 1 A or 4 A



Technical data

Input data		ST-OV4- 24DC/ 24DC/1-PRO	ST-OV4- 24DC/ 24DC/4-PRO
Operating voltage		24 V DC ±50%	
Switching level	1 signal ("H")	8.5 V DC	
	0 signal ("L")	5 V DC	
Typ. input current at U_N		6.5 mA	
Transmission frequency f_{limit}		100 Hz	
Reset period after short circuit / overload shut down		1 ms	
Input circuit		Yellow LED, polarity protection diode	
Output data signaling contact / CONTROL			
Operating voltage range		5 V DC ... 36 V DC	
Limiting continuous current		50 mA	
Residual voltage drop at "H"		≤ 1.5 V	
Output protection		Polarity protection diode	
Output circuit		3-wire, ground-referenced	
Output data load contact			
Operating voltage range		18 V DC ... 36 V DC	
Limiting continuous current		1 A (see derating curve)	4 A (see derating curve)
Min. load current		1 mA	
Residual voltage drop at "H"		300 mV	200 mV
Open circuit alarm with load current		< 100 µA	
Overload disconnection (~ 1.4 x continuous current)		≤ 100 ms (See the time-current characteristic curve)	
Short-circuit disconnection		< 200 µs (See the time-current characteristic curve)	
Current limitation at short circuits		Approx. 25 A	Approx. 70 A
Switching time t_{in} /t_{out}		300 µs / 700 µs	
Output protection		Red LED, damping diode	
Output circuit		3-wire, ground-referenced	
General data			
Test voltage input/output		2.5 kV AC	
Test voltage output/output		2.5 kV AC	
Rated surge voltage		Basic insulation	
Ambient temperature (operation)		0°C ... 60°C	
Standards / regulations		IEC 60664 / EN 50178 / IEC 62103	
Screw connection solid / stranded / AWG		0.2 - 4 mm² / 0.2 - 4 mm² / 24 - 12	
Dimensions	W / H / D	27 mm / 63.5 mm / 114 mm	

Ordering data

Description	Output current	Type	Order No.	Pcs. / Pkt.
Power circuit breaker solid-state relay, with signal logic				
	1 A	**ST-OV4- 24DC/ 24DC/1-PRO**	**2905572**	10
	4 A	**ST-OV4- 24DC/ 24DC/4-PRO**	**2905585**	10

Accessories

Basic terminal block, complete with end cover	**UDK-RELG 4**	**2777056**	10

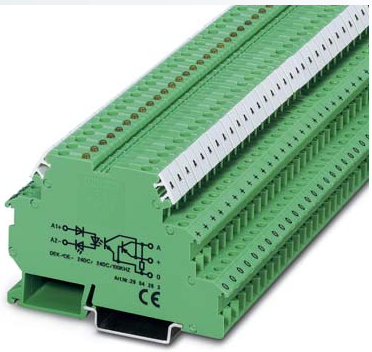
100-kHz input solid-state relay DEK-OE

A solid-state relay for the reliable detection of short pulses
- Limit frequency of up to 100 kHz
- Push-pull stage on output side
- Includes signal inputs on PLC counter boards
- Features a capacitor on the input side for interference suppression

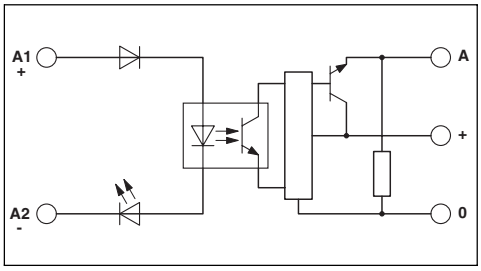
Notes:

Type of housing:
Polyamide PA non-reinforced, color: Green.

For marking systems and mounting material, see CLIPLINE catalog, part 2.



with DC voltage output
Transmission frequency 100 kHz



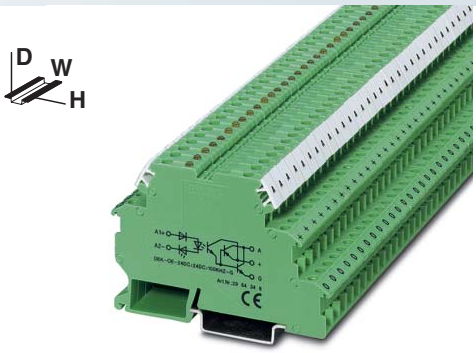
Technical data

		①	②
Input data			
Permissible range (with reference to U_N)		0.8 - 1.2	0.8 - 1.2
Switching level with reference to U_N	1 signal ("H")	≥ 0.8	≥ 0.8
	0 signal ("L")	≤ 0.4	≤ 0.4
Typ. input current at U_N	[mA]	7	6
Typ. switch-on time at U_N	[µs]	1.5	1.5
Typ. switch-off time at U_N	[µs]	2	2
Transmission frequency f_{limit}	[kHz]	100	100
Input protection:		Yellow LED, protection against polarity reversal, surge protection	
Output data			
Operating voltage range		4 V DC ... 30 V DC	
Limiting continuous current		50 mA	
Quiescent current		4.3 mA	
Residual voltage drop at "H"		≤ 0.5 V DC	
Output circuit		3-wire, ground-referenced	
Output protection		Surge protection	
General data			
Test voltage input/output		2.5 kV AC	
Ambient temperature (operation)		-20°C ... 60°C	
Standards / regulations		IEC 60664, EN 50178, IEC 62103	
Pollution degree/surge voltage category		2 / II	
Connection data solid / stranded / AWG		0.2 - 4 mm² / 0.2 - 2.5 mm² / 24 - 12	
Dimensions	W / H / D	6.2 mm / 80 mm / 56 mm	

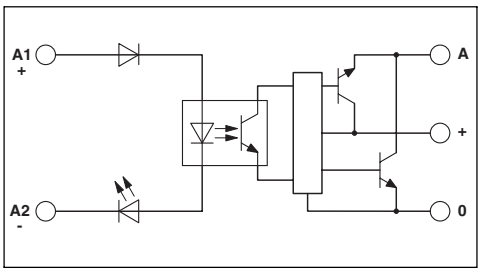
Ordering data

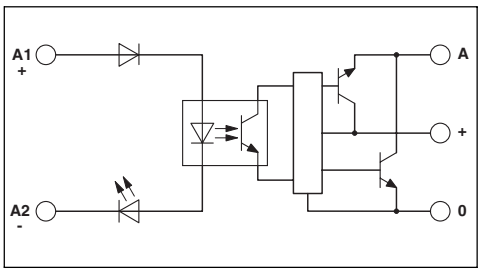
Description		Input voltage U_N	Type	Order No.	Pcs. / Pkt.
Solid-state input relays					
	①	5 V DC	**DEK-OE- 5DC/ 24DC/100KHZ**	**2964270**	10
	②	24 V DC	**DEK-OE- 24DC/ 24DC/100KHZ**	**2964283**	10

with DC voltage output push-pull
Transmission frequency 100 kHz



with DC voltage output push-pull
Transmission frequency 100 kHz





Technical data

①	②
0.5 - 1.2	0.8 - 1.2
≥ 0.5	≥ 0.8
≤ 0.3	≤ 0.4
8	8
1	1
2	2
100	100
Yellow LED, protection against polarity reversal, surge protection	
4 V DC ... 18 V DC	
50 mA	
8.5 mA	
≤ 1.2 V DC	
3-wire push-pull, ground-referenced	
Surge protection	
2.5 kV AC	
-20°C ... 60°C	
IEC 60664, EN 50178, IEC 62103	
2 / II	
0.2 - 4 mm² / 0.2 - 2.5 mm² / 24 - 12	
6.2 mm / 80 mm / 56 mm	

Ordering data

Type	Order No.	Pcs. / Pkt.
DEK-OE- 5DC/ 5DC/100KHZ-G	**2964542**	10
DEK-OE- 24DC/ 5DC/100KHZ-G	**2964364**	10

Technical data

①	②
0.5 - 1.2	0.8 - 1.2
≥ 0.5	≥ 0.8
≤ 0.3	≤ 0.4
8	8
1	1
2	2
100	100
Yellow LED, protection against polarity reversal, surge protection	
14 V DC ... 30 V DC	
50 mA	
15 mA	
≤ 2.2 V DC	
3-wire push-pull, ground-referenced	
Surge protection	
2.5 kV AC	
-20°C ... 60°C	
IEC 60664, EN 50178, IEC 62103	
2 / II	
0.2 - 4 mm² / 0.2 - 2.5 mm² / 24 - 12	
6.2 mm / 80 mm / 56 mm	

Ordering data

Type	Order No.	Pcs. / Pkt.
DEK-OE- 5DC/ 24DC/100KHZ-G	**2964555**	10
DEK-OE- 24DC/ 24DC/100KHZ-G	**2964348**	10

Electronic sensor terminal block for NAMUR proximity sensors

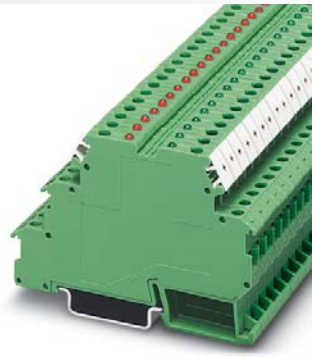
The electronic sensor terminal block EIK 1-SVN 24-P from Phoenix converts the changeable resistance of a NAMUR sensor unit into a digital signal that can be read by all PLCs.

- Monitoring of initiator side for short circuits or strand breaks
- Suitable resistance circuit to enable monitoring of mechanical switches (see application 2)
- LED error display
- Status display (high signal) via green LED,
- 24 V/50 mA digital output
- Bridging and marking with standard terminal accessories.

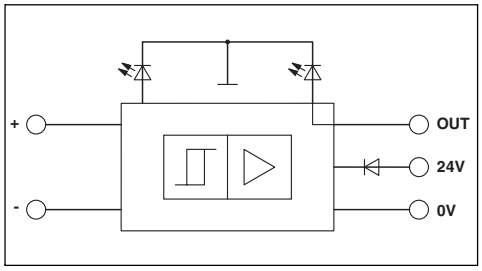
Notes:

Type of housing:
Polyamide PA non-reinforced, color: Green.

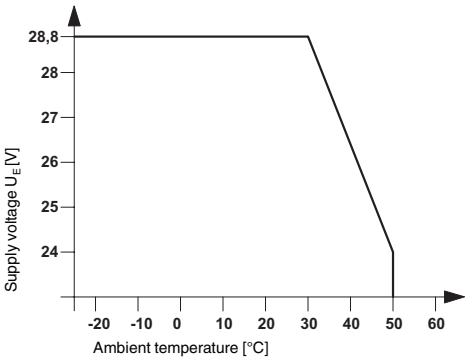
For marking systems and mounting material, see CLIPLINE catalog, part 2.



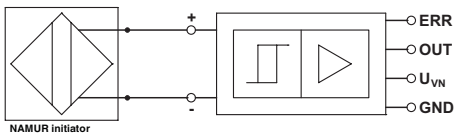
For inductive proximity sensors according to NAMUR



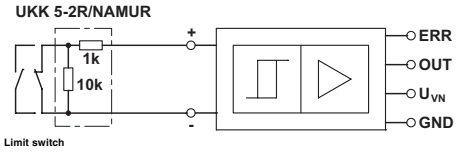
Derating curve for EIK 1-SVN 24 P



Application 1



Application 2



Technical data

Supply	
Input supply nominal voltage U_{VN}	18.5 V DC ... 28.8 V DC (U_{VN}, see derating curve)
Ripple	in acc. with DIN 19240
Current consumption I_{Imax}	70 mA (at 50 mA output current)
Input circuit	Green LED, polarity protection diode
Control circuit	
Non-load voltage	8.2 V DC ±10%
Switching points in accordance with EN 60947-5-6:	≥ 2.1 mA (In conductive state) ≤ 1.2 mA (In blocking state) 6.3 mA ... 10 mA (in the event of a short circuit) 0 mA ... 0.35 mA (In the event of a wire break)
Switching hysteresis	Approx. 0.2 mA
Internal resistance	Approx. 1 kΩ
Output protection	visual short-circuit and wire break control with LED (red), 12 V Zener diode
Signal output	
Max. output current I_{Omax}	50 mA
Residual voltage U_R with I_{Omax}	≤ 1.5 V (U_R)
Output voltage U_O	≤ 100 mV (In conductive state) U_{VN} - U_R (In blocking state)
Output protection	36 V Zener diode as free-wheeling diode
General data	
Ambient temperature (operation)	-25°C ... 50°C
Transmission frequency (INPUT/OUTPUT)	1 kHz
Input pulse length	≥ 0.5 ms
Input pause length	≥ 0.5 ms
Standards / regulations	IEC 60664, EN 61000-6-2, EN 61000-6-4
Pollution degree / surge voltage category	2 / III
Screw connection solid / stranded / AWG	0.2 - 4 mm² / 0.2 - 2.5 mm² / 24 - 12
Dimensions W / H / D	6.2 mm / 80 mm / 56 mm

Ordering data

Description	Type	Order No.	Pcs. / Pkt.
Switching amplifier electronic terminal block, for inductive proximity initiators as per NAMUR, with light indicators for sensor signal and faults	**EIK1-SVN-24P**	**2940799**	10

Accessories

Terminal block, with three through contacts, for mounting on NS 35...	**DIKD 1,5**	**2715979**	50
Double-level terminal block, with pre-assembled resistors	**UKK 5-2R/NAMUR**	**2941662**	50
Insertion bridge	**EB...-DIK...** **Ordering data at DEK-REL...**		

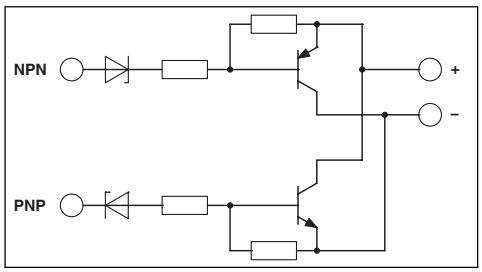
Inverter module DEK-TR/INV

The Phoenix inverter module, DEK-TR/INV, inverts the signals of ground switching NPN transistor outputs into positive switching PNP outputs, and vice versa (see application example).

Notes:

Type of housing:
Polyamide PA non-reinforced, color: Green.

For marking systems and mounting material, see CLIPLINE catalog, part 2.



Technical data

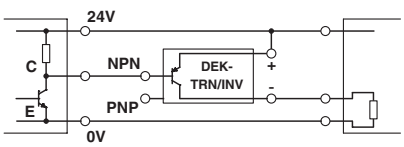
Supply voltage		20 V DC ... 30 V DC (U_V)
Continuous current		200 mA
Residual voltage drop		< 1 V
Leakage current		< 1 mA
Max. transmission frequency		15 kHz
NPN input/PNP output		
Switch-on threshold		< 5 V (at U_V = 24 V; < (U_V - 19 V))
Switch-off threshold		> 15 V (at U_V = 24 V; > (U_V - 9 V))
Min. limit values		-2 V
Max. limit values		26 V (at U_V = 24 V; U_V + 2 V)
Control circuit		
Switch-on threshold		> 19 V
Switch-off threshold		< 9 V
Min. limit values		-2 V
Max. limit values		26 V (at U_V = 24 V; U_V + 2 V)
General data		
Ambient temperature (operation)		-20°C ... 50°C
Standards / regulations		IEC 60664 Basic insulation
Pollution degree / surge voltage category		2 / II
Screw connection solid / stranded / AWG		0.2 - 4 mm² / 0.2 - 2.5 mm² / 24 - 12
Dimensions	W / H / D	6.2 mm / 80 mm / 56 mm

Ordering data

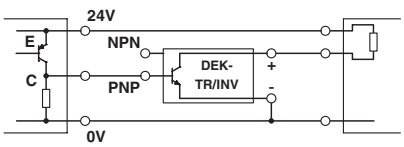
Description	Type	Order No.	Pcs. / Pkt.
Inverter module	**DEK-TR/INV**	**2964319**	10

Connection examples:

NPN output **Load**



PNP output **Load**



Logic pulse expansion module UEGM-OE/AV

Detection of pulses with a duration > 0.1 ms

Additional features:

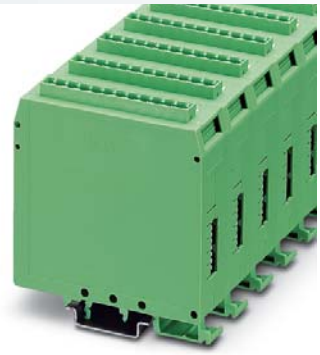
– Electrical isolation of signals using solid-state relays,
– Expansion times from 10 ms to 1500 ms;

If input signals are present longer than the set output pulse time, the output pulse is automatically extended to the duration of the input pulse.

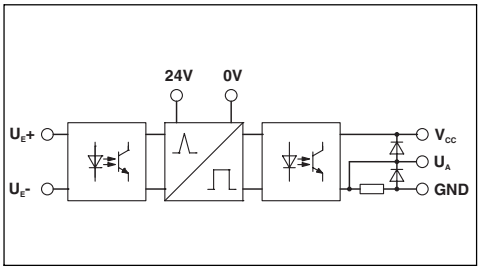
Attention:

COMBICON connection plugs can be ordered separately.

Notes:
Type of housing: Polyamide PA non-reinforced, color: Green.
For marking systems and mounting material, see CLIPLINE catalog, part 2.
Time diagrams and output pulse lengths, see page 107



with DC voltage output max. = 100 mA



Technical data

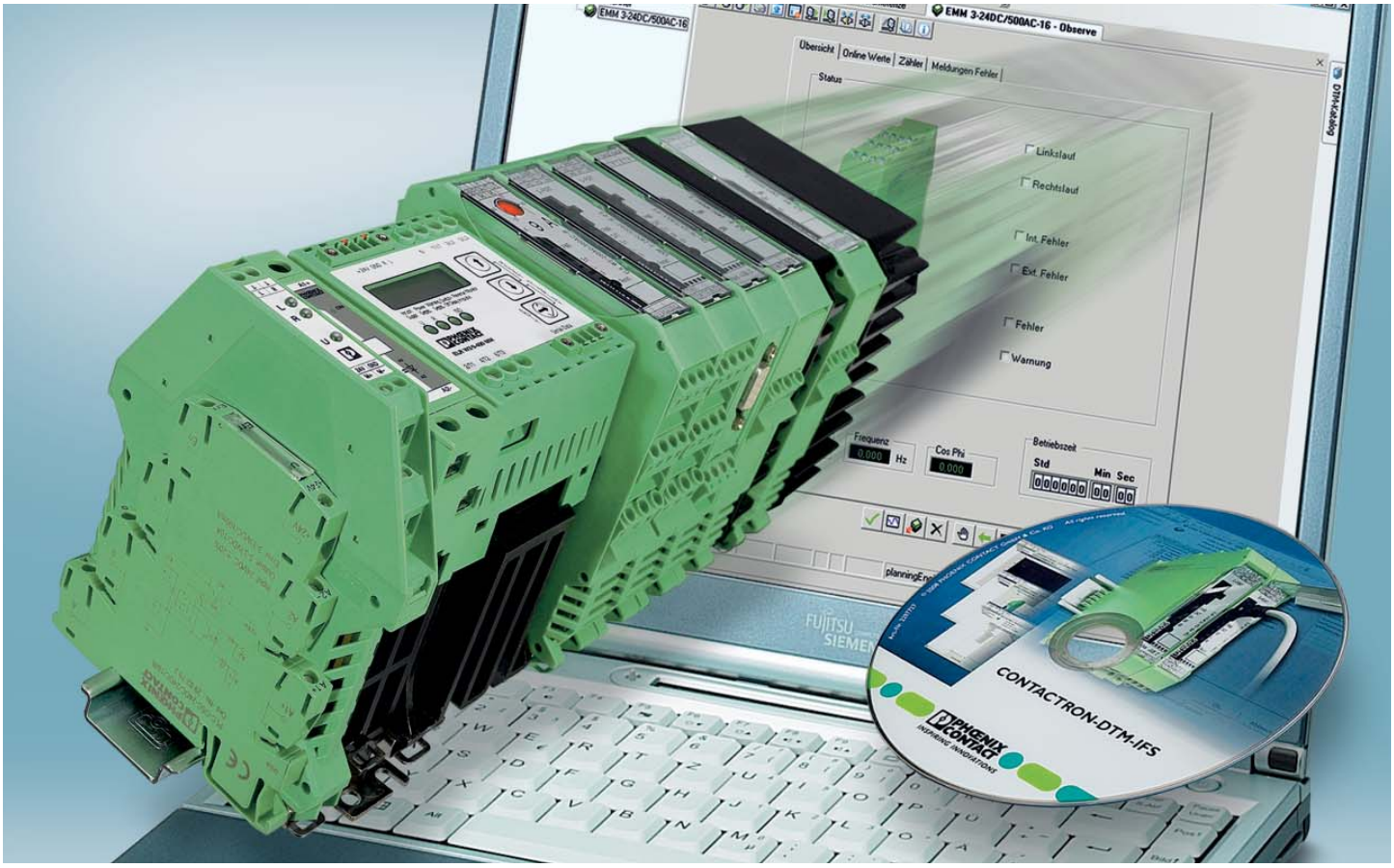
Input		
Supply voltage		20 V DC ... 30 V DC (24 V, 0 V)
Current consumption		Approx. 16 mA
Input circuit		Polarity protection diode, surge protection
Input pulse through optocoupler (U_I)		24 V DC (±20%)
Current consumption		6 mA
Input circuit		RC element
Minimum pulse length		0.1 ms
Output		
Supply voltage		3 V DC ... 48 V DC (V_{CC}, GND)
Output current		100 mA
Output protection		Polarity protection diode, damping diode
Output pulse via optocoupler		3-wire, ground-referenced
Residual voltage drop at "H"		1.4 V
General data		
Test voltage input/output		1 kV
Accuracy		Set time t ±10%
Ambient temperature (operation)		0°C ... 55°C
Standards / regulations		IEC 60664 Basic insulation
Pollution degree / surge voltage category		2 / III
Screw connection solid / stranded / AWG		0.2 - 4 mm² / 0.2 - 2.5 mm² / 24 - 12
Dimensions	W / H / D	25 mm / 79 mm / 85 mm

Ordering data

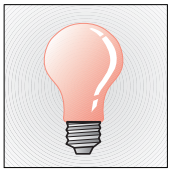
Description	Type	Order No.	Pcs. / Pkt.
Pulse expansion module, without COMBICON connector	**UEGM-OE/AV-24DC/24DC/100**	**2766850**	1

Accessories

COMBICON connector	**MSTBT 2,5/12-ST-5,08**	**1781085**	50

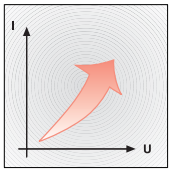


Indicators



Depending on the device type, operating voltage, switching state, and confirmations are indicated by the integrated LEDs. Certain modules from the device range featuring motor management also show all relevant electrical data, errors, and messages on an LC display.

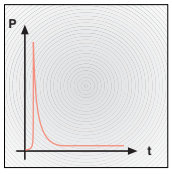
High switching power



The following modules are available:

- Single-channel: 660 V AC up to 50 A
- Three-channel: 575 V AC up to 37 A
- Three-channel reversing circuit: 575 V AC up to 37 A
- Single-channel reversing load relays for 24 V DC 2/6 A DC motors.

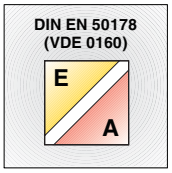
Motor management



These devices – which combine wear-free semiconductor switches with integrated measuring technology – are designed to switch and protect motors and the entire system alike; with special modules even in Ex areas!

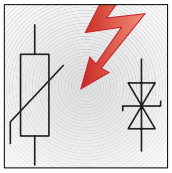
Devices with "only measurement/ monitoring technology" (for all performance classes), software, and bus gateways complete the range.

Approvals



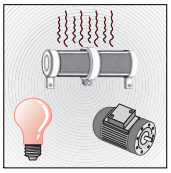
Depending on the device type, important approvals, e.g., for safe isolation in accordance with DIN EN 50178 (VDE 0160) or the ATEX approval "PTB 03 ATEX 3114", are available as standard.

Protective circuits



All devices contain the necessary protective circuits such as polarity protection diodes, RCV circuits, internal locking of the inputs, and surge protection. Even heatsinks (when necessary) are included as part of the "complete device".

For all loads and motors



Power electronics are used where switching occurs frequently or where particularly safe and precise switching is required, e.g., in the case of control valves, production machines, heaters, conveyor systems, lighting units, etc.

Electronic motor management EMM

The electronic motor management modules offer all the advantages of modern effective power monitoring.

ELR-MM modules combine fast, wear-free electronic reversing load relays with modern measurement and evaluation electronics. EMM offers the same functionality for all performance classes, only without a power section.

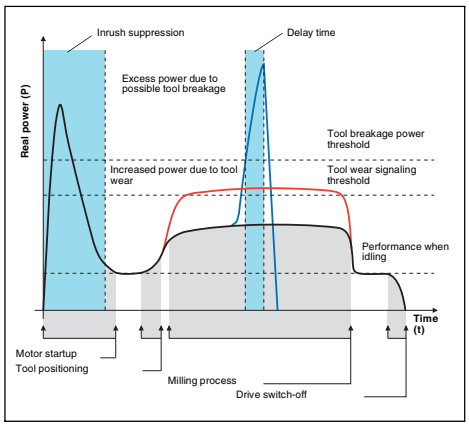
Power within limits

Monitoring is based on freely parameterizable switching and signaling thresholds for overload and underload detection. Identical or separate settings can be made for the thresholds relating to the two directions of rotation.
Parameterization relies on the real power consumed (calculated from three currents, voltages, and the phase angle), therefore offering a much more precise basis than if only the current is taken into consideration, as it is independent of voltage fluctuations and drive load. If a switching threshold is overshot or undershot, the ELR-MM or EMM initiates an emergency shutdown of the motor immediately (or after an adjustable "delay time"). In addition, a message can be provided via an output.

This state can only be deactivated by means of a defined reset. If the effective power consumed is found to be above or below the signaling thresholds, only one feedback message is transmitted throughout the time that the module is being actively controlled.

In addition, the module generates signals to detect the direction of rotation. Asymmetry and phase failures are detected and signaled.

Milling, drilling, grinding

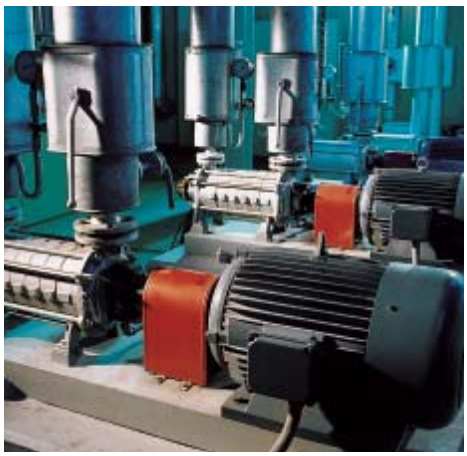


Permanent state monitoring with high scanning rates and the fast semiconductor switch allow protection of the entire system, including motor protection.

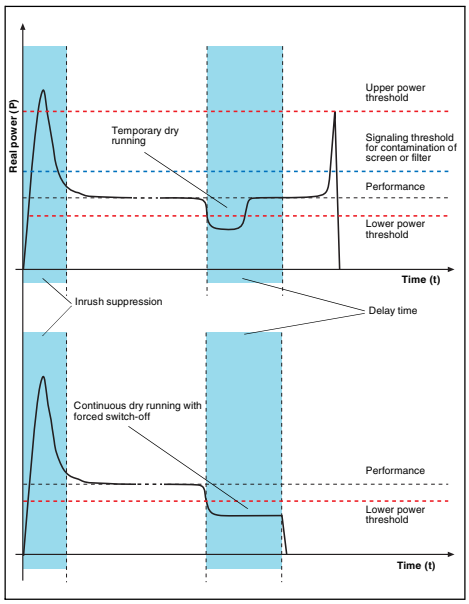
Without any extra wiring – and with just a single device – pumps, actuating drives, fans, and tools are monitored for proper functioning, contamination (filter or similar), and wear. The adjustable "inrush suppression" time can be used to exclude the making operation from the monitoring process.

Machine tools are monitored and protected in a similar way when drilling, milling or grinding. If the feed value on a milling machine is set too high, a tool may break in the "worst-case" scenario. The power threshold – parameterized accordingly – can be used to resolve this issue.

A signaling threshold is also used to signal tool wear in advance.



Pumps



In the case of motor-driven pumps, the lower performance threshold provides reliable protection against hazardous dry running. Forced drive switch-off can be delayed by the "delay time", therefore preventing a reaction to any air bubbles that might be present in the system.

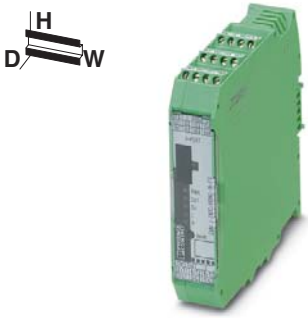
Fans are monitored for V-belt breakage in the same way.

Here, the upper power threshold reacts quickly and reliably to blockages by foreign objects. An additional signaling threshold enables, e.g., the monitoring of contaminated filters or imminent damage to the bearings.

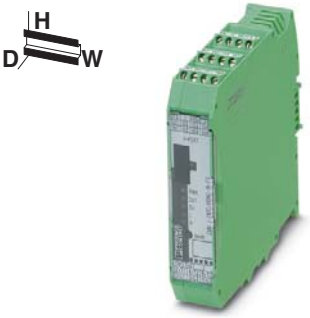
Electronic motor management

The EMM motor management module (with/without current transformer) for all performance classes monitors and protects 3-phase loads, such as electrical drives.

- Freely parameterizable signaling or switching thresholds
- Digital outputs control external switching elements
- Optional connection to INTERFACE system and PROFIBUS-GATEWAY-IFS via TBUS

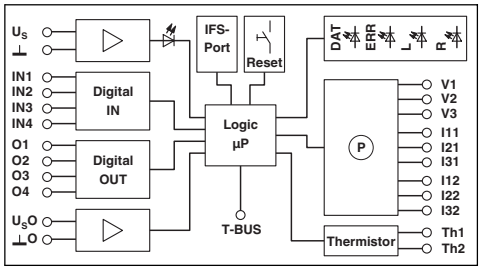


Allows the use of external current transformers

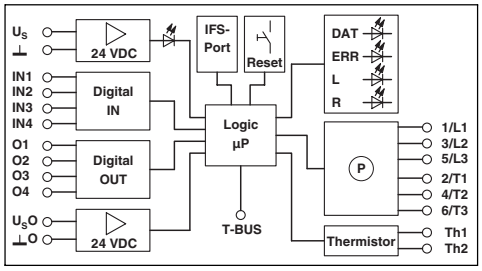


With integrated current transformers

Applied for:
UL listed / CUL listed



Applied for:
UL listed / CUL listed



Technical data

Input data	EMM 3- 24DC/500AC-IFS	EMM 3-230AC/500AC-IFS
Rated control supply voltage U_S	24 V DC	230 V AC
Rated control supply voltage range with reference to U_S	0.8 ... 1.25	0.4 ... 1.1
Rated control supply current I_S at U_S	25 mA	10 mA
Input data of digital inputs	EMM 3- 24DC/500AC-IFS	EMM 3-230AC/500AC-IFS
Number of inputs	4 (IN1 - IN4)	4 (IN1 - IN4)
Rated actuating voltage U_C	24 V DC	230 V AC
Rated actuating current I_C	3.3 mA	3.5 mA
Power measurement		
Voltage measuring input	42 V AC ... 575 V AC	42 V AC ... 575 V AC
Nominal current, voltage measuring input	< 0.5 mA	< 0.5 mA
Current measuring input	5 A secondary external converter	5 A secondary external converter
Output power of the converter	> 1.25 VA	> 1.25 VA
Internal resistance EMM	0.02 Ω	0.02 Ω
Output data for confirmation contacts		
O1 - O4 in the case of 1 signal	24 V DC (semiconductor output) / 500 mA	230 V AC (relay output/500 mA) / 500 mA
General data		
Rated insulation voltage	500 V	
Rated surge voltage	6 kV/safe isolation	6 kV/safe isolation
Ambient temperature (operation)	-25°C ... 70°C	
Standards / regulations	EN 60947 / EN 60947-4-2	
EMC regulations	EN 61000-6-2 / EN 61000-6-3 / EN 61000-6-4	
Degree of protection according to IEC 60529/EN 60529	IP20	
Mounting position	Vertical (horizontal DIN rail)	
Screw connection solid / stranded / AWG	0.14 - 2.5 mm² / 0.14 - 2.5 mm² / 26 - 12	
Dimensions W / H / D	22.5 mm / 99 mm / 114.5 mm	

Technical data

Input data	EMM 3- 24DC/500AC-16-IFS	EMM 3-230AC/500AC-16-IFS
Rated control supply voltage U_S	24 V DC	230 V AC
Rated control supply voltage range with reference to U_S	0.8 ... 1.25	0.4 ... 1.1
Rated control supply current I_S at U_S	25 mA	10 mA
Input data of digital inputs	EMM 3- 24DC/500AC-16-IFS	EMM 3-230AC/500AC-16-IFS
Number of inputs	4 (IN1 - IN4)	4 (IN1 - IN4)
Rated actuating voltage U_C	24 V DC	230 V AC
Rated actuating current I_C	3.3 mA	3.5 mA
Power measurement		
Voltage measuring input	42 V AC ... 575 V AC	42 V AC ... 575 V AC
Nominal current, voltage measuring input	-	-
Current measuring input	Max. 16 A	Max. 16 A
Output power of the converter	-	-
Internal resistance EMM	-	-
Output data for confirmation contacts		
O1 - O4 in the case of 1 signal	24 V DC (semiconductor output) / 500 mA	230 V AC (relay output/500 mA) / 500 mA
General data		
Rated insulation voltage	500 V	
Rated surge voltage	6 kV/safe isolation	6 kV/safe isolation
Ambient temperature (operation)	-25°C ... 70°C	
Standards / regulations	EN 60947 / EN 60947-4-2	
EMC regulations	EN 61000-6-2 / EN 61000-6-3 / EN 61000-6-4	
Degree of protection according to IEC 60529/EN 60529	IP20	
Mounting position	Vertical (horizontal DIN rail)	
Screw connection solid / stranded / AWG	0.14 - 2.5 mm² / 0.14 - 2.5 mm² / 26 - 12	
Dimensions W / H / D	22.5 mm / 99 mm / 114.5 mm	

Ordering data

Description	Type	Order No.	Pcs. / Pkt.
Electronic motor management			
	EMM 3- 24DC/500AC-IFS	**2297497**	1
	EMM 3-230AC/500AC-IFS	**2297507**	1

Ordering data

Type	Order No.	Pcs. / Pkt.
EMM 3- 24DC/500AC-16-IFS	**2297523**	1
EMM 3-230AC/500AC-16-IFS	**2297536**	1

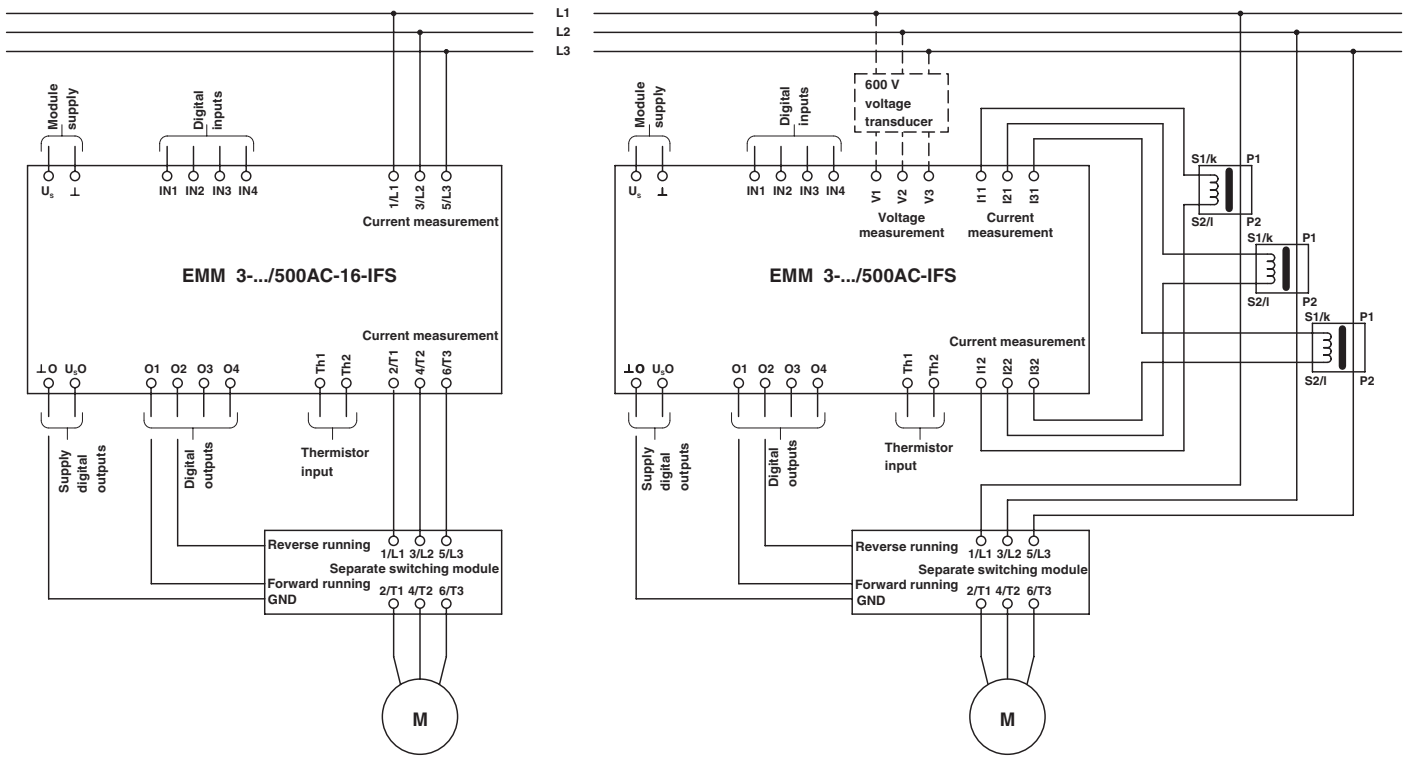
Accessories

Programming adapter with USB interface, for programming with the IFS-CONF software	**IFS-USB-PROG-ADAPTER**	**2811271**	1
TBUS DIN rail connector	**ME 22,5 TBUS 1,5/ 5-ST-3,81 GN**	**2707437**	50
Voltage transducer for 690 V, for EMM 3-.../500AC-IFS, comprising 3 modular terminal blocks and cover	**UT 4-MTD-R/CVC 690/SET**	**2901667**	1
Multifunctional memory block for the INTERFACE system			
- Flat design	**IFS-CONFSTICK**	**2986122**	1
- Tall design	**IFS-CONFSTICK-L**	**2901103**	1
Mini COMBICON connectors			
- Female contact	**MC 1,5/ 5-ST-3,81**	**1803604**	50
- Male contact	**IMC 1,5/ 5-ST-3,81**	**1857919**	50

Accessories

IFS-USB-PROG-ADAPTER	**2811271**	1
ME 22,5 TBUS 1,5/ 5-ST-3,81 GN	**2707437**	50
IFS-CONFSTICK	**2986122**	1
IFS-CONFSTICK-L	**2901103**	1
MC 1,5/ 5-ST-3,81	**1803604**	50
IMC 1,5/ 5-ST-3,81	**1857919**	50

Electronic motor management



The electronic motor management modules offer all the advantages of modern effective power monitoring. Every 6.6 ms, the effective power of a drive system or of any other 3-phase consumer is calculated from three currents, voltages, and the phase angle. Currents of up to 16 A can be directly acquired and currents >16 A are supplied via external converters. Digital outputs can be used to control separate mechanical or electronic switching elements that adopt the actual switching of the load. In this configuration, the EMM reliably protects connected loads – irrespective of their power consumption – against overload and underload, and provides permanent status monitoring.

Up to 8 freely parameterizable switching, message thresholds and up to four freely configurable inputs and outputs enable the protection of electrical drives and the system.

The EMM modules can record the following data:
– Apparent, effective, and reactive power,
– Currents and voltages,
– Phase angle,
– Operating cycles and operating hours,
– Power meter.

Additional Functions:
– Adjustable bimetal function class 5-30
– Thermistor monitor
– Recording measured values
– PROFIBUS connection via TBUS
– Pre-configured motor outputs such as reversing starters, star delta starters, etc.

The EMM modules can be used to record complete "curves" that can be used for system documentation.

The operating modes forward and reverse running, reverse, and limit switch operation (with integrated restart inhibit) switch actuating and regulating drives, pumps etc. and also check for wear.

Current transformer

The external converters should be selected with a secondary nominal current of 5 A. The primary current is determined by the current consumption of the consumer (refer to connection diagram). For suitable current transformers, see catalog INTERFACE.

TBUS DIN rail connector

The **TBUS** (Order No. 2707437) can be used to supply several EMMs with 24 V DC or to couple up to 31 EMMs (for example) to the PROFIBUS-GATEWAY-IFS.

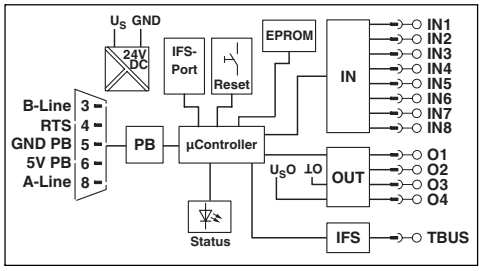
Switching element

Depending on the particular requirement of the application, either an electromechanical contactor or reversing contactor combination, or a semiconductor contactor or a solid-state reversing contactor is to be used for the actual task of switching the load. These switching elements are controlled via the digital outputs of the EMM modules.

PROFIBUS gateway for the electronic motor management modules

The EM-PB-GATEWAY-IFS is used to connect the EMM...IFS modules to PROFIBUS DP.

- Certified according to DPV1 specification (EN 50170)
- Communication via TBUS with up to 31 EMM...IFS modules
- 8 digital inputs and 4 outputs can be freely parameterized.
- Failsafe mode supported
- Digital switching outputs for direct control of the EMM...IFS (forward/reverse running)
- The GSD file (containing the communication characteristics of a PROFIBUS DP device) can be found on the Internet at www.phoenixcontact.com/download.



Technical data

Input data	
Operating voltage U_B	24 V DC -20% ... +25%
Nominal input current at U_{IN}	85 mA
Input circuit	Polarity protection, surge protection
Digital inputs	
Input voltage	24 V DC ±20%
Nominal input current at U_{IN}	3 mA
Input circuit	Polarity protection, surge protection
Digital outputs	
Maximum switching voltage	23 V DC (U_B - $U_{resid.}$ of the output)
Max. switching current	500 mA
Residual voltage	1 V
Output protection	Parallel protection against polarity reversal, pay attention to the fuse
IFS interface	
Connection method	TBUS
PROFIBUS interface	
Data rate	12 Mbps
Connection method	D-SUB-9
General data	
Test voltage data interface/power supply	1.5 kV
Ambient temperature (operation)	-35°C ... 50°C
Nominal operating mode	100% operating factor
Standards / regulations	EN 50178
Degree of protection	IP20
Mounting position / mounting	Any / -
Connection data solid / stranded / AWG	0.2 ... 2.5 mm² / 0.2 ... 2.5 mm² / 24 - 12
Dimensions W / H / D	22.5 mm / 99 mm / 114.5 mm

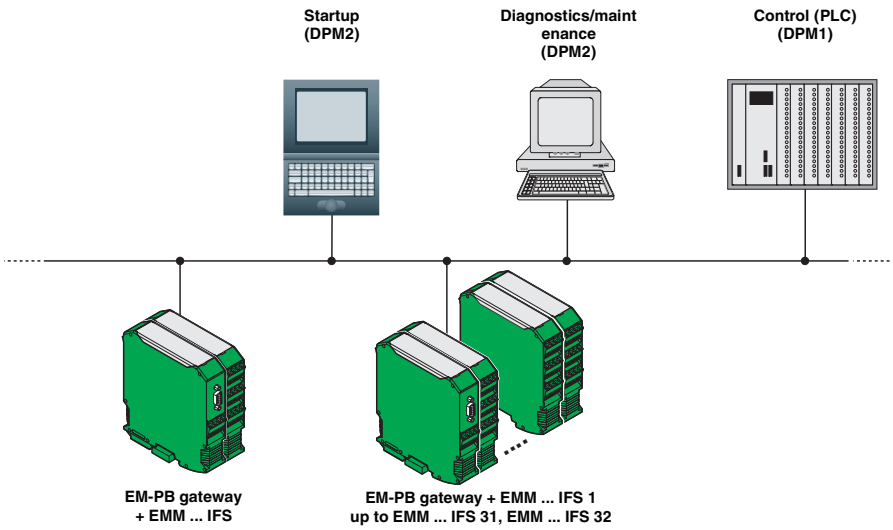
Ordering data

Description	Type	Order No.	Pcs. / Pkt.
PROFIBUS Master gateway for the INTERFACE system			
With screw connection	**EM-PB-GATEWAY-IFS**	**2297620**	1

Accessories

Programming adapter with USB interface, for programming with the IFS-CONF software	**IFS-USB-PROG-ADAPTER**	**2811271**	1
TBUS DIN rail connector	**ME 22,5 TBUS 1,5/ 5-ST-3,81 GN**	**2707437**	50
Mini COMBICON connectors			
- Female contact	**MC 1,5/ 5-ST-3,81**	**1803604**	50
- Male contact	**IMC 1,5/ 5-ST-3,81**	**1857919**	50

PROFIBUS gateway for the electronic motor management modules



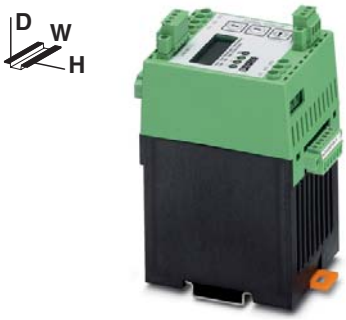
Device Type Manager (DTM) for motor management modules EMM...IFS

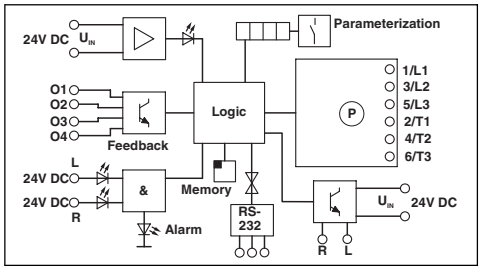
- CONTACTRON-DTM-IFS, programming adapter, and user manual on CD available as configuration package
- USB programming adapter is also available separately as an option
- CONTACTRON-DTM-IFS also available free of charge as a separate download from www.phoenixcontact.com

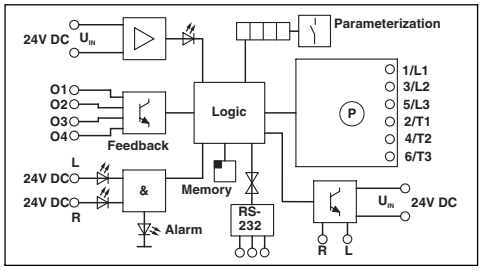
	Ordering data		
Description	Type	Order No.	Pcs. / Pkt.
Configuration package for the EMM...IFS, comprising CONTACTRON-DTM-IFS, USB programming adapter, and user manual on CD	MM-CONF-SET	2297992	1
	Accessories		
Programming adapter with USB interface, for programming with the IFS-CONF software	IFS-USB-PROG-ADAPTER	2811271	1

Electronic motor management

Notes:
Type of housing: Polycarbonate PC, color: Green.
For marking systems and mounting material, see CLIPLINE catalog, part 2.





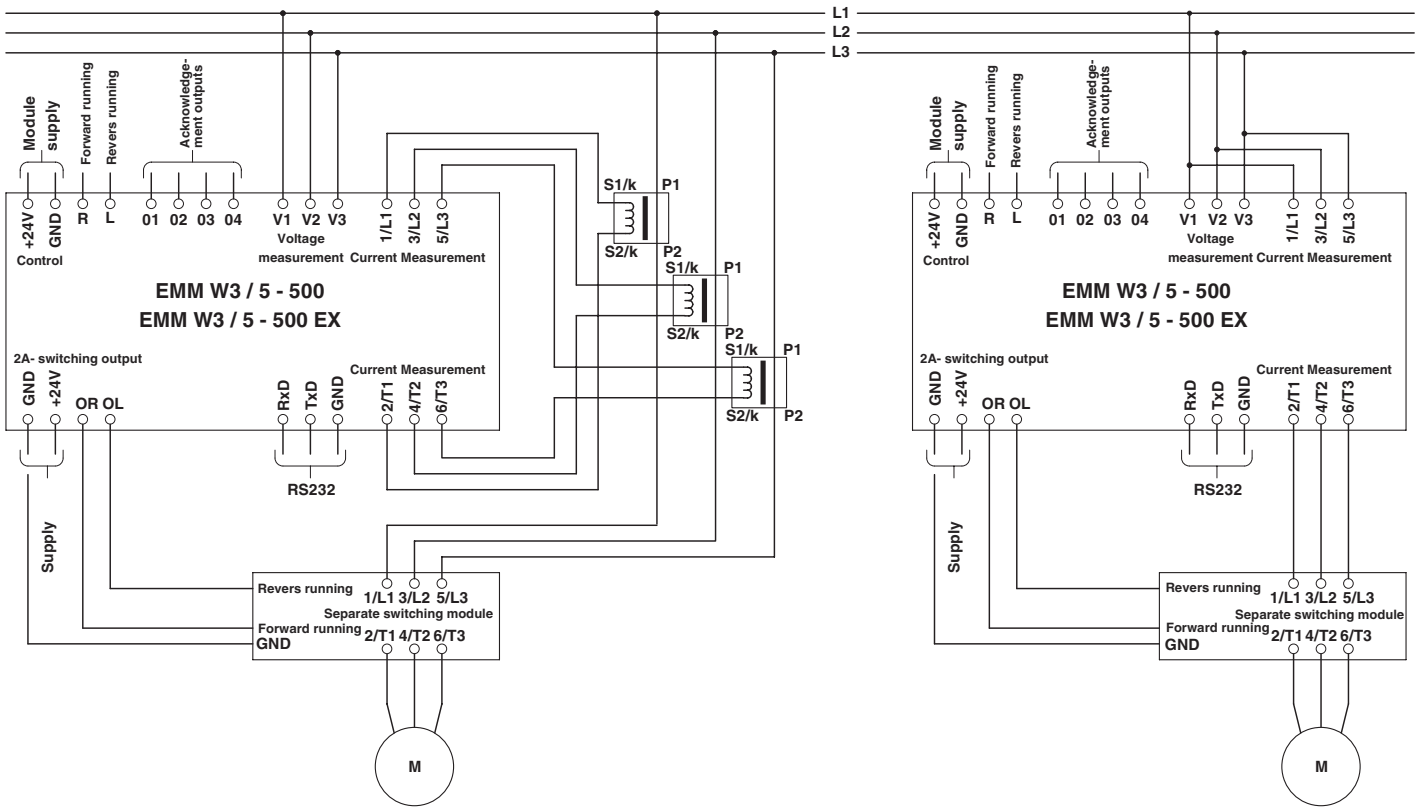


Ex:

	Technical data	Technical data
Input data		
Supply nominal voltage U_{VN}	24 V DC	24 V DC
Supply voltage range with reference to U_{VN}	0.8 ... 1.2	0.8 ... 1.2
Quiescent current	80 mA	80 mA
Control voltage U_{ST} right/left	24 V DC	24 V DC
Control voltage range in reference to U_{ST}	0.8 ... 1.2	0.8 ... 1.2
Typ. input current at U_N	7 mA	0.8 ... 1.2
Input circuit	Protection against polarity reversal, surge protection	Protection against polarity reversal, surge protection
Operating voltage / status / error indicator	Green LED / Yellow LED / Red LED	Green LED / Yellow LED / Red LED
Power measurement		
Voltage measuring input	110 V AC ... 550 V AC (conductor voltage)	110 V AC ... 550 V AC (conductor voltage)
Nominal current, voltage measuring input	6 mA (at 550 V AC, per line)	6 mA (at 550 V AC, per line)
Input circuit	Surge protection, RC element	Surge protection, RC element
Current measuring input	Max. 5 A	Max. 5 A
Max. conductor length between converter and EMM	5 m (for 2.5 mm²) 3 m (for 1.5 mm²)	5 m (for 2.5 mm²) 3 m (for 1.5 mm²)
Output data for confirmation contacts		
O1 - O4 in the case of 1 signal	(U_{VN} - 1 V) / 50 mA	(U_{VN} - 1 V) / 50 mA
Output data load side		
Switching output OL, OR with 1 signal	24 V DC / 2 A	24 V DC / 2 A
Output protection	Protection against polarity reversal, surge protection, Short-circuit and overload proof	Protection against polarity reversal, surge protection, Short-circuit and overload proof
General data		
Test voltage input/output	2.5 kV	2.5 kV
Ambient temperature (operation)	-20°C ... 60°C	-20°C ... 60°C
Standards / regulations	DIN EN 50178 / safe isolation	DIN EN 50178 / safe isolation
Power station requirements	DWR 1300 / ZXX01/DD/7080.8d	DWR 1300 / ZXX01/DD/7080.8d
EMC regulations	EN 61000-6-2 / EN 61000-6-4	EN 61000-6-2 / EN 61000-6-4
Degree of protection according to IEC 60529/EN 60529	IP20	IP20
Mounting position	Vertical (horizontal DIN rail)	Vertical (horizontal DIN rail)
Mounting	Can be aligned with > 20 mm spacing	Can be aligned with > 20 mm spacing
Screw connection solid / stranded / AWG	0.2 - 6 mm² / 0.2 - 4 mm² / 24 - 10	0.2 - 6 mm² / 0.2 - 4 mm² / 24 - 10
Dimensions W / H / D	62 mm / 107 mm / 120 mm	62 mm / 107 mm / 120 mm
Safety data		
EC-type examination certificate according to ATEX		II (2) GD PTB 03 ATEX 3114
Requirement class in acc. with DIN V 19251	-	AK4
Category in acc. with EN 954-1	-	3

Description	Ordering data Type	Order No.	Pcs. / Pkt.	Ordering data Type	Order No.	Pcs. / Pkt.
Electronic motor management						
	EMM W3/ 5-500	**2963556**	1	**EMM W3/ 5-500 EX**	**2963682**	1

Electronic motor management



The EMMs offer all the advantages of modern effective power monitoring. Every 6.6 ms, the effective power of a drive system or of any other 3-phase consumer is calculated from three currents, voltages and the phase angle.

Currents greater than 5 A are fed into the module via converters. The actual switching of the load is carried out by a separate switching element. In this configuration, the EMM reliably protects connected loads – irrespective of their power consumption – against overload and underload, and provides permanent status monitoring.

Switching thresholds, message thresholds, and four configurable acknowledgement outputs enable the motor and system to be protected.

– Apparent, effective, and reactive power,
– Currents and voltages,
– Phase angle,
– Operating cycles and operating hours,
– Power meter.

The integrated memory allows complete "curves" to be recorded, which can then be used for system documentation, for example.

The operating modes right and left rotation, reverse and limit switch operation (with integrated restart inhibit) switch actuating and regulating drives, pumps etc. and also check for function, contamination or wear.

The EMM EX device is particularly suitable for use in the chemicals and petrochemicals industry. A corresponding Ex type-examination certificate has been issued.

Current transformer

For currents greater than 5 A, separate current transducers are to be used. Transducers with a secondary nominal current of 5 A should be chosen. The primary nominal current is determined by the current consumption of the consumer (refer to connection version).

Switching element

Depending on the particular requirement of the application, either an electromechanical contactor or reversing contactor combination, or an electronic load relay or reversing load relay is to be used for the actual task of switching the load. For the control of these switching elements, the EMM supplies two switching outputs with
24 V DC / 2 A.

PROFIBUS gateway for the electronic motor management modules

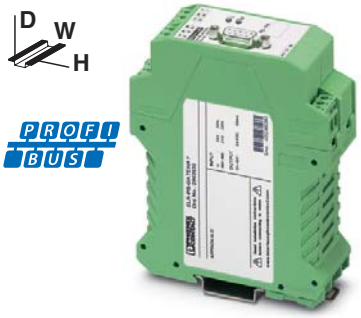
The ELR-PB-GATEWAY is used to connect the E(LR)MM modules to PROFIBUS DP.

- Certified according to DPV1 specification (EN 50170)
- A serial V.24 (RS-232) interface for communication with an E(LR)MM
- 6 digital inputs can be freely parameterized
- Failsafe mode supported
- 2 digital switching outputs for direct control of E(LR)MM (forward/reverse running)
- The GSD file (containing the communication characteristics of a PROFIBUS DP device) can be found on the Internet at www.phoenixcontact.com.

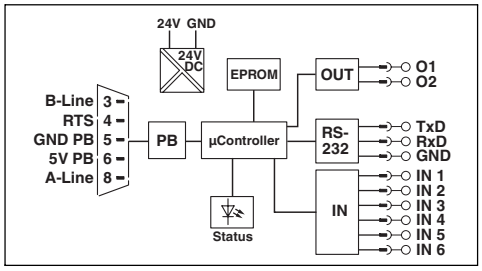
Notes:

Type of housing:
Polycarbonate PC, color: Green.

For marking systems and mounting material, see CLIPLINE catalog, part 2.



Applied for:
UL / CUL



Technical data

Input data	
Operating voltage U_B	24 V DC ±20%
Nominal input current at U_{IN}	Typ. 50 mA (plus load current of an output)
Input circuit	Polarity protection, surge protection
Digital inputs	
Input voltage	24 V DC ±20%
Nominal input current at U_{IN}	7 mA
Input circuit	Polarity protection, surge protection
Digital outputs	
Maximum switching voltage	23.5 V DC ±20% (U_B - $U_{Resid.}$ of output)
Max. switching current	50 mA
Residual voltage	< 0.5 V DC (U_{Rest} at I_N)
Output protection	Polarity protection, surge protection
V.24 (RS-232) interface	
Data rate	20 kbps
Connection method	COMBICON
PROFIBUS interface	
Data rate	12 Mbps
Connection method	D-SUB-9
General data	
Test voltage data interface/power supply	500 V AC
Ambient temperature (operation)	-20°C ... 60°C
Nominal operating mode	100% operating factor
Standards / regulations	EN 61000-4-2 EN 61000-4-3 EN 61000-4-4 EN 50178 EN 61000-4-5 EN 61000-4-6
Degree of protection	IP20
Mounting position / mounting	Any/can be aligned without spacing
Connection data solid / stranded / AWG	0.2 ... 2.5 mm^2 / 0.2 ... 2.5 mm^2 / 24 - 14
Dimensions W / H / D	35 mm / 99 mm / 114.5 mm

Ordering data

Description	Type	Order No.	Pcs. / Pkt.
PROFIBUS interface implementer, for ELR-MM and EMM	**ELR-PB-GATEWAY**	**2963530**	1

Accessories

Connecting cable	**ELR-PB-RS232**	**2963572**	1

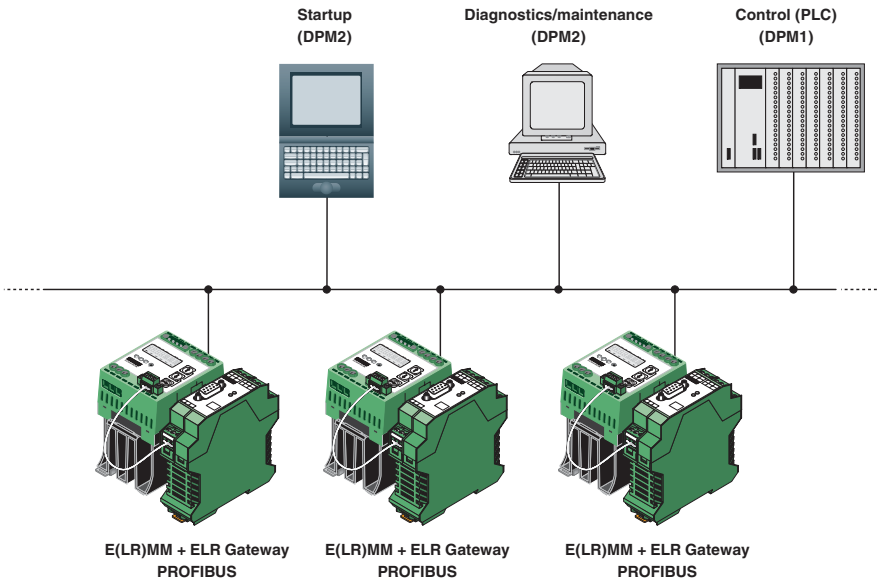
Table 1: Address setting

Switch 1	Start configuration
Switch 1 off	Module inputs configured as normal digital inputs
Switch 1 on	Each function is assigned to one input (see table 2)
Switches 2 - 8 Switch 2 Switch 8	Setting the device address Most significant bit (MSB) Least significant bit (LSB)
Default	126

Table 2:

Input	Function
1	Local/Remote switchover
2	Reverse (button)
3	Stop (button)
4	Forward (button)
5	Limit switch reverse "High active"
6	Limit switch forward "High active"

PROFIBUS gateway for the electronic motor management modules



ELR and EMM control, serial (t < 200 ms)

ELR and EMM control, serial and parallel (t < 200 ms)

PROFIBUS configuration

The illustration shows the typical configuration of a PROFIBUS system. The PLC as a class 1 master (DPM1) administers the bus and is responsible for the cyclical process data traffic. The class 2 masters (DPM2) are used for diagnostics, maintenance, and startup. They can be connected at any point of the PROFIBUS.

Setting the PROFIBUS address

The address of the PROFIBUS device is set via an 8-pos. DIP switch in the housing. The housing must be opened to set the address.

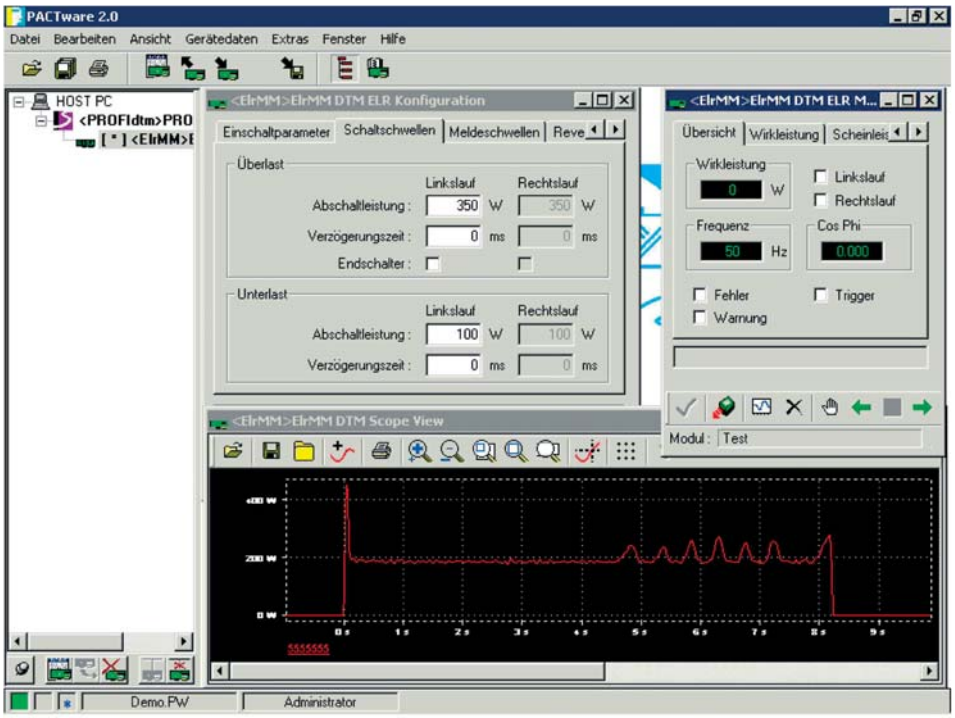
Device Type Manager (DTM) for motor management modules ELR-MM and EMM

The DTM is the configuration and management tool for the ELR and EMM motor management family of products in PROFIBUS environments.

The ELR-DTM is a plug-in for field device tools (FDT) such as PACTware. Uniform and consistent integration of field devices in engineering tools and control systems is therefore possible.

- Description of cyclical data and device parameters,
- Device-specific configuration, parameterization, and diagnostics by means of software components (DTM)
- Standardized interface to engineering tools,
- Free choice of devices,
- "Plug and Play" becomes reality,
- Full device function support,
- Consistent engineering data.

Description	Ordering data		
	Type	Order No.	Pcs. / Pkt.
Device type manager, for motor management modules, version 1.0	ELR-DTM	2963679	1

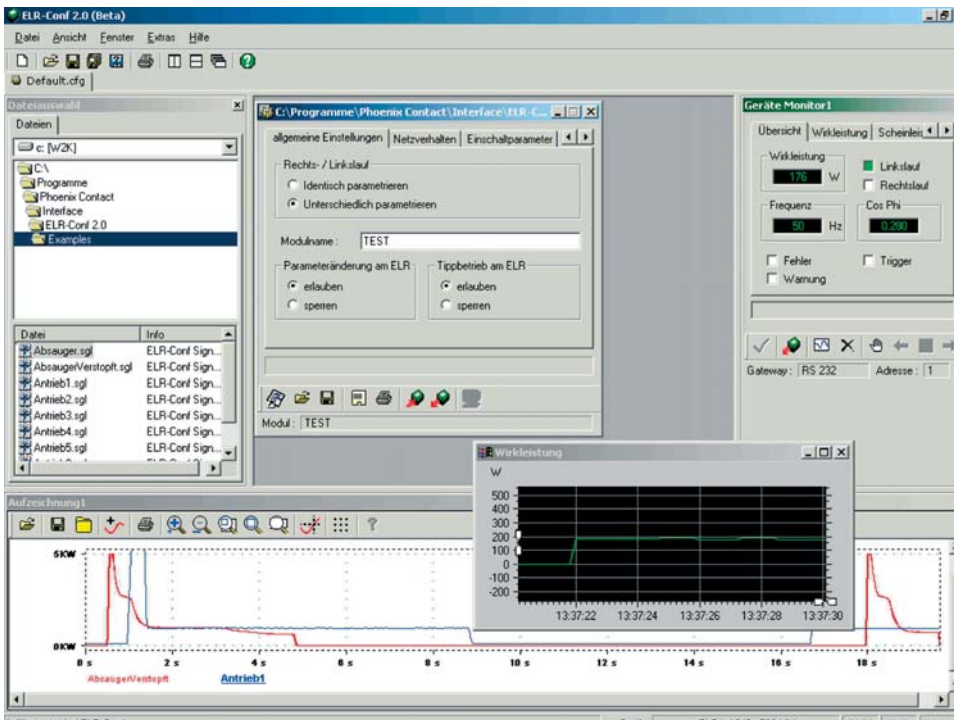


Configuration, monitoring, visualization

Configuration software ELR-CONF-WIN-2.0

The ELR-CONF-WIN 2.0 software is used for "parameterizing" and "visualizing" the electronic motor management modules.
– Graphical parameterization
– Display and recording of operating data
– Runs under Windows 9x, Windows ME, Windows NT4.0, Windows 2000, and Windows XP

Description	Type	Order No.	Pcs. / Pkt.
	Ordering data		
ELR configuration software, for programming the electronic load relays with motor management, language: German, English	ELR-CONF-WIN2.0	2963585	1
	Accessories		
Software adapter cable	ELR-KAD-RS232	2963653	1



Configuration, monitoring, visualization

Electronic reversing load relay with motor management

The electronic load relays with motor management (ELR-MM) combine fast, wear-free semiconductor switches with state-of-the-art measurement and evaluation electronics.

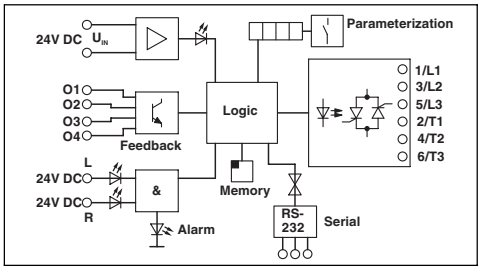
- Effective power consumed calculated every 6.6 ms
- Continuous state monitoring
- Freely parameterizable signaling and switching thresholds for underload/overload detection
- Display of apparent/real/reactive power, currents, voltages, phase angle, cycle/elapsed hour counter
- Switching of actuating/variable-speed drives, pumps, and tools with function, soiling or wear monitoring
- Special ELR-MM EX devices suitable for use in the chemicals and petrochemicals industry. A corresponding Ex-type examination certificate has been issued.
- Optional connection to ELR-PB-GATEWAY

Notes:

Type of housing:
Polycarbonate PC, color: Green.

For marking systems and mounting material, see CLIPLINE catalog, part 2.

Up to 433 V AC/3 x 8 A

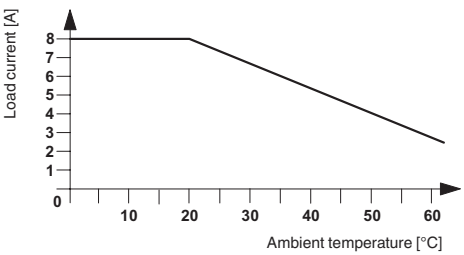


Technical data

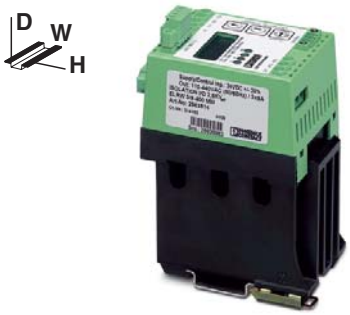
Input data		
Supply nominal voltage U_{VN}		24 V DC
Supply voltage range with reference to U_{VN}		0.8 ... 1.2
Quiescent current		80 mA
Control voltage U_{ST} right/left		24 V DC
Control voltage range in reference to U_{ST}		0.8 ... 1.2
Typ. input current at U_N		5 mA
Input circuit		Protection against polarity reversal, surge protection
Operating voltage / status / error indicator		Green LED / Yellow LED / Red LED
Output data for confirmation contacts		
O1 - O4 in the case of 1 signal		(U_{VN} - 1 V) / Max. 50 mA
Output data load side		
Output voltage range		110 V AC ... 433 V AC
Periodic peak reverse voltage		1000 V
Load current		8 A (see derating curve)
Surge current		360 A (tp = 10 ms, at 25°C)
Min. load current		150 mA
Residual voltage		Typ. 1.4 V
Leakage current		Typ. 4 mA
Output protection		RC element, surge protection
General data		
Test voltage input/output		2.5 kV
Reversing frequency		Max. 2.5 Hz (at cos ϕ = 0.5)
Ambient temperature (operation)		-20°C ... 60°C
Standards / regulations		DIN EN 50178 / safe isolation
Power station requirements		DWR 1300 / ZXX01/DD/7080.8d
EMC regulations		EN 61000-6-2 / EN 61000-6-4
Degree of protection according to IEC 60529/EN 60529		IP20
Mounting position		Vertical (horizontal DIN rail)
Mounting		Can be aligned with > 20 mm spacing
Screw connection solid / stranded / AWG		0.2 - 6 mm^2 / 0.2 - 4 mm^2 / 24 - 10
Dimensions	W / H / D	62 mm / 94 mm / 122 mm
Safety data		
EC-type examination certificate according to ATEX		
Requirement class in acc. with DIN V 19251		-
Category in acc. with EN 954-1		-

Ordering data

Description	Type	Order No.	Pcs. / Pkt.
Electronic reversing load relay, with motor management	**ELR W3/ 9-400 MM**	**2963514**	1



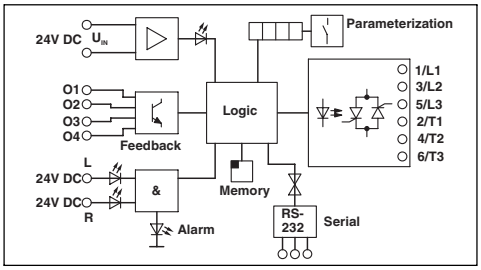
Load current as a function of the ambient temperature
Operating time: 100% operating factor

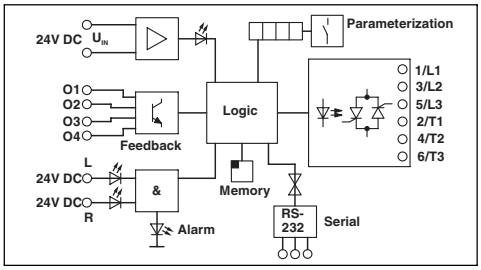


Up to 500 V AC/3 x 8 A

Up to 500 V AC/3 x 8 A, including ATEX approval

Ex:





Technical data

ELR W3/ 2-500 MM	ELR W3/ 9-500 MM
24 V DC	24 V DC
0.8 ... 1.2	0.8 ... 1.2
80 mA	80 mA
24 V DC	24 V DC
0.8 ... 1.2	0.8 ... 1.2
0.8 ... 1.2	0.8 ... 1.2
Protection against polarity reversal, surge protection	Protection against polarity reversal, surge protection
Green LED / Yellow LED / Red LED	
(U_{VN} - 1 V) / max. 50 mA	(U_{VN} - 1 V) / max. 50 mA
110 V AC ... 550 V AC	110 V AC ... 550 V AC
1500 V	1500 V
1.8 A (see derating curve)	8 A (see derating curve)
360 A (tp = 10 ms, at 25°C)	360 A (tp = 10 ms, at 25°C)
150 mA	150 mA
Typ. 1.4 V	Typ. 1.4 V
Typ. 7 mA	Typ. 7 mA
RC element, surge protection	
2.5 kV	
Max. 2.5 Hz (at cos ϕ = 0.5)	
-20°C ... 60°C	
DIN EN 50178 / safe isolation	
DWR 1300 / ZXX01/DD/7080.8d	
EN 61000-6-2 / EN 61000-6-4	
IP20	
Vertical (horizontal DIN rail)	
Can be aligned with > 20 mm spacing	
0.2 - 6 mm^2 / 0.2 - 4 mm^2 / 24 - 10	
62 mm / 94 mm / 122 mm	
-	-
-	-

Technical data

24 V DC
0.8 ... 1.2
80 mA
24 V DC
0.8 ... 1.2
0.8 ... 1.2
Protection against polarity reversal, surge protection
Green LED / Yellow LED / Red LED
(U_{VN} - 1 V) / max. 50 mA
110 V AC ... 550 V AC
1500 V
8 A (see derating curve)
360 A (tp = 10 ms, at 25°C)
150 mA
Typ. 1.4 V
Typ. 7 mA
RC element, surge protection
2.5 kV
Max. 2.5 Hz (at cos ϕ = 0.5)
-20°C ... 60°C
DIN EN 50178 / safe isolation
DWR 1300 / ZXX01/DD/7080.8d
EN 61000-6-2 / EN 61000-6-4
IP20
Vertical (horizontal DIN rail)
Can be aligned with > 20 mm spacing
0.2 - 6 mm^2 / 0.2 - 4 mm^2 / 24 - 10
62 mm / 94 mm / 122 mm
II (2) GD
PTB 03 ATEX 3114
AK4
3

Ordering data

Type	Order No.	Pcs. / Pkt.
ELR W3/ 2-500 MM	**2982621**	1
ELR W3/ 9-500 MM	**2963543**	1

Ordering data

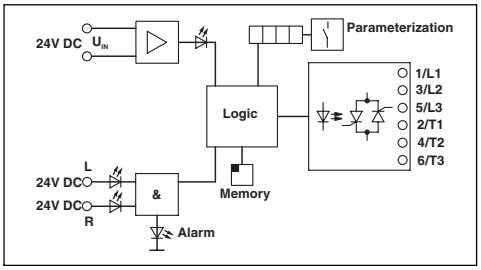
Type	Order No.	Pcs. / Pkt.
ELR W3/ 9-500 MM EX	**2963695**	1

Electronic reversing load relay, with integrated soft switch

The ELR W 3/9-400 S soft switch can be used to increase the service life of a 3-phase induction motor.

- Parameterization is performed directly on the device via display and keyboard.
- Friction time
- Torque, start
- Start time
- Stop time
- Torque, stop
- Braking time and
- Braking torque
- Drive can be controlled locally via keyboard

Notes:
Type of housing: Polycarbonate PC, color: Green.
For marking systems and mounting material, see CLIPLINE catalog, part 2.

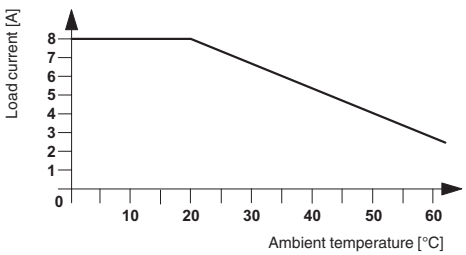


Technical data

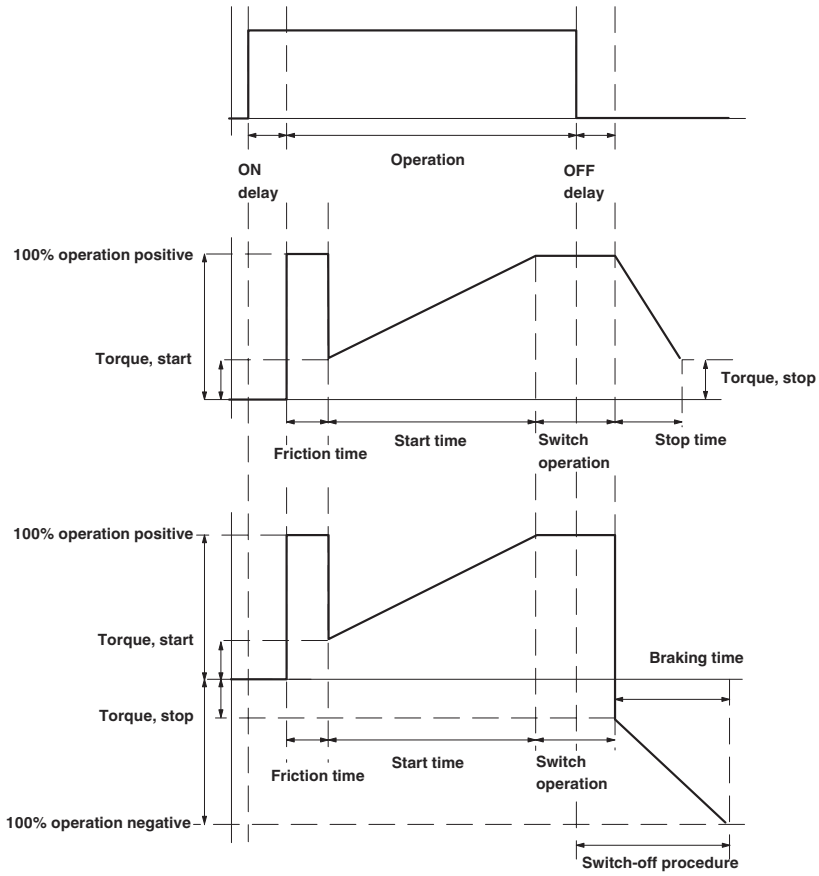
Input data	
Supply nominal voltage U_{VN}	24 V DC
Supply voltage range with reference to U_{VN}	0.8 ... 1.2
Quiescent current	85 mA
Control voltage U_{ST} right/left	24 V DC
Control voltage range in reference to U_{ST}	0.8 ... 1.2
Typ. input current at U_N	5 mA
Input circuit	Protection against polarity reversal, surge protection
Operating voltage / status / error indicator	Green LED / Yellow LED / Red LED
Output data load side	
Max. switching voltage	440 V AC (L1/T1) 440 V AC (L2/T2) 440 V AC (L3/T3)
Output voltage range	110 V AC ... 433 V AC
Periodic peak reverse voltage	1000 V
Load current	< 8 A (IL1, at 20°C Tu, see derating) < 8 A (IL2, at 20°C Tu, see derating) < 8 A (IL3, at 20°C Tu, see derating)
Surge current	230 A (tp = 10 ms, at 25°C)
Min. load current	150 mA
Residual voltage	Typ. 1.5 V (for IL)
Leakage current	5 mA (IL1, in switched-off state)
Output protection	RC element, surge protection
General data	
Test voltage input/output	2.5 kV
Ambient temperature (operation)	-20°C ... 60°C
Standards / regulations	DIN EN 50178 / safe isolation
Power station requirements	DWR 1300 / ZXX01/DD/7080.8d
EMC regulations	EN 61000-6-2 / EN 61000-6-4
Degree of protection according to IEC 60529/EN 60529	IP20
Mounting position	Vertical (horizontal DIN rail)
Mounting	Can be aligned with > 20 mm spacing
Screw connection solid / stranded / AWG	0.2 - 6 mm^2 / 0.2 - 4 mm^2 / 24 - 10
Dimensions W / H / D	62 mm / 94 mm / 122 mm

Ordering data

Description	Type	Order No.	Pcs. / Pkt.
Electronic reversing load relay, with an integrated soft switch	**ELR W3/ 9-400 S**	**2963569**	1



Load current as a function of the ambient temperature
Operating time: 100% operating factor



The figure shows the control of the reversing load relay with a soft starter and the operation of a three-phase current load.

"4 in 1" hybrid motor starter with reversing function, motor protection, and emergency stop

These 3-phase "4 in 1" hybrid motor starters combine four functions in one device: right contactor, left contactor, motor protection relay, and emergency stop up to category 3.

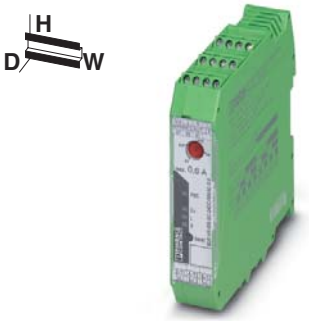
They offer the following advantages:

- 22.5 mm wide
- They save wiring
- Bi-metal function can be set up to 9 A
- Long service life
- Space-saving
- 3-phase loop bridging

Safety level according to:

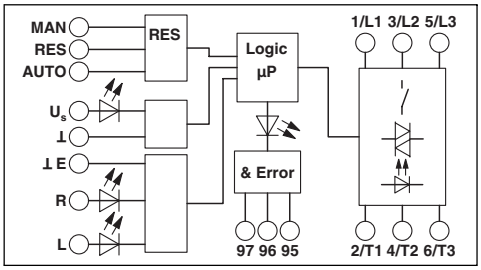
- IEC 61508-1: SIL3
- ISO 13849: PL e

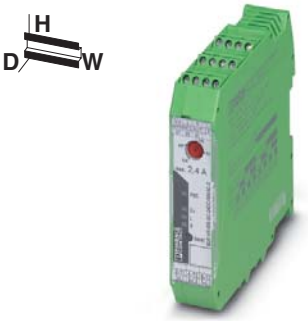
Notes:
Type of housing: Polyamide PA non-reinforced, color: Green.
For marking systems and mounting material, see CLIPLINE catalog, part 2.



For reversing 3~ AC motors up to 550 V AC/3 x 0.6 A

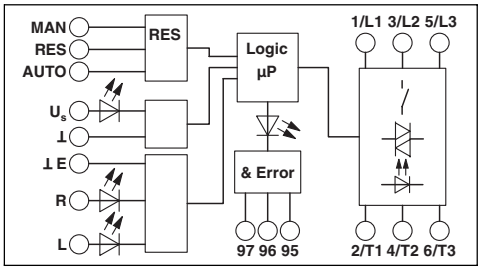
Ex:





For reversing 3~ AC motors up to 550 V AC/3 x 2 A

Ex:



Technical data

Input data	ELR H5-IES-SC- 24DC/500AC-0,6	ELR H5-IES-SC-230AC/500AC-0,6
Rated control supply voltage U_S	24 V DC	230 V AC
Rated control supply voltage range with reference to U_S	0.8 ... 1.25	0.4 ... 1.1
Rated control supply current I_S at U_S	40 mA	4 mA
Rated actuating voltage U_C R/L	24 V DC	230 V AC
Rated actuating voltage range with reference to U_C	0.8 ... 1.25	0.4 ... 1.1
Rated actuating current I_C at U_C	3 mA	7 mA
Input circuit	Protection against polarity reversal, surge protection	Surge protection
Operating voltage / status / error indicator	Green LED / Yellow LED / Red LED	
Output data load side		
Output voltage range	42 V AC ... 550 V AC	42 V AC ... 550 V AC
Load current	Max. 600 mA (see derating curve)	Max. 600 mA (see derating curve)
Surge current	100 A (t = 10 ms)	100 A (t = 10 ms)
Min. load current	100 mA	100 mA
Residual voltage	< 0.2 V	< 0.2 V
Leakage current	0 mA	0 mA
Output protection	Surge protection	
General data		
Rated insulation voltage	500 V	
Rated surge voltage	6 kV/safe isolation	4 kV/safe isolation
Reversing frequency	Max. 2 Hz	Max. 2 Hz
Ambient temperature (operation)	-25°C ... 70°C	
Electrical service life	3 x 10^7 cycles	
Standards / regulations	DIN EN 50178 / EN 60947	
Degree of protection according to IEC 60529/EN 60529	IP20	
Mounting position	Vertical (horizontal DIN rail)	
Mounting	Can be aligned with spacing = 20 mm	
Screw connection solid / stranded / AWG	0.14 - 2.5 mm^2 / 0.14 - 2.5 mm^2 / 26 - 12	
Dimensions W / H / D	22.5 mm / 99 mm / 114.5 mm	
Safety data		
EC-type examination certificate according to ATEX	Ex II (2) G, Ex II (2) D PTB 07 ATEX 3145	Ex II (2) G, Ex II (2) D PTB 07 ATEX 3145

Technical data

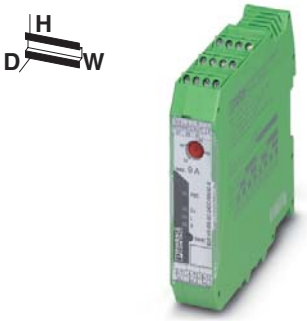
Input data	ELR H5-IES-SC- 24DC/500AC-2	ELR H5-IES-SC-230AC/500AC-2
Rated control supply voltage U_S	24 V DC	230 V AC
Rated control supply voltage range with reference to U_S	0.8 ... 1.25	0.4 ... 1.1
Rated control supply current I_S at U_S	40 mA	4 mA
Rated actuating voltage U_C R/L	24 V DC	230 V AC
Rated actuating voltage range with reference to U_C	0.8 ... 1.25	0.4 ... 1.1
Rated actuating current I_C at U_C	3 mA	7 mA
Input circuit	Protection against polarity reversal, surge protection	Surge protection
Operating voltage / status / error indicator	Green LED / Yellow LED / Red LED	
Output data load side		
Output voltage range	42 V AC ... 550 V AC	42 V AC ... 550 V AC
Load current	Max. 2.4 A (see derating curve)	Max. 2.4 A (see derating curve)
Surge current	100 A (t = 10 ms)	100 A (t = 10 ms)
Min. load current	180 mA	180 mA
Residual voltage	< 0.3 V	< 0.3 V
Leakage current	0 mA	0 mA
Output protection	Surge protection	
General data		
Rated insulation voltage	500 V	
Rated surge voltage	6 kV/safe isolation	4 kV/safe isolation
Reversing frequency	Max. 2 Hz	Max. 2 Hz
Ambient temperature (operation)	-25°C ... 70°C	
Electrical service life	3 x 10^7 cycles	
Standards / regulations	DIN EN 50178 / EN 60947	
Degree of protection according to IEC 60529/EN 60529	IP20	
Mounting position	Vertical (horizontal DIN rail)	
Mounting	Can be aligned with spacing = 20 mm	
Screw connection solid / stranded / AWG	0.14 - 2.5 mm^2 / 0.14 - 2.5 mm^2 / 26 - 12	
Dimensions W / H / D	22.5 mm / 99 mm / 114.5 mm	
Safety data		
EC-type examination certificate according to ATEX	Ex II (2) G, Ex II (2) D PTB 07 ATEX 3145	Ex II (2) G, Ex II (2) D PTB 07 ATEX 3145

Ordering data

Description	Type	Order No.	Pcs. / Pkt.
"4 in 1" hybrid motor starter, incl. right contactor, left contactor, motor protection relay, and emergency stop			
	ELR H5-IES-SC- 24DC/500AC-0,6	**2900582**	1
	ELR H5-IES-SC-230AC/500AC-0,6	**2900692**	1
"4 in 1" hybrid motor starter, incl. right contactor, left contactor, motor protection relay, and emergency stop, terminals L1, L2, L3 and T1, T2, T3 rotated			

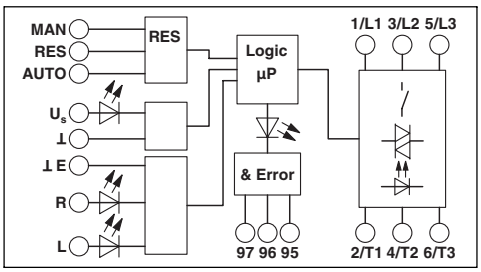
Ordering data

Type	Order No.	Pcs. / Pkt.
ELR H5-IES-SC- 24DC/500AC-2	**2900414**	1
ELR H5-IES-SC-230AC/500AC-2	**2900420**	1
ELR W3- 24DC/500AC- 2I	**2297031**	1
ELR W3-230AC/500AC- 2I	**2297044**	1



For reversing 3~ AC motors up to 550 V AC/3 x 9 A

Ex:



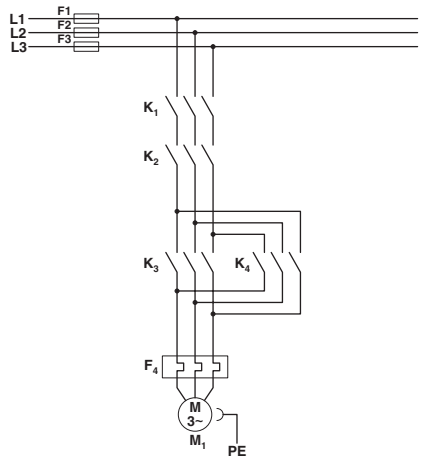
Technical data

ELR H5-IES-SC- 24DC/500AC-9	ELR H5-IES-SC-230AC/500AC-9
24 V DC	230 V AC
0.8 ... 1.25	0.4 ... 1.1
40 mA	4 mA
24 V DC	230 V AC
0.8 ... 1.25	0.4 ... 1.1
3 mA	7 mA
Protection against polarity reversal, surge protection	Surge protection
Green LED / Yellow LED / Red LED	
42 V AC ... 550 V AC	42 V AC ... 550 V AC
Max. 9 A (see derating curve)	Max. 9 A (see derating curve)
100 A (t = 10 ms)	100 A (t = 10 ms)
1.5 A	1.5 A
< 0.5 V	< 0.5 V
0 mA	0 mA
Surge protection	
500 V	
6 kV/safe isolation	4 kV/safe isolation
Max. 2 Hz	Max. 2 Hz
-25°C ... 70°C	
3 x 10^7 cycles	
DIN EN 50178 / EN 60947	
IP20	
Vertical (horizontal DIN rail)	
Can be aligned with spacing = 20 mm	
0.14 - 2.5 mm^2 / 0.14 - 2.5 mm^2 / 26 - 12	
22.5 mm / 99 mm / 114.5 mm	
Ex II (2) G, Ex II (2) D	Ex II (2) G, Ex II (2) D
PTB 07 ATEX 3145	PTB 07 ATEX 3145

Ordering data

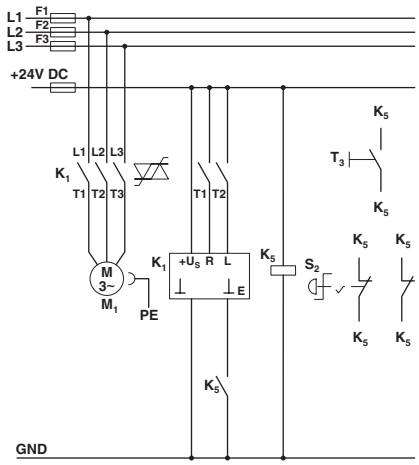
Type	Order No.	Pcs. / Pkt.
ELR H5-IES-SC- 24DC/500AC-9	**2900421**	1
ELR H5-IES-SC-230AC/500AC-9	**2900422**	1
ELR W3- 24DC/500AC- 9I	**2297057**	1
ELR W3-230AC/500AC- 9I	**2297060**	1

Conventional structure
Main current path reversing contactor according to category 3



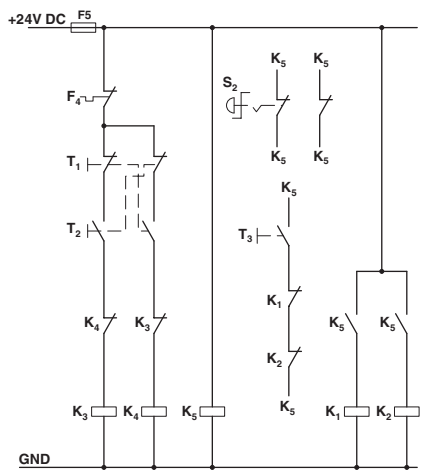
K1 + K2 = Emergency stop contactor
K3 = Left contactor
K4 = Right contactor
F4 = Motor protection relay

Structure with CONTACTRON
Main and control current path for "4 in 1" hybrid motor starter with reversing function according to category 3

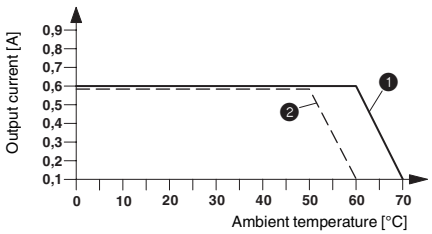


K1 = "4 in 1" hybrid motor starter with reversing function
K5 = PSR SCP-24DC.../Safety relay
T1 = Left, T2 = Right, T3 = Reset
S2 = Emergency stop

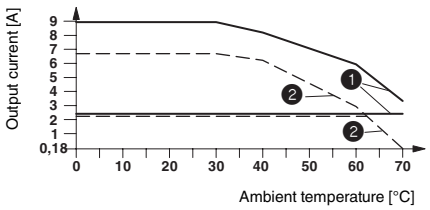
Conventional structure
Control current path reversing contactor according to category 3



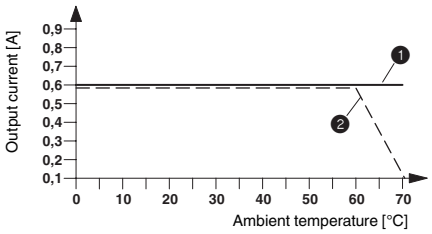
K1 + K2 = Emergency stop contactor
K3 = Left contactor
K4 = Right contactor
K5 = PSR SCP-24DC.../Safety relay
T1 = Left, T2 = Right, T3 = Reset
S2 = Emergency stop
F4 = Motor protection relay



Derating curve ELR H5-IES-SC-230AC/500AC-0,6
100% operating time

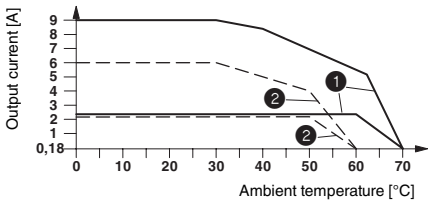


Derating curve ELR H5-IES-SC-24DC/500AC-2 and ELR H5-IES-SC-24DC/500AC-9
100% operating time



Derating curve ELR H5-IES-SC-24DC/500AC-0,6
100% operating time

❶ Aligned with > 20 mm spacing
❷ Aligned without spacing



Derating curve ELR H5-IES-SC-230AC/500AC-2 and ELR H5-IES-SC-230AC/500AC-9
100% operating time

"3 in 1" hybrid motor starter with motor protection and emergency stop

These 3-phase "3 in 1" hybrid motor starters combine three functions in one device: right contactor, motor protection relay, and emergency stop up to category 3.

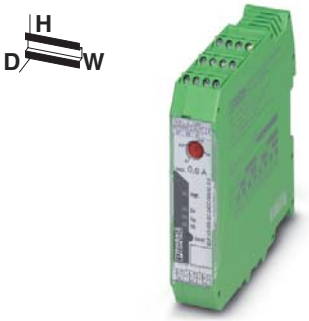
They offer the following advantages:

- 22.5 mm wide
- They save wiring
- Bi-metal function can be set up to 9 A
- Long service life
- Space-saving
- 3-phase loop bridging

Safety level according to:

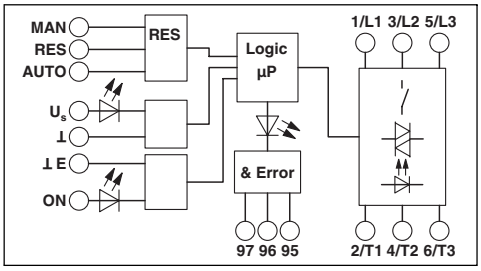
- IEC 61508-1: SIL3
- ISO 13849: PL e

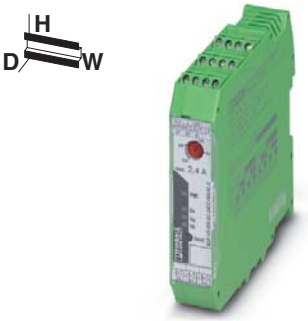
Notes:
Type of housing: Polyamide PA non-reinforced, color: Green.
For marking systems and mounting material, see CLIPLINE catalog, part 2.



For starting 3~ AC motors up to 550 V AC/3 x 0.6 A

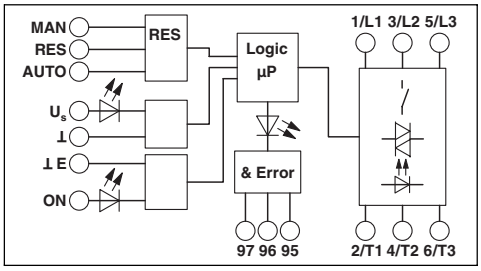
Ex:





For starting 3~ AC motors up to 550 V AC/3 x 2 A

Ex:



Technical data

Input data	ELR H3-IES-SC- 24DC/500AC-0,6	ELR H3-IES-SC-230AC/500AC-0,6
Rated control supply voltage U_S	24 V DC	230 V AC
Rated control supply voltage range with reference to U_S	0.8 ... 1.25	0.4 ... 1.1
Rated control supply current I_S at U_S	40 mA	4 mA
Rated actuation voltage U_C ON	24 V DC	230 V AC
Rated actuating voltage range with reference to U_C	0.8 ... 1.25	0.4 ... 1.1
Rated actuating current I_C at U_C	3 mA	7 mA
Input circuit	Protection against polarity reversal, surge protection	Surge protection
Operating voltage / status / error indicator	Green LED / Yellow LED / Red LED	
Output data load side		
Output voltage range	42 V AC ... 550 V AC	42 V AC ... 550 V AC
Load current	Max. 600 mA (see derating curve)	Max. 600 mA (see derating curve)
Surge current	100 A (t = 10 ms)	100 A (t = 10 ms)
Min. load current	100 mA	100 mA
Residual voltage	< 0.2 V	< 0.2 V
Leakage current	0 mA	0 mA
Output protection	Surge protection	
General data		
Rated insulation voltage	500 V	
Rated surge voltage	6 kV/safe isolation	4 kV/safe isolation
Switching frequency	Max. 2 Hz	Max. 2 Hz
Ambient temperature (operation)	-25°C ... 70°C	
Electrical service life	3 x 10^7 cycles	
Standards / regulations	DIN EN 50178 / EN 60947	
Degree of protection according to IEC 60529/EN 60529	IP20	
Mounting position	Vertical (horizontal DIN rail)	
Mounting	Can be aligned with spacing = 20 mm	
Screw connection solid / stranded / AWG	0.14 - 2.5 mm^2 / 0.14 - 2.5 mm^2 / 26 - 12	
Dimensions W / H / D	22.5 mm / 99 mm / 114.5 mm	
Safety data		
EC-type examination certificate according to ATEX	Ex II (2) G, Ex II (2) D PTB 07 ATEX 3145	Ex II (2) G, Ex II (2) D PTB 07 ATEX 3145

Technical data

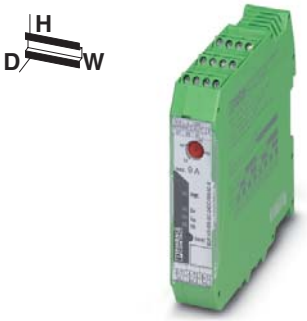
Input data	ELR H3-IES-SC- 24DC/500AC-2	ELR H3-IES-SC-230AC/500AC-2
Rated control supply voltage U_S	24 V DC	230 V AC
Rated control supply voltage range with reference to U_S	0.8 ... 1.25	0.4 ... 1.1
Rated control supply current I_S at U_S	40 mA	4 mA
Rated actuation voltage U_C ON	24 V DC	230 V AC
Rated actuating voltage range with reference to U_C	0.8 ... 1.25	0.4 ... 1.1
Rated actuating current I_C at U_C	3 mA	7 mA
Input circuit	Protection against polarity reversal, surge protection	Surge protection
Operating voltage / status / error indicator	Green LED / Yellow LED / Red LED	
Output data load side		
Output voltage range	42 V AC ... 550 V AC	42 V AC ... 550 V AC
Load current	Max. 2.4 A (see derating curve)	Max. 2.4 A (see derating curve)
Surge current	100 A (t = 10 ms)	100 A (t = 10 ms)
Min. load current	180 mA	180 mA
Residual voltage	< 0.3 V	< 0.3 V
Leakage current	0 mA	0 mA
Output protection	Surge protection	
General data		
Rated insulation voltage	500 V	
Rated surge voltage	6 kV/safe isolation	4 kV/safe isolation
Switching frequency	Max. 2 Hz	Max. 2 Hz
Ambient temperature (operation)	-25°C ... 70°C	
Electrical service life	3 x 10^7 cycles	
Standards / regulations	DIN EN 50178 / EN 60947	
Degree of protection according to IEC 60529/EN 60529	IP20	
Mounting position	Vertical (horizontal DIN rail)	
Mounting	Can be aligned with spacing = 20 mm	
Screw connection solid / stranded / AWG	0.14 - 2.5 mm^2 / 0.14 - 2.5 mm^2 / 26 - 12	
Dimensions W / H / D	22.5 mm / 99 mm / 114.5 mm	
Safety data		
EC-type examination certificate according to ATEX	Ex II (2) G, Ex II (2) D PTB 07 ATEX 3145	Ex II (2) G, Ex II (2) D PTB 07 ATEX 3145

Ordering data

Description	Type	Order No.	Pcs. / Pkt.
"3 in 1" hybrid motor starter, incl. right contactor, motor protection relay, and emergency stop			
	ELR H3-IES-SC- 24DC/500AC-0,6	**2900566**	1
	ELR H3-IES-SC-230AC/500AC-0,6	**2900689**	1

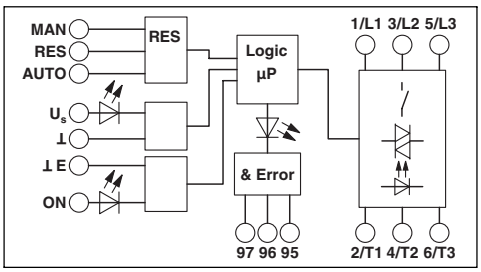
Ordering data

Type	Order No.	Pcs. / Pkt.
ELR H3-IES-SC- 24DC/500AC-2	**2900567**	1
ELR H3-IES-SC-230AC/500AC-2	**2900568**	1



For starting 3~ AC motors up to 550 V AC/3 x 9 A

Ex:



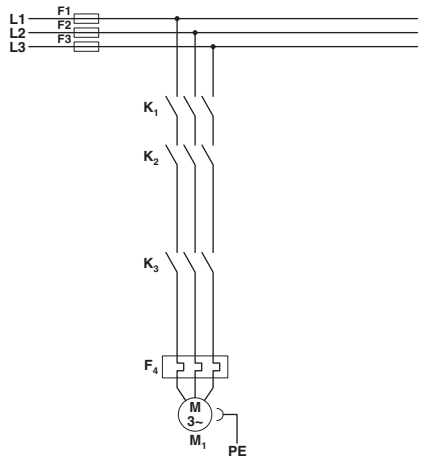
Technical data

ELR H3-IES-SC- 24DC/500AC-9	ELR H3-IES-SC-230AC/500AC-9
24 V DC	230 V AC
0.8 ... 1.25	0.4 ... 1.1
40 mA	4 mA
24 V DC	230 V AC
0.8 ... 1.25	0.4 ... 1.1
3 mA	7 mA
Protection against polarity reversal, surge protection	Surge protection
Green LED / Yellow LED / Red LED	
42 V AC ... 550 V AC	42 V AC ... 550 V AC
Max. 9 A (see derating curve)	Max. 9 A (see derating curve)
100 A (t = 10 ms)	100 A (t = 10 ms)
1.5 A	1.5 A
< 0.5 V	< 0.5 V
0 mA	0 mA
Surge protection	
500 V	
6 kV/safe isolation	4 kV/safe isolation
Max. 2 Hz	Max. 2 Hz
-25°C ... 70°C	
3 x 10^7 cycles	
DIN EN 50178 / EN 60947	
IP20	
Vertical (horizontal DIN rail)	
Can be aligned with spacing = 20 mm	
0.14 - 2.5 mm^2 / 0.14 - 2.5 mm^2 / 26 - 12	
22.5 mm / 99 mm / 114.5 mm	
Ex II (2) G, Ex II (2) D	Ex II (2) G, Ex II (2) D
PTB 07 ATEX 3145	PTB 07 ATEX 3145

Ordering data

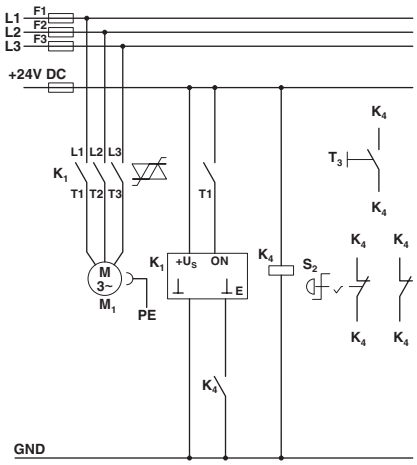
Type	Order No.	Pcs. / Pkt.
ELR H3-IES-SC- 24DC/500AC-9	**2900569**	1
ELR H3-IES-SC-230AC/500AC-9	**2900570**	1

Conventional structure
Main current path contactor according to category 3



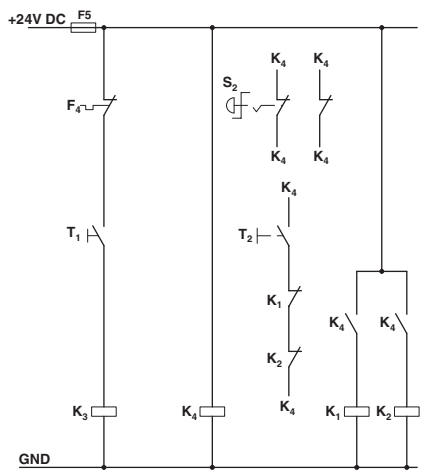
K1 + K2 = Emergency stop contactor
K3 = Right contactor
F4 = Motor protection relay

Structure with CONTACTRON
Main and control current path for "3 in 1" hybrid motor starter according to category 3

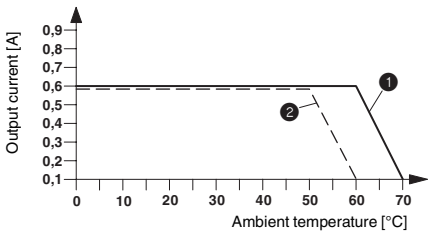


K1 = "3 in 1" hybrid motor starter
K4 = PSR SCP-24DC.../Safety relay
T1 = Right, T3 = Reset
S2 = Emergency stop

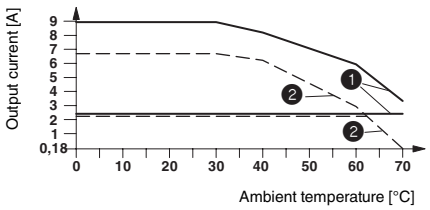
Conventional structure
Control current path contactor according to category 3



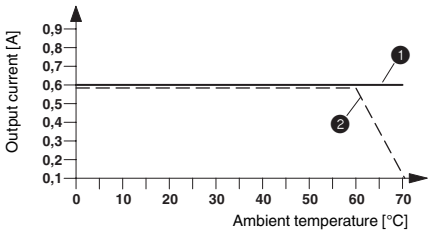
K1 + K2 = Emergency stop contactor
K3 = Right contactor
K4 = PSR SCP-24DC.../Safety relay
T1 = Right, T3 = Reset
S2 = Emergency stop
F4 = Motor protection relay



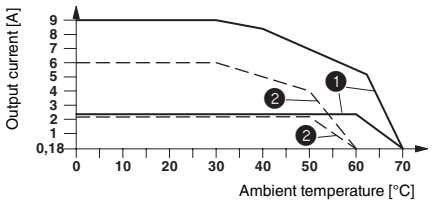
Derating curve ELR H3-IES-SC-230AC/500AC-0,6
100% operating time



Derating curve ELR H3-IES-SC-24DC/500AC-2 and ELR H3-IES-SC-24DC/500AC-9
100% operating time



Derating curve ELR H3-IES-SC-24DC/500AC-0,6
100% operating time



Derating curve ELR H3-IES-SC-230AC/500AC-2 and ELR H3-IES-SC-230AC/500AC-9
100% operating time

❶ Aligned with > 20 mm spacing
❷ Aligned without spacing

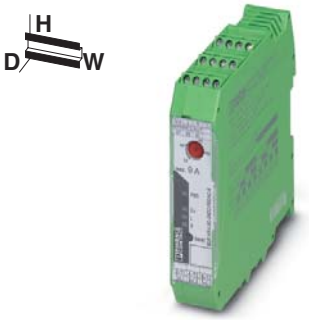
"3 in 1" hybrid motor starter with reversing function and motor protection

These 3-phase "3 in 1" hybrid motor starters combine three functions in one device: right contactor, left contactor, and motor protection relay.

They offer the following advantages:

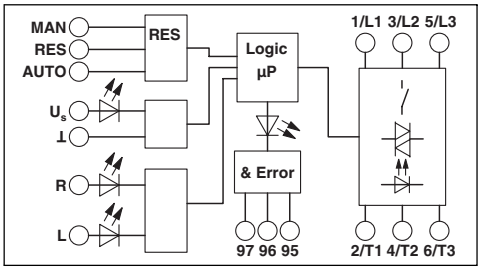
- 22.5 mm wide
- They save wiring
- Bi-metal function can be set up to 9 A
- Long service life
- Space-saving
- 3-phase loop bridging

N

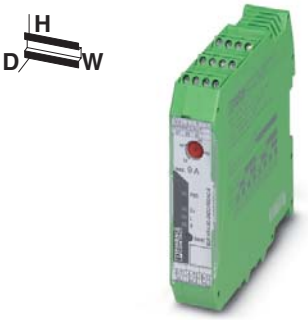


For starting 3~ AC motors up to 550 V AC/3 x 0.6 A

Ex:

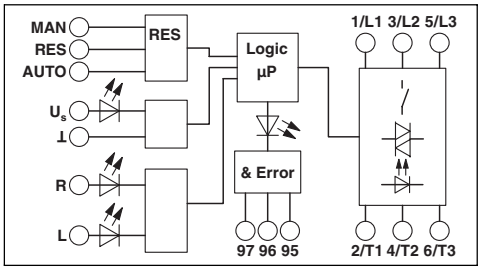


N



For starting 3~ AC motors up to 550 V AC/3 x 2 A

Ex:



Technical data

Input data	ELR H5-I-SC- 24DC/500AC-0,6	ELR H5-I-SC-230AC/500AC-0,6
Rated control supply voltage U_S	24 V DC	230 V AC
Rated control supply voltage range with reference to U_S	0.8 ... 1.25	0.4 ... 1.1
Rated control supply current I_S at U_S	35 mA	3.5 mA
Rated actuation voltage U_C ON	24 V DC	230 V AC
Rated actuating voltage range with reference to U_C	0.8 ... 1.25	0.4 ... 1.1
Rated actuating current I_C at U_C	3 mA	7 mA
Input circuit	Protection against polarity reversal, surge protection	Surge protection
Operating voltage / status / error indicator	Green LED / Yellow LED / Red LED	
Output data load side		
Output voltage range	48 V AC ... 550 V AC	48 V AC ... 550 V AC
Load current	Max. 600 mA (see derating curve)	Max. 600 mA (see derating curve)
Surge current	100 A (t = 10 ms)	100 A (t = 10 ms)
Min. load current	100 mA	100 mA
Residual voltage	< 0.2 V	< 0.2 V
Leakage current	0 mA	0 mA
Output protection	Surge protection	
General data		
Rated insulation voltage	500 V	
Rated surge voltage	6 kV/safe isolation	4 kV/safe isolation
Switching frequency		
Ambient temperature (operation)	-25°C ... 70°C	
Electrical service life	3 x 10^7 cycles	
Standards / regulations	DIN EN 50178 / EN 60947	
Degree of protection according to IEC 60529/EN 60529	IP20	
Mounting position	Vertical (horizontal DIN rail)	
Mounting	Can be aligned with spacing = 20 mm	
Screw connection solid / stranded / AWG	0.14 - 2.5 mm^2 / 0.14 - 2.5 mm^2 / 26 - 12	
Dimensions W / H / D	22.5 mm / 99 mm / 114.5 mm	

Technical data

Input data	ELR H5-I-SC- 24DC/500AC-2	ELR H5-I-SC-230AC/500AC-2
Rated control supply voltage U_S	24 V DC	230 V AC
Rated control supply voltage range with reference to U_S	0.8 ... 1.25	0.4 ... 1.1
Rated control supply current I_S at U_S	35 mA	3.5 mA
Rated actuation voltage U_C ON	24 V DC	230 V AC
Rated actuating voltage range with reference to U_C	0.8 ... 1.25	0.4 ... 1.1
Rated actuating current I_C at U_C	3 mA	7 mA
Input circuit	Protection against polarity reversal, surge protection	Surge protection
Operating voltage / status / error indicator	Green LED / Yellow LED / Red LED	
Output data load side		
Output voltage range	48 V AC ... 550 V AC	48 V AC ... 550 V AC
Load current	Max. 2.4 A (see derating curve)	Max. 2.4 A (see derating curve)
Surge current	100 A (t = 10 ms)	100 A (t = 10 ms)
Min. load current	180 mA	180 mA
Residual voltage	< 0.3 V	< 0.3 V
Leakage current	0 mA	0 mA
Output protection	Surge protection	
General data		
Rated insulation voltage	500 V	
Rated surge voltage	6 kV/safe isolation	4 kV/safe isolation
Switching frequency		
Ambient temperature (operation)	-25°C ... 70°C	
Electrical service life	3 x 10^7 cycles	
Standards / regulations	DIN EN 50178 / EN 60947	
Degree of protection according to IEC 60529/EN 60529	IP20	
Mounting position	Vertical (horizontal DIN rail)	
Mounting	Can be aligned with spacing = 20 mm	
Screw connection solid / stranded / AWG	0.14 - 2.5 mm^2 / 0.14 - 2.5 mm^2 / 26 - 12	
Dimensions W / H / D	22.5 mm / 99 mm / 114.5 mm	

Ordering data

Description	Type	Order No.	Pcs. / Pkt.
"3 in 1" hybrid motor starter, incl. right contactor, left contactor, and motor protection relay			
	ELR H5-I-SC- 24DC/500AC-0,6	**2900573**	1
	ELR H5-I-SC-230AC/500AC-0,6	**2900691**	1

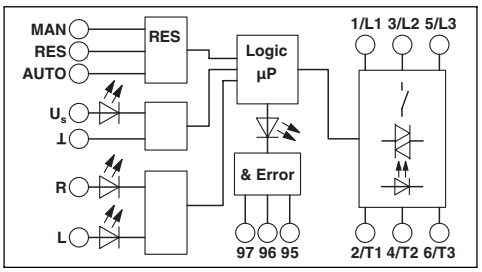
Ordering data

Type	Order No.	Pcs. / Pkt.
ELR H5-I-SC- 24DC/500AC-2	**2900574**	1
ELR H5-I-SC-230AC/500AC-2	**2900575**	1

N

For starting 3~ AC motors up to 550 V AC/3 x 9 A

Ex:



Technical data

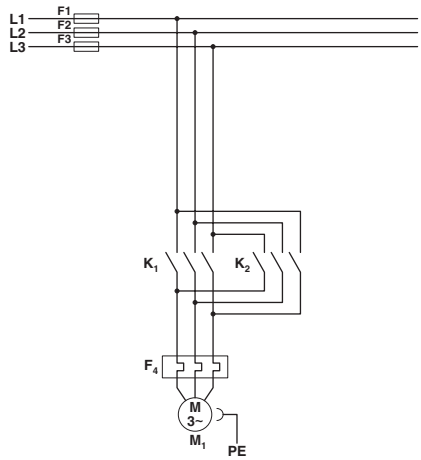
ELR H5-I-SC- 24DC/500AC-9	ELR H5-I-SC-230AC/500AC-9
24 V DC	230 V AC
0.8 ... 1.25	0.4 ... 1.1
35 mA	3.5 mA
24 V DC	230 V AC
0.8 ... 1.25	0.4 ... 1.1
3 mA	7 mA
Protection against polarity reversal, surge protection	Surge protection
Green LED / Yellow LED / Red LED	
48 V AC ... 550 V AC	48 V AC ... 550 V AC
Max. 9 A (see derating curve)	Max. 9 A (see derating curve)
100 A (t = 10 ms)	100 A (t = 10 ms)
1.5 A	1.5 A
< 0.5 V	< 0.5 V
0 mA	0 mA
Surge protection	
500 V	
6 kV/safe isolation	4 kV/safe isolation

-25°C ... 70°C
3 x 10^7 cycles
DIN EN 50178 / EN 60947
IP20
Vertical (horizontal DIN rail)
Can be aligned with spacing = 20 mm
0.14 - 2.5 mm^2 / 0.14 - 2.5 mm^2 / 26 - 12
22.5 mm / 99 mm / 114.5 mm

Ordering data

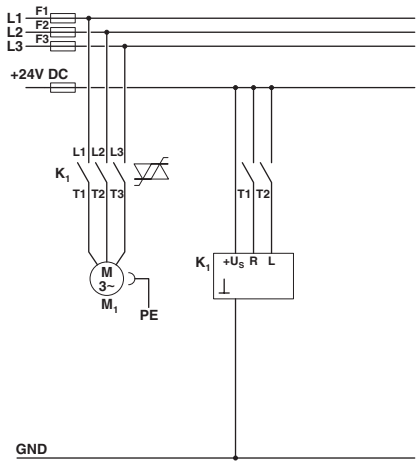
Type	Order No.	Pcs. / Pkt.
ELR H5-I-SC- 24DC/500AC-9	**2900576**	1
ELR H5-I-SC-230AC/500AC-9	**2900578**	1

Conventional structure
Main current path contactor according to category 3



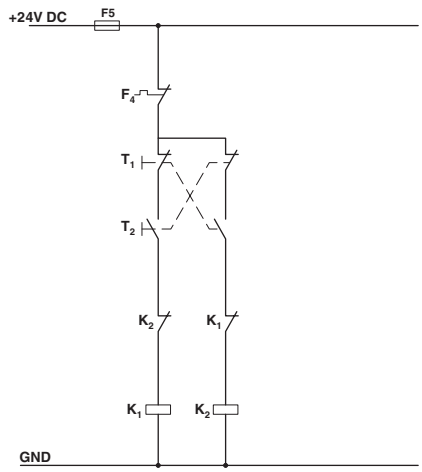
K1 = Left contactor
K2 = Right contactor
F4 = Motor protection relay

Structure with CONTACTRON
Main and control current path for "3 in 1" hybrid motor starter according to category 3

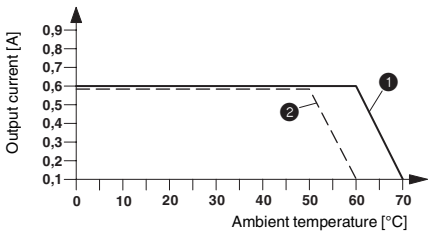


K1 = "3 in 1" hybrid motor starter
T1 = Right, T2 = Left, T3 = Reset

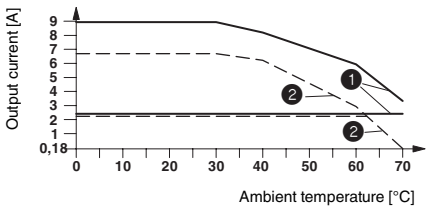
Conventional structure
Control current path contactor according to category 3



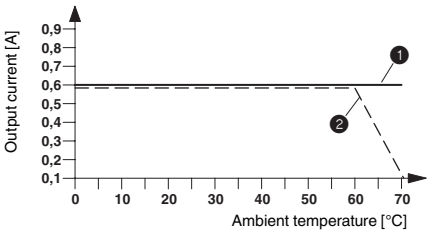
K1 = Left contactor
K2 = Right contactor
T1 = Right, T2 = Left, T3 = Reset
F4 = Motor protection relay



Derating curve ELR H5-I-SC-230AC/500AC-0,6
100% operating time

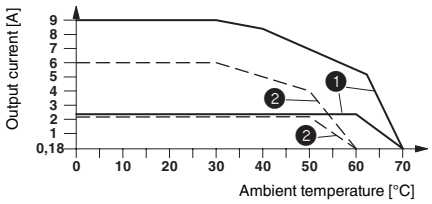


Derating curve ELR H5-I-SC-24DC/500AC-2 and
ELR H5-I-SC-24DC/500AC-99
100% operating time



Derating curve ELR H5-I-SC-24DC/500AC-0,6
100% operating time

❶ Aligned with > 20 mm spacing
❷ Aligned without spacing



Derating curve ELR H5-I-SC-230AC/500AC-2 and
ELR H5-I-SC-230AC/500AC-9
100% operating time

"3 in 1" hybrid motor starter with reversing function and emergency stop

These 3-phase "3 in 1" hybrid motor starters combine three functions in one device: right contactor, left contactor, and emergency stop up to category 3.

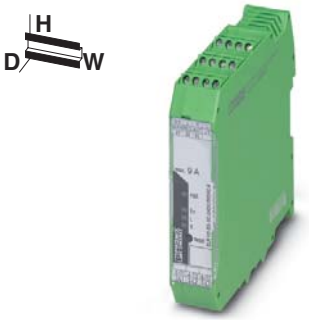
They offer the following advantages:

- 22.5 mm wide
- They save wiring
- Up to 9 A
- Long service life
- Space-saving
- 3-phase loop bridging

Safety level according to:

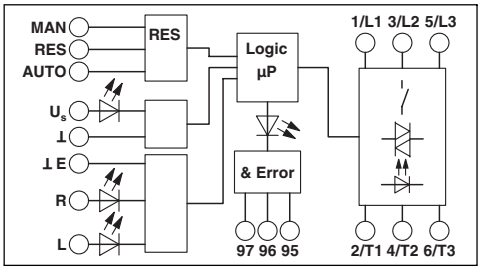
- IEC 61508-1: SIL3
- ISO 13849: PL e

N

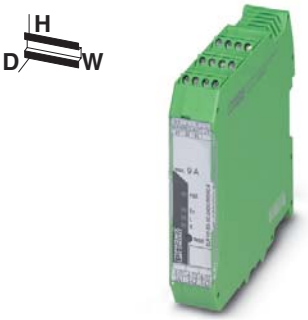


For reversing 3~ AC motors up to 550 V AC/3 x 0.6 A

Ex:

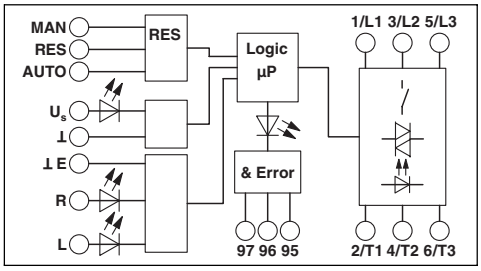


N



For reversing 3~ AC motors up to 550 V AC/3 x 2 A

Ex:



Technical data

Input data	ELR H5-ES-SC- 24DC/500AC-0,6	ELR H5-ES-SC-230AC/500AC-0,6
Rated control supply voltage U_S	24 V DC	230 V AC
Rated control supply voltage range with reference to U_S	0.8 ... 1.25	0.4 ... 1.1
Rated control supply current I_S at U_S	35 mA	3.5 mA
Rated actuation voltage U_C ON	24 V DC	230 V AC
Rated actuating voltage range with reference to U_C	0.8 ... 1.25	0.4 ... 1.1
Rated actuating current I_C at U_C	3 mA	7 mA
Input circuit	Protection against polarity reversal, surge protection	Surge protection
Operating voltage / status / error indicator	Green LED / Yellow LED / Red LED	
Output data load side		
Output voltage range	48 V AC ... 550 V AC	48 V AC ... 550 V AC
Load current	Max. 600 mA (see derating curve)	Max. 600 mA (see derating curve)
Surge current	100 A (t = 10 ms)	100 A (t = 10 ms)
Min. load current	100 mA	100 mA
Residual voltage	< 0.3 V	< 0.3 V
Leakage current	0 mA	0 mA
Output protection	Surge protection	
General data		
Rated insulation voltage	500 V	
Rated surge voltage	6 kV/safe isolation	4 kV/safe isolation
Switching frequency		
Ambient temperature (operation)	-25°C ... 70°C	
Electrical service life	3 x 10^7 cycles	
Standards / regulations	DIN EN 50178 / EN 60947	
Degree of protection according to IEC 60529/EN 60529	IP20	
Mounting position	Vertical (horizontal DIN rail)	
Mounting	Can be aligned with spacing = 20 mm	
Screw connection solid / stranded / AWG	0.14 - 2.5 mm^2 / 0.14 - 2.5 mm^2 / 26 - 12	
Dimensions W / H / D	22.5 mm / 99 mm / 114.5 mm	
Safety data		
EC-type examination certificate according to ATEX	Ex II (2) G, Ex II (2) D PTB 07 ATEX 3145	Ex II (2) G, Ex II (2) D PTB 07 ATEX 3145

Technical data

Input data	ELR H5-ES-SC- 24DC/500AC-2	ELR H5-ES-SC-230AC/500AC-2
Rated control supply voltage U_S	24 V DC	230 V AC
Rated control supply voltage range with reference to U_S	0.8 ... 1.25	0.4 ... 1.1
Rated control supply current I_S at U_S	35 mA	3.5 mA
Rated actuation voltage U_C ON	24 V DC	230 V AC
Rated actuating voltage range with reference to U_C	0.8 ... 1.25	0.4 ... 1.1
Rated actuating current I_C at U_C	3 mA	7 mA
Input circuit	Protection against polarity reversal, surge protection	Surge protection
Operating voltage / status / error indicator	Green LED / Yellow LED / Red LED	
Output data load side		
Output voltage range	48 V AC ... 550 V AC	48 V AC ... 550 V AC
Load current	Max. 2.4 A (see derating curve)	Max. 2.4 A (see derating curve)
Surge current	100 A (t = 10 ms)	100 A (t = 10 ms)
Min. load current	180 mA	180 mA
Residual voltage	< 0.3 V	< 0.3 V
Leakage current	0 mA	0 mA
Output protection	Surge protection	
General data		
Rated insulation voltage	500 V	
Rated surge voltage	6 kV/safe isolation	4 kV/safe isolation
Switching frequency		
Ambient temperature (operation)	-25°C ... 70°C	
Electrical service life	3 x 10^7 cycles	
Standards / regulations	DIN EN 50178 / EN 60947	
Degree of protection according to IEC 60529/EN 60529	IP20	
Mounting position	Vertical (horizontal DIN rail)	
Mounting	Can be aligned with spacing = 20 mm	
Screw connection solid / stranded / AWG	0.14 - 2.5 mm^2 / 0.14 - 2.5 mm^2 / 26 - 12	
Dimensions W / H / D	22.5 mm / 99 mm / 114.5 mm	
Safety data		
EC-type examination certificate according to ATEX	Ex II (2) G, Ex II (2) D PTB 07 ATEX 3145	Ex II (2) G, Ex II (2) D PTB 07 ATEX 3145

Ordering data

Description	Type	Order No.	Pcs. / Pkt.
"3 in 1" hybrid motor starter, incl. right contactor, left contactor, and emergency stop			
	ELR H5-ES-SC- 24DC/500AC-0,6	**2900558**	1
	ELR H5-ES-SC-230AC/500AC-0,6	**2900688**	1

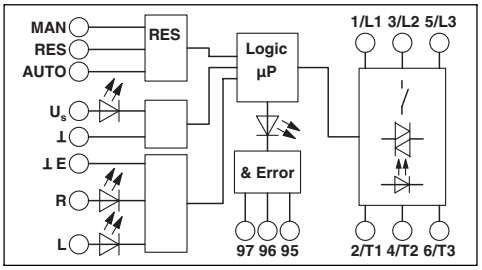
Ordering data

Description	Type	Order No.	Pcs. / Pkt.
"3 in 1" hybrid motor starter, incl. right contactor, left contactor, and emergency stop			
	ELR H5-ES-SC- 24DC/500AC-2	**2900559**	1
	ELR H5-ES-SC-230AC/500AC-2	**2900560**	1

N

For reversing 3~ AC motors up to 550 V AC/3 x 9 A

Ex:



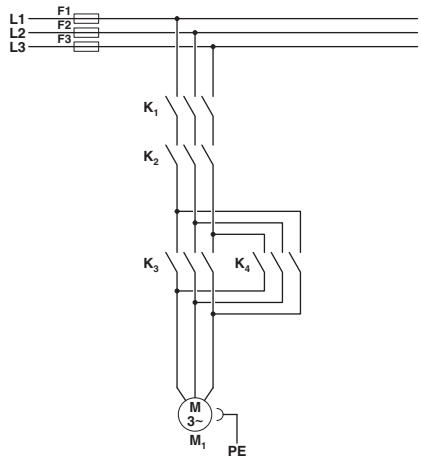
Technical data

ELR H5-ES-SC- 24DC/500AC-9	ELR H5-ES-SC-230AC/500AC-9
24 V DC	230 V AC
0.8 ... 1.25	0.4 ... 1.1
35 mA	3.5 mA
24 V DC	230 V AC
0.8 ... 1.25	0.4 ... 1.1
3 mA	7 mA
Protection against polarity reversal, surge protection	Surge protection
Green LED / Yellow LED / Red LED	
48 V AC ... 550 V AC	48 V AC ... 550 V AC
Max. 9 A (see derating curve)	Max. 9 A (see derating curve)
100 A (t = 10 ms)	100 A (t = 10 ms)
1.5 A	1.5 A
< 0.3 V	< 0.3 V
0 mA	0 mA
Surge protection	
500 V	
6 kV/safe isolation	4 kV/safe isolation
-25°C ... 70°C	
3 x 10^7 cycles	
DIN EN 50178 / EN 60947	
IP20	
Vertical (horizontal DIN rail)	
Can be aligned with spacing = 20 mm	
0.14 - 2.5 mm^2 / 0.14 - 2.5 mm^2 / 26 - 12	
22.5 mm / 99 mm / 114.5 mm	
Ex II (2) G, Ex II (2) D	Ex II (2) G, Ex II (2) D
PTB 07 ATEX 3145	PTB 07 ATEX 3145

Ordering data

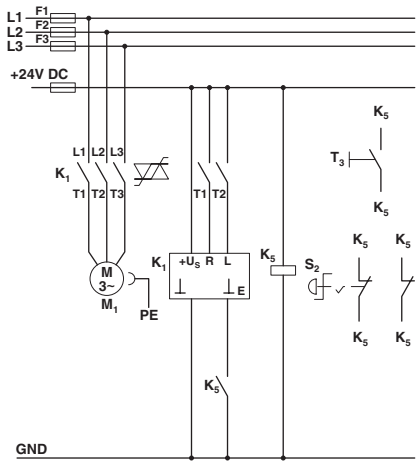
Type	Order No.	Pcs. / Pkt.
ELR H5-ES-SC- 24DC/500AC-9	2900561	1
ELR H5-ES-SC-230AC/500AC-9	2900562	1

Conventional structure
Main current path contactor according to category 3



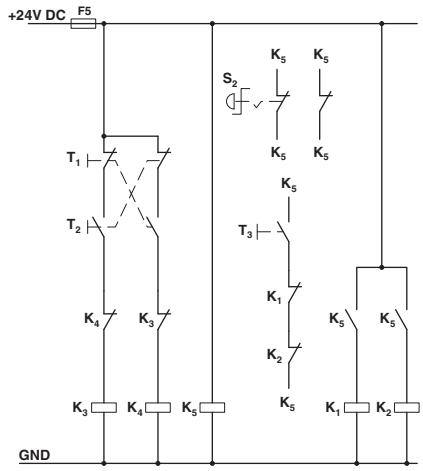
K1 + K2 = Emergency stop contactor
K3 = Left contactor
K4 = Right contactor

Structure with CONTACTRON
Main and control current path for "3 in 1" hybrid motor starter with reversing function according to category 3

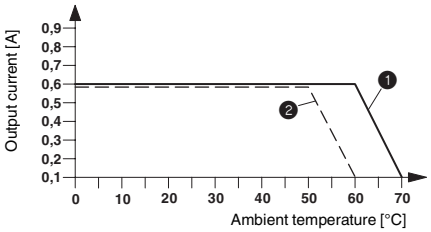


K1 = "3 in 1" hybrid motor starter with reversing function
K5 = PSR SCP-24DC.../Safety relay
T1 = Left, T2 = Right, T3 = Reset
S2 = Emergency stop

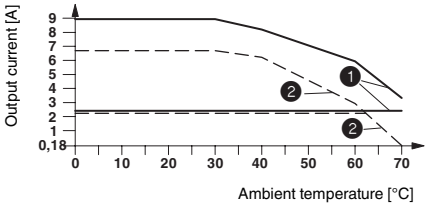
Conventional structure
Control current path contactor according to category 3



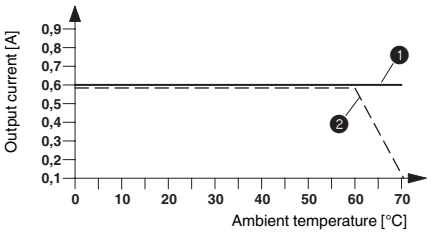
K1 + K2 = Emergency stop contactor
K3 = Left contactor
K4 = Right contactor
K5 = PSR SCP-24DC.../Safety relay
T1 = Left, T2 = Right, T3 = Reset
S2 = Emergency stop



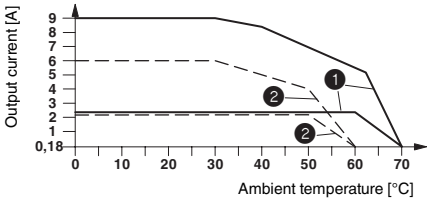
Derating curve ELR H5-ES-SC-230AC/500AC-0,6
100% operating time



Derating curve ELR H5-ES-SC-24DC/500AC-2 and ELR H5-ES-SC-24DC/500AC-9
100% operating time



Derating curve ELR H5-ES-SC-24DC/500AC-0,6
100% operating time



Derating curve ELR H5-ES-SC-230AC/500AC-2 and ELR H5-ES-SC-230AC/500AC-9
100% operating time

❶ Aligned with > 20 mm spacing
❷ Aligned without spacing

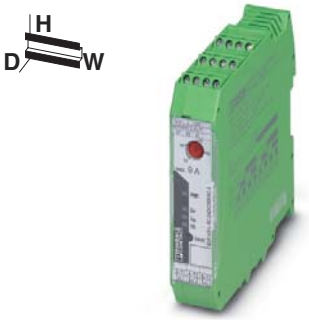
"2 in 1" hybrid motor starter with motor protection

These 3-phase "2 in 1" hybrid motor starters combine two functions in one device: right contactor and motor protection.

The devices offer the following advantages:

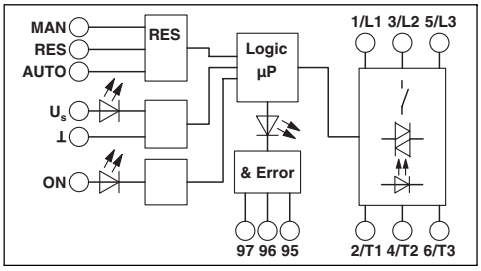
- 22.5 mm wide
- They save wiring
- Bi-metal function can be set up to 9 A
- Low-wear switching
- Long service life
- Space-saving
- 3-phase loop bridging

N

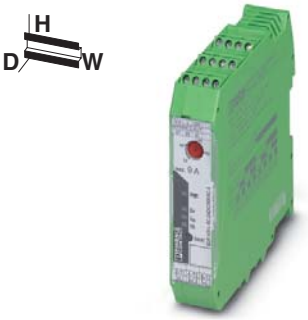


For starting 3~ AC motors up to 550 V AC/3 x 0.6 A

Ex:

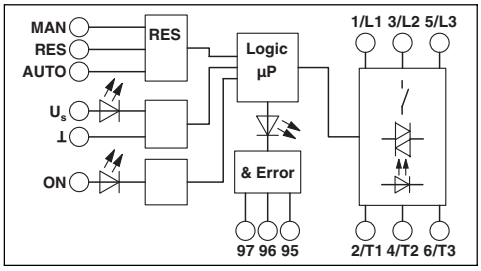


N



For starting 3~ AC motors up to 550 V AC/3 x 2 A

Ex:



Technical data

Input data	ELR H3-I-SC- 24DC/500AC-0,6	ELR H3-I-SC-230AC/500AC-0,6
Rated control supply voltage U_S	24 V DC	230 V AC
Rated control supply voltage range with reference to U_S	0.8 ... 1.25	0.4 ... 1.1
Rated control supply current I_S at U_S	35 mA	3.5 mA
Rated actuation voltage U_C ON	24 V DC	230 V AC
Rated actuating voltage range with reference to U_C	0.8 ... 1.25	0.4 ... 1.1
Rated actuating current I_C at U_C	3 mA	7 mA
Input circuit	Protection against polarity reversal, surge protection	Surge protection
Operating voltage / status / error indicator	Green LED / Yellow LED / Red LED	
Output data load side		
Output voltage range	48 V AC ... 550 V AC	48 V AC ... 550 V AC
Load current	Max. 600 mA (see derating curve)	Max. 600 mA (see derating curve)
Surge current	100 A (t = 10 ms)	100 A (t = 10 ms)
Min. load current	100 mA	100 mA
Residual voltage	< 0.2 V	< 0.2 V
Leakage current	0 mA	0 mA
Output protection	Surge protection	
General data		
Rated insulation voltage	500 V	
Rated surge voltage	6 kV/safe isolation	4 kV/safe isolation
Switching frequency		
Ambient temperature (operation)	-25°C ... 70°C	
Electrical service life	3 x 10^7 cycles	
Standards / regulations	DIN EN 50178 / EN 60947	
Degree of protection according to IEC 60529/EN 60529	IP20	
Mounting position	Vertical (horizontal DIN rail)	
Mounting	Can be aligned with spacing = 20 mm	
Screw connection solid / stranded / AWG	0.14 - 2.5 mm^2 / 0.14 - 2.5 mm^2 / 26 - 12	
Dimensions W / H / D	22.5 mm / 99 mm / 114.5 mm	

Technical data

Input data	ELR H3-I-SC- 24DC/500AC-2	ELR H3-I-SC-230AC/500AC-2
Rated control supply voltage U_S	24 V DC	230 V AC
Rated control supply voltage range with reference to U_S	0.8 ... 1.25	0.4 ... 1.1
Rated control supply current I_S at U_S	35 mA	3.5 mA
Rated actuation voltage U_C ON	24 V DC	230 V AC
Rated actuating voltage range with reference to U_C	0.8 ... 1.25	0.4 ... 1.1
Rated actuating current I_C at U_C	3 mA	7 mA
Input circuit	Protection against polarity reversal, surge protection	Surge protection
Operating voltage / status / error indicator	Green LED / Yellow LED / Red LED	
Output data load side		
Output voltage range	48 V AC ... 550 V AC	48 V AC ... 550 V AC
Load current	Max. 2.4 A (see derating curve)	Max. 2.4 A (see derating curve)
Surge current	100 A (t = 10 ms)	100 A (t = 10 ms)
Min. load current	180 mA	180 mA
Residual voltage	< 0.3 V	< 0.3 V
Leakage current	0 mA	0 mA
Output protection	Surge protection	
General data		
Rated insulation voltage	500 V	
Rated surge voltage	6 kV/safe isolation	4 kV/safe isolation
Switching frequency		
Ambient temperature (operation)	-25°C ... 70°C	
Electrical service life	3 x 10^7 cycles	
Standards / regulations	DIN EN 50178 / EN 60947	
Degree of protection according to IEC 60529/EN 60529	IP20	
Mounting position	Vertical (horizontal DIN rail)	
Mounting	Can be aligned with spacing = 20 mm	
Screw connection solid / stranded / AWG	0.14 - 2.5 mm^2 / 0.14 - 2.5 mm^2 / 26 - 12	
Dimensions W / H / D	22.5 mm / 99 mm / 114.5 mm	

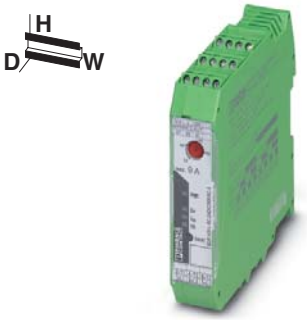
Ordering data

Description	Type	Order No.	Pcs. / Pkt.
"2 in 1" hybrid motor starter, incl. right contactor and motor protection relay			
	ELR H3-I-SC- 24DC/500AC-0,6	**2900542**	1
	ELR H3-I-SC-230AC/500AC-0,6	**2900685**	1

Ordering data

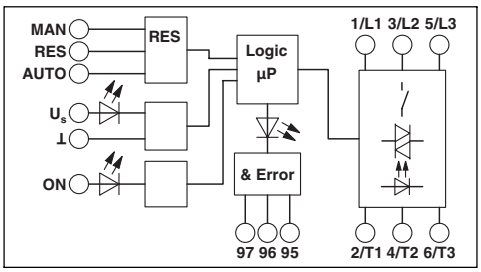
Type	Order No.	Pcs. / Pkt.
ELR H3-I-SC- 24DC/500AC-2	**2900543**	1
ELR H3-I-SC-230AC/500AC-2	**2900544**	1

N



For starting 3~ AC motors up to 550 V AC/3 x 9 A

Ex:



Technical data

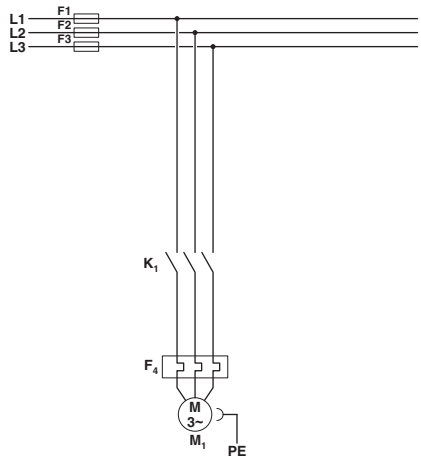
ELR H3-I-SC- 24DC/500AC-9	ELR H3-I-SC-230AC/500AC-9
24 V DC	230 V AC
0.8 ... 1.25	0.4 ... 1.1
35 mA	3.5 mA
24 V DC	230 V AC
0.8 ... 1.25	0.4 ... 1.1
3 mA	7 mA
Protection against polarity reversal, surge protection	Surge protection
Green LED / Yellow LED / Red LED	
48 V AC ... 550 V AC	48 V AC ... 550 V AC
Max. 9 A (see derating curve)	Max. 9 A (see derating curve)
100 A (t = 10 ms)	100 A (t = 10 ms)
1.5 A	1.5 A
< 0.5 V	< 0.5 V
0 mA	0 mA
Surge protection	
500 V	
6 kV/safe isolation	4 kV/safe isolation

-25°C ... 70°C
3 x 10^7 cycles
DIN EN 50178 / EN 60947
IP20
Vertical (horizontal DIN rail)
Can be aligned with spacing = 20 mm
0.14 - 2.5 mm^2 / 0.14 - 2.5 mm^2 / 26 - 12
22.5 mm / 99 mm / 114.5 mm

Ordering data

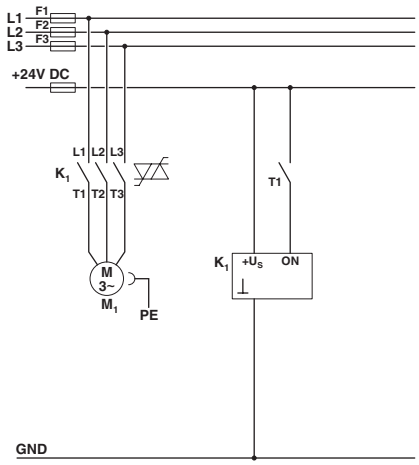
Type	Order No.	Pcs. / Pkt.
ELR H3-I-SC- 24DC/500AC-9	**2900545**	1
ELR H3-I-SC-230AC/500AC-9	**2900546**	1

Conventional structure
Main current path reversing contactor according to category 3



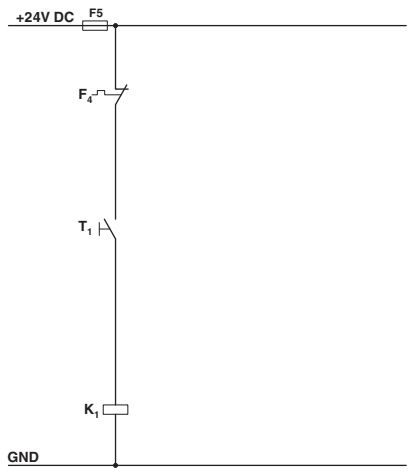
K1 = Right contactor
F4 = Motor protection relay

Structure with CONTACTRON
Main and control current path for "2 in 1" hybrid motor starter according to category 3

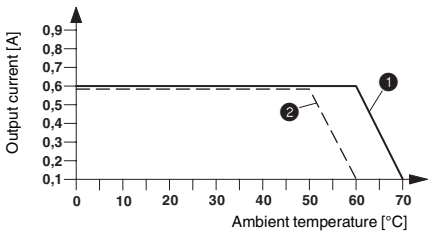


K1 = "2 in 1" hybrid motor starter
T1 = Right, T3 = Reset

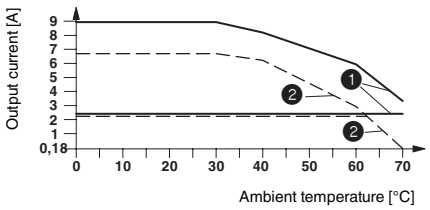
Conventional structure
Control current path contactor according to category 3



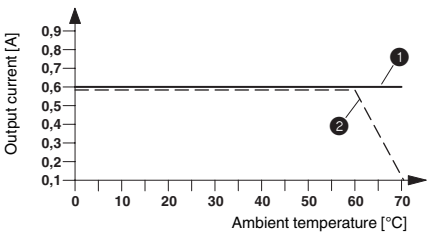
K1 = Right contactor
T1 = Right, T3 = Reset
F4 = Motor protection relay



Derating curve ELR H3-I-SC-230AC/500AC-0,6
100% operating time

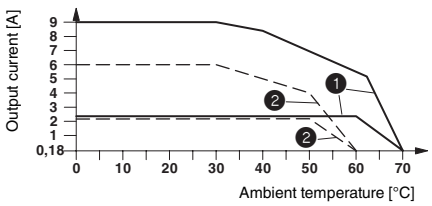


Derating curve ELR H3-I-SC-24DC/500AC-2 and
ELR H3-I-SC-24DC/500AC-9
100% operating time



Derating curve ELR H3-I-SC-24DC/500AC-0,6
100% operating time

❶ Aligned with > 20 mm spacing
❷ Aligned without spacing



Derating curve ELR H3-I-SC-230AC/500AC-2 and
ELR H3-I-SC-230AC/500AC-9
100% operating time

"2 in 1" hybrid motor starter with emergency stop

These 3-phase "2 in 1" hybrid motor starters combine two functions in one device: right contactor and emergency stop up to category 3.

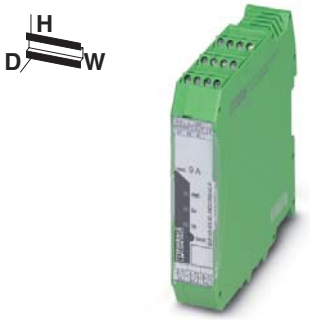
The devices offer the following advantages:

- 22.5 mm wide
- They save wiring
- Up to 9 A
- Low-wear switching
- Long service life
- Space-saving
- 3-phase loop bridging

Safety level according to:

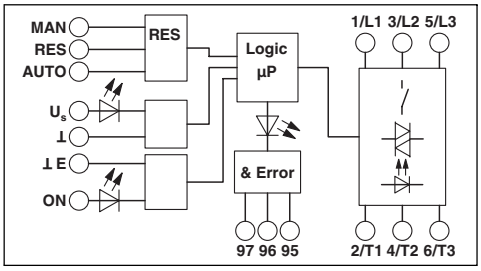
- IEC 61508-1: SIL3
- ISO 13849: PL e
- 3-phase loop bridging

N

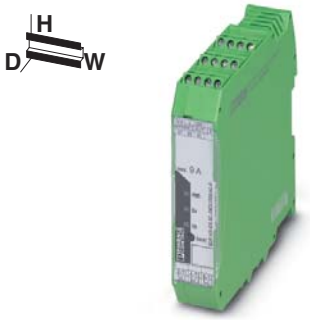


For starting 3~ AC motors up to 550 V AC/3 x 0.6 A

Ex:

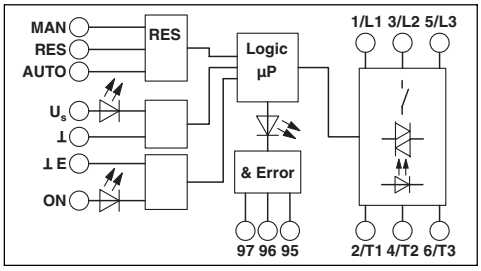


N



For starting 3~ AC motors up to 550 V AC/3 x 2 A

Ex:



Technical data

Input data	ELR H3-ES-SC- 24DC/500AC-0,6	ELR H3-ES-SC-230AC/500AC-0,6
Rated control supply voltage U_S	24 V DC	230 V AC
Rated control supply voltage range with reference to U_S	0.8 ... 1.25	0.4 ... 1.1
Rated control supply current I_S at U_S	35 mA	3.5 mA
Rated actuation voltage U_C ON	24 V DC	230 V AC
Rated actuating voltage range with reference to U_C	0.8 ... 1.25	0.4 ... 1.1
Rated actuating current I_C at U_C	3 mA	7 mA
Input circuit	Protection against polarity reversal, surge protection	Surge protection
Operating voltage / status / error indicator	Green LED / Yellow LED / Red LED	
Output data load side		
Output voltage range	48 V AC ... 550 V AC	48 V AC ... 550 V AC
Load current	Max. 600 mA (see derating curve)	Max. 600 mA (see derating curve)
Surge current	100 A (t = 10 ms)	100 A (t = 10 ms)
Min. load current	100 mA	100 mA
Residual voltage	< 0.3 V	< 0.2 V
Leakage current	0 mA	0 mA
Output protection	Surge protection	
General data		
Rated insulation voltage	500 V	
Rated surge voltage	6 kV/safe isolation	4 kV/safe isolation
Switching frequency		
Ambient temperature (operation)	-25°C ... 70°C	
Electrical service life	3 x 10^7 cycles	
Standards / regulations	DIN EN 50178 / EN 60947	
Degree of protection according to IEC 60529/EN 60529	IP20	
Mounting position	Vertical (horizontal DIN rail)	
Mounting	Can be aligned with spacing = 20 mm	
Screw connection solid / stranded / AWG	0.14 - 2.5 mm^2 / 0.14 - 2.5 mm^2 / 26 - 12	
Dimensions W / H / D	22.5 mm / 99 mm / 114.5 mm	
Safety data		
EC-type examination certificate according to ATEX	Ex II (2) G, Ex II (2) D PTB 07 ATEX 3145	Ex II (2) G, Ex II (2) D PTB 07 ATEX 3145

Technical data

Input data	ELR H3-ES-SC- 24DC/500AC-2	ELR H3-ES-SC-230AC/500AC-2
Rated control supply voltage U_S	24 V DC	230 V AC
Rated control supply voltage range with reference to U_S	0.8 ... 1.25	0.4 ... 1.1
Rated control supply current I_S at U_S	35 mA	3.5 mA
Rated actuation voltage U_C ON	24 V DC	230 V AC
Rated actuating voltage range with reference to U_C	0.8 ... 1.25	0.4 ... 1.1
Rated actuating current I_C at U_C	3 mA	7 mA
Input circuit	Protection against polarity reversal, surge protection	Surge protection
Operating voltage / status / error indicator	Green LED / Yellow LED / Red LED	
Output data load side		
Output voltage range	48 V AC ... 550 V AC	48 V AC ... 550 V AC
Load current	Max. 2.4 A (see derating curve)	Max. 2.4 A (see derating curve)
Surge current	100 A (t = 10 ms)	100 A (t = 10 ms)
Min. load current	180 mA	180 mA
Residual voltage	< 0.3 V	< 0.3 V
Leakage current	0 mA	0 mA
Output protection	Surge protection	
General data		
Rated insulation voltage	500 V	
Rated surge voltage	6 kV/safe isolation	4 kV/safe isolation
Switching frequency		
Ambient temperature (operation)	-25°C ... 70°C	
Electrical service life	3 x 10^7 cycles	
Standards / regulations	DIN EN 50178 / EN 60947	
Degree of protection according to IEC 60529/EN 60529	IP20	
Mounting position	Vertical (horizontal DIN rail)	
Mounting	Can be aligned with spacing = 20 mm	
Screw connection solid / stranded / AWG	0.14 - 2.5 mm^2 / 0.14 - 2.5 mm^2 / 26 - 12	
Dimensions W / H / D	22.5 mm / 99 mm / 114.5 mm	
Safety data		
EC-type examination certificate according to ATEX	Ex II (2) G, Ex II (2) D PTB 07 ATEX 3145	Ex II (2) G, Ex II (2) D PTB 07 ATEX 3145

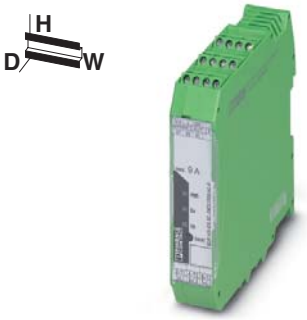
Ordering data

Description	Type	Order No.	Pcs. / Pkt.
"2 in 1" hybrid motor starter, incl. right contactor and emergency stop			
	ELR H3-ES-SC- 24DC/500AC-0,6	**2900550**	1
	ELR H3-ES-SC-230AC/500AC-0,6	**2900686**	1

Ordering data

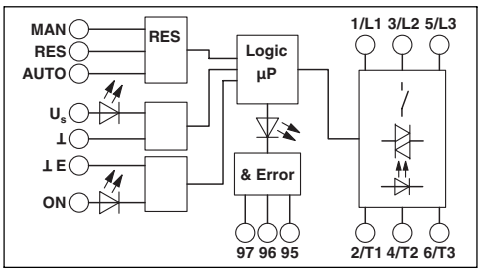
Type	Order No.	Pcs. / Pkt.
ELR H3-ES-SC- 24DC/500AC-2	**2900552**	1
ELR H3-ES-SC-230AC/500AC-2	**2900553**	1

N



For starting 3~ AC motors up to 550 V AC/3 x 9 A

Ex:



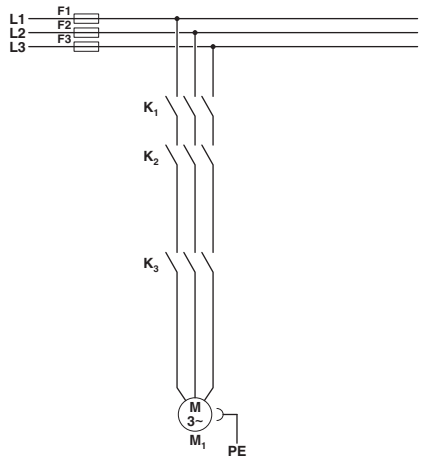
Technical data

ELR H3-ES-SC- 24DC/500AC-9	ELR H3-ES-SC-230AC/500AC-9
24 V DC	230 V AC
0.8 ... 1.25	0.4 ... 1.1
35 mA	3.5 mA
24 V DC	230 V AC
0.8 ... 1.25	0.4 ... 1.1
3 mA	7 mA
Protection against polarity reversal, surge protection	Surge protection
Green LED / Yellow LED / Red LED	
48 V AC ... 550 V AC	48 V AC ... 550 V AC
Max. 9 A (see derating curve)	Max. 9 A (see derating curve)
100 A (t = 10 ms)	100 A (t = 10 ms)
1.5 A	1.5 A
< 0.5 V	< 0.5 V
0 mA	0 mA
Surge protection	
500 V	
6 kV/safe isolation	4 kV/safe isolation
-25°C ... 70°C	
3 x 10^7 cycles	
DIN EN 50178 / EN 60947	
IP20	
Vertical (horizontal DIN rail)	
Can be aligned with spacing = 20 mm	
0.14 - 2.5 mm^2 / 0.14 - 2.5 mm^2 / 26 - 12	
22.5 mm / 99 mm / 114.5 mm	
Ex II (2) G, Ex II (2) D	Ex II (2) G, Ex II (2) D
PTB 07 ATEX 3145	PTB 07 ATEX 3145

Ordering data

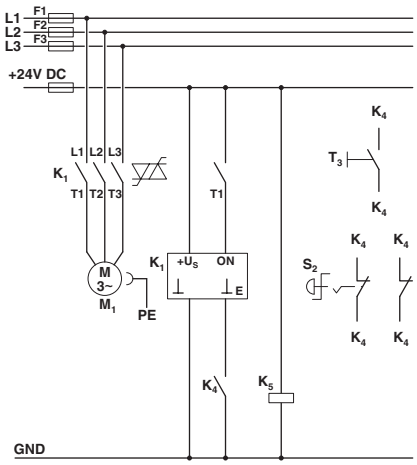
Type	Order No.	Pcs. / Pkt.
ELR H3-ES-SC- 24DC/500AC-9	**2900554**	1
ELR H3-ES-SC-230AC/500AC-9	**2900555**	1

Conventional structure
Main current path contactor according to category 3



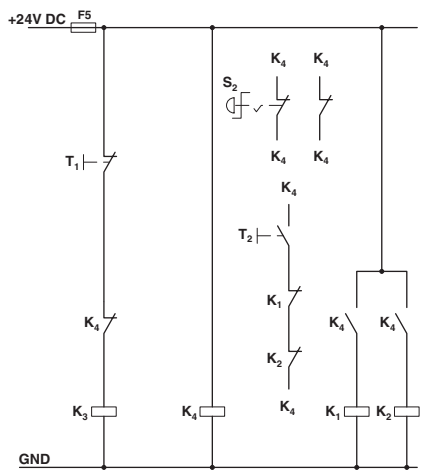
K1 + K2 = Emergency stop contactor
K3 = Right contactor

Structure with CONTACTRON
Main and control current path for "2 in 1" hybrid motor starter according to category 3

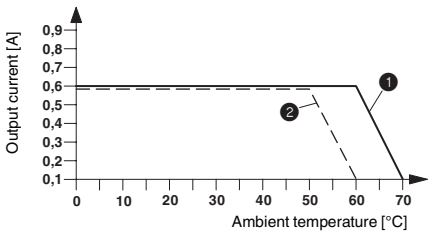


K1 = "2 in 1" hybrid motor starter
K4 = PSR SCP-24DC.../Safety relay
T1 = Right, T3 = Reset
S2 = Emergency stop

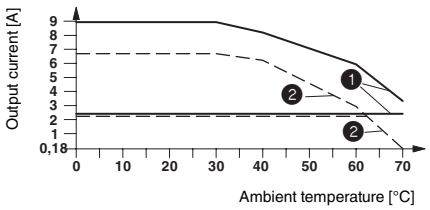
Conventional structure
Control current path contactor according to category 3



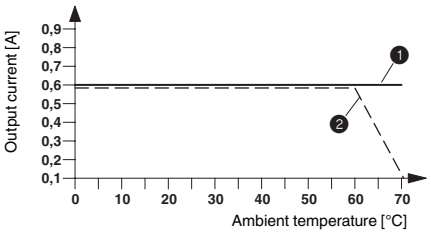
K1 + K2 = Emergency stop contactor
K3 = Right contactor
K4 = PSR SCP-24DC.../Safety relay
T1 = Right, T3 = Reset
S2 = Emergency stop



Derating curve ELR H3-ES-SC-230AC/500AC-0,6
100% operating time

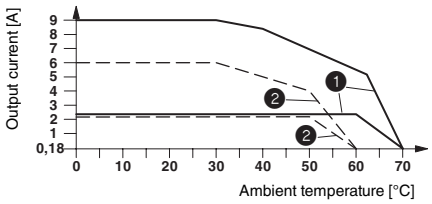


Derating curve ELR H3-ES-SC-24DC/500AC-2 and ELR H3-ES-SC-24DC/500AC-9
100% operating time



Derating curve ELR H3-ES-SC-24DC/500AC-0,6
100% operating time

❶ Aligned with > 20 mm spacing
❷ Aligned without spacing



Derating curve ELR H3-ES-SC-230AC/500AC-2 and ELR H3-ES-SC-230AC/500AC-9
100% operating time

"2 in 1" hybrid motor starter with reversing function

3-phase hybrid motor starter for reversing three-phase induction motors

The devices offer the following advantages:

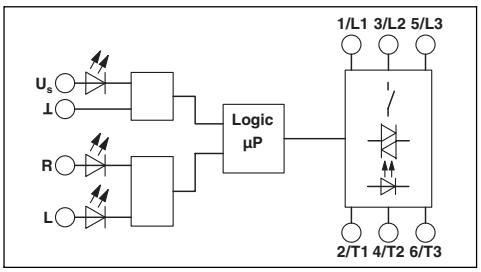
- 22.5 mm wide
- They save wiring
- Up to 9 A
- Low-wear switching
- Long service life
- Space-saving
- 3-phase loop bridging

Notes:

Type of housing:
Polyamide PA non-reinforced, color: Green.

For marking systems and mounting material, see CLIPLINE catalog, part 2.

For reversing 3~ AC motors up to 550 V AC/3 x 9 A

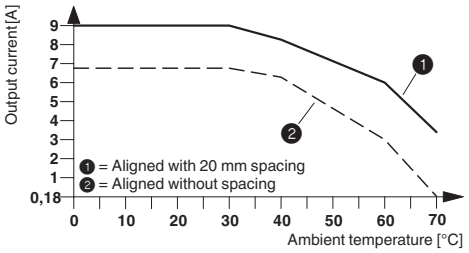


Technical data

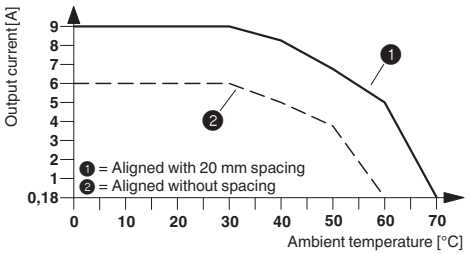
Input data	ELR H5-SC- 24DC/500AC-9	ELR H5-SC-230AC/500AC-9
Rated control supply voltage U_S	24 V DC	230 V AC
Rated control supply voltage range with reference to U_S	0.8 ... 1.25	0.4 ... 1.1
Rated control supply current I_S at U_S	40 mA	4 mA
Rated actuating voltage U_C R/L	24 V DC	230 V AC
Rated actuating voltage range with reference to U_C	0.8 ... 1.25	0.4 ... 1.1
Rated actuating current I_C at U_C	3 mA	7 mA
Input circuit	Protection against polarity reversal, surge protection	Surge protection
Operating voltage / status / error indicator	Green LED / Yellow LED / Red LED	
Output data load side		
Output voltage range	42 V AC ... 550 V AC	42 V AC ... 550 V AC
Load current	Max. 9 A (see derating curve)	Max. 9 A (see derating curve)
Surge current	100 A (t = 10 ms)	100 A (t = 10 ms)
Min. load current	1.5 A	1.5 A
Residual voltage	< 0.5 V	< 0.5 V
Leakage current	0 mA	0 mA
Output protection	Surge protection	
General data		
Rated insulation voltage	500 V	
Rated surge voltage	6 kV/safe isolation	4 kV/safe isolation
Reversing frequency	Max. 2 Hz	Max. 2 Hz
Ambient temperature (operation)	-25°C ... 70°C	
Electrical service life	3 x 10^7 cycles	
Standards / regulations	DIN EN 50178 / EN 60947	
Degree of protection according to IEC 60529/EN 60529	IP20	
Mounting position	Vertical (horizontal DIN rail)	
Mounting	Can be aligned with spacing = 20 mm	
Screw connection solid / stranded / AWG	0.14 - 2.5 mm^2 / 0.14 - 2.5 mm^2 / 26 - 12	
Dimensions W / H / D	22.5 mm / 99 mm / 114.5 mm	

Ordering data

Description	Type	Order No.	Pcs. / Pkt.
"2 in 1" hybrid motor starter, incl. right contactor and left contactor	**ELR H5-SC- 24DC/500AC-9**	**2900538**	1
	ELR H5-SC-230AC/500AC-9	**2900539**	1



Derating curve for ELR H3-SC-24DC/500AC-9 100% operating time



Derating curve for ELR H3-SC-230AC/500AC-9 100% operating time

"1 in 1" hybrid motor starter

3-phase hybrid motor starter for starting three-phase induction motors

The devices offer the following advantages:

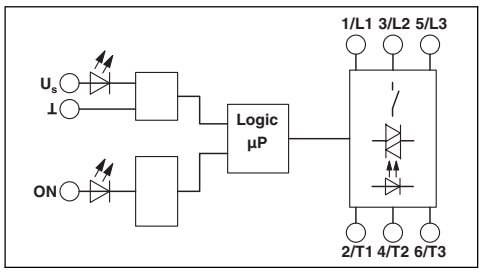
- 22.5 mm wide
- Low-wear switching
- Up to 9 A
- Long service life
- Space-saving
- 3-phase loop bridging

Notes:

Type of housing:
Polyamide PA non-reinforced, color: Green.

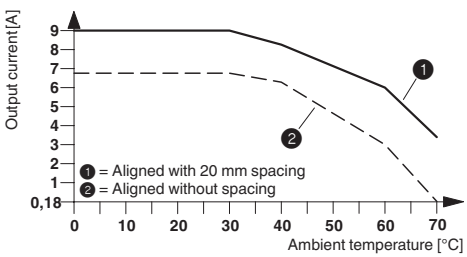
For marking systems and mounting material, see CLIPLINE catalog, part 2.

For starting 3~ AC motors up to 550 V AC/3 x 9 A

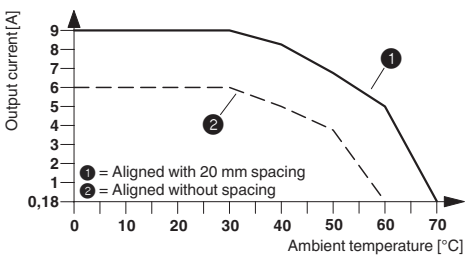


Technical data

Input data	ELR H3-SC- 24DC/500AC-9	ELR H3-SC-230AC/500AC-9
Rated control supply voltage U_S	24 V DC	230 V AC
Rated control supply voltage range with reference to U_S	0.8 ... 1.25	0.4 ... 1.1
Rated control supply current I_S at U_S	40 mA	4 mA
Rated actuation voltage U_C ON	24 V DC	230 V AC
Rated actuating voltage range with reference to U_C	0.8 ... 1.25	0.4 ... 1.1
Rated actuating current I_C at U_C	3 mA	7 mA
Input circuit	Protection against polarity reversal, surge protection	Surge protection
Operating voltage / status / error indicator	Green LED / Yellow LED / Red LED	
Output data load side		
Output voltage range	42 V AC ... 550 V AC	42 V AC ... 550 V AC
Load current	Max. 9 A (see derating curve)	Max. 9 A (see derating curve)
Surge current	100 A (t = 10 ms)	100 A (t = 10 ms)
Min. load current	1.5 A	1.5 A
Residual voltage	< 0.5 V	< 0.5 V
Leakage current	0 mA	0 mA
Output protection	Surge protection	
General data		
Rated insulation voltage	500 V	
Rated surge voltage	6 kV/safe isolation	4 kV/safe isolation
Switching frequency	Max. 2 Hz	Max. 2 Hz
Ambient temperature (operation)	-25°C ... 70°C	
Electrical service life	3 x 10^7 cycles	
Standards / regulations	DIN EN 50178 / EN 60947	
Degree of protection according to IEC 60529/EN 60529	IP20	
Mounting position	Vertical (horizontal DIN rail)	
Mounting	Can be aligned with spacing = 20 mm	
Screw connection solid / stranded / AWG	0.14 - 2.5 mm^2 / 0.14 - 2.5 mm^2 / 26 - 12	
Dimensions W / H / D	22.5 mm / 99 mm / 114.5 mm	



Derating curve for ELR H5-SC-24DC/500AC-9 100% operating time



Derating curve for ELR H5-SC-230AC/500AC-9 100% operating time

Ordering data

Description	Type	Order No.	Pcs. / Pkt.
"1 in 1" hybrid motor starter, incl. right contactor			
	ELR H3-SC- 24DC/500AC-9	**2900530**	1
	ELR H3-SC-230AC/500AC-9	**2900531**	1

CONTACTRON bridge

The flexible CONTACTRON loop bridge (BRIDGE-…) simplifies the supply and looping through of phases L1, L2, and L3. It is available in 2 to 10-way versions for modules in the CONTACTRON family with 22.5 mm housing width.

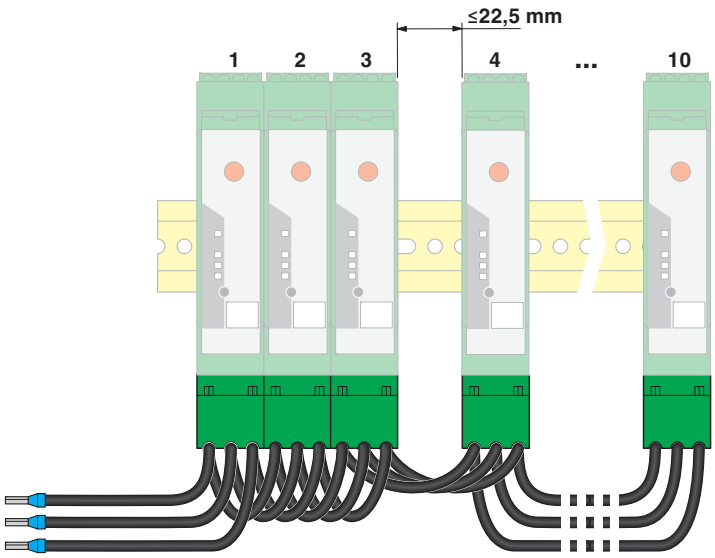
Features of the 3-phase loop bridge:

– Saves considerable wiring
– Suitable for CONTACTRON series
  - ELR H3…
  - ELR H5…
  - ELR (W)3…
  - EMM…IFS
– Bridging of 2 to 10 devices with maximum module spacing of 22.5 mm
– Up to 575 V AC/3 x 25 A
– Additional bridge versions available on request

0.3 m connecting cable with ferrules

	Technical data
General data	
Nominal voltage U_N	575 V AC
Nominal current at U_N	25 A
Cross section	2.5 mm²

Description	Type	Order No.	Pcs. / Pkt.
3-phase loop bridge			
2-way	**BRIDGE- 2**	**2900746**	1
3-way	**BRIDGE- 3**	**2900747**	1
4-way	**BRIDGE- 4**	**2900748**	1
5-way	**BRIDGE- 5**	**2900749**	1
6-way	**BRIDGE- 6**	**2900750**	1
7-way	**BRIDGE- 7**	**2900751**	1
8-way	**BRIDGE- 8**	**2900752**	1
9-way	**BRIDGE- 9**	**2900753**	1
10-way	**BRIDGE-10**	**2900754**	1



N

3 m connecting cable without ferrules

Technical data

575 V AC
25 A
2.5 mm²

Ordering data

Type	Order No.	Pcs. / Pkt.
BRIDGE- 2-3M	**2901543**	1
BRIDGE- 3-3M	**2901656**	1
BRIDGE- 4-3M	**2901659**	1
BRIDGE- 5-3M	**2901545**	1
BRIDGE- 6-3M	**2901697**	1
BRIDGE- 7-3M	**2901698**	1
BRIDGE- 8-3M	**2901700**	1
BRIDGE- 9-3M	**2901701**	1
BRIDGE-10-3M	**2901702**	1

Three-phase solid-state reversing contactors

The three-phase solid-state reversing contactors with an integrated locking circuit and load wiring are intended for applications such as control valves, slides, separating filters, ship steering gears, etc. The scope of performance ranges from 575 V AC/3 x 2 A to 575 V AC/3 x 37 A.

Advantages of three-phase solid-state reversing contactors:

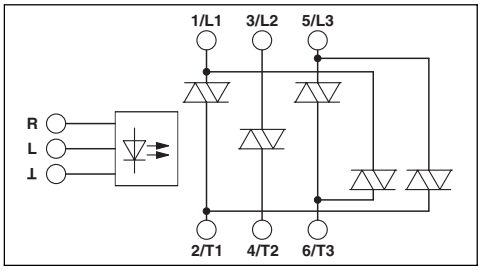
- Noise-free and wear-free switching
- Integrated protective circuit
- Stable and short switching times
- Long service life
- High switching frequency
- Integrated locking and load wiring
- Thermal fuse optional

Notes:

Type of insulation housing:
ELR W 3...2, ELR W 3...9
Polyamide PA non-reinforced, color: Green
ELR W 3...16, ELR W 3...37
Polyester PBT non-reinforced, color: Green

For marking systems and mounting material, see CLIPLINE catalog, part 2.

For reversing 3~ AC motors up to 575 V AC/3 x 2 A



Technical data

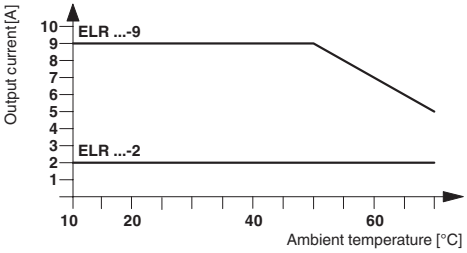
Input data	ELR W3- 24DC/500AC- 2	ELR W3-230AC/500AC- 2
Rated actuating voltage U_C R/L	24 V DC	230 V AC
Rated actuating voltage range with reference to U_C	0.8 ... 1.25	0.4 ... 1.1
Rated actuating current I_C at U_C	12.7 mA	11.2 mA
Input circuit	Protection against polarity reversal, surge protection	Surge protection
Operating voltage / status / error indicator	- / Yellow LED / Red LED	
Output data load side		
Output voltage range	48 V AC ... 575 V AC	48 V AC ... 575 V AC
Periodic peak reverse voltage	1200 V	1200 V
Load current	Max. 2 A (see derating curve)	Max. 2 A (see derating curve)
Surge current	200 A (t = 10 ms)	200 A (t = 10 ms)
Min. load current	100 mA	100 mA
Residual voltage	< 1.5 V	< 1.5 V
Leakage current	6 mA	6 mA
Max. load value I^2 x t (t = 10 ms)	250 A^2s	250 A^2s
Output protection	RCV circuit	
General data		
Rated insulation voltage	500 V	
Rated surge voltage	6 kV / basic insulation	6 kV / basic insulation
Reversing frequency	Max. 10 Hz	Max. 2 Hz
Switching frequency	Max. 5 Hz	Max. 1 Hz
Ambient temperature (operation)	-25°C ... 70°C	
Standards / regulations	DIN EN 50178 / EN 60947	
Power station requirements	DWR 1300 / ZXX01/DD/7080.8d	
Degree of protection according to IEC 60529/EN 60529	IP20	
Mounting position	Vertical (horizontal DIN rail)	
Mounting	Can be aligned with spacing = 20 mm	
Screw connection solid / stranded / AWG		
- Control side	0.14 - 2.5 mm^2 / 0.14 - 2.5 mm^2 / 26 - 12	
- Load side	0.14 - 2.5 mm^2 / 0.14 - 2.5 mm^2 / 26 - 12	
Dimensions W / H / D	40 mm / 99 mm / 114.5 mm	

Ordering data

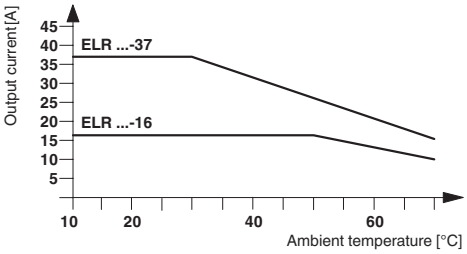
Description	Type	Order No.	Pcs. / Pkt.
3-phase solid-state reversing contactor			
	ELR W3- 24DC/500AC- 2	**2297293**	1
	ELR W3-230AC/500AC- 2	**2297303**	1

Accessories

Thermal fuse	**THERMAL FUSE TF104**	**2900796**	1



Load current as a function of the ambient temperature
Operating time: 100% operating factor

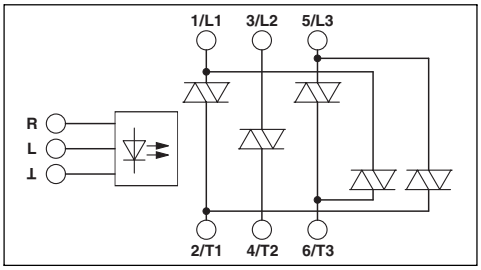


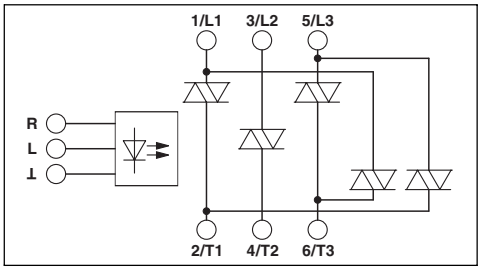
Load current as a function of the ambient temperature
Operating time: 100% operating factor

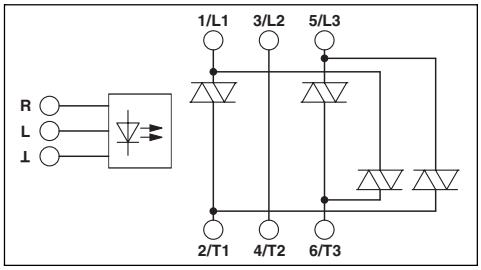
For reversing 3~ AC motors up to 575 V AC/3 x 9 A

For reversing 3~ AC motors up to 575 V AC/3 x 16 A

For reversing 3~ AC motors up to 575 V AC/3 x 37 A







Technical data

ELR W3- 24DC/500AC- 9	ELR W3-230AC/500AC- 9
24 V DC	230 V AC
0.8 ... 1.25	0.4 ... 1.1
12.7 mA	11.2 mA
Protection against polarity reversal, surge protection	Surge protection
- / Yellow LED / Red LED	
48 V AC ... 575 V AC	48 V AC ... 575 V AC
1200 V	1200 V
Max. 9 A (see derating curve)	Max. 9 A (see derating curve)
300 A (t = 10 ms)	300 A (t = 10 ms)
100 mA	100 mA
< 1.5 V	< 1.5 V
6 mA	6 mA
580 A^2s	580 A^2s
RCV circuit	
500 V	
6 kV / basic insulation	6 kV / basic insulation
Max. 10 Hz	Max. 2 Hz
Max. 5 Hz	Max. 1 Hz
-25°C ... 70°C	
DIN EN 50178 / EN 60947	
DWR 1300 / ZXX01/DD/7080.8d	
IP20	
Vertical (horizontal DIN rail)	
Can be aligned with spacing = 20 mm	
0.14 - 2.5 mm^2 / 0.14 - 2.5 mm^2 / 26 - 12	
0.14 - 2.5 mm^2 / 0.14 - 2.5 mm^2 / 26 - 12	
67.5 mm / 99 mm / 114.5 mm	

Ordering data

Type	Order No.	Pcs. / Pkt.
ELR W3- 24DC/500AC- 9	**2297316**	1
ELR W3-230AC/500AC- 9	**2297329**	1

Accessories

THERMAL FUSE TF104	**2900796**	1

Technical data

ELR W3- 24DC/500AC-16	ELR W3-230AC/500AC-16
24 V DC	230 V AC
0.8 ... 1.25	0.4 ... 1.1
12.7 mA	11.2 mA
Protection against polarity reversal, surge protection	Surge protection
- / Yellow LED / Red LED	
48 V AC ... 575 V AC	48 V AC ... 575 V AC
1200 V	1200 V
Max. 16 A (see derating curve)	Max. 16 A (see derating curve)
300 A (t = 10 ms)	300 A (t = 10 ms)
100 mA	100 mA
< 1.5 V	< 1.5 V
6 mA	6 mA
580 A^2s	580 A^2s
RCV circuit	
500 V	
6 kV / basic insulation	6 kV / basic insulation
Max. 10 Hz	Max. 2 Hz
Max. 5 Hz	Max. 1 Hz
-25°C ... 70°C	
DIN EN 50178 / EN 60947	
DWR 1300 / ZXX01/DD/7080.8d	
IP20	
Vertical (horizontal DIN rail)	
Can be aligned with spacing = 40 mm	
0.2 - 4 mm^2 / 0.2 - 2.5 mm^2 / 24 - 12	
0.5 - 16 mm^2 / 0.5 - 16 mm^2 / 20 - 6	
147.5 mm / 99 mm / 114.5 mm	

Ordering data

Type	Order No.	Pcs. / Pkt.
ELR W3- 24DC/500AC-16	**2297332**	1
ELR W3-230AC/500AC-16	**2297345**	1

Accessories

THERMAL FUSE TF104	**2900796**	1

Technical data

ELR W2+1- 24DC/500AC-37	ELR W2+1-230AC/500AC-37
24 V DC	230 V AC
0.8 ... 1.25	0.4 ... 1.1
12.7 mA	11.2 mA
Protection against polarity reversal, surge protection	Surge protection
- / Yellow LED / Red LED	
48 V AC ... 575 V AC	48 V AC ... 575 V AC
1200 V	1200 V
Max. 37 A (see derating curve)	Max. 37 A (see derating curve)
1300 A (t = 10 ms)	1300 A (t = 10 ms)
200 mA	200 mA
< 1.5 V	< 1.5 V
6 mA	6 mA
9000 A^2s	9000 A^2s
RCV circuit	
500 V	
6 kV / basic insulation	6 kV / basic insulation
Max. 10 Hz	Max. 2 Hz
Max. 5 Hz	Max. 1 Hz
-25°C ... 70°C	
DIN EN 50178 / EN 60947	
DWR 1300 / ZXX01/DD/7080.8d	
IP20	
Vertical (horizontal DIN rail)	
Can be aligned with spacing = 40 mm	
0.2 - 4 mm^2 / 0.2 - 2.5 mm^2 / 24 - 12	
0.5 - 16 mm^2 / 0.5 - 16 mm^2 / 20 - 6	
147.5 mm / 99 mm / 114.5 mm	

Ordering data

Type	Order No.	Pcs. / Pkt.
ELR W2+1- 24DC/500AC-37	**2297374**	1
ELR W2+1-230AC/500AC-37	**2297387**	1

Accessories

THERMAL FUSE TF104	**2900796**	1

Electronic reversing load relays for 3-phase networks ELR W 3/9-...

3-phase electronic reversing load relays implement a contactor-type reverser-starter combination fully electronically. Since the corresponding interlocking of the control inputs is already implemented in the device, the wiring of the control circuit is omitted as well as the complete wiring on the load side. Therefore, the wiring work can be reduced to a minimum.

Common features of all ELR 3/9-...:

- LED display for right and left rotation, operating voltage, and non-permitted control
- Noiseless and wear-free switching up to 500 V AC/9 A
- High switching frequency
- Protective circuits in input and output

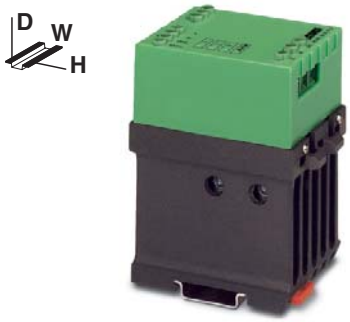
The ELR W 3/9-... can be used in control valves and conveying systems.

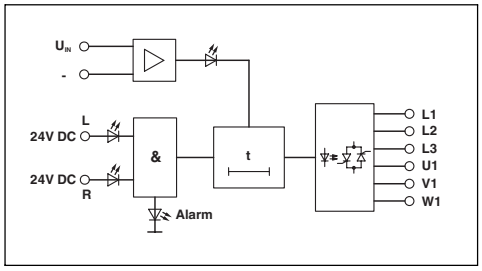
Notes:

Type of housing:
Polycarbonate PC, color: Green.

For marking systems and mounting material, see CLIPLINE catalog, part 2.

The operating voltage and control voltage inputs must be operated with power supply modules in acc. with DIN 19240 (max. 5% residual ripple). In order to avoid inductive or capacitive decoupling of disturbing pulses where long control wires are used, we recommend the use of shielded conductors.



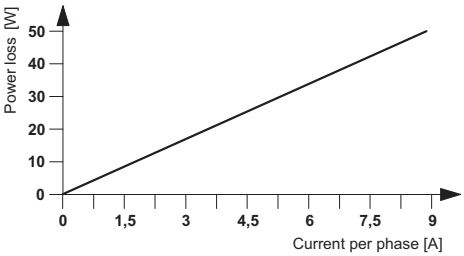


Technical data

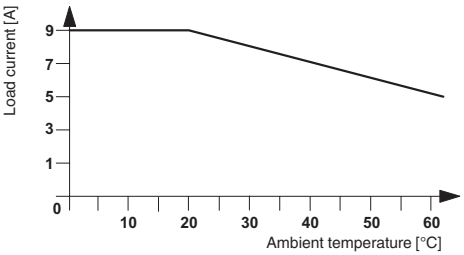
Input data	ELR W3/ 9-400	ELR W3/ 9-500
Supply nominal voltage U_{VN}	24 V DC	24 V DC
Supply voltage range with reference to U_{VN}	0.8 ... 1.25	0.8 ... 1.25
Quiescent current	40 mA	40 mA
Control voltage U_{ST} right/left	24 V DC	24 V DC
Control voltage range in reference to U_{ST}	0.8 ... 1.25	0.8 ... 1.25
Typ. input current at U_N	0.8 ... 1.25	0.8 ... 1.25
Input circuit	Protection against polarity reversal, surge protection	Protection against polarity reversal, surge protection
Operating voltage / status / error indicator	Green LED / Yellow LED / Red LED	
Output data load side		
Output voltage	400 V AC	500 V AC
Output voltage range	110 V AC ... 440 V AC	110 V AC ... 550 V AC
Periodic peak reverse voltage	1000 V	1200 V
Load current	9 A (see derating curve)	9 A (see derating curve)
Surge current	230 A (tp = 10 ms, at 25°C)	230 A (tp = 10 ms, at 25°C)
Min. load current	150 mA	150 mA
Residual voltage	Typ. 1.5 V	Typ. 1.5 V
Leakage current	Typ. 7 mA	Typ. 7 mA
Output protection	RC element, surge protection	
General data		
Test voltage input/output	2.5 kV	
Reversing frequency	Max. 10 Hz (at cos ϕ = 0.5)	Max. 10 Hz (at cos ϕ = 0.5)
Ambient temperature (operation)	-20°C ... 60°C	
Standards / regulations	EN 50178 / Basic insulation	
Degree of protection according to IEC 60529/EN 60529	IP20	
Mounting position	Vertical (horizontal DIN rail)	
Mounting	Can be aligned with > 20 mm spacing	
Screw connection solid / stranded / AWG	0.2 - 6 mm² / 0.2 - 4 mm² / 24 - 10	
Dimensions W / H / D	62 mm / 84 mm / 110 mm	

Ordering data

Description	Type	Order No.	Pcs. / Pkt.
3-phase solid-state reversing contactor			
	ELR W3/ 9-400	**2964173**	1
	ELR W3/ 9-500	**2964186**	1



Power loss depending on the load current
Operating time: 100% operating factor



Load current as a function of the ambient temperature
Operating time: 100% operating factor

Electronic reversing load relay for DC motors

The electronic reversing load relays ELR-DC allow mechanically commutated DC motors to be switched. They reverse and reduce the speed of DC motors up to 24 V/6 A in a wear-free manner. A short-circuit, surge-voltage, and overload proof output guarantees reliable use in the plant.

If a 24 V DC signal is applied to the "left" input, the ELR-DC is interconnected so that the output supplies the motor with voltage. If the "right" input is triggered, the polarity of the voltage is inverted on the output. By triggering both inputs, i.e., "right" and "left", the motor is short-circuited internally via the ELR-DC and reduces the speed.

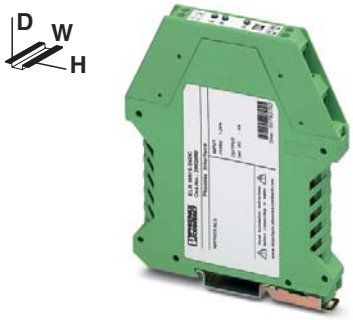
Thanks to the internal interlocking circuit and load wiring, wiring expense is reduced to a minimum.

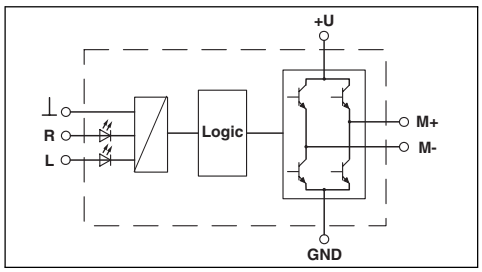
Notes:

Type of housing:
Polycarbonate PC, color: Green.

For marking systems and mounting material, see CLIPLINE catalog, part 2.

PWM = Pulse Width Modulation





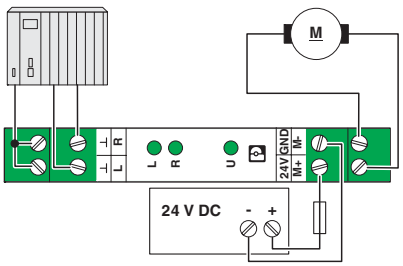
Technical data

Input data	ELR W1/ 2-24DC	ELR W1/ 6-24DC
Control voltage U_{ST} right/left	24 V DC	24 V DC
Control voltage range in reference to U_{ST}	0.8 ... 1.2	0.8 ... 1.2
Typ. input current at U_N	0.8 ... 1.2	0.8 ... 1.2
Input circuit	Protection against polarity reversal, surge protection	
Operating voltage / status / error indicator	Green LED / yellow LED, forward running (R), yellow LED, reverse running (L) / -	
PWM option		
Max. clock frequency of the PWM at the control inputs	1000 Hz	1000 Hz
Pulse width repetition rate of the PWM	0% ... 100%	0% ... 100%
Output data load side		
Operating voltage range	10 V DC ... 30 V DC	10 V DC ... 30 V DC
Load current	2 A (Mounted in rows with zero spacing)	6 A (see derating curve)
Quiescent current	Approx. 7 mA (When switched off)	Approx. 7 mA (When switched off)
Current limitation at short circuits	15 A	20 A
Output protection	Protection against polarity reversal, surge protection	
Operating voltage / status / error indicator	Green LED / - / -	
General data		
Test voltage input/output	2.5 kV AC	
Ambient temperature (operation)	-20°C ... 60°C	
Nominal operating mode	100% operating factor	
Standards / regulations	EN 50178 / Basic insulation	
Degree of protection according to IEC 60529/EN 60529	IP20	
Mounting position	Vertical (horizontal DIN rail)	
Screw connection solid / stranded / AWG	0.2 - 6 mm^2 / 0.2 - 4 mm^2 / 24 - 10	
Dimensions W / H / D	12.5 mm / 99 mm / 114.5 mm	

Ordering data

Description	Type	Order No.	Pcs. / Pkt.
3-phase solid-state reversing contactor, for controlling DC motors	**ELR W1/ 2-24DC**	**2963598**	1
	ELR W1/ 6-24DC	**2982090**	1

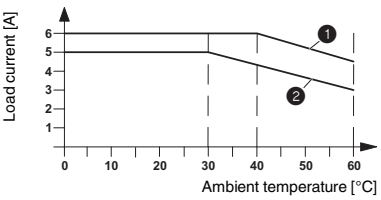
Application example



Status table

Input		Output	
right	left	M +	M –
0	0	high resistance	high resistance
1	0	+ 24 V	GND
0	1	GND	+ 24 V
1	1	GND	GND

Load current dependent upon the ambient temperature
Operating time: 100% OT



❶ Individual device
❷ Aligned without spacing

Three-phase semiconductor contactor

Motors of mixers, machine tools, conveying systems, pumps, and fans up to 575 V AC/3 x 37 A (equivalent to 1 kW to 18.5 kW) can be controlled using the CONTACTRON three-phase semiconductor contactors.

Advantages of three-phase semiconductor contactors:

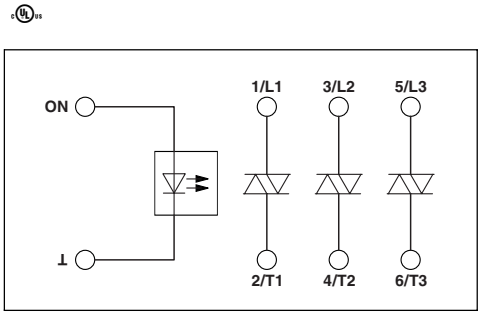
– Noise-free and wear-free switching
– Integrated protective circuit
– Stable and short switching times
– Long service life
– High switching frequency
– Thermal fuse optional

Notes:

Type of insulation housing:
ELR 3...2, ELR 3...9
Polyamide PA non-reinforced, color: Green
ELR 3...16, ELR 3...37
Polyester PBT non-reinforced, color: Green

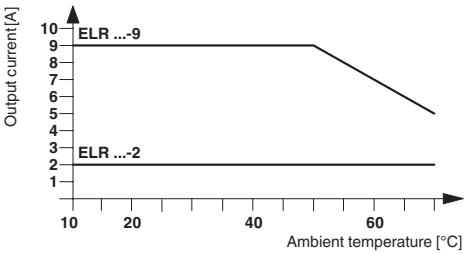
For marking systems and mounting material, see CLIPLINE catalog, part 2.

For switching 3~ AC motors up to 575 V AC/3 x 2 A

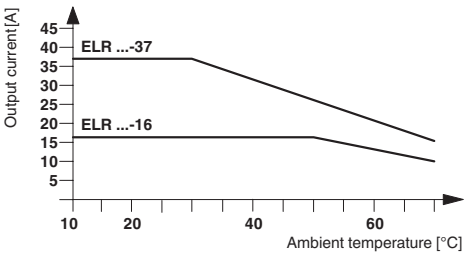


Technical data

Input data	ELR 3- 24DC/500AC- 2	ELR 3-230AC/500AC- 2
Rated actuation voltage U_C ON	24 V DC	230 V AC
Rated actuating voltage range with reference to U_C	0.8 ... 1.25	0.4 ... 1.1
Rated actuating current I_C at U_C	8.3 mA	12.5 mA
Input circuit	Protection against polarity reversal, surge protection	Surge protection
Operating voltage / status / error indicator	- / Yellow LED / Red LED	
Output data load side		
Output voltage range	48 V AC ... 575 V AC	48 V AC ... 575 V AC
Periodic peak reverse voltage	1200 V	1200 V
Load current	Max. 2 A (see derating curve)	Max. 2 A (see derating curve)
Surge current	200 A (t = 10 ms)	200 A (t = 10 ms)
Min. load current	100 mA	100 mA
Residual voltage	< 1.5 V	< 1.5 V
Leakage current	6 mA	6 mA
Max. load value I^2 x t (t = 10 ms)	250 A^2s	250 A^2s
Output protection	RCV circuit	
General data		
Rated insulation voltage	500 V	
Rated surge voltage	6 kV / basic insulation	6 kV / basic insulation
Switching frequency	Max. 10 Hz	Max. 1 Hz
Ambient temperature (operation)	-25°C ... 70°C	
Standards / regulations	DIN EN 50178 / EN 60947	
Power station requirements	DWR 1300 / ZXX01/DD/7080.8d	
Degree of protection according to IEC 60529/EN 60529	IP20	
Mounting position	Vertical (horizontal DIN rail)	
Mounting	Can be aligned with spacing = 20 mm	
Screw connection solid / stranded / AWG		
- Control side	0.14 - 2.5 mm^2 / 0.14 - 2.5 mm^2 / 26 - 12	
- Load side	0.14 - 2.5 mm^2 / 0.14 - 2.5 mm^2 / 26 - 12	
Dimensions W / H / D	40 mm / 99 mm / 114.5 mm	



Load current as a function of the ambient temperature
Operating time: 100% operating factor



Load current as a function of the ambient temperature
Operating time: 100% operating factor

Ordering data

Description	Type	Order No.	Pcs. / Pkt.
Three-phase semiconductor contactor			
	ELR 3- 24DC/500AC- 2	**2297196**	1
	ELR 3-230AC/500AC- 2	**2297206**	1

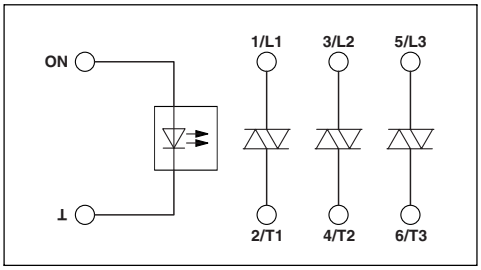
Accessories

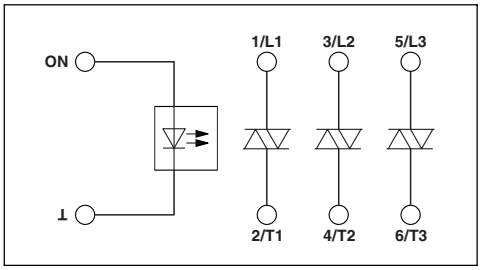
Thermal fuse	**THERMAL FUSE TF104**	**2900796**	1

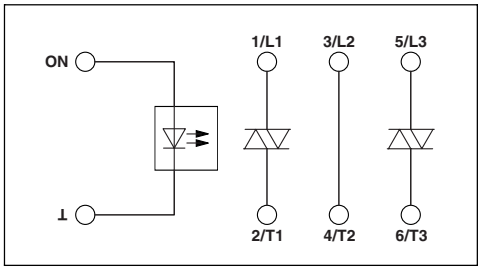
For switching 3~ AC motors up to 575 V AC/3 x 9 A

For switching 3~ AC motors up to 575 V AC/3 x 16 A

For switching 3~ AC motors up to 575 V AC/3 x 37 A







Technical data

ELR 3- 24DC/500AC- 9	ELR 3-230AC/500AC- 9	
24 V DC	230 V AC	
0.8 ... 1.25	0.4 ... 1.1	
8.3 mA	12.5 mA	
Protection against polarity reversal, surge protection	Surge protection	
- / Yellow LED / Red LED		
48 V AC ... 575 V AC	48 V AC ... 575 V AC	
1200 V	1200 V	
Max. 9 A (see derating curve)	Max. 9 A (see derating curve)	
300 A (t = 10 ms)	300 A (t = 10 ms)	
100 mA	100 mA	
< 1.5 V	< 1.5 V	
6 mA	6 mA	
580 A^2s	580 A^2s	
RCV circuit		
500 V		
6 kV / basic insulation	6 kV / basic insulation	
Max. 10 Hz	Max. 1 Hz	
-25°C ... 70°C		
DIN EN 50178 / EN 60947		
DWR 1300 / ZXX01/DD/7080.8d		
IP20		
Vertical (horizontal DIN rail)		
Can be aligned with spacing = 20 mm		
0.14 - 2.5 mm^2 / 0.14 - 2.5 mm^2 / 26 - 12		
0.14 - 2.5 mm^2 / 0.14 - 2.5 mm^2 / 26 - 12		
67.5 mm / 99 mm / 114.5 mm		

Ordering data

Type	Order No.	Pcs. / Pkt.
ELR 3- 24DC/500AC- 9	**2297219**	1
ELR 3-230AC/500AC- 9	**2297222**	1

Accessories

THERMAL FUSE TF104	**2900796**	1

Technical data

ELR 3- 24DC/500AC-16	ELR 3-230AC/500AC-16	
24 V DC	230 V AC	
0.8 ... 1.25	0.4 ... 1.1	
8.3 mA	12.5 mA	
Protection against polarity reversal, surge protection	Surge protection	
- / Yellow LED / Red LED		
48 V AC ... 575 V AC	48 V AC ... 575 V AC	
1200 V	1200 V	
Max. 16 A (see derating curve)	Max. 16 A (see derating curve)	
300 A (t = 10 ms)	300 A (t = 10 ms)	
100 mA	100 mA	
< 1.5 V	< 1.5 V	
6 mA	6 mA	
580 A^2s	580 A^2s	
RCV circuit		
500 V		
6 kV / basic insulation	6 kV / basic insulation	
Max. 10 Hz	Max. 1 Hz	
-25°C ... 70°C		
DIN EN 50178 / EN 60947		
DWR 1300 / ZXX01/DD/7080.8d		
IP20		
Vertical (horizontal DIN rail)		
Can be aligned with spacing = 40 mm		
0.2 - 4 mm^2 / 0.2 - 2.5 mm^2 / 24 - 12		
0.5 - 16 mm^2 / 0.5 - 16 mm^2 / 20 - 6		
147.5 mm / 99 mm / 114.5 mm		

Ordering data

Type	Order No.	Pcs. / Pkt.
ELR 3- 24DC/500AC-16	**2297235**	1
ELR 3-230AC/500AC-16	**2297248**	1

Accessories

THERMAL FUSE TF104	**2900796**	1

Technical data

ELR 2+1- 24DC/500AC-37	ELR 2+1-230AC/500AC-37	
24 V DC	230 V AC	
0.8 ... 1.25	0.4 ... 1.1	
8.3 mA	12.5 mA	
Protection against polarity reversal, surge protection	Surge protection	
- / Yellow LED / Red LED		
48 V AC ... 575 V AC	48 V AC ... 575 V AC	
1200 V	1200 V	
Max. 37 A (see derating curve)	Max. 37 A (see derating curve)	
1300 A (t = 10 ms)	1300 A (t = 10 ms)	
200 mA	200 mA	
< 1.5 V	< 1.5 V	
6 mA	6 mA	
9000 A^2s	9000 A^2s	
RCV circuit		
500 V		
6 kV / basic insulation	6 kV / basic insulation	
Max. 10 Hz	Max. 1 Hz	
-25°C ... 70°C		
DIN EN 50178 / EN 60947		
DWR 1300 / ZXX01/DD/7080.8d		
IP20		
Vertical (horizontal DIN rail)		
Can be aligned with spacing = 40 mm		
0.2 - 4 mm^2 / 0.2 - 2.5 mm^2 / 24 - 12		
0.5 - 16 mm^2 / 0.5 - 16 mm^2 / 20 - 6		
147.5 mm / 99 mm / 114.5 mm		

Ordering data

Type	Order No.	Pcs. / Pkt.
ELR 2+1- 24DC/500AC-37	**2297277**	1
ELR 2+1-230AC/500AC-37	**2297280**	1

Accessories

THERMAL FUSE TF104	**2900796**	1

Electronic load relays for 3-phase networks ELR 3/9-...

3-phase electronic load relays offer functions such as mechanical contactors, but allow the non-contacting switching of loads in the three-phase network without bounce or wear and tear.

Common features of all ELR 3/9-...

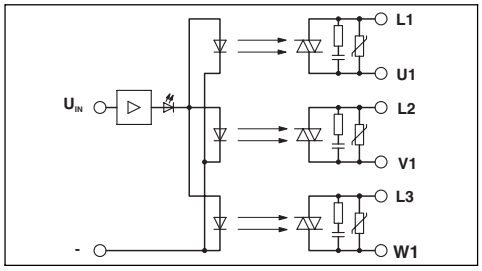
- Operating indicator,
- Noiseless and wear-free switching up to 500 V AC/9 A
- High switching frequency
- Protective circuits in input and output

The ELR 3/9-... can be used, for example, in mixers, machine tools, pumps, and fans.

Notes:

Type of housing:
Polycarbonate PC, color: Green.

For marking systems and mounting material, see CLIPLINE catalog, part 2.

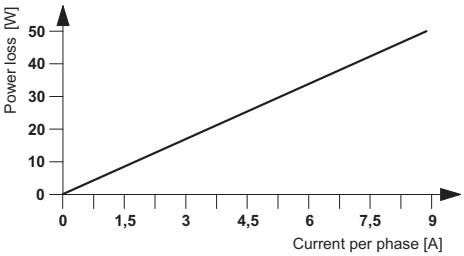


Technical data

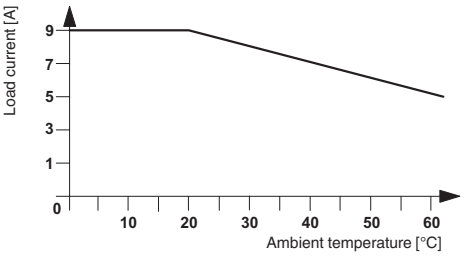
Input data	ELR 3/ 9-400	ELR 3/ 9-500
Control voltage U_{ST}	24 V DC	24 V DC
Control voltage range in reference to U_{ST}	0.8 ... 1.2	0.8 ... 1.2
Typ. input current at U_N	0.8 ... 1.2	0.8 ... 1.2
Input circuit	Protection against polarity reversal, surge protection	Protection against polarity reversal, surge protection
Operating voltage / status / error indicator	- / Yellow LED / -	
Output data load side		
Output voltage	400 V AC	500 V AC
Output voltage range	110 V AC ... 440 V AC	110 V AC ... 550 V AC
Periodic peak reverse voltage	800 V	1200 V
Load current	9 A (see derating curve)	9 A (see derating curve)
Surge current	230 A (tp = 10 ms, at 25°C)	230 A (tp = 10 ms, at 25°C)
Min. load current	150 mA	150 mA
Residual voltage	Typ. 1.5 V	Typ. 1.5 V
Leakage current	Typ. 7 mA	Typ. 7 mA
Output protection	RC element, surge protection	
General data		
Test voltage input/output	2.5 kV	
Switching frequency	Max. 10 Hz (at cos ϕ = 0.5)	Max. 10 Hz (at cos ϕ = 0.5)
Ambient temperature (operation)	-20°C ... 60°C	
Standards / regulations	EN 50178 / Basic insulation	
Degree of protection according to IEC 60529/EN 60529	IP20	
Mounting position	Vertical (horizontal DIN rail)	
Mounting	Can be aligned with > 20 mm spacing	
Screw connection solid / stranded / AWG	0.2 - 6 mm² / 0.2 - 4 mm² / 24 - 10	
Dimensions W / H / D	62 mm / 84 mm / 110 mm	

Ordering data

Description	Type	Order No.	Pcs. / Pkt.
Three-phase semiconductor contactor			
	ELR 3/ 9-400	**2941701**	1
	ELR 3/ 9-500	**2941714**	1



Power loss depending on the load current
Operating time: 100% operating factor



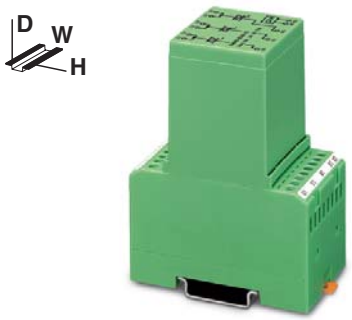
Load current as a function of the ambient temperature
Operating time: 100% operating factor

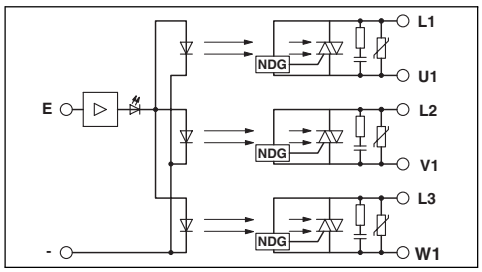
Electronic load relays for 3-phase networks
EMG 45-ELR 3/1,5

For electronic switching of 3-phase loads such as pumps, fans etc.

Properties:
- Wear-free,
- High switching frequency
- Protective circuits in input and output

Notes:
Type of housing: Polycarbonate PC, color: Green.
For marking systems and mounting material, see CLIPLINE catalog, part 2.



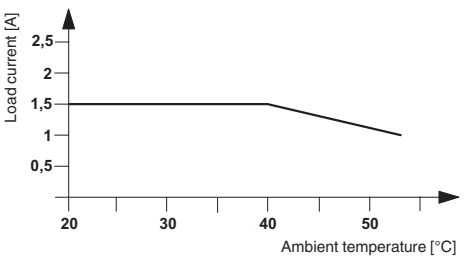


Technical data

Input data		
Control voltage U_{ST}		24 V DC
Control voltage range in reference to U_{ST}		0.8 ... 1.2
Typ. input current at U_N		20 mA
Input circuit		Protection against polarity reversal, surge protection
Operating voltage / status / error indicator		- / Yellow LED / -
Output data load side		
Output voltage		400 V AC
Output voltage range		320 V AC ... 440 V AC
Periodic peak reverse voltage		600 V (load relay is not suitable for the construction of reversing circuits)
Continuous load current		Max. 1.5 A (see derating curve)
Surge current		100 A (tp = 10 ms, at 25°C)
Min. load current		50 mA
Residual voltage		Typ. 1 V
Leakage current		Typ. 7 mA
Output protection		RC element, surge protection
General data		
Test voltage input/output		3.5 kV
Ambient temperature (operation)		-20°C ... 55°C
Standards / regulations		EN 50178 / Basic insulation
Degree of protection according to IEC 60529/EN 60529		IP20
Mounting position		Vertical (horizontal DIN rail)
Mounting		Can be aligned with > 20 mm spacing
Screw connection solid / stranded / AWG		0.2 - 4 mm^2 / 0.2 - 2.5 mm^2 / 24 - 12
Dimensions	W / H / D	45 mm / 75 mm / 82.5 mm

Ordering data

Description	Type	Order No.	Pcs. / Pkt.
Three-phase semiconductor contactor			
	EMG 45-ELR3/1,5	**2942739**	5



Load current as a function of the ambient temperature
Operating time: 100% operating factor

Single-phase solid-state contactors

Single-phase solid-state contactors are used in AC voltage networks wherever silent switching, high switching frequencies, and a practically unlimited service life are required.

The sturdy power semiconductors switch in zero voltage crossing and therefore produce no additional high frequency interferences. The modules are insensitive to shock loads and vibrations – even use in aggressive, polluted environments is unproblematic.

They offer the following advantages:
- High switching frequency
- Wear-free and output-free,
- Input voltage versions 24 V DC and 230 V AC.

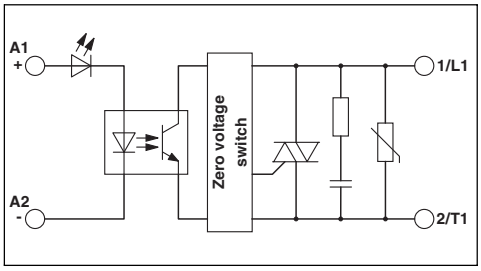
Common areas of application are:
- Production machines,
- Temperature controllers,
- Conveyor equipment and
- Light and lighting systems.

Notes:

Type of housing:
Polycarbonate PC, color: Green.

For marking systems and mounting material, see CLIPLINE catalog, part 2.

For switching 1~ AC motors up to 660 V AC/20 A

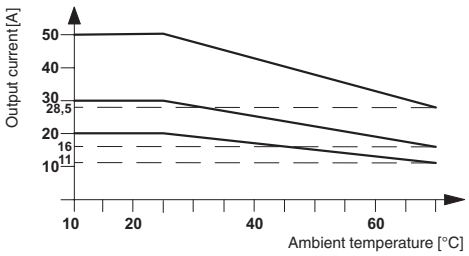


Technical data

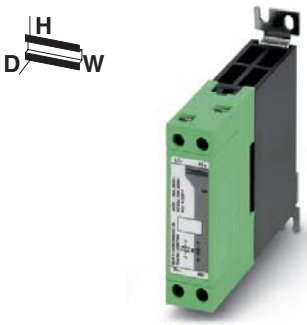
Input data		ELR 1- 24DC/600AC-20	ELR 1-230AC/600AC-20
Input voltage range		4 V DC ... 32 V DC	24 V AC ... 275 V AC
Typ. input current at U_N		Approx. 12 mA	Approx. 17 mA
Switching level	1 signal ("H")	≥ 4 V DC	≥ 22 V AC
	0 signal ("L")	≤ 1 V DC	≤ 6 V AC
Transmission frequency f_{limit}		25 Hz	6 Hz
Operating voltage / status / error indicator		Green LED / - / -	
Output data load side			
Output voltage range		42 V AC ... 660 V AC (45/65 Hz)	42 V AC ... 660 V AC (45/65 Hz)
Periodic peak reverse voltage		1200 V	1200 V
Load current		20 A (see derating curve)	20 A (see derating curve)
Surge current		250 A (t = 10 ms)	250 A (t = 10 ms)
Min. load current		350 mA	350 mA
Residual voltage		< 1.6 V	< 1.6 V
Leakage current		< 3 mA (In off state)	< 3 mA (In off state)
Phase angle (cos Φ)		0.5	0.5
Max. load value I^2 x t (t = 10 ms)		525 A^2s	525 A^2s
Output protection		RCV circuit	
General data			
Test voltage input/output		4 kV_{rms}	
Ambient temperature (operation)		-30°C ... 70°C	
Standards / regulations		EN 61000-4-2 / EN 61000-4-3 / EN 61000-4-4 / EN 61000-4-5 / EN 61000-4-6 / EN 55011 / Basic insulation	
Mounting position		Vertical (horizontal DIN rail)	
Mounting		Can be aligned with ≥ 22.5 mm spacing	
Screw connection solid / stranded / AWG			
- Control side		0.5 - 2.5 mm^2 / 0.5 - 2.5 mm^2 / 20 - 14	
- Load side		0.5 - 4 mm^2 / 0.5 - 4 mm^2 / 20 - 12	
Dimensions	W / H / D	22.5 mm / 103 mm / 103 mm	

Ordering data

Description	Type	Order No.	Pcs. / Pkt.
Single-phase electronic load relay			
	ELR 1- 24DC/600AC-20	**2297138**	1
	ELR 1-230AC/600AC-20	**2297141**	1

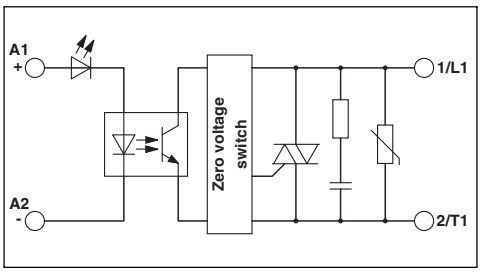


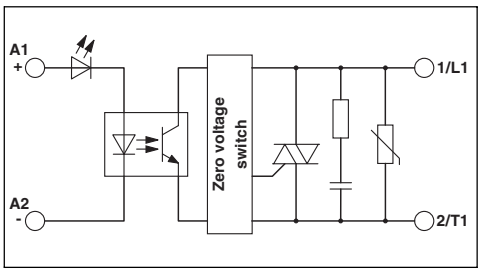
Load current as a function of the ambient temperature
Operating time: 100% operating factor



For switching 1~ AC motors up to 660 V AC/30 A

For switching 1~ AC motors up to 660 V AC/50 A





Technical data

ELR 1- 24DC/600AC-30	ELR 1-230AC/600AC-30
4 V DC ... 32 V DC	24 V AC ... 275 V AC
Approx. 12 mA	Approx. 17 mA
≥ 4 V DC	≥ 22 V AC
≤ 1 V DC	≤ 6 V AC
25 Hz	6 Hz
Green LED / - / -	
42 V AC ... 660 V AC (45/65 Hz)	42 V AC ... 660 V AC (45/65 Hz)
1200 V	1200 V
30 A (see derating curve)	30 A (see derating curve)
400 A (t = 10 ms)	400 A (t = 10 ms)
150 mA	150 mA
< 1.6 V	< 1.6 V
< 3 mA (In off state)	< 3 mA (In off state)
0.5	0.5
1800 A^2s	1800 A^2s
RCV circuit	
4 kV_{rms}	
-30°C ... 70°C	
EN 61000-4-2 / EN 61000-4-3 / EN 61000-4-4 / EN 61000-4-5 / EN 61000-4-6 / EN 55011 / Basic insulation	
Vertical (horizontal DIN rail)	
Can be aligned with ≥ 22.5 mm spacing	
0.5 - 2.5 mm^2 / 0.5 - 2.5 mm^2 / 20 - 14	
0.5 - 4 mm^2 / 0.5 - 4 mm^2 / 20 - 12	
22.5 mm / 103 mm / 103 mm	

Ordering data

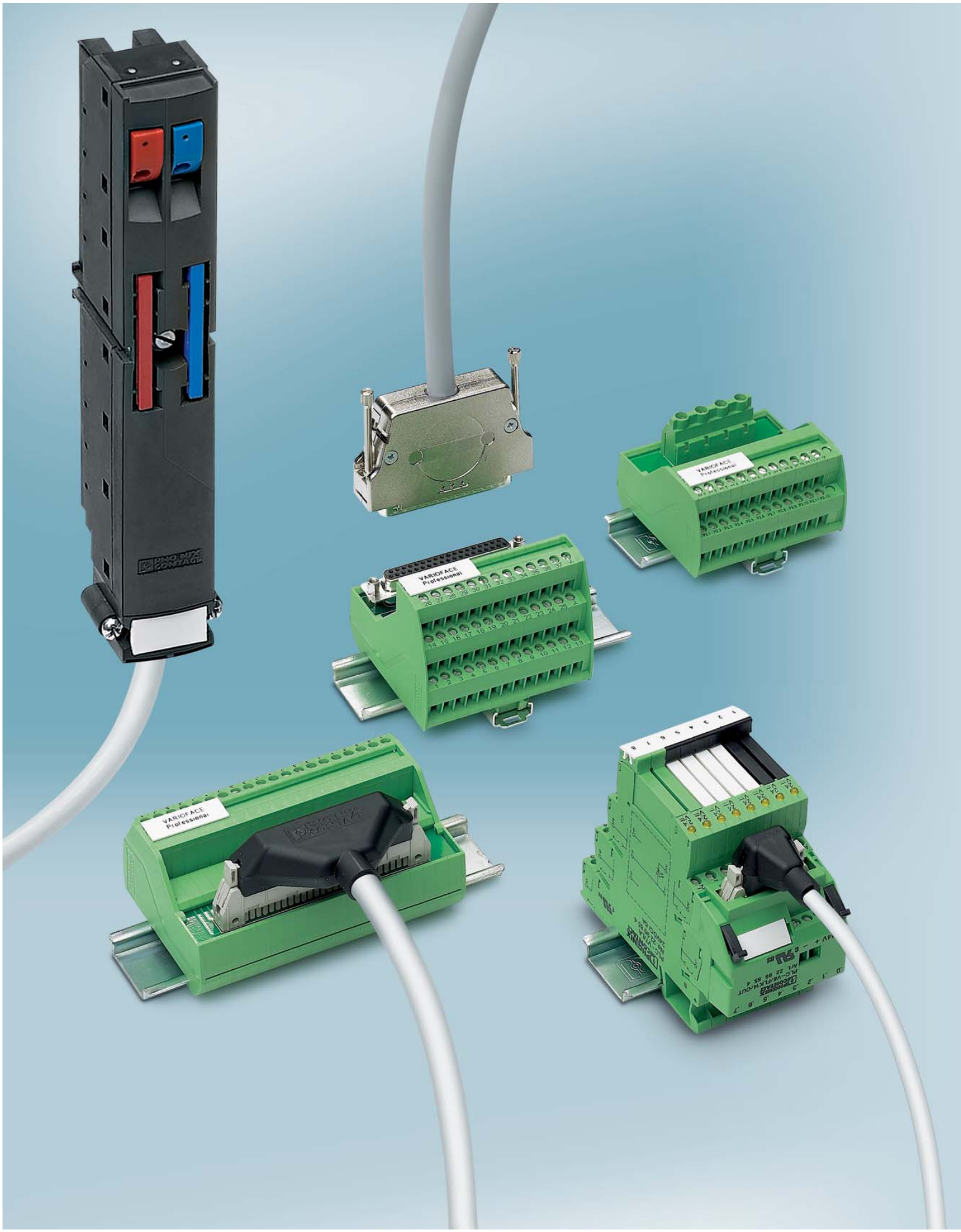
Type	Order No.	Pcs. / Pkt.
ELR 1- 24DC/600AC-30	**2297154**	1
ELR 1-230AC/600AC-30	**2297167**	1

Technical data

ELR 1- 24DC/600AC-50	ELR 1-230AC/600AC-50
4 V DC ... 32 V DC	24 V AC ... 275 V AC
Approx. 12 mA	Approx. 17 mA
≥ 4 V DC	≥ 22 V AC
≤ 1 V DC	≤ 6 V AC
25 Hz	6 Hz
Green LED / - / -	
42 V AC ... 660 V AC (45/65 Hz)	42 V AC ... 660 V AC (45/65 Hz)
1200 V	1200 V
50 A (see derating curve)	50 A (see derating curve)
1900 A (t = 10 ms)	1900 A (t = 10 ms)
150 mA	150 mA
< 1.6 V	< 1.6 V
< 3 mA (In off state)	< 3 mA (In off state)
0.5	0.5
18000 A^2s	18000 A^2s
RCV circuit	
4 kV_{rms}	
-30°C ... 70°C	
EN 61000-4-2 / EN 61000-4-3 / EN 61000-4-4 / EN 61000-4-5 / EN 61000-4-6 / EN 55011 / Basic insulation	
Vertical (horizontal DIN rail)	
Can be aligned with ≥ 22.5 mm spacing	
0.5 - 4 mm^2 / 0.5 - 4 mm^2 / 20 - 12	
4 - 25 mm^2 / 4 - 25 mm^2 / 12 - 3	
45 mm / 103 mm / 103 mm	

Ordering data

Type	Order No.	Pcs. / Pkt.
ELR 1- 24DC/600AC-50	**2297170**	1
ELR 1-230AC/600AC-50	**2297183**	1


VARIOFACE
Professional

INTERFACE Cabling

System cabling and wiring interface

Wiring I/O modules with individual wires is an extremely time-consuming process. Wiring errors and tedious troubleshooting cannot be ruled out.

Interface Cabling reduces assembly costs by using plug-in components to carry out wiring quickly, clearly, and without errors.

The new interface modules in the **VIP - VARIOFACE Professional** series, which feature a modern housing design, offer the following advantages over previous solutions:

- **They save space**
- **Vibration-resistant up to 5 g thanks to metal feet**
- **Wide range of labeling options**

VIP modules are available for both product segments:

VARIOFACE system cabling is a cabling concept that has been specially developed to allow connection to the I/O modules of a wide range of automation devices.

The **VIP series** is rounded off by new front adapters with enclosed system cables for the Simatic S7 300.

VARIOFACE wiring interfaces are suitable for universal use. Various **VIP - VARIOFACE Professional** modules with a 1:1 connection from a high-pole connector to a different connection method are available. The enclosed system cables provide an effective and efficient means of establishing a connection to a control device with protection against polarity reversal.

A wide variety of potential distributors are available for splitting the control and operating voltage.

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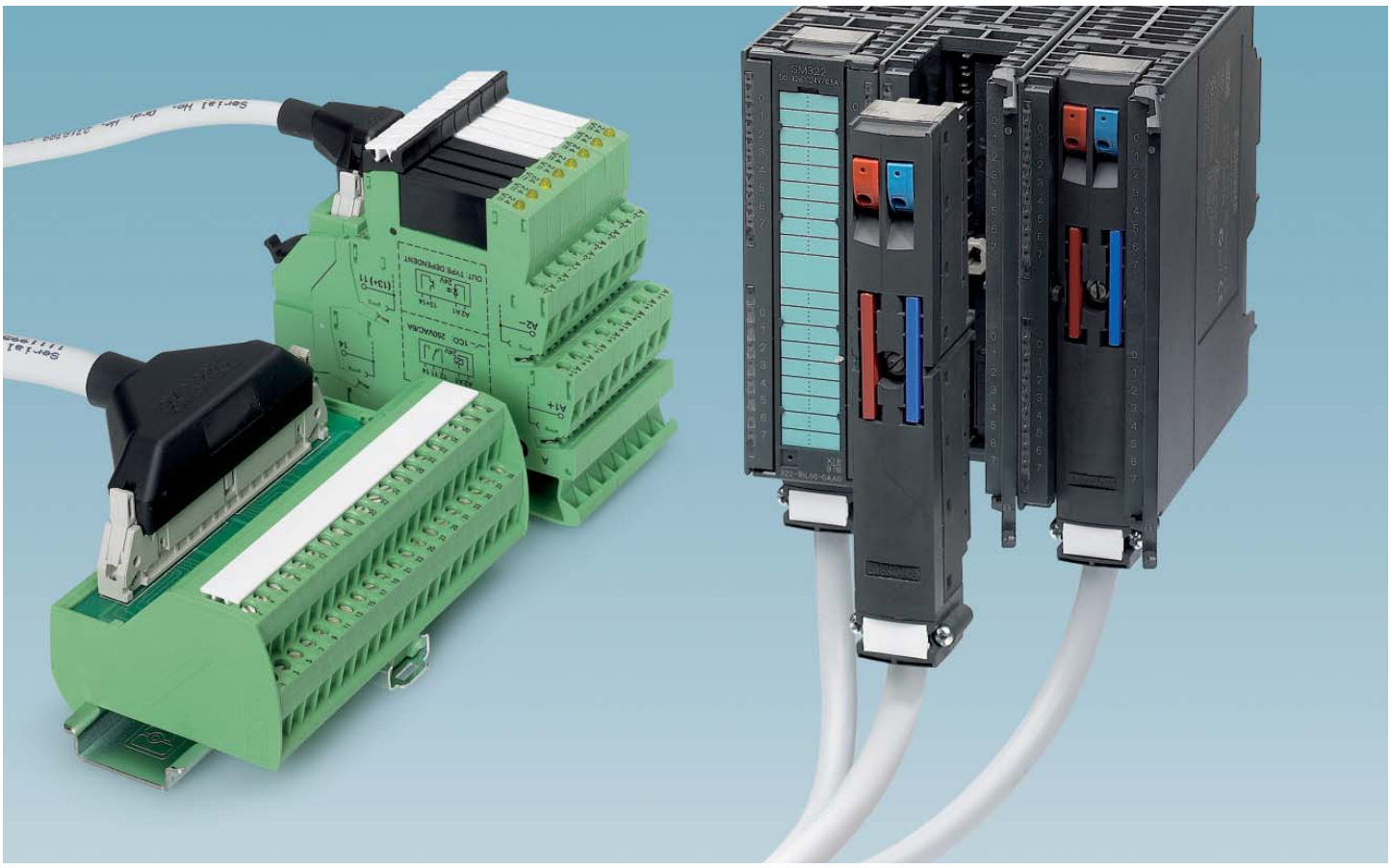
VIP modules with high-density D-SUB connectors 313
With DIN strips 314
With ELCO connectors 316
With RJ45 connector 320
With COMBICON connection 321
VIP potential distributors 322

Active interface modules

For relay couplers/optocouplers 324
For solid-state relays 327
Accessories (relays, optocouplers) 328



A large part of the costs incurred in automation systems today results from the cabling for the actuators and signaling units. On top of this, machines and systems are becoming more and more complex, which means that the cabling costs for the input and output stations are also steadily on the increase. In addition to cabling material costs, the costs associated with planning, assembly, startup and documentation must also be considered.

VARIOFACE PLC system cabling is a system concept that reduces manufacturing costs by allowing fast, faultless, and uniform wiring of the input and output signals of a PLC.

The system configuration comprises three components:
- VARIOFACE front adapter
- VARIOFACE system cable
- VARIOFACE termination board

VARIOFACE system cabling is available for controllers from:
- **ABB**
- **Allen-Bradley**
- **Emerson**
- **Honeywell**
- **GE Fanuc**
- **Mitsubishi Electric**
- **OMRON**
- **Schneider Electric**
- **Siemens**
- **Yokogawa**
- **Phoenix Contact**

VIP - VARIOFACE Professional

The new front adapters with enclosed system cables for the S7 300 and new compact termination boards make the system cabling even more robust. VARIOFACE Professional means:

New front adapters
- **Optimized housing concept**
- **Power supplied via PCB terminal blocks**
- **Plug-in bridges for electrical isolation**
- **Directly connected system cables with enclosed connectors**

New termination boards
- **Space-saving**
- **Vibration-resistant up to 5 g**
- **Optional labeling**
- **New housing design**

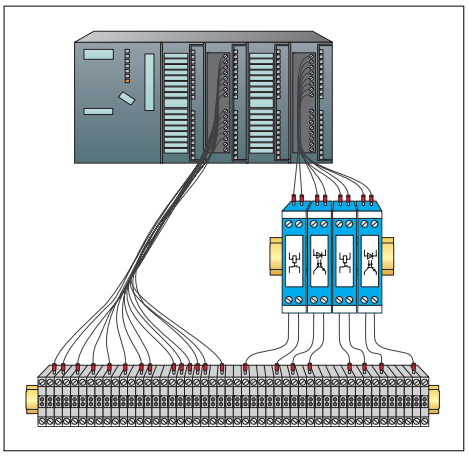


Figure 1: Example of control cabinet cabling with individual signal lines

The conventional method of wiring the input and output cards of programmable logic controllers is extremely time-consuming.

Signals are transmitted from the controller to modular terminal blocks or coupling modules such as relays or optocouplers by means of single conductor wiring (Figure 1).

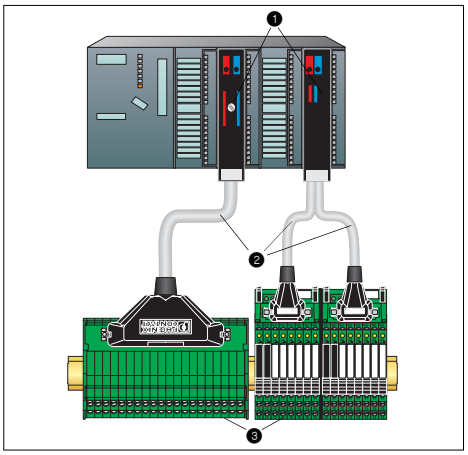


Figure 2: Example of control cabinet wiring with front adapters ❶, pre-assembled system cables ❷, and termination boards ❸

This requires a complex wiring process. At the same time, wiring mistakes are always possible with this connection method. Errors in wiring are often only noticed during system startup, resulting in additional costs.

Wiring based on the system cabling concept reduces assembly time considerably and guarantees protection against polarity reversal (Figure 2).

Front adapters with an integrated pin strip (IEC 60603-13) are plugged onto the PLC I/O cards. They replace connection methods such as those involving a screw or crimp connection.

The termination boards are simply snapped onto the DIN rail instead of modular terminal blocks or coupling modules. They too have a high-pole pin strip on the control side.

The termination boards are connected to the front adapters using high-pole and pre-assembled system cables that can simply be plugged in.

Actuators and sensors from the field level are connected to the termination boards by means of screw or spring-cage connections, or knife disconnect terminal blocks. The termination boards are marked on the field side according to application, so that the signals can be clearly assigned.

These termination boards are available in a wide range of designs depending on the application:

- **Interface modules for 1:1 signal transfer with or without LED**
- **Initiator modules for the connection of PNP 3-wire initiators**
- **Active output modules and interfaces equipped with relays or optocouplers for electrical isolation, signal amplification or level adaptation**
- **Input modules and interfaces for various voltage ranges, feed-through and jumper modules**

The termination boards are connected to the PLC front adapter using the high-pole system round cables. The individual wires of the system cable can each be subjected to a load of 1 A.

The signals from 32-channel input and output cards (32 signals of 500 mA each) can be transmitted using a 50-pole system cable. Four single bytes are transmitted separately using one 14-pole system cable for each. The signals from 8-channel I/O cards (8 signals of 500 mA each) are also transmitted via a 14-pole system cable.

The supply voltage per byte is supplied through several free cores in the cable. This ensures that when 32 signals are transferred via a 50-pole cable, a total current of 2 A can flow.

If 8 signals are transmitted via a 14-pole cable, the total current is 3 A per byte. If a higher level of protection is required for the I/O cards, separate power terminals are available directly on the front adapter. The system components allow distribution of the coupling level even within a confined space.

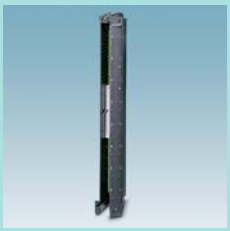
The plug-in, standardized connection method not only simplifies the actual construction of the control cabinet and system startup thanks to fast and faultless wiring, but also planning and design.

The project planning cross-reference list (a quick reference guide to the VARIOFACE system components) is extremely useful when selecting the required components. What's more, matching components can be configured using the INTERFACE search wizard. See www.phoenixcontact.net/catalog.

VARIOFACE system cabling enables you to achieve greater efficiency:

- **Simple planning using the project planning cross-reference list or online selector**
- **Cost reductions thanks to time-saving wiring**
- **Fault minimization through protection against polarity reversal and**
- **Easy maintenance thanks to modular system components**

Product overview of VARIOFACE system cabling

System component		Version	Controller						
			ABB	Allen-Bradley			Emerson	GE FANUC	
			S800 I/O	Control Logix	PLC 5	SLC 500	DeltaV	RX3i	90-30
			Page	Page	Page	Page	Page	Page	Page
Front adapter			Not required	206	208	210	Not required	218	219
System cables		Standard	290	282	282	282	284	282	282
		Controller-specific	205			212	214		
Termination boards		Passive, standard	248	248	248	248	248	248	248
		Passive, controller-specific	204	251		211	215		
		Active, standard	268	268	268	268	268	268	268
		V8 adapter/ feed-through terminal block	262	262	262	262	262	262	262
		Relay/optocoupler	80	80	80	80	80	80	80
		MINI Analog system adapter							
		MINI Analog							

Honeywell		Mitsubishi	OMRON CJ1	Phoenix Contact	Schneider		Siemens			Yokogawa
C300 Series CI/O	PlantScape	MELSEC A, A1S, Q	CS1, CQM1, C200H	Axioline Inline	TSX Qantum	M340	S7 300	S7 400	S5 to S7 conversion	Centum CS3000
Page	Page	Page	Page	Page	Page	Page	Page	Page	Page	Page
220	206	Not required	Not required	225	226	Not required	228	236	237	Not required
290	282			282	282	227	282	282		
		222	223				233			244
221	248	248	248	248	248	248	248	248		
					251		250	250		246
268	268	268	268	268	268	268	268	268		
262	262	262	262	262	262	262	262	262		262
80	80	80	80	80	80	80	80	80		80
							374			374
							372			372

ABB S800 I/O
Termination boards with knife disconnection

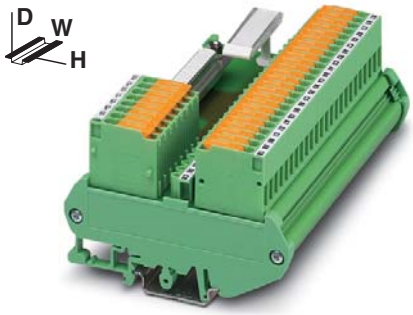
The ABB S800 I/O system offers the possibility of realizing the process wiring with D-SUB plug connectors. ABB TU 812 Compact MTU are available for this purpose.

The FLKM-D25SUB/B/KDS3-MT/... modules are connected to the I/O modules using assembled D-SUB cables (refer to chapter System cables).

In addition to screw connection with knife disconnection for every channel and ABB S800-specific labeling, the modules have the following features:

– Eight negative terminals with knife disconnection (TU810)
– Eight positive terminals with knife disconnection (TU810/P)
– For each channel, there is a positive and negative terminal with knife disconnection (TU830)

Passive interface modules can also be used for signal transmission (e.g., VIP-3/SC/D25SUB/F, 2315188), see page 307.



Interface module with knife disconnect terminal blocks

Technical data

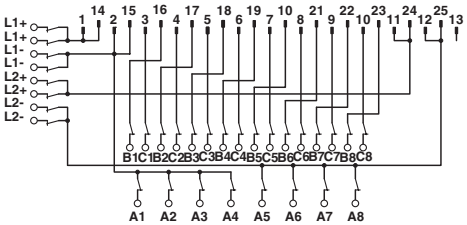
Max. perm. operating voltage		50 V AC/DC
Max. perm. current (per branch)		2 A
Max. total current (voltage supply)		4 A (8 A L1-/L2-)
Rated surge voltage		1.4 kV
Ambient temperature (operation)		-20°C ... 50°C
Mounting position		Any
Standards / regulations		DIN EN 50178, IEC 62103
Connection method	Field level	Screw connection with disconnect knife
	Control system level	D-SUB socket
Connection data solid / stranded / AWG		0.2 ... 4 mm² / 0.2 ... 2.5 mm² / 24 - 12
Dimensions	H / D	90 mm / 61 mm

Connectable I/O modules

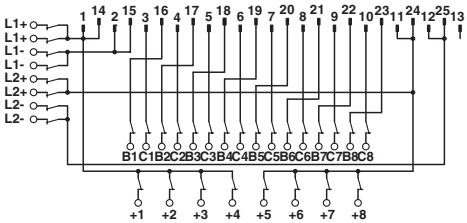
Card type	FLKM-D25SUB...
Digital input	DI 810 DI 811 DI 814 DI 830 DI 831 DI 885
Digital output	DO 810 DO 814
Analog input	AI 810 AI 820 AI 830 AI 835
Analog output	AO 810 AO 820

Ordering data

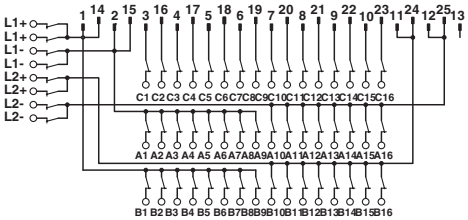
Description	No. of poles	Module width W	Type	Order No.	Pcs. / Pkt.
VARIOFACE module, with knife disconnect terminal blocks for:					
- S800 I/O output modules	25	126.5 mm	**FLKM-D25 SUB/B/KDS3-MT/TU810**	**2304513**	1
- S800 I/O input modules	25	126.5 mm	**FLKM-D25 SUB/B/KDS3-MT/TU810/P**	**2304539**	1
- S800 I/O universal module	25	247.5 mm	**FLKM-D25 SUB/B/KDS3-MT/TU830**	**2304526**	1



FLKM-D25 SUB/B/KDS3-MT/TU810 connection scheme



FLKM-D25 SUB/B/KDS3-MT/TU810/P connection scheme



FLKM-D25 SUB/B/KDS3-MT/TU830 connection scheme

Explanation:
- Flat-ribbon cable strip
- Connection to I/O card
- Screw terminal blocks for separate supply

ABB S800 I/O
System cable

The ABB S800 I/O system offers the possibility of realizing the process wiring with D-SUB plug connectors. ABB TU 812 Compact MTU are available for this purpose.

The CABLE-D25SUB/B/2X14/.../TU812 system cables convert from a D-SUB socket strip to two flat-ribbon cable connectors. Therefore, all 8-channel controller boards of the system cabling can be connected to S800 I/O modules. Two controller boards are used per module.

System cable

Technical data

Max. perm. operating voltage		< 50 V AC / 60 V DC
Max. perm. current carrying capacitance per path		1 A
Ambient temperature (operation)		-20°C ... 50°C
Assembly		Insulation displacement, IEC 60352-4 / DIN EN 60352-4
Conductor cross section		AWG - / 0.14 mm²
Conductor structure: stranded wires / material		7 / Cu tin-plated
Outside diameter	25-pole	6.3 mm

Ordering data

Description	No. of poles	Cable length	Type	Order No.	Pcs. / Pkt.
VARIOFACE system cable, for S800 I/O, with a 25-pole D-SUB socket strip and two 14-pole flat-ribbon cable connectors, in standard lengths					
	25	1 m	**CABLE-D25SUB/B/2X14/100/TU812**	**2304649**	1
	25	2 m	**CABLE-D25SUB/B/2X14/200/TU812**	**2304652**	1
	25	3 m	**CABLE-D25SUB/B/2X14/300/TU812**	**2304665**	1
	25	5 m	**CABLE-D25SUB/B/2X14/500/TU812**	**2304678**	1
VARIOFACE system cable for S800 I/O, with a 25-pole D-SUB socket strip and two 14-pole flat-ribbon cable connectors, in variable lengths					
	25		**CABLE-D25SUB/B/2X14/TU812/...**	**2304681**	1

Color code and pin assignment
CABLE-D25SUB/B/2X14...TU812

D-SUB connector 25-pos.	FLK 14 1. Connector	FLK 14 2. Connector	Conductor color
1	9		Gray
2	10		White
3	1		Black
4	3		Red
5	5		Yellow
6	7		Blue
7		1	Black
8		3	Red
9		5	Yellow
10		7	Blue
11		9	Orange
12		10	White
13	NC	NC	–
14	11		White-black
15	12		White-brown
16	2		Brown
17	4		Orange
18	6		Green
19	8		Violet
20		2	Brown
21		4	Orange
22		6	Green
23		8	Violet
24		11	White-black
25		12	White-brown

Ordering example for system cable**:**
– Cable for ABB S800, 12.75 m long

Quantity	Order No.	Length [m][1])
1	2304681	12.75

[1]) min. 0.20 m

Allen-Bradley ControlLogix, Honeywell PlantScape Front adapter

I/O modules with 32 channels or with this design

The front adapters are pushed into the tall 1756-TBE covers (not supplied as standard, original accessories must be ordered directly from manufacturer) of the controller. 50-pole system cable can connect a maximum of 32 channels to the field level.

Perfectly-fitting VARIOFACE termination boards round off this system concept.

Notes:
Front adapters can also be used without a cover.
Suitable system cabling components can be configured in the INTERFACE search wizard. See **www.phoenixcontact.net/catalog**.

32-channel front adapter with 50-pole FLK strip

Technical data

Max. perm. operating voltage	< 50 V AC / 60 V DC
Max. permissible current	1 A (per path) 8 A (per connection, supply via separate power supply)
Ambient temperature (operation)	-20°C ... 50°C
Ambient temperature (storage / transport)	-20°C ... 70°C
Connection data solid / stranded / AWG	0.14 ... 1.5 mm² / 0.14 ... 1.5 mm² / 28 - 16
Standards / regulations	IEC 60664 / DIN EN 50178 / IEC 62103

Ordering data

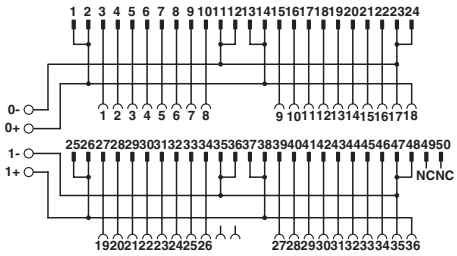
Description	No. of poles	Type	Order No.	Pcs. / Pkt.
VARIOFACE front adapters, for ControlLogix:				
- A maximum of 1 x 32 channels can be connected	50	**FLKM 50-PA-AB/1756/EXTC**	**2302735**	1
- IB 32 input board	50	**FLKM 50-PA-AB/1756/IN/EXTC**	**2302748**	1

Front adapter for I/O modules of Allen Bradley ControlLogix and Honeywell PlantScape automation devices

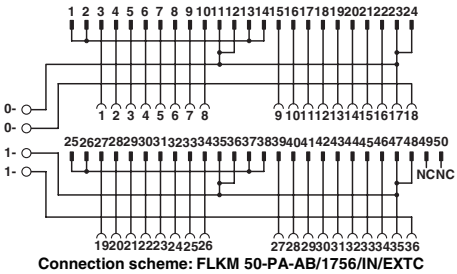
Card type	FLKM 50-PA-AB/1756/EXTC
Digital input	1756-IA 16 I* or TC-TDK 161* 1756-IB 16 D* or TC-TDX 161* 1756-IB 16 I* or TC-TDJ 161* 1756-IH 16 I*
Digital output	1756-OB 32 or TC-ODD 321
Analog input	1756-IF 8* 1756-IF 16 I* or TC-IAH 161* 1756-IF 8H*
Counter	1756-HSC*
Servo	1756-M02 AE*

Card type	FLKM 50-PA-AB/1756/IN/EXTC
Digital input	1756-IB 32 or TC-IDD 321

* Only in conjunction with VIP-2/SC/FLK50/AB-1756, Order No.: 2322317. There must be no voltage supply at the front adapter. Risk of short circuit!



Connection scheme: FLKM 50-PA-AB/1756/EXTC



Connection scheme: FLKM 50-PA-AB/1756/IN/EXTC

Explanation:

- Flat-ribbon cable strip
- Connection to I/O card
- Screw terminal blocks for separate supply

Allen-Bradley ControlLogix, Honeywell PlantScape Front adapter

I/O modules with 16 channels or with this design

The front adapters are pushed into the tall 1756-TBE covers (not supplied as standard, original accessories must be ordered directly from manufacturer) of the controller. Two 14-pole system cables are used to connect up to 2 x 8 channels to the field level.

Perfectly-fitting VARIOFACE termination boards round off this system concept.

Notes:

Front adapters can also be used without a cover.

Suitable system cabling components can be configured in the INTERFACE search wizard. See **www.phoenixcontact.net/catalog**.

16-channel front adapter with two 14-pole FLK strips

Technical data

Max. perm. operating voltage	< 50 V AC / 60 V DC
Max. permissible current	1 A (per path) 8 A (per connection, supply via separate power supply)
Ambient temperature (operation)	-20°C ... 50°C
Ambient temperature (storage / transport)	-20°C ... 70°C
Connection data solid / stranded / AWG	0.14 ... 1.5 mm² / 0.14 ... 1.5 mm² / 28 - 16
Standards / regulations	IEC 60664 / DIN EN 50178 / IEC 62103

Ordering data

Description	No. of poles	Type	Order No.	Pcs. / Pkt.
VARIOFACE front adapters, for ControlLogix:				
– Up to 2 x 8 channels can be connected	14	**FLKM 14-PA-AB/1756/EXTC**	**2302861**	1
– IA 16, IB 16, IC 16, IN 16 input card	14	**FLKM 14-PA-AB/1756/IN/EXTC**	**2302874**	1
- IF6 I input card (only suitable for measuring current; no power terminals on adapter)	14	**FLKM 14-PA-AB/1756/IF6I/EXTC**	**2901037**	1

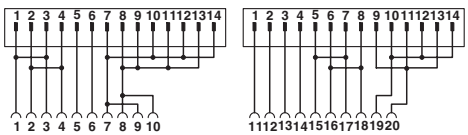
Front adapter for I/O modules of Allen Bradley ControlLogix and Honeywell PlantScape automation devices

Card type	FLKM 14-PA-AB/1756/EXTC
Digital input	1756-IA 8 D** or TC-IDX 081**
Digital output	1756-OB 16 E
Analog input	1756-IF 6 CIS** 1756-IF 6 I** or TC-IAH 061** 1756-IR 6 I** or TC-IXR 061** 1756-IT 6 I** or TC-IXL 061**
Analog output	1756-OF 4 I** 1756-OF 6 CI** or TC-OAH 061** 1756-OF 6 VI** or TC-OAV 061** 1756-OF 8** or TC-OAV 081** 1756-OF 8 H**
Switch	1756-PLS**

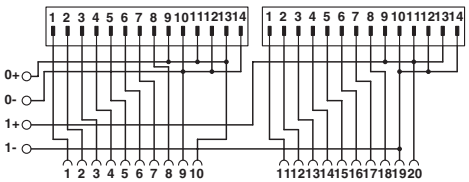
Card type	FLKM 14-PA-AB/1756/IN/EXTC
Digital input	1756-IN 16** 1756-IA 16 or TC-IDA 161** 1756-IB 16 1756-IC 16**

Card type	FLKM 14-PA-AB/1756/IF6I/EXTC
Analog input	IF6I**

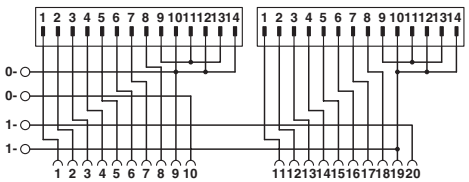
** Only in conjunction with VIP-2/SC/2FLK14/AB-1756, Order No.: 2322333. There must be no voltage supply at the front adapter. Risk of short circuit!!



Connection scheme: FLKM 14-PA-AB/1756/IF6I/EXTC



Connection scheme: FLKM 14-PA-AB/1756/EXTC



Connection scheme: FLKM 14-PA-AB/1756/IN/EXTC

Explanation:
- Flat-ribbon cable strip
- Connection to I/O card
- Screw terminal blocks for separate supply

Allen-Bradley, PLC 5 series 1771 Front adapter

The front adapters mean that pre-assembled system cables can be directly connected to I/O modules.

Up to 32 channels are connected via 50-pole system cables.

Perfectly-fitting VARIOFACE termination boards with a variety of functions and connection possibilities round off this system concept.

Notes:

Suitable system cabling components can be configured in the INTERFACE search wizard. See **www.phoenixcontact.net/catalog**.

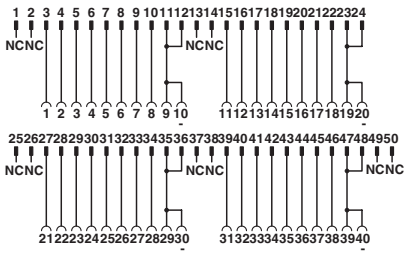
Front adapter for Allen-Bradley PLC 5, 1771

Technical data

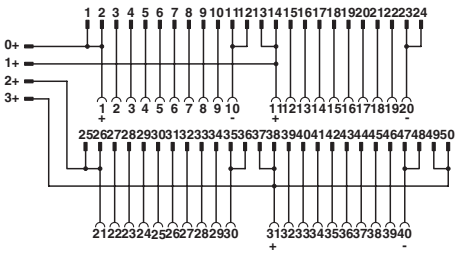
Max. perm. operating voltage	< 50 V AC / 60 V DC
Max. permissible current	1 A (per path)
Max. perm. total current	2 A (per byte, for supply via connector)
Ambient temperature (operation)	-20°C ... 50°C
Ambient temperature (storage / transport)	-20°C ... 70°C
Standards / regulations	IEC 60664 / DIN EN 50178 / IEC 62103

Ordering data

Description	No. of poles	Type	Order No.	Pcs. / Pkt.
VARIOFACE front adapters, for Allen-Bradley PLC 5, 1771				
- IBN 32 channels input	50	**FLKM 50-PA-AB/IBN**	**2289816**	2
- OBN 32 channels output	50	**FLKM 50-PA-AB/OBN**	**2289829**	2



Connection scheme FLKM 50-PA-AB/IBN



Connection scheme FLKM 50-PA-AB/OBN

Explanation:

- Flat-ribbon cable strip
- Connection to I/O card
- Screw terminal blocks for separate supply

Allen-Bradley SLC 500 Front adapter

The front adapters mean that pre-assembled system cables can be directly connected to I/O modules.

– The FLKM 14-PA-SLC500... adapters connect max. 2 x 8 channels via two 14-pole system cables. Perfectly-fitting VARIOFACE termination boards with a variety of functions and connection possibilities round off this system concept.
– With the FLKM50-PA-SLC500 OUT/2A front adapters, the FLKM 50/16/SLC500 termination board and 50-pole system cables, the VARIOFACE system cabling can also be coupled to the OA16 and OW16 power output cards.

Notes:

Suitable system cabling components can be configured in the INTERFACE search wizard. See **www.phoenixcontact.net/catalog**.

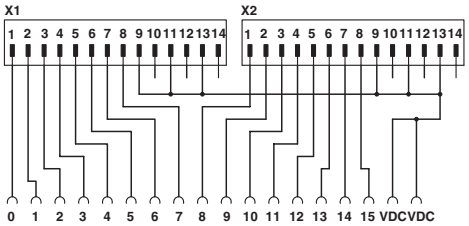
Front adapter for SLC 500 1746, 2 x 8 channels can be connected

Technical data

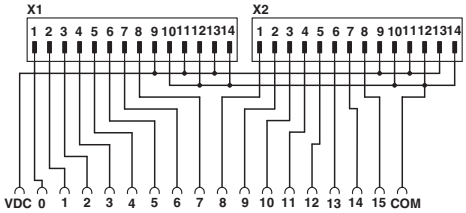
	FLKM 14-PA...	FLKM 50-PA...
Max. perm. operating voltage	< 50 V AC / 60 V DC	< 50 V AC / 60 V DC
Max. permissible current	1 A (per path)	2 A (per path)
Max. perm. total current	2 A (per byte, for supply via connector)	7 A (per byte, for supply via connector)
Ambient temperature (operation)	-20°C ... 50°C	-20°C ... 50°C
Ambient temperature (storage / transport)	-20°C ... 70°C	-20°C ... 70°C
Mounting position	Any	Any
Standards / regulations	IEC 60664 / DIN EN 50178 / IEC 62103	IEC 60664 / DIN EN 50178 / IEC 62103

Ordering data

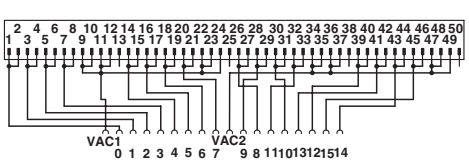
Description	No. of poles	Type	Order No.	Pcs. / Pkt.
VARIOFACE front adapter, 2 x 8 channels can be connected for Allen-Bradley SLC 500 for:				
- 1746 OB16, OV16, OG16, and IG16	14	**FLKM 14-PA-SLC500/OUT**	**2293459**	1
- 1746 IA16, IB16, ITB16, and IN16	14	**FLKM 14-PA-SLC500/IN**	**2293462**	1
- 1746 IV16 and IVT16	14	**FLKM 14-PA-SLC500/IN/M**	**2293475**	1
VARIOFACE front adapter, 1 x 16 channels can be connected for Allen-Bradley SLC 500 1746 OA16 and OW16	50	**FLKM 50-PA-SLC500/OUT/2A**	**2293446**	1



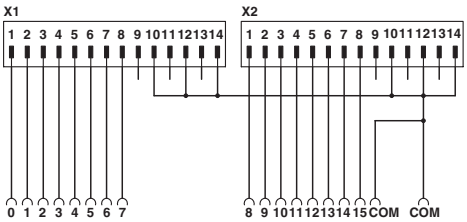
Connection scheme FLKM 14-PA-SLC500/IN/M



Connection scheme FLKM 14-PA-SLC500/OUT



Connection scheme FLKM 50-PA-SLC500/OUT/2A

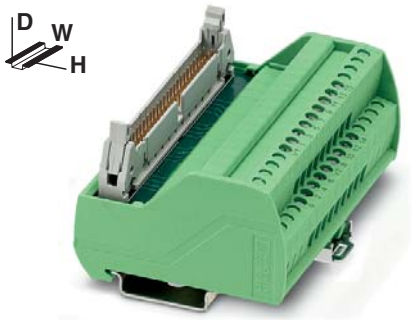


Connection scheme FLKM 14-PA-SLC500/IN

Explanation:
- Flat-ribbon cable strip
- Connection to I/O card
- Screw terminal blocks for separate supply

VIP termination board for Allen-Bradley SLC 500, 2 A output cards

The VIP - VARIOFACE Professional module VIP-2/SC/FLK50/16/SLC500 has been specially designed for the output modules OA16 and OW16. As regards the front adapter FLKM 50-PA-SLC500/OUT/2A, currents up to 2 A per channel can be transferred with the system cabling.



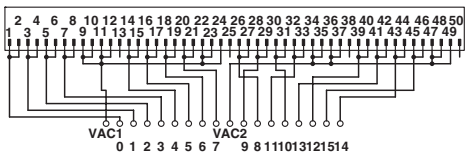
VARIOFACE controller board for 16 channels

Technical data

Max. perm. operating voltage		120 V AC/DC
Max. perm. current (per branch)		1 A
Max. total current (voltage supply)		2 A (per channel)
Rated surge voltage		-
Ambient temperature (operation)		-20°C ... 50°C
Mounting position		Any
Standards / regulations		IEC 60664, DIN EN 50178, IEC 62103
Connection method	Field level	Screw connection
	Control system level	Flat-ribbon cable plug connector in acc. with IEC 60603-13
Connection data solid / stranded / AWG		0.2 ... 4 mm² / 0.2 ... 2.5 mm² / 24 - 12
Dimensions	H / D	65.5 mm / 56 mm

Ordering data

Description	No. of poles	Module width W	Type	Order No.	Pcs. / Pkt.
VARIOFACE controller board, for transfer of max. 16 channels, only in connection with FLKM 50-PA-SLC500 OUT/2A		90.8 mm	**VIP-2/SC/FLK50/16/SLC500**	**2322320**	1



VIP-2/SC/FLK50/16/SLC500 connection scheme

Explanation:
- Flat-ribbon cable strip
- Connection to I/O card
- Screw terminal blocks for separate supply

Allen-Bradley SLC 500
System cable for 32 channels

The 32-channel I/O cards of the SLC 500 are connected using 40-pole connectors (already integrated into the I/O modules). Passive interface modules (-3/SC/FLK40, etc.) are connected to the I/O cards using the **FLK 40/EZ-DR/.../SLC** system cables.

32 channels are split into 4x8 channels using the **FLK 40/4X14/EZ-DR/...** system cables.

The following 8-channel system cabling modules can be coupled:

– OB32 and IB32
  passive and active modules plus V8 adapter
– OV32 and IV32
  passive modules without status indicator

Notes:

Suitable system cabling components can be configured in the INTERFACE search wizard. See **www.phoenixcontact.net/catalog**.

System cable for 32-channel I/O cards of the SLC 500 (OB32, OV32, IB32, IV32)

Technical data

Max. perm. operating voltage	< 50 V AC / 60 V DC
Max. perm. current carrying capacitance per path	1 A
Ambient temperature (operation)	-20°C ... 50°C
Assembly	Insulation displacement, IEC 60352-4 / DIN EN 60352-4
Conductor cross section	AWG 26 / 0.14 mm²
Conductor structure: stranded wires / material	7 / Cu tin-plated
Outside diameter	10 mm
40-pole	

Ordering data

Description	No. of poles	Cable length	Type	Order No.	Pcs. / Pkt.
Assembled round cables, with two 40-pole socket strips in fixed lengths (50 cm steps) for connection with 32-channel I/O cards of the SLC 500					
	40	0.5 m	**FLK 40/EZ-DR/ 50/SLC**	**2294610**	1
	40	1 m	**FLK 40/EZ-DR/ 100/SLC**	**2294623**	1
	40	1.5 m	**FLK 40/EZ-DR/ 150/SLC**	**2294636**	1
	40	2 m	**FLK 40/EZ-DR/ 200/SLC**	**2294649**	1
	40	3 m	**FLK 40/EZ-DR/ 300/SLC**	**2294652**	1
Round cable sets, for connection to Allen-Bradley SLC500, OB32 and IB32, with one 40-pole female connector and four 14-pole female connectors, for splitting max. 32 channels into 4 x 8 channels.					
for OB32	40	0.5 m			
	40	1 m			
	40	2 m			
	40	3 m			
for IB32	40	0.5 m			
	40	1 m			
	40	2 m			
	40	3 m			

System cable for splitting max. 32 channels into 4 x 8 channels (OB32, IB32)

Technical data

< 50 V AC / 60 V DC
1 A
-20°C ... 50°C
Insulation displacement, IEC 60352-4 / DIN EN 60352-4

AWG 26 / 0.14 mm^2
7 / Cu tin-plated

7.8 mm

Ordering data

Type	Order No.	Pcs. / Pkt.
FLK 40/4X14/EZ-DR/ 50/OB32	2296786	1
FLK 40/4X14/EZ-DR/ 100/OB32	2298483	1
FLK 40/4X14/EZ-DR/ 200/OB32	2298522	1
FLK 40/4X14/EZ-DR/ 300/OB32	2298535	1
FLK 40/4X14/EZ-DR/ 50/IB32	2296812	1
FLK 40/4X14/EZ-DR/ 100/IB32	2296825	1
FLK 40/4X14/EZ-DR/ 200/IB32	2296838	1
FLK 40/4X14/EZ-DR/ 300/IB32	2296841	1

Emerson DeltaV System cable

The DeltaV system allows you to install the process wiring through "mass termination blocks" (MTB) using flat-ribbon cable connectors. Besides the 10, 16, and 20-pole system cables of system cabling (refer to the System cables chapter), the following system-specific lines are also available:

- **FLK 16/14/DV-OUT/...**, for digital assemblies with 16-pos. MTB for connection with PLC-INTERFACE
- **FLK 16/14/DV-IN/...**, for digital modules with 16-pos. MTB for connection to PLC-INTERFACE
- **FLK 20/2FLK14/EZ-DR/...**, for digital assemblies with 40-pos. MTB for connection with PLC-INTERFACE
- **FLK 16/24/DV-AI/EZ-DR/...**, for analog assemblies with 24-pos. MTB
- **FLK 50/2FLK20/EZ-DR/.../DV** system cables are specifically designed for 32-channel I/O modules with 40-pin MTB for the purpose of connecting I/O modules with 32-channel VARIOFACE interface modules

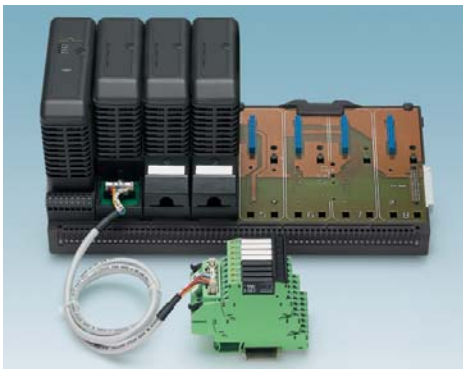
System cable for DeltaV

Technical data

Max. perm. operating voltage		< 50 V AC / 60 V DC
Max. perm. current carrying capacitance per path		1 A
Max. conductor resistance		0.16 Ω/m
Ambient temperature (operation)		-20°C ... 50°C
Conductor cross section		AWG 26 / 0.14 mm²
Outside diameter		
	16-pole	6.8 mm
	20-pole	7.6 mm
	24-pole	6.5 mm
	20-pole	10.3 mm

Ordering data

Description	No. of poles	Cable length	Type	Order No.	Pcs. / Pkt.
System cable, for 16-pos. "mass termination blocks" with a 16-pole and a 14-pole flat-ribbon cable connector for connection with PLC-INTERFACE					
	16	0.3 m	**FLK 16/14/DV-OUT/ 30**	**2304348**	1
	16	0.5 m	**FLK 16/14/DV-OUT/ 50**	**2304351**	1
	16	1 m	**FLK 16/14/DV-OUT/100**	**2300575**	1
	16	2 m	**FLK 16/14/DV-OUT/200**	**2300588**	1
	16	3 m	**FLK 16/14/DV-OUT/300**	**2304364**	1
Variable cable length	16		**FLK 16-14-DV-OUT/...**	**2304377**	1
System cable, for 16-pos. "mass termination blocks" with a 16-pole and a 14-pos. flat-ribbon cable connector for connection with PLC-INTERFACE					
	16	0.5 m	**FLK 16/14/DV-IN/ 50**	**2304393**	1
	16	1 m	**FLK 16/14/DV-IN/100**	**2300559**	1
	16	2 m	**FLK 16/14/DV-IN/200**	**2300562**	1
	16	3 m	**FLK 16/14/DV-IN/300**	**2304403**	1
	16	4 m	**FLK 16/14/DV-IN/400**	**2305185**	1
Variable cable length	16		**FLK 16-14-DV-IN/...**	**2304416**	1
System cable, for 40-pos. (2 x 20) "mass termination blocks" with a 20-pole and two 14-pole flat-ribbon cable connectors for connection with PLC-INTERFACE (two cables should be used per 32-channel I/O card)					
	20	1 m	**FLK 20/2FLK14/EZ-DR/100/KONFEK**	**2298470**	1
	20	2 m	**FLK 20/2FLK14/EZ-DR/200/KONFEK**	**2298438**	1
	20	3 m	**FLK 20/2FLK14/EZ-DR/300/KONFEK**	**2300818**	1
Variable cable length	20		**FLK 20/2FLK14/EZ-DR/...**	**2304487**	1
System cable, for 24-pos. "mass termination blocks" with a 24-pole and a 16-pos. flat-ribbon cable connector for connection with UM-DELTAV/... modules					
	24	0.3 m	**FLK 16/24/DV-AI/EZ-DR/ 30**	**2304319**	1
	24	0.5 m	**FLK 16/24/DV-AI/EZ-DR/ 50**	**2304296**	1
	24	1 m	**FLK 16/24/DV-AI/EZ-DR/100**	**2301134**	1
	24	2 m	**FLK 16/24/DV-AI/EZ-DR/200**	**2301545**	1
	24	3 m	**FLK 16/24/DV-AI/EZ-DR/300**	**2304322**	1
Variable cable length	24		**FLK 16-24-DV-AI-EZ-DR/...**	**2304335**	1
System cable, for 40-pos. "mass termination blocks" with two 20-pole and one 50-pole flat-ribbon cable plugs for connecting with 32-channel interface modules					
	20	0.5 m	**FLK 50/2FLK20/EZ-DR/ 50/DV**	**2304872**	1
	20	1 m	**FLK 50/2FLK20/EZ-DR/ 100/DV**	**2304898**	1
	20	2 m	**FLK 50/2FLK20/EZ-DR/ 200/DV**	**2304908**	1
	20	3 m	**FLK 50/2FLK20/EZ-DR/ 300/DV**	**2304911**	1
	20	6 m	**FLK 50/2FLK20/EZ-DR/ 600/DV**	**2304937**	1
	20	8 m	**FLK 50/2FLK20/EZ-DR/ 800/DV**	**2304940**	1
	20	10 m	**FLK 50/2FLK20/EZ-DR/1000/DV**	**2304953**	1
Variable cable length	20		**FLK 50-2FLK20-EZ-DR-DV/...**	**2304966**	1



Emerson DeltaV
Controller board for eight channels

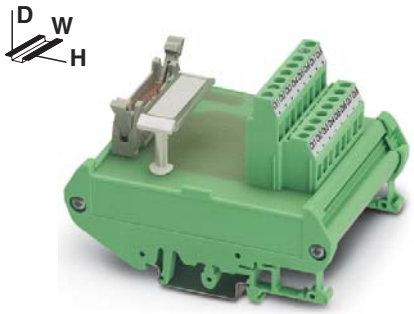
These system-specific interface modules for DeltaV assemblies are used in combination with the respective system cables. The controller board is connected to 8-channel modules through "mass termination blocks" with flat-ribbon cable connection.

FLKM 16/DV
– Universal module
– 1:1 connection

FLKM 16/AI/DV
– 1:1 connection
– Separate equipotential terminals per channel

FLKM 16/AO/SI/DV
– 1:1 connection
– Fuse 5 x 20, 50 mA T, IEC 60127-2/3 per channel

FLKM 16/DI/SI/LA/DV
– 1:1 connection
– Fuse 5 x 20, 50 mA T, IEC 60127-2/3 per channel
– LED status indicator per signal path



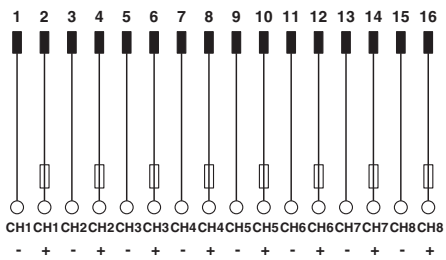
Interface module for 8 channels

Technical data

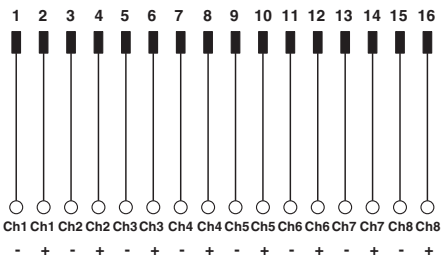
		FLKM 16/.../DV	FLKM 16/.../SI/.../DV
Max. perm. operating voltage		< 50 V AC	< 50 V AC
Max. perm. current (per branch)		1 A (per signal path)	50 mA (In delivered state, with one 50 mA fuse, max. 1 A permitted)
Rated surge voltage		0.8 kV	0.8 kV
Ambient temperature (operation)		-20°C ... 50°C	-20°C ... 50°C
Mounting position		Any	Any
Standards / regulations		IEC 60664, DIN EN 50178, IEC 62103	
Connection method	Field level	Screw connection	Screw connection
	Control system level	Flat-ribbon cable plug connector in acc. with IEC 60603-13	Flat-ribbon cable plug connector in acc. with IEC 60603-13
Connection data solid / stranded / AWG		0.2 ... 4 mm² / 0.2 ... 2.5 mm² / 24 - 12	
Dimensions	H / D	90 mm / 68 mm	

Ordering data

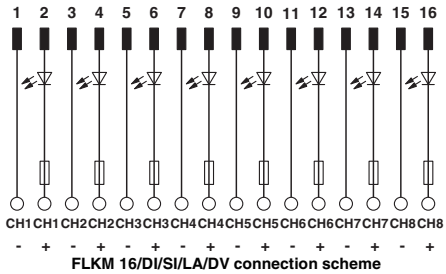
Description	No. of poles	Module width W	Type	Order No.	Pcs. / Pkt.
Interface module, with 1:1 connection	16	45 mm	**FLKM 16/DV**	**2304432**	1
Interface module, with 1:1 connection and separate potential terminal blocks per channel	16	57 mm	**FLKM 16/AI/DV**	**2304429**	1
Interface module, with fuses per channel	16	90 mm	**FLKM 16/AO/SI/DV**	**2304445**	1
Interface module, with LED and fuses per channel	16	90 mm	**FLKM 16/DI/SI/LA/DV**	**2304458**	1



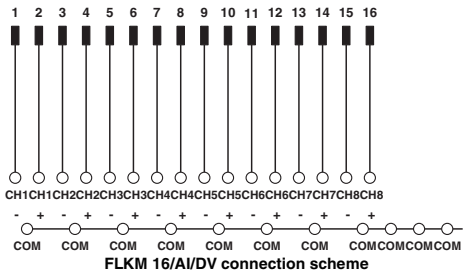
FLKM 16/AO/SI/DV connection scheme



FLKM 16/DV connection scheme



FLKM 16/DI/SI/LA/DV connection scheme



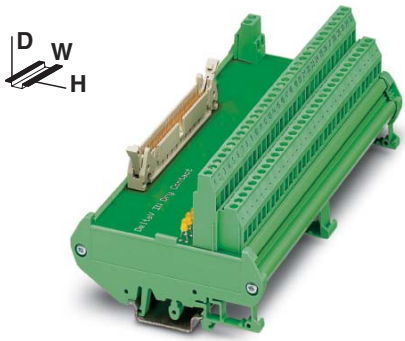
FLKM 16/AI/DV connection scheme

Emerson DeltaV
Controller board for 32 channels

These system-specific interface modules for DeltaV assemblies are used in combination with the FLK 50/2FLK20/EZ-DR/.../DV system cables. The controller board is connected to 32-channel modules through 40-pos. "mass termination blocks" with flat-ribbon cable connection.

FLKM 50/32M/DV
- Can be used for 32-channel input and output modules
- Two-wire connection with a separate negative terminal per channel

FLKM 50/32M/IN/LA/DV
- Can be used for 32-channel input modules
- LED status display per channel
- Two-wire connection with a separate negative terminal per channel (dry contact)



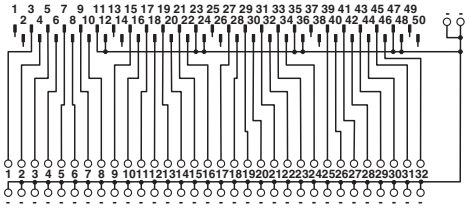
Interface module with two-wire connection method for DeltaV

Technical data

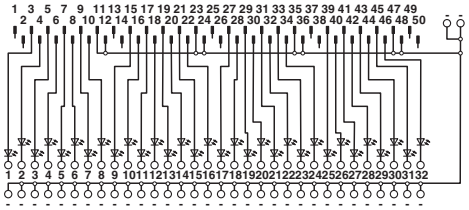
		FLKM 50/32M/DV	FLKM 50/32M/IN/LA/DV
Max. perm. operating voltage		< 50 V AC	30 V DC
Max. perm. current (per branch)		1 A	1 A
Rated surge voltage		0.8 kV	0.8 kV
Ambient temperature (operation)		-20°C ... 50°C	-20°C ... 50°C
Mounting position		Any	Any
Standards / regulations		IEC 60664, DIN EN 50178, IEC 62103	
Connection method	Field level	Screw connection	Screw connection
	Control system level	Flat-ribbon cable plug connector in acc. with IEC 60603-13	Flat-ribbon cable plug connector in acc. with IEC 60603-13
Connection data solid / stranded / AWG		0.2 ... 4 mm² / 0.2 ... 2.5 mm² / 24 - 12	
Dimensions	H / D	90 mm / 68 mm	

Ordering data

Description	No. of poles	Module width W	Type	Order No.	Pcs. / Pkt.
VARIOFACE interface modules, for 32-channel I/O modules:					
- Input/Output	50	169 mm	**FLKM 50/32M/DV**	**2304869**	1
- Input with LED per signal	50	169 mm	**FLKM 50/32M/IN/LA/DV**	**2304856**	1



FLKM 50/32M/DV connection scheme



FLKM 50/32M/IN/LA/DV connection scheme

Emerson DeltaV Controller boards with fuses for 8 channels

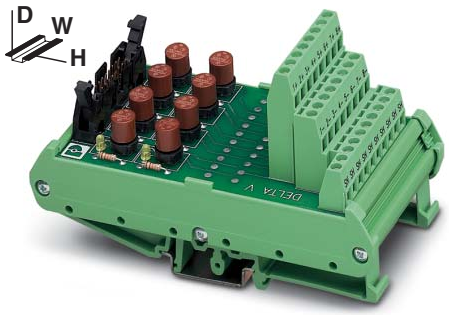
These system-specific interface modules for DeltaV assemblies are used in combination with the respective system cables. The controller board is connected to 8-channel modules through 16-pos. or 24-pos. "mass termination blocks" with flat-ribbon cable connection.

UM-DELTA V/D/SI
– Fuse per channel
– Separate equipotential terminals per channel

UM-DELTA V/D/SI
– Fuse per channel
– Separate equipotential terminals per channel
– Knife disconnection for each channel

UM-DELTA V/D/SI/BFI/TP
– Fuse and LED status indicator per channel
– Separate equipotential terminals per channel

UM-DELTA V/D/SI
– Fuse and LED status indicator per channel
– Separate equipotential terminals per channel
– Knife disconnection for each channel



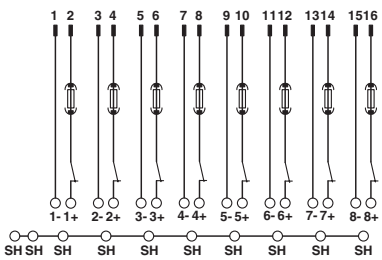
Interface module with fuses for 16-pos. and 24-pos. "mass termination blocks"

Technical data

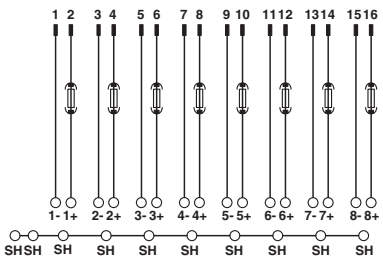
Max. perm. operating voltage		24 V DC
Max. perm. current (per branch)		50 mA (in as-supplied state, with one 50 mAF fuse, max. 1 A permitted)
Rated surge voltage		-
Ambient temperature (operation)		-20°C ... 50°C
Mounting position		Any
Standards / regulations		IEC 60664, DIN EN 50178, IEC 62103
Connection method	Field level	Screw connection
	Control system level	Flat-ribbon cable plug connector in acc. with IEC 60603-13
Connection data solid / stranded / AWG		0.2 ... 4 mm² / 0.2 ... 2.5 mm² / 24 - 12
Dimensions	H / D	126 mm / 71 mm

Ordering data

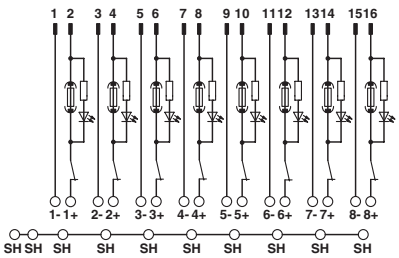
Description	No. of poles	Module width W	Type	Order No.	Pcs. / Pkt.
Interface modules for 16-pos. and 24-pos. "mass termination blocks" with:					
- Fuses	16	61 mm	**UM-DELTA V/D/SI**	**5603255**	1
– Fuses and knife disconnect terminal blocks	16	61 mm	**UM-DELTA V/D/SI/BFI/TP**	**5603257**	1
– Fuses and fuse failure display	16	61 mm	**UM-DELTA V/A/SI**	**5603256**	1
- Fuses, fuse failure display, and knife disconnect terminal blocks	16	61 mm	**UM-DELTA V/A/SI/BFI/TP**	**5603258**	1



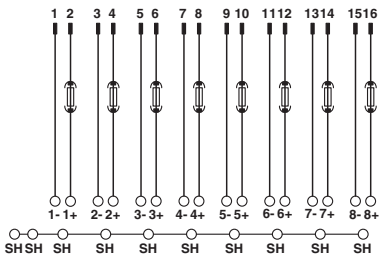
Connection scheme UM-DELTAV/A/SI



Connection scheme UM-DELTAV/D/SI



Connection scheme UM-DELTAV/A/SI/BFI/TP



Connection scheme UM-DELTAV/D/SI/BFI/TP

Explanation:
Flat-ribbon cable strip
Connection to I/O card
Screw terminal blocks for separate supply

GE Fanuc/RX3i Front adapters

The front adapters mean that pre-assembled system cables can be directly connected to I/O modules.

– Transfer of max. 32 channels over one 50-pole system cable
– Can be plugged onto I/O modules
– Connection via suitable VARIOFACE termination boards

Notes:

Suitable system cabling components can be configured in the INTERFACE search wizard. See **www.phoenixcontact.net/catalog**.

Front adapter for GE Fanuc RX3i

Technical data

Max. perm. operating voltage	< 50 V AC / 60 V DC
Max. permissible current	1 A (per path) 8 A (per connection, supply via separate power supply)
Ambient temperature (operation)	-20°C ... 50°C
Ambient temperature (storage / transport)	-20°C ... 70°C
Mounting position	Any
Standards / regulations	IEC 60664 / DIN EN 50178 / IEC 62103

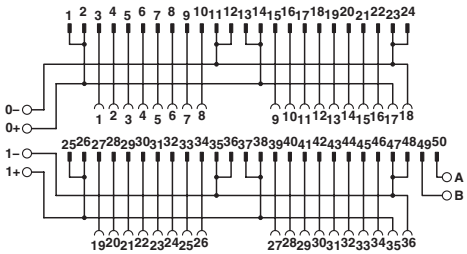
Ordering data

Description	No. of poles	Type	Order No.	Pcs. / Pkt.
VARIOFACE front adapter, for PACSystems RX3i,				
For digital output and analog modules	50	**FLKM 50-PA-GE/TKFC/RXI**	**2321473**	1
For digital input modules	50	**FLKM 50-PA-GE/TKFC/RXI/IN**	**2321486**	1

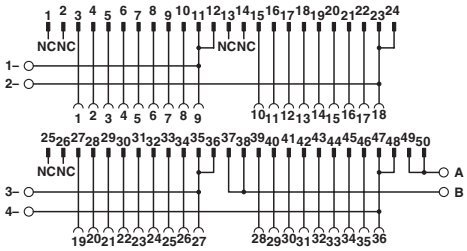
Front adapter for I/O modules of RX3i series

Card type	FLKM 50-PA/GE/TKFC/RXI
Digital output	IC 694 MDL 754
Analog	IC 695 ALG 608* IC 695 ALG 616* IC 695 ALG 626* IC 695 ALG 629* IC 695 ALG 704* IC 695 ALG 708* IC 695 ALG 728*

Card type	FLKM 50-PA/GE/TKFC/RXI/IN
Digital input	IC 694 MDL 660



Connection scheme for FLKM 50-PA-GE/TKFC/RXI



Connection scheme for FLKM 50-PA-GE/TKFC/RXI/IN

* Only in connection with VIP-3/SC/FLK50, Order No. 2315081. No voltage may be supplied through the slip-on connections on the front adapter.

Explanation:

Flat-ribbon cable strip
Connection to I/O card
Screw terminal blocks for separate supply

GE-FANUC, series 90-30 Front adapter

The front adapters mean that pre-assembled system cables can be directly connected to I/O modules.

Up to 2 x 8 channels are connected via two 14-pole system cables.

Perfectly-fitting VARIOFACE termination boards with a variety of functions and connection possibilities round off this system concept.

Notes:

Suitable system cabling components can be configured in the INTERFACE search wizard. See **www.phoenixcontact.net/catalog.**

Front adapter for GE-FANUC series 90-30

Technical data

Max. perm. operating voltage	< 50 V AC / 60 V DC
Max. permissible current	1 A (per path) 4 A (per connection, supply via separate power supply)
Max. perm. total current	3 A (per byte, for supply via connector)
Ambient temperature (operation)	-20°C ... 50°C
Ambient temperature (storage / transport)	-20°C ... 70°C
Mounting position	Any
Standards / regulations	IEC 60664 / DIN EN 50178 / IEC 62103

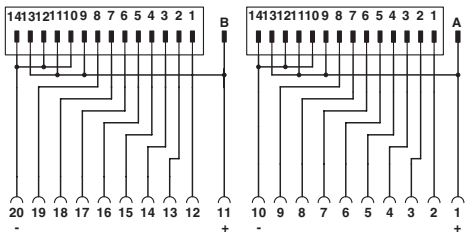
Ordering data

Description	No. of poles	Type	Order No.	Pcs. / Pkt.
VARIOFACE front adapter, for 90-30 series, max. 2 x 8 channels can be connected, digital output	14	**FLKM 14-PA/GE/DO**	**2290009**	2
VARIOFACE front adapter, for 90-30 series, max. 2 x 8 channels can be connected, digital input	14	**FLKM 14-PA/GE/DI**	**2290038**	5

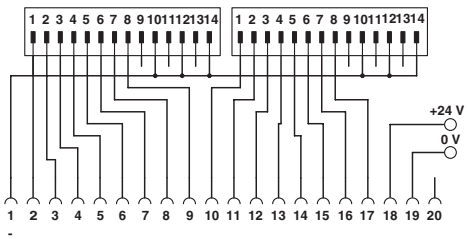
Front adapter for 90-30 series I/O modules

Card type	FLKM 14-PA/GE/DO
Digital output	IC 693 MDL 732 IC 693 MDL 733* IC 693 MDL 740 IC 693 MDL 741* IC 693 MDL 742
Analog	IC 693 ALG 220* IC 693 ALG 221* IC 693 ALG 222* IC 693 ALG 223* IC 693 ALG 390* IC 693 ALG 391* IC 693 ALG 392* IC 693 ALG 442*

Card type	FLKM 14-PA/GE/DI
Digital input	IC 693 MDL 241 IC 693 MDL 634 IC 693 MDL 645 IC 693 MDL 646



Connection scheme FLKM 14-PA/GE/DO



Connection scheme FLKM 14-PA/GE/DI

* Only in conjunction with VIP-2/SC/2FLK14(1-20)/S7, Order No.: 2315230 and UM 45-2FLK14/ZFKDS/S7, Order No.: 2965156. All wire bridges (DR) on the adapter must be disconnected. There must be no voltage supply at the front adapter (flowing via the slip-on connections)!

Explanation:

- Flat-ribbon cable strip
- Connection to I/O card
- Screw terminal blocks for separate supply

N

Honeywell C300, series C I/O Front adapters

The front adapters mean that pre-assembled system cables can be directly connected to I/O modules.

FLKM-PA-D37/HW/C300
- Front adapter with D-SUB connector
- Connection of a maximum of 16 digital channels
- Terminal blocks for power supply
- Not for redundant digital I/O cards

FLKM-PA-D37/HW/DIO/C300
- Front adapter with D-SUB connector
- Connection of a maximum of 16 digital channels
- Specially designed for redundant digital I/O cards

FLKM-PA-D37/HW/AN/C300
- Front adapter with D-SUB connector
- Connection of analog modules

FLKM-PA-2D15/HW/DO/C300
- Front adapter with two 15-pole D-SUB connectors
- Connection of a maximum of 2 x 8 digital outputs

Front adapter for I/O modules of the C300 series, C I/O series

Card type	FLKM-PA-D37/HW/C300
Digital input	TDIL 01*
Digital output	TDOB 01*

Card type	FLKM-PA-D37/HW/DIO/C300
Digital input	TDIL 11*
Digital output	TDOB 11*

Card type	FLKM-PA-D37/HW/AN/C300
Analog input	TAIX 01** TAIX 11**
Analog output	TAOX 01** TAOX 11**

Card type	FLKM-PA-2D15/HW/DO/C300
Digital output	TDOB 01* TDOB 11*

* Two front adapters are required for each module.

** For three-wire operation (channels 13 - 16) of input modules: Only in conjunction with VIP-3/SC/D37SUB/M/HW/C300, Order No. 2900675.

- Specially designed for coupling PLC-V8/D15.../OUT

Notes:

Matching system cable fitted with D-SUB female connector at both ends, see page 291.

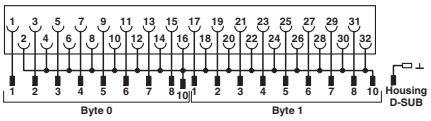
Honeywell C300 front adapter

Technical data

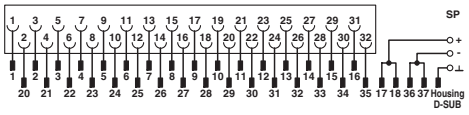
Max. perm. operating voltage	< 50 V AC / 60 V DC
Max. permissible current	1 A (per path) 4 A (per connection, supply via separate power supply)
Ambient temperature (operation)	-20°C ... 50°C
Ambient temperature (storage / transport)	-20°C ... 70°C
Mounting position	Any
Standards / regulations	IEC 60664 / DIN EN 50178 / IEC 62103

Ordering data

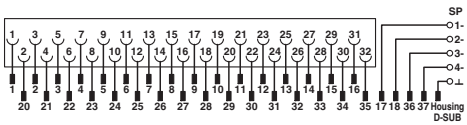
Description	No. of poles	Type	Order No.	Pcs. / Pkt.
VARIOFACE front adapter for series C I/O, With D-SUB pin strip for digital I/O modules	37	**FLKM-PA-D37/HW/C300**	**2322029**	1
With D-SUB pin strip for redundant digital I/O modules	37	**FLKM-PA-D37/HW/DIO/C300**	**2901423**	1
With D-SUB pin strip for analog I/O modules	37	**FLKM-PA-D37/HW/AN/C300**	**2900622**	1
With two D-SUB pin strips for digital output modules	15	**FLKM-PA-2D15/HW/DO/C300**	**2900924**	1



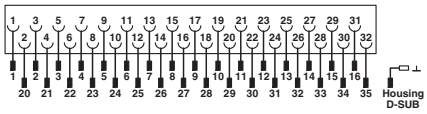
Connection scheme: FLKM-PA-2D15/HW/DO/C300



Connection scheme: FLKM-PA-D37/HW/C300



Connection scheme: FLKM-PA-D37/HW/AN/C300



Connection scheme: FLKM-PA-D37/HW/DIO/C300

Explanation:
- Connector
- Connection to I/O card
- Screw terminal blocks for separate supply

Honeywell C300, series C I/O Interface modules

These VARIOFACE modules are used in combination with the respective front adapters.

VIP-2/SC/D37SUB/M

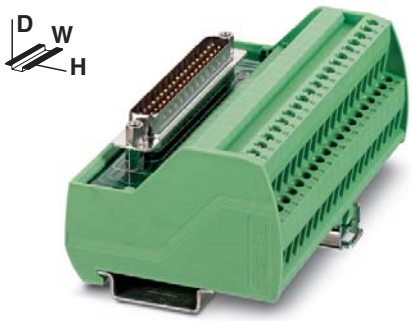
- In conjunction with FLKM-PA-D37/HW/C300 or FLKM-PA-D37/HW/AN/C300 front adapter
- Universal module
- Field connection via double-level terminal blocks

VIP-2/SC/D37SUB/M/SO

- In conjunction with FLKM-PA-D37/HW/C300 front adapter
- System-specific labeling
- Field connection via double-level terminal blocks

VIP-3/SC/D37SUB/M/HW/C300

- In conjunction with FLKM-PA-D37/HW/AN/C300 front adapter
- System-specific labeling
- For TAIX01, TAIX11 analog input modules
- Field connection via three-level terminal blocks



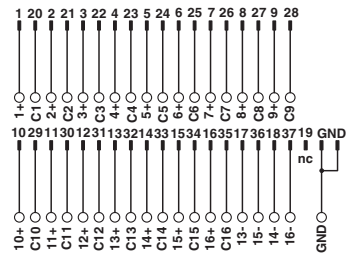
37 poles
with screw connection

Technical data

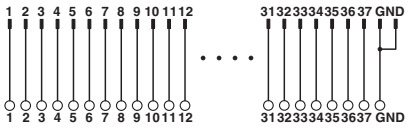
	VIP-2/SC...	VIP-3/SC...C300
Max. perm. operating voltage	125 V AC/DC	24 V DC
Max. perm. current (per branch)	2 A	2 A
Ambient temperature (operation)	-20°C ... 50°C	-20°C ... 50°C
Mounting position	Any	Any
Standards / regulations	DIN EN 50178	
Connection method	Screw connection	Screw connection
PCB connection	Male connector; 4-40 UNC thread	Male connector; 4-40 UNC thread
D-SUB connection		
Connection data solid / stranded / AWG	0.2 ... 4 mm² / 0.2 ... 2.5 mm² / 24 - 12	
Dimensions H / D	45.5 mm / 65.5 mm	

Ordering data

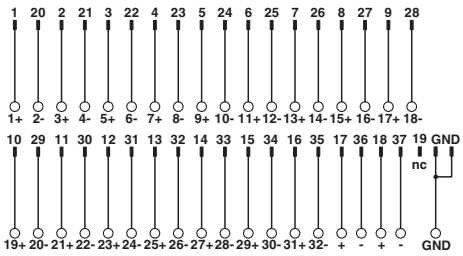
Description	No. of poles	Module width W	Type	Order No.	Pcs. / Pkt.
VARIOFACE interface modules with D-SUB pin strip,					
With universal labeling	37	101 mm	**VIP-2/SC/D37SUB/M**	**2900676**	1
With system specific labeling	37	88 mm	**VIP-2/SC/D37SUB/M/SO**	**2900786**	1
For analog input modules	37	88 mm	**VIP-3/SC/D37SUB/M/HW/C300**	**2900675**	1



VIP-3/SC/D37SUB/M/HW/C300 connection scheme



VIP-2/SC/D37SUB/M connection scheme



VIP-2/SC/D37SUB/M/SO connection scheme

Mitsubishi Electric MELSEC A, A1S, and Q System cable

For 32-/64-channel I/O boards with 37-pole D-SUB connectors. System cables are available for connecting 1 x 32 channels or 4 x 8 channels.

Notes:

Suitable system cabling components can be configured in the INTERFACE search wizard. See **www.phoenixcontact.net/catalog**.

System cable, D-SUB female connector on FLK, number of poles: 37 on 50

Splitting cable, D-SUB-female connector on FLK, number of poles: 37 on 4 x 14

	Technical data	Technical data
Max. perm. operating voltage	< 50 V AC / 60 V DC	< 50 V AC / 60 V DC
Max. perm. current carrying capacitance per path	1 A	1 A
Max. conductor resistance	0.16 Ω/m	0.16 Ω/m
Ambient temperature (operation)	-20°C ... 50°C	-20°C ... 50°C
Conductor cross section	AWG 26 / 0.14 mm²	AWG 26 / 0.14 mm²
Conductor structure: stranded wires / material	7 / Cu tin-plated	7 / Cu tin-plated
Outside diameter		
37-pole	10.5 mm	6.3 mm

Description	No. of poles	Cable length	Ordering data: Type	Order No.	Pcs. / Pkt.	Ordering data: Type	Order No.	Pcs. / Pkt.
Round cable (connection of 1 x 32 channels), for MELSEC Q Y81 P, MELSEC A1S Y81, and MELSEC A AY82EP, in standard lengths								
	37	0.5 m	**FLK 50/EZ-DR/D37SUB/ 50/Y81P-O**	**2302599**	1	**CABLE-D37-M2,5/4X14/ 50/Y81P-O**	**2302476**	1
	37	1 m	**FLK 50/EZ-DR/D37SUB/100/Y81P-O**	**2302609**	1	**CABLE-D37-M2,5/4X14/100/Y81P-O**	**2302489**	1
	37	2 m	**FLK 50/EZ-DR/D37SUB/200/Y81P-O**	**2302612**	1	**CABLE-D37-M2,5/4X14/200/Y81P-O**	**2302492**	1
	37	3 m	**FLK 50/EZ-DR/D37SUB/300/Y81P-O**	**2302638**	1	**CABLE-D37-M2,5/4X14/300/Y81P-O**	**2302502**	1
Round cable, same as before, however in variable lengths								
	37		**FLK 50-EZ-DR-D37SUB-Y81P-O/...**	**2302625**	1	**CABLE-D37-M2,5-4X14-Y81P-O/...**	**2302696**	1
Round cable (connection of 4 x 8 channels), for MELSEC Q Y81 P, MELSEC A1S Y81, and MELSEC A AY82EP, in standard lengths								
	37	0.5 m	**FLK 50/EZ-DR/D37SUB/ 50/X81-I**	**2302641**	1	**CABLE-D37-M2,5/4X14/ 50/X81-I**	**2302515**	1
	37	1 m	**FLK 50/EZ-DR/D37SUB/100/X81-I**	**2302654**	1	**CABLE-D37-M2,5/4X14/100/X81-I**	**2302528**	1
	37	2 m	**FLK 50/EZ-DR/D37SUB/200/X81-I**	**2302667**	1	**CABLE-D37-M2,5/4X14/200/X81-I**	**2302531**	1
	37	3 m	**FLK 50/EZ-DR/D37SUB/300/X81-I**	**2302670**	1	**CABLE-D37-M2,5/4X14/300/X81-I**	**2302544**	1
Round cable, same as before, however in variable lengths								
	37		**FLK 50-EZ-DR-D37SUB-X81-I/...**	**2302683**	1	**CABLE-D37-M2,5-4X14-X81-I/...**	**2302706**	1

Ordering example for system cable:

– Cable for MELSEC Q Y81P, 12.75 m long

Quantity	Order No.	Length [m][1])
1	2302625	12.75

[1]) min. 0.20 m

Ordering examples for splitting cable:

– Cable for MELSEC Q Y81P, 11.00 m long

Quantity	Order No.	Length [m][1])
1	2302696	11.00

[1]) min. 0.20 m

OMRON CJ1, CS1, CQM1, and C200H System cable

These system cables are plugged onto the I/O cards that are connected using Fujitsu connectors.

FLK 50/EZ-DR/...
– Signal transmission of 32 channels

CABLE-FCN40...
– Splitting up 32 channels into 4 x 8 channels

CABLE-FCN24...
– Splitting up 16 channels into 2 x 8 channels

Connector Fujitsu FCN on flat-ribbon cable, number of poles: 40 on 50

Connector Fujitsu FCN on flat-ribbon cable, number of poles: 40 on 4 x 14 or 24 on 2 x 14

	Technical data	Technical data
Max. perm. operating voltage	< 50 V AC / 60 V DC	< 50 V AC / 60 V DC
Max. perm. current carrying capacitance per path	1 A	1 A
Max. conductor resistance	0.16 Ω/m	0.16 Ω/m
Ambient temperature (operation)	-20°C ... 50°C	-20°C ... 50°C
Conductor cross section	AWG 26 / 0.14 mm²	AWG - / 0.14 mm²
Conductor structure: stranded wires / material	7 / Cu tin-plated	7 / Cu tin-plated

Description	No. of poles	Cable length	Ordering data: Type	Order No.	Pcs. / Pkt.	Ordering data: Type	Order No.	Pcs. / Pkt.
Round cable in variable lengths for CJ1: OD231, OD261 CS1, C200H: OD218, OD219 CQM1: OD213								
	40	1 m	**FLK 50/EZ-DR/FCN40/100/OMR-OUT**	**2304144**	1	**CABLE-FCN40/4X14/100/OMR-OUT**	**2304186**	1
	40	2 m	**FLK 50/EZ-DR/FCN40/200/OMR-OUT**	**2304157**	1	**CABLE-FCN40/4X14/200/OMR-OUT**	**2304199**	1
Round cable, same as before, however in variable lengths	40		**FLK 50-EZ-DR-FCN40-OMR-OUT/...**	**2302829**	1	**CABLE-FCN40-4X14-OMR-OUT/...**	**2302832**	1
Round cable in variable lengths for CJ1: ID231, ID261 CS1 and C200H: ID111, ID216, ID217, CQM1: ID213; ID214;ID112								
	40	1 m	**FLK 50/EZ-DR/FCN40/100/OMR-IN**	**2304160**	1	**CABLE-FCN40/4X14/100/OMR-IN**	**2304209**	1
	40	2 m	**FLK 50/EZ-DR/FCN40/200/OMR-IN**	**2304173**	1	**CABLE-FCN40/4X14/200/OMR-IN**	**2304212**	1
Round cable, same as before, however in variable lengths	40		**FLK 50-EZ-DR-FCN40-OMR-IN/...**	**2302803**	1	**CABLE-FCN40-4X14-OMR-IN/...**	**2302816**	1
Round cable in variable lengths for CS1, C200H: OD215, MD115 (only output), MD215 (only output)								
	24	1 m				**CABLE-FCN24/2X14/100/OMR-OUT**	**2304225**	1
	24	2 m				**CABLE-FCN24/2X14/200/OMR-OUT**	**2304238**	1
Round cable, same as before, however in variable lengths	24					**CABLE-FCN24-2X14-OMR-OUT/...**	**2302858**	1
Round cable in variable lengths for CS1, C200H: ID215, MD115 (only input), MD215 (only input)								
	24	1 m				**CABLE-FCN24/2X14/100/OMR-IN**	**2304241**	1
	24	2 m				**CABLE-FCN24/2X14/200/OMR-IN**	**2304254**	1
Round cable, same as before, however in variable lengths	24					**CABLE-FCN24-2X14-OMR-IN/...**	**2302845**	1

Ordering example for system cable:
– Cable for OMRON CJ1, ID231, 12.75 m long

Quantity	Order No.	Length [m][1])
1	2302803	/ 12.75

[1]) min. 0.20 m

N

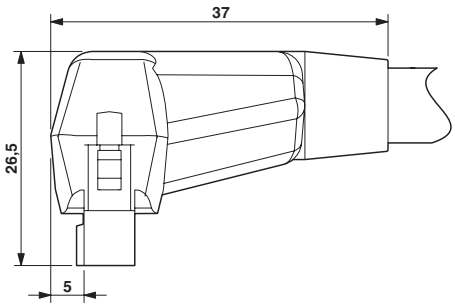
Phoenix Contact Axioline real-time I/O System cables

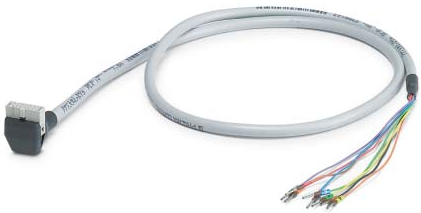
These cables have been specifically developed for connecting VARIOFACE termination boards to the Axioline realtime I/O system. The PIT technology on the I/O system ensures rapid connection.

The cables have the following features:

– 1:1 connection
– 14-pole connector, molded
– 8 pre-assembled open ends, for connection to the Axioline realtime I/O system
– Transmission of groups of 8 channels
– Labeling field on connector

Perfectly-fitting VARIOFACE termination boards round off this system concept.





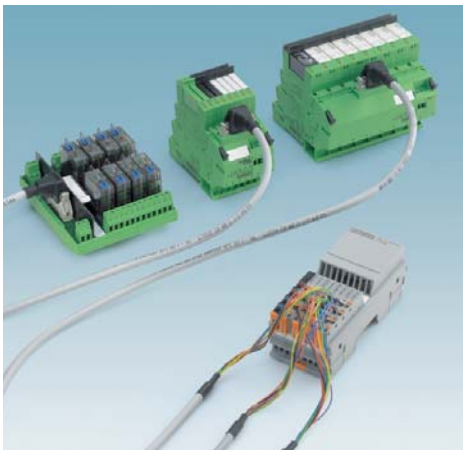
System cable for 8 channels

Notes:

The following modules cannot be coupled due to the larger outer contour of the molded connectors:
UM 45-FLK14/ 8IM/ZFKDS/PLC, 2965211
UM 45- 8RM/MR-G24/1/PLC, 2962900

Technical data

Max. perm. operating voltage	< 50 V AC / 60 V DC
Max. perm. current carrying capacitance per path	1 A
Max. conductor resistance	0.16 Ω/m
Ambient temperature (operation)	-20°C ... 50°C
Assembly	Insulation displacement, IEC 60352-4 / DIN EN 60352-4
Conductor cross section	AWG 26 / 0.14 mm²
Conductor structure: stranded wires / material	7 / Cu tin-plated
Outside diameter	
14-pole	6.4 mm



Ordering data

Description	No. of poles	Cable length	Type	Order No.	Pcs. / Pkt.
Round cable with an open end (8 individual wires)					
	14	0.5 m	**VIP-CAB-FLK14/AXIO/0,14/0,5M**	**2901604**	1
	14	1 m	**VIP-CAB-FLK14/AXIO/0,14/1,0M**	**2901605**	1
	14	1.5 m	**VIP-CAB-FLK14/AXIO/0,14/1,5M**	**2901606**	1
	14	2 m	**VIP-CAB-FLK14/AXIO/0,14/2,0M**	**2901607**	1
	14	2.5 m	**VIP-CAB-FLK14/AXIO/0,14/2,5M**	**2901608**	1
	14	3 m	**VIP-CAB-FLK14/AXIO/0,14/3,0M**	**2901609**	1
	14	4 m	**VIP-CAB-FLK14/AXIO/0,14/4,0M**	**2901610**	1
	14	6 m	**VIP-CAB-FLK14/AXIO/0,14/6,0M**	**2901611**	1

Phoenix Contact Inline Front adapters

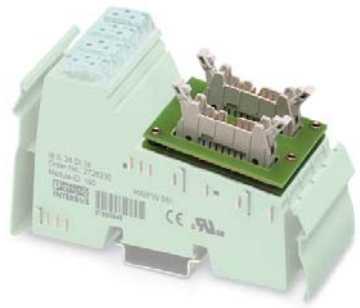
The front adapters are used to connect pre-assembled system cables directly to Inline. Front adapters are simply plugged into the relevant Inline modules. Three connection options are available:

– Transfer of 8 channels via a 14-pole system cable
– Transmission of 2 x 8 channels over two 14-pole system cables
– Transmission of 4 x 8 channels over four 14-pole system cables

Perfectly-fitting VARIOFACE termination boards round off this system concept.

Notes:

Suitable system cabling components can be configured in the INTERFACE search wizard. See **www.phoenixcontact.net/catalog**.



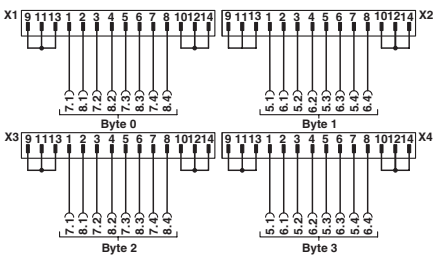
Front adapters for Inline

Technical data

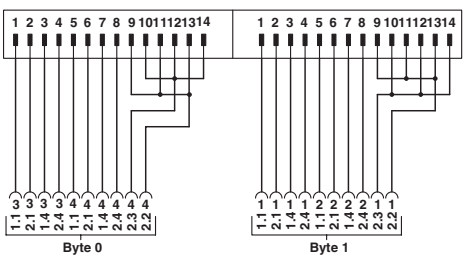
Max. perm. operating voltage	< 50 V AC / 60 V DC
Max. permissible current	1 A (per path)
Ambient temperature (operation)	-20°C ... 50°C
Ambient temperature (storage / transport)	-20°C ... 70°C
Mounting position	Any
Standards / regulations	IEC 60664 / DIN EN 50178 / IEC 62103

Ordering data

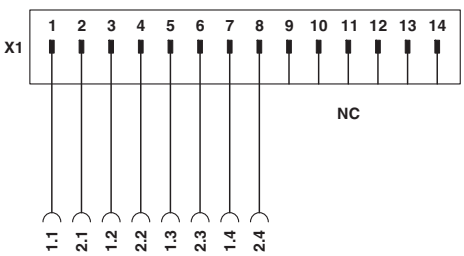
Description	No. of poles	Type	Order No.	Pcs. / Pkt.
VARIOFACE front adapter, for 8-channel Inline modules				
Input: IB IL 24 D I8/HD-PAC Output: IB IL 24 DO 8/HD-PAC		**FLKM 14-PA-INLINE/DIO8**	**2900889**	1
VARIOFACE front adapter, for 16-channel Inline modules				
Input: IB IL 24 DI 16		**FLKM 14-PA-INLINE/IN16**	**2302751**	1
Output: IB IL 24 DO 16		**FLKM 14-PA-INLINE/OUT16**	**2302764**	1
VARIOFACE front adapter, for 32-channel Inline modules				
Input: IB IL 24 DI 32/HD and Output: IB IL 24 DO 32/HD		**FLKM 14-PA-INLINE/32**	**2302777**	1



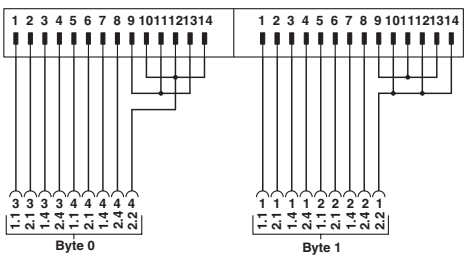
Connection scheme: FLKM 14-PA-INLINE/32



Connection scheme: FLKM 14-PA-INLINE/IN16



Connection scheme for FLKM 14-PA-INLINE/DIO8



Connection scheme: FLKM 14-PA-INLINE/OUT16

Explanation:
- Flat-ribbon cable strip
- Connection to I/O card
- Screw terminal blocks for separate supply

Schneider Electric MODICON® TSX Quantum Front adapter

The front adapters mean that pre-assembled system cables can be directly connected to I/O modules. There are two connection possibilities available:

– Transfer of max. 32 channels over one 50-pole system cable
– Transmission of 4 x 8 channels over four 14-pole system cables,

Perfectly-fitting VARIOFACE termination boards with a variety of functions and connection possibilities round off this system concept.

Notes:

Suitable system cabling components can be configured in the INTERFACE search wizard. See **www.phoenixcontact.net/catalog**.

Front adapter for MODICON TSX Quantum

Technical data

Max. perm. operating voltage	< 50 V AC / 60 V DC
Max. permissible current	1 A (per path) 4 A (per connection, supply via separate power supply)
Ambient temperature (operation)	-20°C ... 50°C
Ambient temperature (storage / transport)	-20°C ... 70°C
Mounting position	Any
Standards / regulations	IEC 60664 / DIN EN 50178 / IEC 62103

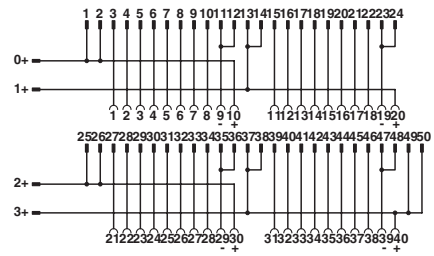
Ordering data

Description	No. of poles	Type	Order No.	Pcs. / Pkt.
VARIOFACE front adapter, for MODICON® TSX Quantum, 1 x 32 channels can be connected	50	**FLKM 50-PA-MODI-TSX/Q**	**2294306**	1
VARIOFACE front adapter, for MODICON® TSX Quantum, 4 x 8 channels can be connected	14	**FLKM 50/ 4-FLK14/PA-MODI-TSX/Q**	**2294416**	1

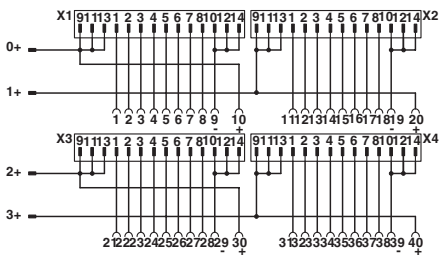
Front adapters for I/O modules of MODICON® TSX Quantum automation devices

Card type	FLKM 50-PA-MODI-TSX/Q
Digital input	DDI 353 DDI 841* DDI 853 DAI 340* DAI 353** DAI 440* DAI 453**
Digital output	DDO 353
Digital input/output	DDM 390*
Analog input	ACI 030* ACI 040* ATI 030* ARI 030* AVI 030*
Analog output	ACO 020* ACO 130* AVO 020*
Analog input/output	AMM 090*
Counter	ECH 105* EHC 202*

* Only in conjunction with VIP-2/SC/FLK50/MODI-TSX/Q, Order No. 2322304.
** Only in conjunction with passive termination boards without LED.



Connection scheme FLKM 50-PA-MODI-TSX/Q



Connection scheme FLKM 50/ 4-FLK14/PA-MODI-TSX/Q

Explanation:
Flat-ribbon cable strip
Connection to I/O card
Screw terminal blocks for separate supply

Schneider Electric MODICON® M340 System cable

These system cables are plugged onto the I/O cards that are connected using Fujitsu connectors.

CABLE-FCN40/1X50/…
– Signal transmission of 32 channels

CABLE-FCN40/4X14/…
– Splitting up 32 channels into 4 x 8 channels

Notes:
Suitable system cabling components can be configured in the INTERFACE search wizard. See **www.phoenixcontact.net/catalog**.

Connector Fujitsu FCN on flat-ribbon cable, number of poles: 40 on 50

Connector Fujitsu FCN on flat-ribbon cable, number of poles: 40 on 4 x 14

	Technical data	Technical data
Max. perm. operating voltage	< 50 V AC / 60 V DC	< 50 V AC / 60 V DC
Max. perm. current carrying capacitance per path	1 A	1 A
Max. conductor resistance	0.16 Ω/m	0.16 Ω/m
Ambient temperature (operation)	-20°C ... 50°C	-20°C ... 50°C
Conductor cross section	AWG 26 / 0.14 mm²	AWG 26 / 0.14 mm²
Conductor structure: stranded wires / material	7 / Cu tin-plated	7 / Cu tin-plated
Outside diameter	10.5 mm	6.3 mm

Description	No. of poles	Cable length	Ordering data: Type	Order No.	Pcs. / Pkt.	Ordering data: Type	Order No.	Pcs. / Pkt.
Round cable in variable lengths for BMX DDI 3202K, BMX DDI 6402K, BMX DD0 3202K, BMX DD0 6402K, BMX DDM 3202K								
	40	0.5 m	**CABLE-FCN40/1X50/ 0,5M/M340**	**2321635**	1	**CABLE-FCN40/4X14/ 0,5M/M340**	**2321716**	1
	40	1 m	**CABLE-FCN40/1X50/ 1,0M/M340**	**2321648**	1	**CABLE-FCN40/4X14/ 1,0M/M340**	**2321729**	1
	40	2 m	**CABLE-FCN40/1X50/ 2,0M/M340**	**2321651**	1	**CABLE-FCN40/4X14/ 2,0M/M340**	**2321732**	1
	40	3 m	**CABLE-FCN40/1X50/ 3,0M/M340**	**2321664**	1	**CABLE-FCN40/4X14/ 3,0M/M340**	**2321745**	1
	40	4 m	**CABLE-FCN40/1X50/ 4,0M/M340**	**2321677**	1	**CABLE-FCN40/4X14/ 4,0M/M340**	**2321758**	1
	40	6 m	**CABLE-FCN40/1X50/ 6,0M/M340**	**2321680**	1	**CABLE-FCN40/4X14/ 6,0M/M340**	**2321761**	1
	40	8 m	**CABLE-FCN40/1X50/ 8,0M/M340**	**2321693**	1	**CABLE-FCN40/4X14/ 8,0M/M340**	**2321774**	1
	40	10 m	**CABLE-FCN40/1X50/10,0M/M340**	**2321703**	1	**CABLE-FCN40/4X14/10,0M/M340**	**2321787**	1

VIP – VARIOFACE Professional front adapters for SIMATIC S7-300

Three connection options are available:

- Transfer of max. 32 channels via two 50-pole system cables (32-channel cards or this design)
- Transfer of 4 x 8 channels via two 14-pole system cables (32-channel cards or their type)
- Transfer of 2 x 8 channels via two 14-pole system cables (16-channel cards or their type)

The front adapters have the following features:

- Can be screwed with I/O module
- Voltage supply via terminal blocks with spring-cage double connection
- Encapsulated socket strips for module side

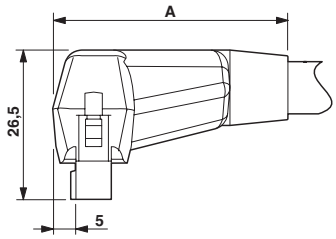
Special lengths can be configured using separate order numbers.

Ordering example:

A front adapter with a connected 50-pole system cable (32-channel cards), 12.75 m in length:

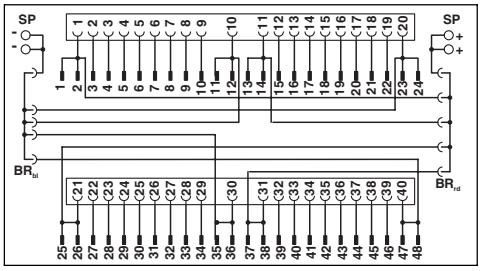
1 pcs. 2900885/12,75

Notes:
The following modules cannot be coupled due to the larger outer contour of the molded connectors: UM 45-FLK14/ 8IM/ZFKDS/PLC, 2965211 UM 45-FLK50/32IM/ZFKDS/PLC, 2965224 UM 45- 8RM/MR-G24/1/PLC, 2962900 UM 45-16RM/MR-G24/1/PLC, 2962913
Suitable system cabling components can be configured in the INTERFACE search wizard. See **www.phoenixcontact.net/catalog**.



	A
...FLK14...	37
...FLK50...	42

Front adapter with system cable 1 x 32 channels can be connected



Technical data

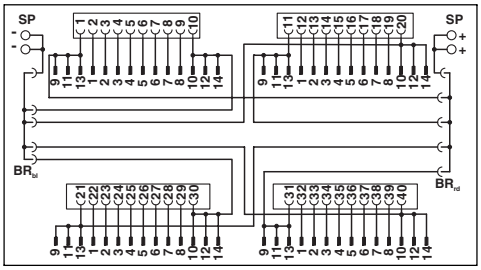
Max. perm. operating voltage		< 50 V AC / 60 V DC
Max. perm. current carrying capacitance per path		1 A (per path)
Max. perm. current (separate power supply)		8 A
Rated surge voltage		0.8 kV
Max. conductor resistance		0.16 Ω/m
Conductor cross section		AWG 26 / 0.14 mm²
Conductor structure: stranded wires / material		7 / Cu tin-plated
Outside diameter		10.3 mm
Ambient temperature range		-20°C ... 50°C
Standards / regulations		IEC 60664, IEC 62103, DIN EN 50178
Connection method	Front adapter	Can be plugged onto 40-pos. I/O modules / separate power supply through terminal blocks with spring-cage double connection
	System cable	Flat-ribbon cable plug connector in acc. with IEC 60603-13
Connection data solid / stranded / AWG		0.2 ... 2.5 mm² / 0.2 ... 2.5 mm² / 24 - 14

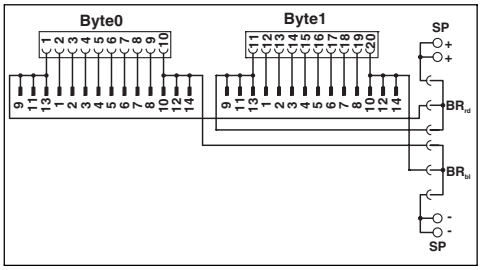
Ordering data

Description	Cable length	Type	Order No.	Pcs. / Pkt.
VIP VARIOFACE front adapter, with connected system cables for SIMATIC S7 300				
	0.5 m	**VIP-PA-FLK50/ 0,5M/S7**	**2322443**	1
	1 m	**VIP-PA-FLK50/ 1,0M/S7**	**2322456**	1
	1.5 m	**VIP-PA-FLK50/ 1,5M/S7**	**2322469**	1
	2 m	**VIP-PA-FLK50/ 2,0M/S7**	**2321800**	1
	2.5 m	**VIP-PA-FLK50/ 2,5M/S7**	**2322472**	1
	3 m	**VIP-PA-FLK50/ 3,0M/S7**	**2322485**	1
	4 m	**VIP-PA-FLK50/ 4,0M/S7**	**2322498**	1
	5 m	**VIP-PA-FLK50/ 5,0M/S7**	**2322508**	1
	6 m	**VIP-PA-FLK50/ 6,0M/S7**	**2322511**	1
	7 m	**VIP-PA-FLK50/ 7,0M/S7**	**2322524**	1
	8 m	**VIP-PA-FLK50/ 8,0M/S7**	**2322537**	1
	10 m	**VIP-PA-FLK50/10,0M/S7**	**2322540**	1
VIP VARIOFACE front adapter, as above, in variable lengths		**VIP-PA-FLK50-S7/...**	**2900885**	1

Front adapter with system cable
4 x 8 channels can be connected

Front adapter with system cable
2 x 8 channels can be connected





Technical data

< 50 V AC / 60 V DC
1 A (per path)
8 A

0.8 kV
0.16 Ω/m
AWG 26 / 0.14 mm²
7 / Cu tin-plated
6.4 mm
-20°C ... 50°C
IEC 60664, IEC 62103, DIN EN 50178
Can be plugged onto 40-pos. I/O modules / separate power supply through terminal blocks with spring-cage double connection

Flat-ribbon cable plug connector in acc. with IEC 60603-13

0.2 ... 2.5 mm² / 0.2 ... 2.5 mm² / 24 - 14

Ordering data

Type	Order No.	Pcs. / Pkt.
VIP-PA-FLK50/4X14/ 0,5M/S7	2322553	1
VIP-PA-FLK50/4X14/ 1,0M/S7	2322566	1
VIP-PA-FLK50/4X14/ 1,5M/S7	2322579	1
VIP-PA-FLK50/4X14/ 2,0M/S7	2321910	1
VIP-PA-FLK50/4X14/ 2,5M/S7	2322582	1
VIP-PA-FLK50/4X14/ 3,0M/S7	2322595	1
VIP-PA-FLK50/4X14/ 4,0M/S7	2322605	1
VIP-PA-FLK50/4X14/ 5,0M/S7	2322618	1
VIP-PA-FLK50/4X14/ 6,0M/S7	2322621	1
VIP-PA-FLK50/4X14/ 7,0M/S7	2322634	1
VIP-PA-FLK50/4X14/ 8,0M/S7	2322647	1
VIP-PA-FLK50/4X14/10,0M/S7	2322650	1
VIP-PA-FLK50-4X14-S7/...	2900886	1

Technical data

< 50 V AC / 60 V DC
1 A (per path)
8 A

0.8 kV
0.16 Ω/m
AWG 26 / 0.14 mm²
7 / Cu tin-plated
6.4 mm
-20°C ... 50°C
IEC 60664, IEC 62103, DIN EN 50178
Can be plugged onto 20-pos. I/O modules / separate power supply through terminal blocks with spring-cage double connection

Flat-ribbon cable plug connector in acc. with IEC 60603-13

0.2 ... 2.5 mm² / 0.2 ... 2.5 mm² / 24 - 14

Ordering data

Type	Order No.	Pcs. / Pkt.
VIP-PA-FLK14/ 0,5M/S7	2322663	1
VIP-PA-FLK14/ 1,0M/S7	2322676	1
VIP-PA-FLK14/ 1,5M/S7	2322689	1
VIP-PA-FLK14/ 2,0M/S7	2321790	1
VIP-PA-FLK14/ 2,5M/S7	2322692	1
VIP-PA-FLK14/ 3,0M/S7	2322702	1
VIP-PA-FLK14/ 4,0M/S7	2322715	1
VIP-PA-FLK14/ 5,0M/S7	2322728	1
VIP-PA-FLK14/ 6,0M/S7	2322731	1
VIP-PA-FLK14/ 7,0M/S7	2322744	1
VIP-PA-FLK14/ 8,0M/S7	2322757	1
VIP-PA-FLK14/10,0M/S7	2322760	1
VIP-PA-FLK14-S7/...	2900887	1

Front adapter for 32-channel cards of SIMATIC® S7-300

Card type	VIP-PA-FLK50/...M/S7
Digital input	6ES7 321-1BL00-0AA0
Digital output	6ES7 322-1BL00-0AA0
Digital input/output	6ES7 323-1BL00-0AA0
Analog input	6ES7 331-7PF01-0AB0* 6ES7 331-7PF11-0AB0* 6ES7 331-7NF00-0AB0* 6ES7 331-7NF10-0AB0* 6ES7 331-1KF01-0AB0*
Analog output	6ES7 332-5HF00-0AB0*
CPU	312C, 313C, 314C, 313C-2PtP 313C-2DP, 314C-2DP, 314C-2PtP
Other modules	6ES7 350-2AH01-0AE0* 6ES7 357-4AH01-0AE0*

Card type	VIP-PA-FLK50/4X14/...M/S7
Digital input	6ES7 321-1BL00-0AA0
Digital output	6ES7 322-1BL00-0AA0
Digital input/output	6ES7 323-1BL00-0AA0
CPU	313C, 314C, 313C-2PtP 313C-2DP, 314C-2DP, 314C-2PtP

* Only in conjunction with
VIP-2/SC/FLK50 (1-40)/S7, Order No.: 2315243,
UM 45-FLK50/ZFKDS/S7-300, Order No.: 2968111,
FLKM 50/KDS3-MT/PPA/S7-300, Order No.: 2304490.
All bridges (BR) at the adapter must be removed!

Front adapter for 16-channel cards of SIMATIC® S7-300

Card type	VIP-PA-FLK14/...M/S7
Digital input	6ES7 321-1BH02-0AA0 6ES7 321-1BH10-0AA0 6ES7 321-1BH50-0AA0* 6ES7 321-7BH01-0AB0*
Digital output	6ES7 322-1BH01-0AA0 6ES7 322-1BH10-0AA0 6ES7 322-8BF00-0AB0*
Digital input/output	6ES7 323-1BH01-0AA0
Analog input	6ES7 331-7KF02-0AB0* 6ES7 331-7HF01-0AB0* 6ES7 331-7KB02-0AB0* 6ES7 331-7TF01-0AB0*
Analog output	6ES7 332-5HD01-0AB0* 6ES7 332-5HB01-0AB0* 6ES7 332-7ND02-0AB0*
Analog input/output	6ES7 334-0CE01-0AA0* 6ES7 334-0KE00-0AB0* 6ES7 335-7HG01-0AB0*
Other modules	6ES7 338-4BC01-0AB0* 6ES7 350-1AH03-0AE0* 6ES7 351-1AH01-0AE0* 6ES7 352-1AH02-0AE0* 6ES7 353-1AH01-0AE0* 6ES7 354-1AH01-0AE0* 6ES7 355-0VH10-0AE0* 6ES7 355-1VH10-0AE0*

* Only in conjunction with
IP-2/SC/2FLK14 (1-20)S7, Order No.: 2315230
UM 45-2FLK14/ZFKDS/S7, Order No.: 2965156
FLKM-2FLK14/KDS 3-MT/PPA/S7, Order No.: 2295062
All bridges (BR) on the adapter must be disconnected.

Note:
The front adapters are non-isolated on delivery.
Removal of the bridges can achieve electrical isolation (in groups of 8).

Explanation:
Flat-ribbon cable strip
Connection to I/O card

SP: Separate power terminals
BRbl: Blue plug-in bridge
BRrd: Red plug-in bridge

Siemens-SIMATIC® S7-300 Front adapter

I/O modules with 32 channels or with this design

There are two connection possibilities available:

– Transfer of max. 32 channels over one 50-pole system cable
– Transmission of 4 x 8 channels over four 14-pole system cables,

Perfectly-fitting VARIOFACE termination boards with a variety of functions and connection possibilities round off this system concept.

Notes:

Suitable system cabling components can be configured in the INTERFACE search wizard. See **www.phoenixcontact.net/catalog**.

Front adapter for SIMATIC® S7-300, I/O cards with max. 32 channels

Technical data

Max. perm. operating voltage	< 50 V AC / 60 V DC
Max. permissible current	1 A (per path) 8 A (per connection, supply via separate power supply (2.8 x 0.8 mm))
Max. perm. total current	2 A (per byte, for supply via connector) 8 A (during supply via a separate bridged power supply)
Ambient temperature (operation)	-20°C ... 50°C
Ambient temperature (storage / transport)	-20°C ... 70°C
Standards / regulations	IEC 60664 / DIN EN 50178 / IEC 62103
Connection method	Flat-ribbon cable plug connector in acc. with IEC 60603-13

Ordering data

Description	No. of poles	Type	Order No.	Pcs. / Pkt.
VARIOFACE front adapters, for SIMATIC® S7-300				
- 1 x 32 channels can be connected	50	**FLKM 50-PA-S300**	**2294445**	1
- 4 x 8 channels can be connected	14	**FLKM 50/4-FLK14/PA-S300**	**2296281**	1

Front adapter for 32-channel cards of SIMATIC® S7-300

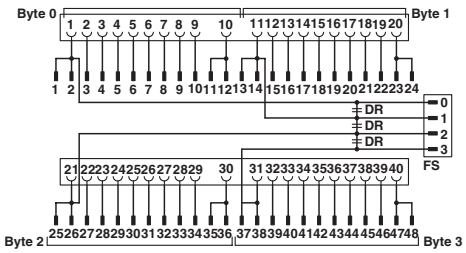
Card type	FLKM 50-PA-S300
Digital input	6ES7 321-1BL00-0AA0
Digital output	6ES7 322-1BL00-0AA0
Digital input/output	6ES7 323-1BL00-0AA0
Analog input	6ES7 331-7PF01-0AB0* 6ES7 331-7PF11-0AB0* 6ES7 331-7NF00-0AB0* 6ES7 331-7NF10-0AB0* 6ES7 331-1KF01-0AB0*
Analog output	6ES7 332-5HF00-0AB0*
CPU	312C, 313C, 314C, 313C-2PtP 313C-2DP, 314C-2DP, 314C-2PtP
Other modules	6ES7 350-2AH01-0AE0* 6ES7 357-4AH01-0AE0*

Card type	FLKM 50/4-FLK14/PA-S300
Digital input	6ES7 321-1BL00-0AA0
Digital output	6ES7 322-1BL00-0AA0
Digital input/output	6ES7 323-1BL00-0AA0
CPU	313C, 314C, 313C-2PtP 313C-2DP, 314C-2DP, 314C-2Pt

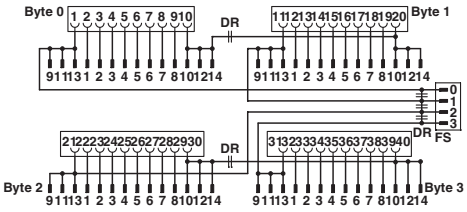
* Only in conjunction with
VIP-2/SC/FLK50 (1-40)/S7, Order No.:2315243,
UM 45-FLK50/ZFKDS/S7-300, Order No.: 2968111,
FLKM 50/KDS3-MT/PPA/S7-300, Order No.: 2304490.
All wire bridges (DR) on the adapter must be disconnected!
There must be no voltage supply at the front adapter (flowing via the slip-on connections)!

Note:
The front adapters are non-isolated on delivery.
Removal of the bridges can achieve electrical isolation (in groups of 8).

Explanation:
Flat-ribbon cable strip
Connection to I/O card
Screw terminal blocks for separate supply



Connection scheme FLKM 50-PA-S300



Connection scheme FLKM 50/4-FLK14/PA-S300

Siemens-SIMATIC® S7-300 Front adapter

I/O modules with 16 channels or with this design

– Up to 2 x 8 channels are connected via two 14-pole system cables

Perfectly-fitting VARIOFACE termination boards with a variety of functions and connection possibilities round off this system concept.

Notes:

Suitable system cabling components can be configured in the INTERFACE search wizard. See **www.phoenixcontact.net/catalog**.

Front adapter for SIMATIC® S7-300, I/O cards with max. 16 channels

Technical data

Max. perm. operating voltage	< 50 V AC / 60 V DC
Max. permissible current	1 A (per path) 8 A (per connection, supply via separate power supply (2.8 x 0.8 mm))
Max. perm. total current	2 A (per byte, for supply via connector) 8 A (during supply via a separate bridged power supply)
Ambient temperature (operation)	-20°C ... 50°C
Ambient temperature (storage / transport)	-20°C ... 70°C
Standards / regulations	IEC 60664 / DIN EN 50178 / IEC 62103
Connection method	Flat-ribbon cable plug connector in acc. with IEC 60603-13

Ordering data

Description	No. of poles	Type	Order No.	Pcs. / Pkt.
VARIOFACE front adapters, for SIMATIC® S7-300				
- 2 x 8 channels can be connected	14	**FLKM 14-PA-S300**	**2299770**	1

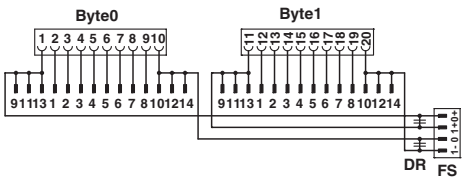
Front adapter for 16-channel cards of SIMATIC® S7-300

Card type	FLKM 14-PA-S300
Digital input	6ES7 321-1BH02-0AA0 6ES7 321-1BH10-0AA0 6ES7 321-1BH50-0AA0* 6ES7 321-7BH01-0AB0*
Digital output	6ES7 322-1BH01-0AA0 6ES7 322-1BH10-0AA0 6ES7 322-8BF00-0AB0*
Digital input/output	6ES7 323-1BH01-0AA0
Analog input	6ES7 331-7KF02-0AB0* 6ES7 331-7HF01-0AB0* 6ES7 331-7KB02-0AB0* 6ES7 331-7TF01-0AB0*
Analog output	6ES7 332-5HD01-0AB0* 6ES7 332-5HB01-0AB0* 6ES7 332-7ND02-0AB0*
Analog input/output	6ES7 334-0CE01-0AA0* 6ES7 334-0KE00-0AB0* 6ES7 335-7HG01-0AB0*
Other modules	6ES7 338-4BC01-0AB0* 6ES7 350-1AH03-0AE0* 6ES7 351-1AH01-0AE0* 6ES7 352-1AH02-0AE0* 6ES7 353-1AH01-0AE0* 6ES7 354-1AH01-0AE0* 6ES7 355-0VH10-0AE0* 6ES7 355-1VH10-0AE0*

* Only in conjunction with
VIP-2/SC/2FLK14 (1-20)/S7, Order No.: 2315230
UM 45-2FLK14/ZFKDS/S7, Order No.: 2965156
FLKM-2FLK14/KDS 3-MT/PPA/S7, Order No.: 2295062
All wire bridges (DR) on the adapter must be disconnected.
There must be no voltage supply at the front adapter (flowing via the slip-on connections)!

Note:
The front adapters are non-isolated on delivery.
Removal of the bridges can achieve electrical isolation (in groups of 8).

Explanation:
Flat-ribbon cable strip
Connection to I/O card
Screw terminal blocks for separate supply



Connection scheme FLKM 14-PA-S300

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Siemens SIMATIC® S7-300
Front adapter for failsafe modules

The front adapters are coupled using 50-pole system cables and convert the signals for passive modules.

Siemens SIMATIC S7-300 front adapter for failsafe I/O cards

Technical data

Max. perm. operating voltage	30 V DC
Max. permissible current	1 A (per path)
Max. perm. total current	2 A
Ambient temperature (operation)	-20°C ... 50°C
Ambient temperature (storage / transport)	-20°C ... 70°C
Standards / regulations	EN 50178
Connection method	Flat-ribbon cable plug connector in acc. with IEC 60603-13

Ordering data

Description	No. of poles	Type	Order No.	Pcs. / Pkt.
VARIOFACE front adapter for failsafe I/O cards				
6ES7 326-1BK02-0AB0 6ES7 326-1RF00-0AB0 6ES7 336-1HE00-0AB0	50	**FLKM 50-PA-S300/SO167**	**2307662**	1
VARIOFACE front adapter for failsafe I/O cards				
6ES7 326-2BF01-0AB0	50	**FLKM 50-PA/DO326/S7-300**	**2321952**	1

Front adapter for I/O modules of SIMATIC® S7-300

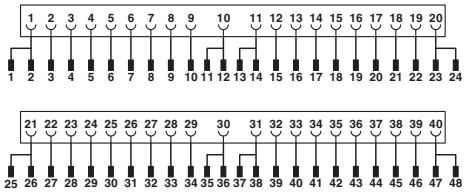
Card type	FLKM 50-PA-S300/SO167
Digital input	6ES7 326-1BK02-0AB0* 6ES7 326-1RF00-0AB0*[1])
Analog input	6ES7 336-1HE00-0AB0*

Card type	FLKM 50-PA/DO326/S7-S300
Digital output	6ES7 326-2BF01-0AB0**

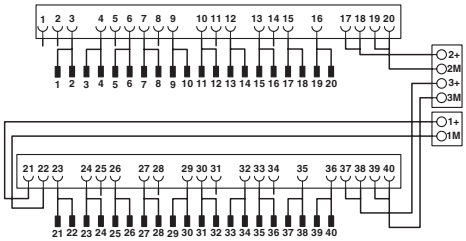
* Only in conjunction with
VIP-2/SC/FLK50 (1-40)/S7, Order No.:2315243,
UM 45-FLK50/ZFKDS/S7-300, Order No.: 2968111,
FLKM 50/KDS3-MT/PPA/S7-300, Order No.: 2304490.

** Only in conjunction with
FLKM 50/DO326/S7-300, Order No.: 2312952.

[1]) Not suitable for signals from the Ex area.



Connection scheme FLKM 50-PA-S300/SO167



Connection scheme FLKM 50-PA/DO326/S7-300

Explanation:
- Flat-ribbon cable strip
- Connection to I/O card
- Screw terminal blocks for separate supply

Siemens SIMATIC S7 -300
System cables for 64-channel I/O cards

These system cables are plugged onto the 64-channel (2x32) I/O cards that are directly connected using connectors.

CABLE-FCN40/1X50/…
- Signal transmission of 1x32 channels
- System cable: 40-pole connector on 50-pole flat-ribbon cable strip

CABLE-FCN40/4X14/…
- Signal transmission of 4x8 channels
- Splitting cable: 40-pole connector on four 14-pole flat-ribbon cable strips

System cable

Splitting cable

	Technical data	Technical data
Max. perm. operating voltage	< 50 V AC / 60 V DC	< 50 V AC / 60 V DC
Max. perm. current carrying capacitance per path	1 A	1 A
Max. conductor resistance	0.16 Ω/m	0.16 Ω/m
Ambient temperature (operation)	-20°C ... 50°C	-20°C ... 50°C
Conductor cross section	AWG 26 / 0.14 mm²	AWG 26 / 0.14 mm²
Conductor structure: stranded wires / material	7 / Cu tin-plated	7 / Cu tin-plated
Outside diameter	10 mm	6.3 mm

Description	No. of poles	Cable length	Ordering data: Type	Order No.	Pcs. / Pkt.	Ordering data: Type	Order No.	Pcs. / Pkt.
Round cable, for output module 6ES7 322-1BP00-0AA0 and 6ES7 322-1BP50-0AA0 (two cables per module)								
	40	0.5 m	**CABLE-FCN40/1X50/ 0,5M/S7-OUT**	**2321017**	1	**CABLE-FCN40/4X14/ 0,5M/S7-OUT**	**2321172**	1
	40	1 m	**CABLE-FCN40/1X50/ 1,0M/S7-OUT**	**2321020**	1	**CABLE-FCN40/4X14/ 1,0M/S7-OUT**	**2321185**	1
	40	2 m	**CABLE-FCN40/1X50/ 2,0M/S7-OUT**	**2321033**	1	**CABLE-FCN40/4X14/ 2,0M/S7-OUT**	**2321198**	1
	40	3 m	**CABLE-FCN40/1X50/ 3,0M/S7-OUT**	**2321046**	1	**CABLE-FCN40/4X14/ 3,0M/S7-OUT**	**2321208**	1
	40	4 m	**CABLE-FCN40/1X50/ 4,0M/S7-OUT**	**2321059**	1	**CABLE-FCN40/4X14/ 4,0M/S7-OUT**	**2321211**	1
	40	6 m	**CABLE-FCN40/1X50/ 6,0M/S7-OUT**	**2321062**	1	**CABLE-FCN40/4X14/ 6,0M/S7-OUT**	**2321224**	1
	40	8 m	**CABLE-FCN40/1X50/ 8,0M/S7-OUT**	**2321075**	1	**CABLE-FCN40/4X14/ 8,0M/S7-OUT**	**2321237**	1
	40	10 m	**CABLE-FCN40/1X50/10,0M/S7-OUT**	**2321088**	1	**CABLE-FCN40/4X14/10,0M/S7-OUT**	**2321240**	1
Round cable, for input module 6ES7 321-1BP00-0AA0 (two cables per module). Plus-reading operation (sinking mode) of the module								
	40	0.5 m	**CABLE-FCN40/1X50/ 0,5M/S7-IN**	**2321091**	1	**CABLE-FCN40/4X14/ 0,5M/S7-IN**	**2321253**	1
	40	1 m	**CABLE-FCN40/1X50/ 1,0M/S7-IN**	**2321101**	1	**CABLE-FCN40/4X14/ 1,0M/S7-IN**	**2321266**	1
	40	2 m	**CABLE-FCN40/1X50/ 2,0M/S7-IN**	**2321114**	1	**CABLE-FCN40/4X14/ 2,0M/S7-IN**	**2321279**	1
	40	3 m	**CABLE-FCN40/1X50/ 3,0M/S7-IN**	**2321127**	1	**CABLE-FCN40/4X14/ 3,0M/S7-IN**	**2321282**	1
	40	4 m	**CABLE-FCN40/1X50/ 4,0M/S7-IN**	**2321130**	1	**CABLE-FCN40/4X14/ 4,0M/S7-IN**	**2321295**	1
	40	6 m	**CABLE-FCN40/1X50/ 6,0M/S7-IN**	**2321143**	1	**CABLE-FCN40/4X14/ 6,0M/S7-IN**	**2321305**	1
	40	8 m	**CABLE-FCN40/1X50/ 8,0M/S7-IN**	**2321156**	1	**CABLE-FCN40/4X14/ 8,0M/S7-IN**	**2321318**	1
	40	10 m	**CABLE-FCN40/1X50/10,0M/S7-IN**	**2321169**	1	**CABLE-FCN40/4X14/10,0M/S7-IN**	**2321321**	1

Siemens SIMATIC® S7-300
Front adapter for MINI MCR

This front adapter helps only in coupling the MINI MCR-SL-V8-FLK 16 A adapter. Changed analog standard signals can be transmitted with the help of these components.

Suitable isolators can be seen from page 352 on.

For suitable 16-pole system cable (FLK 16/EZ-DR/...), refer to page 284.

Front adapter for SIMATIC® S7-300, 20-pos. analog I/O boards

Technical data

	FLKM 16-PA-S300/MINI-MCR
Max. perm. operating voltage	30 V AC/DC
Max. permissible current	50 mA (per path) 500 mA (per connection, supply via separate power supply)
Ambient temperature (operation)	-20°C ... 60°C
Ambient temperature (storage / transport)	-20°C ... 70°C
Standards / regulations	DIN EN 50178 / IEC 62103

Ordering data

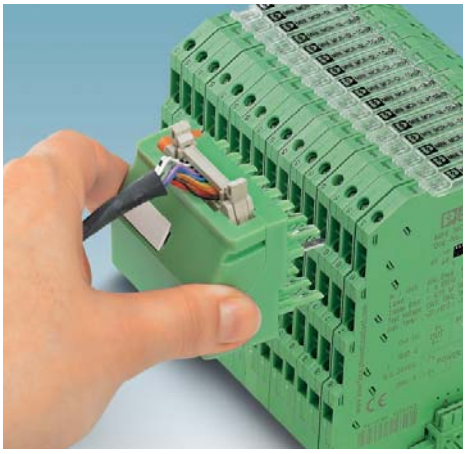
Description	No. of poles	Type	Order No.	Pcs. / Pkt.
VARIOFACE front adapter, for SIMATIC® S7-300, only in connection with MINI MCR-SL-V8-FLK 16-A	16	**FLKM 16-PA-S300/MINI-MCR**	**2314749**	1

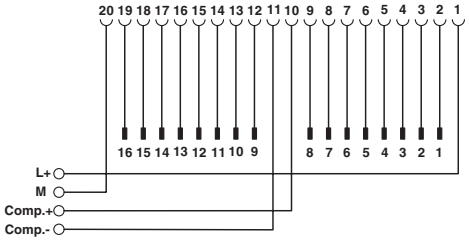
Accessories

Assembled round cable, with two 16-pole socket strips		**FLK 16/EZ-DR/ 300/KONFEK**	**2299330**	1
System adapter, for MINI Analog modules with screw connection		**MINI MCR-SL-V8-FLK 16-A**	**2811268**	1

Front adapter for analog cards of SIMATIC® S7-300

Card type	FLKM 16-PA-S300/MINI-MCR
Analog input	6ES7 331-7KF02-0AB0 6ES7 331-7KB02-0AB0 6ES7 331-7KB81-0AB0 6ES7 331-7TF00-0AB0
Analog output	6ES7 332-8TF01-0AB0





FLKM 16-PA-S300/MINI-MCR connection scheme

Explanation:
- Flat-ribbon cable strip
- Connection to I/O card
- Screw terminal blocks for separate supply

Siemens SIMATIC® S7-300 Front adapter for MINI Analog system cabling

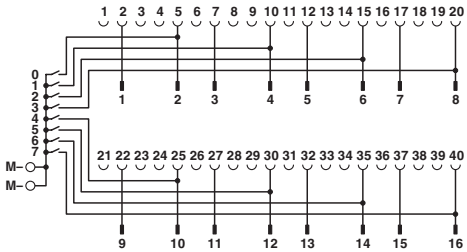
The FLKM 16-PA-331-1KF/I/MINI-MCR front adapter helps in system cabling in conjunction with the MINI Analog system adapter and a 16-pole system cable FLK 16/EZ-DR/.../KONFEK, refer to page 284.

Instead of the conventional front connector, screw terminal blocks are used to snap this component on to the analog module.

The DIP switches can be used to connect "M-" connections to each other and to the central ground of the system.

The front adapter supports **only current signals**.

The front adapter is suitable for the following analog input card:
– 6ES7 331-1KF02-0AB0



FLKM 16-PA-331-1KF/I/MINI-MCR connection scheme

Front adapter for SIMATIC® S7-300, 6ES7 331-1KF02-0AB0 analog I/O board

Technical data

Max. perm. operating voltage	30 V AC/DC
Max. permissible current	50 mA (per path)
Rated surge voltage / insulation	0.5 kV / basic insulation
Ambient temperature (operation)	-20°C ... 60°C
Ambient temperature (storage / transport)	-20°C ... 70°C
Standards / regulations	DIN EN 50178 / IEC 62103

Ordering data

Description	No. of poles	Type	Order No.	Pcs. / Pkt.
VARIOFACE front adapter, for SIMATIC® S7-300, only in connection with MINI MCR-SL-V8-FLK 16-A	16	**FLKM 16-PA- 331-1KF/I/MINI-MCR**	**2318237**	1

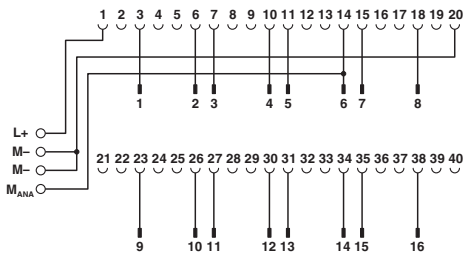
Siemens SIMATIC® S7-300 Front adapter for MINI Analog system cabling

The FLKM 16-PA-332-5HF/I/MINI-MCR front adapter helps in system cabling in conjunction with the MINI Analog system adapter and a 16-pole system cable FLK 16/EZ-DR/.../KONFEK, refer to page 284.

Instead of the conventional front connector, screw terminal blocks are used to snap this component on to the analog module.

The front adapter supports **only current signals**.

The front adapter is suitable for the following analog output cards:
– 6ES7 332-5HF00-0AB0



FLKM 16-PA-332-5HF/I/MINI-MCR connection scheme

Front adapter for SIMATIC® S7-300, 6ES7 332-5HF00-0AB0 analog I/O board

Technical data

Max. perm. operating voltage	30 V AC/DC
Max. permissible current	50 mA (per path) 500 mA (per connection, supply via separate power supply)
Rated surge voltage / insulation	0.5 kV / basic insulation
Ambient temperature (operation)	-20°C ... 60°C
Ambient temperature (storage / transport)	-20°C ... 70°C
Standards / regulations	DIN EN 50178 / IEC 62103

Ordering data

Description	No. of poles	Type	Order No.	Pcs. / Pkt.
VARIOFACE front adapter, for SIMATIC® S7-300, only in connection with MINI MCR-SL-V8-FLK 16-A	16	**FLKM 16-PA- 332-5HF/I/MINI-MCR**	**2318240**	1

Siemens SIMATIC® S7-400
Front adapter

The front adapters mean that pre-assembled system cables can be directly connected to I/O modules.

FLKM 50-PA-S400
– Transmission of max. 32 digital channels over one 50-pole system cable

FLKM 50/4-FLK14/PA-S400
– Transmission of max. 32 digital channels via one 14-pole system cable

Perfectly-fitting VARIOFACE termination boards with a variety of functions and connection possibilities round off this system concept.

FLKM 50-PA-S400 (3-48)
– Analog channels are connected via a 50-pole system cable

The 1:1 connection of the adapter means that corresponding 1:1 interface modules are connected here.

Front adapter for SIMATIC® S7-400

Technical data

Max. perm. operating voltage	< 50 V AC / 60 V DC
Max. permissible current	1 A (per path) 8 A (per connection, supply via separate power supply)
Max. perm. total current	2 A (per byte, for supply via connector) 8 A (during supply via a separate bridged power supply)
Ambient temperature (operation)	-20°C ... 50°C
Ambient temperature (storage / transport)	-20°C ... 70°C
Mounting position	Any
Standards / regulations	IEC 60664 / DIN EN 50178 / IEC 62103

Ordering data

Description	No. of poles	Type	Order No.	Pcs. / Pkt.
VARIOFACE front adapter, for				
- SIMATIC® S7-400, 1 x 32 channels can be connected	50	**FLKM 50-PA-S400**	**2294500**	2
- SIMATIC® S7-400, 4 x 8 channels can be connected	14	**FLKM 50/ 4-FLK14/PA-S400**	**2294429**	2
- SIMATIC® S7-400, only analog	50	**FLKM 50-PA-S400(3-48)**	**2294908**	2

Front adapter for I/O modules of the Siemens automation equipment SIMATIC® S7-400

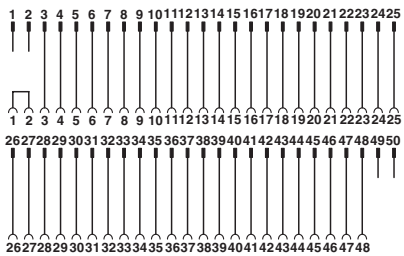
Card type	FLKM 50-PA-S400
Digital input	6ES7 421-1BL01-0AA0 6ES7 421-7BH01-0AB0* 6ES7 421-7DH00-0AB0*
Digital output	6ES7 422-1BL00-0AA0 6ES7 422-7BL00-0AB0

Card type	FLKM 50/4-FLK14/PA-S400
Digital input	6ES7 421-1BL01-0AA0
Digital output	6ES7 422-1BL00-0AA0 6ES7 422-7BL00-0AB0

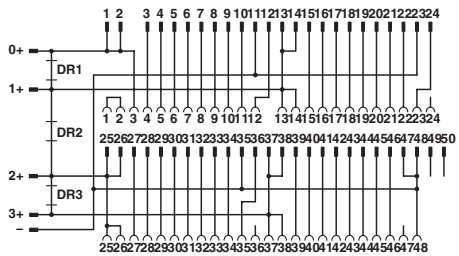
Card type	FLKM 50-PA-S400 (3-48)
Analog input	6ES7 431-0HH00-0AB0** 6ES7 431-1KF00-0AB0** 6ES7 431-1KF10-0AB0** 6ES7 431-1KF20-0AB0** 6ES7 431-7KF00-0AB0** 6ES7 431-7KF10-0AB0** 6ES7 431-7QH00-0AB0**
Analog output	6ES7 432-1HF00-0AB0**

* Only in connection with
VIP-2/SC/FLK50/S7/A-S400, Order No.: 2322359
All wire bridges (DR) on the adapter must be disconnected.

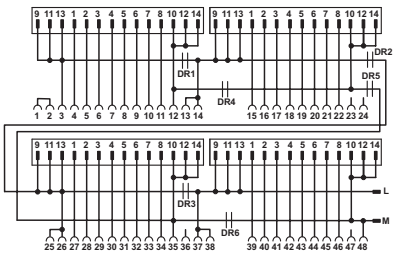
** Only in connection with
VIP-3/SC/FLK50, Order No.: 2315081
UM 45-FLK 50/ZFKDS, Order No.: 2293585
UM 45-FLKS 50/ZFKDS, Order No.: 2968470
FLKM 50/KDS 3-MT/PPA/AN/PLC, Order No.: 2291587



Connection scheme FLKM 50-PA-S400 (3-48)



Connection scheme FLKM 50-PA-S400



Connection scheme: FLKM 50/4-FLK14/PA-S400

Explanation:
- Flat-ribbon cable strip
- Connection to I/O card
- Screw terminal blocks for separate supply

Siemens SIMATIC® S7-400 Adapter for conversion from S5-135/155 to S7-400

The FLKM S135/... adapters connect a SIMATIC® S5 connector wired with individual conductors directly with the SIMATIC® S7-400 basic card.

The SIMATIC® S5 connector is plugged directly onto an S7-400 I/O card with the help of an FLKM S135/... intermediate adapter.

A new SIMATIC® S7-400 is installed in place of the SIMATIC® S5. The existing field wiring remains intact.

Attention:

The LEDs of the S7-400 module are hidden.

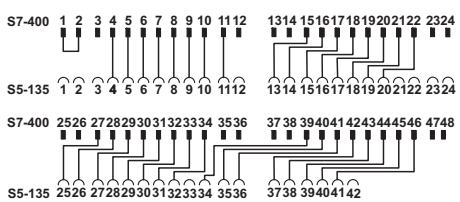
Adapter for Siemens SIMATIC® S5-135/S7-400

Technical data

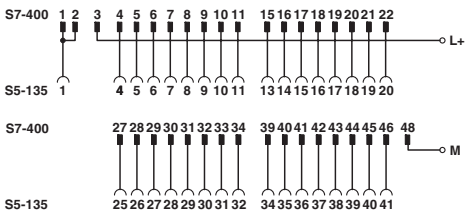
	①	②	③	④
Max. perm. operating voltage	24 V AC/DC	60 V DC	24 V DC	24 V AC/DC
Max. permissible current	4 A (per path)	2 A (per path)	4 A (per path)	4 A (per path)
Test voltage (contact / contact)	500 V (50 Hz, 1 min.)	1.25 kV (50 Hz, 1 min.)	1.25 kV (50 Hz, 1 min.)	1.25 kV (50 Hz, 1 min.)
Ambient temperature (operation)	-20°C ... 50°C	-20°C ... 50°C	-20°C ... 50°C	-20°C ... 50°C
Mounting position	Any	Any	Any	Any
Standards / regulations	DIN EN 50178 / IEC 62103			

Ordering data

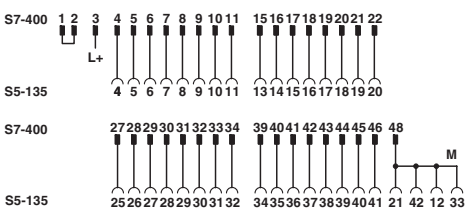
Description	No. of poles	Type	Order No.	Pcs. / Pkt.
Digital IN 24 V from S5-135/155 to S7-400				
6ES5 420-4UA14 on 6ES7 421-1BL01-0AA0	①	**FLKM S135/S400/SO120**	**2301723**	1
6ES5 430-4UA14 on 6ES7 421-1BL01-0AA0	②	**FLKM S135/S400/SO121**	**2301736**	1
6ES5 431-4UA12 to 6ES7 421-7DH00-0AB0	③	**FLKM S135-431-4UA/S400**	**2314846**	1
6ES5 432-4UA12 on 6ES7 421-1BL01-0AA0	④	**FLKM S135/S400/SO122**	**2301749**	1



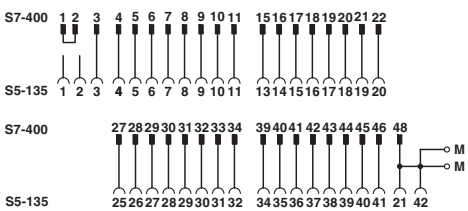
FLKM S135-431-UA/S400 connection scheme



Connection scheme: FLKM S135/S400/SO120



Connection scheme: FLKM S135/S400/SO122



Connection scheme: FLKM S135/S400/SO121

Siemens SIMATIC® S7-400 Adapter for conversion from S5-135/155 to S7-400

The FLKM S135/... adapters connect a SIMATIC® S5 connector wired with individual conductors directly with the SIMATIC® S7-400 basic card.

The SIMATIC® S5 connector is plugged directly onto an S7-400 I/O card with the help of an FLKM S135/... intermediate adapter.

A new SIMATIC® S7-400 is installed in place of the SIMATIC® S5. The existing field wiring remains intact.

Attention:

The LEDs of the S7-400 module are hidden.

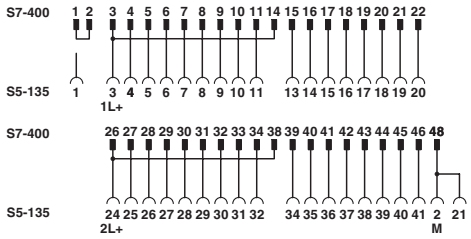
Front adapter for SIMATIC S5-135/S7-400

Technical data

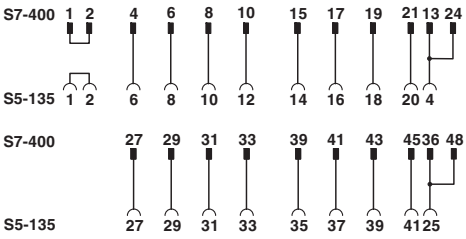
	①	②	③	④
Max. perm. operating voltage	230 V AC/DC	24 V AC/DC	24 V DC	24 V DC
Max. permissible current	4 A (per path)	4 A (per path)	4 A (per path)	4 A (per path)
Test voltage (contact / contact)	1.5 kV (50 Hz, 1 min.)	500 V (50 Hz, 1 min.)	1.25 kV (50 Hz, 1 min.)	500 V (50 Hz, 1 min.)
Ambient temperature (operation)	-20°C ... 50°C	-20°C ... 50°C	-20°C ... 50°C	-20°C ... 50°C
Mounting position	Any	Any	Any	Any
Standards / regulations	DIN EN 50178 / IEC 62103			

Ordering data

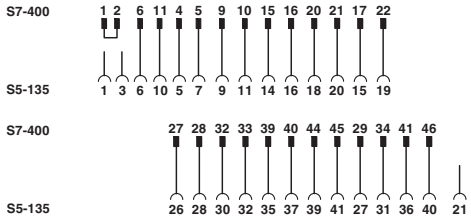
Description	No. of poles	Type	Order No.	Pcs. / Pkt.
Digital IN 120/230 V UC from S5-135/155 to S7-400				
6ES5 436-4UA12 to 6ES7 421-1FH20-0AA0	①	**FLKM S135/S400/SO123**	**2301752**	1
Digital OUT 24 V from S5-135/155 to S7-400				
6ES5 441-4UA12 to 6ES7 422-1BL00-0AA0	②	**FLKM S135/S400/SO125**	**2301778**	1
6ES5 451-4UA14 to 6ES7 422-1BL00-0AA0	③	**FLKM S135/S400/SO126**	**2301781**	1
Digital OUT 24 V DC / 2 A from S5-135/155 to S7-400				
6ES5 453-4UA12 to 6ES7 422-1HH00-0AA0	④	**FLKM S135/S400/SO127**	**2301794**	1



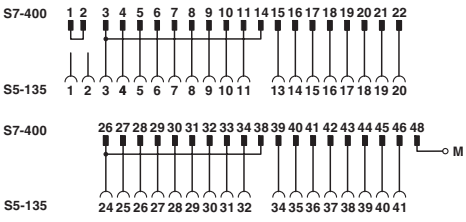
Connection scheme: FLKM S135/S400/SO126



Connection scheme: FLKM S135/S400/SO123



Connection scheme: FLKM S135/S400/SO127



Connection scheme: FLKM S135/S400/SO125

Siemens SIMATIC® S7-400 Adapter for conversion from S5-135/155 to S7-400

The FLKM S135/... adapters connect a SIMATIC® S5 connector wired with individual conductors directly with the SIMATIC® S7-400 basic card.

The SIMATIC® S5 connector is plugged directly onto an S7-400 I/O card with the help of an FLKM S135/... intermediate adapter.

A new SIMATIC® S7-400 is installed in place of the SIMATIC® S5. The existing field wiring remains intact.

Attention:

The LEDs of the S7-400 module are hidden.

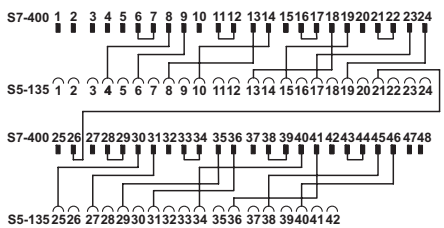
Adapter for Siemens SIMATIC® S5-135/S7-400

Technical data

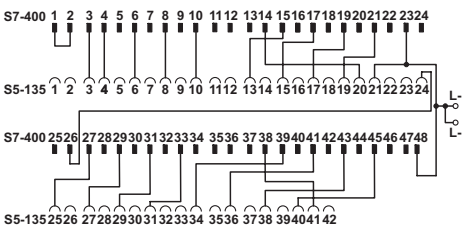
	①	②	③	④
Max. perm. operating voltage	24 V DC	230 V AC	24 V DC	24 V DC
Max. permissible current	4 A (per path)	4 A (per path)	4 A (per path)	4 A (per path)
Test voltage (contact / contact)	1.25 kV (50 Hz, 1 min.)	1.5 kV (50 Hz, 1 min.)	500 V (50 Hz, 1 min.)	500 V (50 Hz, 1 min.)
Ambient temperature (operation)	-20°C ... 50°C	-20°C ... 50°C	-20°C ... 50°C	-20°C ... 50°C
Mounting position	Vertical	Vertical	Vertical	Vertical
Standards / regulations	DIN EN 50178 / IEC 62103			

Ordering data

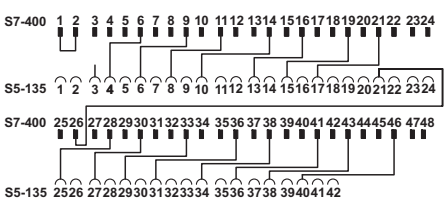
Description	No. of poles	Type	Order No.	Pcs. / Pkt.
Digital OUT 24 V DC / 2 A from S5-135/155 to S7-400				
6ES5 454-4UA14 to 6ES7 422-1BH11-0AA0	①	**FLKM S135-454-4UA/S400**	**2314859**	1
Digital OUT 230 V UC / 2 A from S5-135/155 to S7-400				
6ES5 456-4UA12 to 6ES7 422-1FH00-0AA0	②	**FLKM S135/S400/SO124**	**2301765**	1
Analog IN (only current measurement) from S5-135/155 to S7-400				
6ES5 460-4UA13 to 6ES7 431-1KF00-0AB0	③	**FLKM S135-460-4UA/I/S400**	**2314613**	1
Analog IN (only voltage measurement) from S5-135/155 to S7-400				
6ES5 460-4UA13 to 6ES7 431-1KF00-0AB0	④	**FLKM S135-460-4UA/U/S400**	**2314862**	1



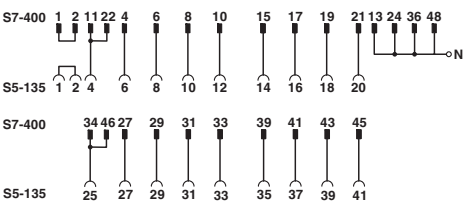
FLKM S135-460-4UA/I/S400 connection scheme



FLKM S135-454-4UA/S400 connection scheme



Connection scheme: FLKM S135-460-4UA/U/S400



Connection scheme: FLKM S135/S400/SO124

Siemens SIMATIC® S7-400 Adapter for conversion from S5-135/155 to S7-400

The FLKM S135/... adapters connect a SIMATIC® S5 connector wired with individual conductors directly with the SIMATIC® S7-400 basic card.

The SIMATIC® S5 connector is plugged directly onto an S7-400 I/O card with the help of an FLKM S135/... intermediate adapter.

A new SIMATIC® S7-400 is installed in place of the SIMATIC® S5. The existing field wiring remains intact.

Attention:

The LEDs of the S7-400 module are hidden.

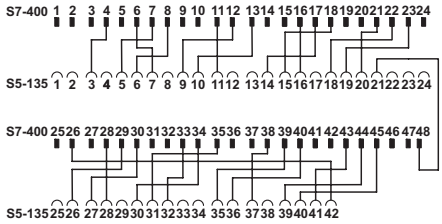
Adapter for Siemens SIMATIC® S5-135/S7-400

Technical data

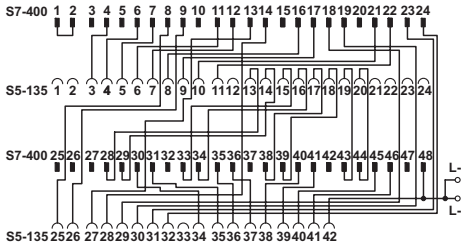
	①	②	③	④
Max. perm. operating voltage	24 V DC	24 V DC	24 V DC	24 V DC
Max. permissible current	2 A (per path)	4 A (per path)	4 A (per path)	4 A (per path)
Test voltage (contact / contact)	500 V (50 Hz, 1 min.)	500 V (50 Hz, 1 min.)	500 V (50 Hz, 1 min.)	500 V (50 Hz, 1 min.)
Ambient temperature (operation)	-20°C ... 50°C	-20°C ... 50°C	-20°C ... 50°C	-20°C ... 50°C
Mounting position	Any	Any	Any	Any
Standards / regulations	DIN EN 50178 / IEC 62103			

Ordering data

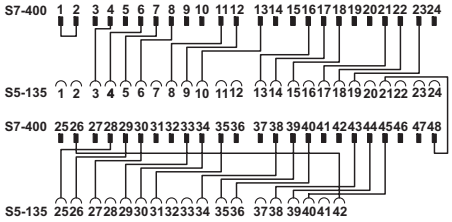
Description	No. of poles	Type	Order No.	Pcs. / Pkt.
Analog IN (only Pt 100) from S5-135/155 to S7-400				
6ES5 465-4UA13 to 6ES7 431-7KF10-0AB0	①	**FLKM S135-465-4UA/T/S400**	**2314875**	1
Analog IN (only current and voltage measurement) from S5-135/155 to S7-400				
6ES5 465-4UA13 to 6ES7 431-0HH00-0AB0 6ES5 465-4UA13 to 6ES7 431-7QH00-0AB0	②	**FLKM S135-465-4UA/UI/S400**	**2314888**	1
Analog OUT (only current output) from S5-135/155 to S7-400				
6ES5 470-4UA13 to 6ES7 432-1HF00-0AB0 6ES5 470-4UC13 to 6ES7 432-1HF00-0AB0	③	**FLKM S135-470-4UC/I/S400**	**2314626**	1
Analog OUT (only voltage output) from S5-135/155 to S7-400				
6ES5 470-4UA13 to 6ES7 432-1HF00-0AB0 6ES5 470-4UB13 to 6ES7 432-1HF00-0AB0 6ES5 470-4UC13 to 6ES7 432-1HF00-0AB0	④	**FLKM S135-470-4UC/U/S400**	**2314891**	1



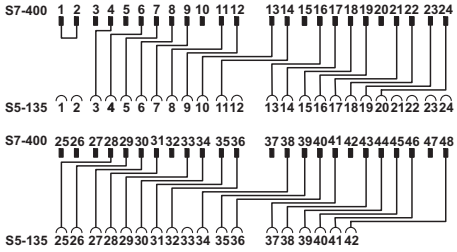
Connection scheme FLKM S135-470-4UC/I/S400



FLKM S135-465-4UA/T/S400 connection scheme



Connection scheme FLKM S135-470-4UC/U/S400

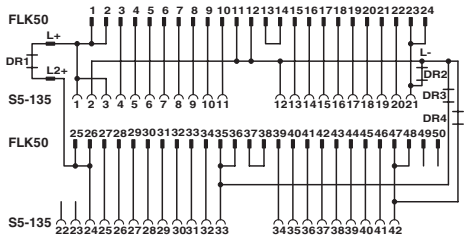


FLKM S135-465-4UA/UI/S400 connection scheme

Siemens SIMATIC® S7-300 Adapter for conversion from S5-135/155 to S7-300

S5-S7 adapters connect the S5-135 front adapters wired with individual wires to the I/O modules of the S7.

With the help of the FLKM S135/S7/FLK50 converter module, the signals of the S5-135 front adapter can be converted to a 50-pole strip. A 50-pole system cable FLK 50/EZ-DR/.../KONFEK and a front adapter for the SIMATIC® S7 (FLKM 50-PA-S300) now connect the signals with the I/O module.



FLKM S135/S7/FLK50/PLC connection scheme

Converter for Siemens SIMATIC® S5-135 to 50-pole FLK strip

Technical data

Max. perm. operating voltage	50 V AC/DC
Max. permissible current	1 A (per path)
Ambient temperature (operation)	-20°C ... 50°C
Ambient temperature (storage / transport)	-20°C ... 70°C
Mounting position	Any
Standards / regulations	DIN EN 50178 / IEC 62103

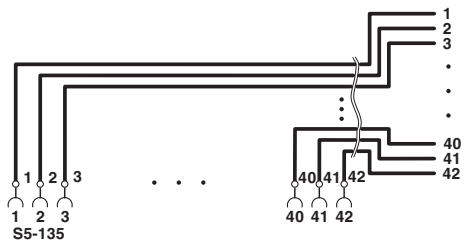
Ordering data

Description	Type	Order No.	Pcs. / Pkt.
Digital IN or OUT 24 V DC from S5-135 to S7-300 **IN** 6ES5 420-4UA14 to 6ES7 321-1BL00-0AA0 6ES5 430-4UA14 to 6ES7 321-1BL00-0AA0 **OUT** 6ES5 441-4UA14 to 6ES7 322-1BL00-0AA0 6ES5 451-4UA14 to 6ES7 322-1BL00-0AA0	**FLKM S135/S7/FLK50/PLC**	**2314736**	1

Startup adapter for extending the existing S5-135/155 field wiring

All signals of the existing S5-135 wiring 3 or 5 are extended with the help of the universal commissioning adapters. The open cable end can be connected to various controllers such as S7-400 or S7-300. Therefore, the existing field wiring of S5-135 can communicate with the new controller for test purposes. Since the new control unit is temporarily arranged before the control cabinet, the original status of the system can be restored if required.

If the system functions with the new controller without problems, the S5-135 can now be replaced.



Technical data

Max. perm. operating voltage	250 V AC/DC
Max. permissible current	6 A (per path)
Ambient temperature (operation)	-20°C ... 50°C
Ambient temperature (storage / transport)	-20°C ... 80°C
Mounting position	Any
Standards / regulations	EN 60664-1

Ordering data

Description	Type	Order No.	Pcs. / Pkt.
Connection of all S5-135 connections (1 to 42) at the open cable end			
	FLKM S135/42X0,75/3,0M/OE	**2315007**	1
	FLKM S135/42X0,75/5,0M/OE	**2318017**	1

Siemens SIMATIC® S7-400 Adapter for conversion from S5-115 to S7-400

The FLKM S115/... adapters connect a SIMATIC® S5 connector wired with individual conductors directly with the SIMATIC® S7-400 basic card.

The SIMATIC® S5 connector is plugged directly onto an S7-400 I/O card with the help of an FLKM S115/... intermediate adapter.

A new SIMATIC® S7-400 is installed in place of the SIMATIC® S5. The existing field wiring remains intact.

Attention:

Due to the geometry, it is only possible to use every second slot. The LEDs of the S7-400 module are hidden by the S5-115 adapter.

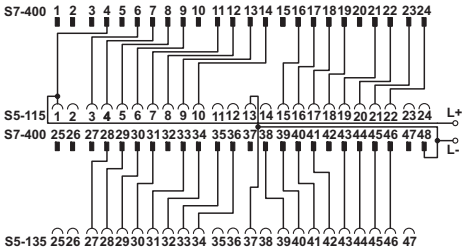
Adapter for Siemens SIMATIC® S5-115/S7-400

Technical data

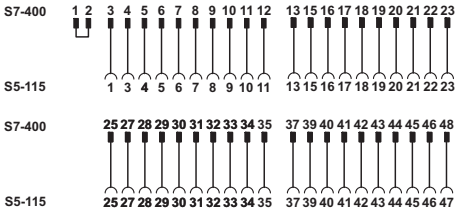
Max. perm. operating voltage	24 V AC/DC
Max. permissible current	4 A (per path) 4 A (per connection, supply via separate power supply)
Ambient temperature (operation)	-20°C ... 50°C
Ambient temperature (storage / transport)	-20°C ... 70°C
Mounting position	Vertical
Standards / regulations	DIN EN 50178 / IEC 62103

Ordering data

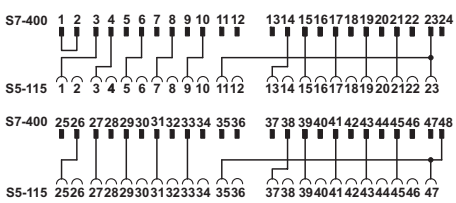
Description	Type	Order No.	Pcs. / Pkt.
Digital IN or OUT 24 V DC from S5-115 to S7-400 **IN** 6ES5 420-7LA11 on 6ES7 421-1BL01-0AA0 6ES5 430-7LA11 on 6ES7 421-1BL01-0AA0 **OUT** 6ES5 441-7LA11 on 6ES7 422-1BL01-0AA0 6ES5 451-7LA11 on 6ES7 422-1BL01-0AA0	**FLKM S115/S400/SO155**	**2307248**	1
Digital OUT 24 V DC from S5-115 to S7-400 6ES5 454-7LA12 to 6ES7 422-1BH11-0AA0	**FLKM S115-454-7LA/S400**	**2314901**	1
Analog IN (only current and voltage measurement) from S5-115 to S7-400 6ES5 465-7LA13 to 6ES7 431-0HH00-0AB0 6ES5 465-7LA13 to 6ES7 431-7QH00-0AB0	**FLKM S115-465-7LA/UI/S400**	**2314914**	1



FLKM S115-465-7LA/UI/S400 connection scheme



Connection scheme: FLKM S115/S400/SO155

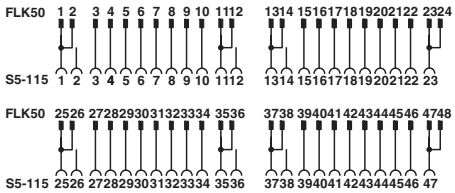


FLKM S115-454-7LA/S400 connection scheme

Siemens SIMATIC® S7-300 Adapter for conversion from S5-115 to S7-300

S5-S7 adapters connect the S5-115 front adapters wired with individual wires to the I/O modules of S7-300.

With the aid of the FLKM S115/S7/FLK50/SO137 converter module, the signals of the S5-115 front adapter can be converted to a 50-pole strip. A 50-pole system cable FLK 50/EZ-DR/.../KONFEK and a front adapter for the SIMATIC® S7 (FLKM 50-PA-S300) now connect the signals with the I/O module.



Connection scheme: FLKM S115/S7/FLK50/PLC/SO137

Converter for Siemens SIMATIC® S5-115 to 50-pole FLK strip

Technical data

Max. perm. operating voltage	24 V AC/DC
Max. permissible current	1 A (per path)
Max. perm. total current	2 A (per byte)
Ambient temperature (operation)	-20°C ... 50°C
Ambient temperature (storage / transport)	-20°C ... 70°C
Standards / regulations	DIN EN 50178 / IEC 62103

Ordering data

Description	Type	Order No.	Pcs. / Pkt.
Digital IN or OUT 24 V DC from S5-115 through converters, system cables and front adapters to S7-300 **IN** 6ES5 420-7LA11 on 6ES7 321-1BL00-0AA0 6ES5 430-7LA11 on 6ES7 321-1BL00-0AA0 **OUT** 6ES5 441-7LA11 on 6ES7 322-1BL00-0AA0 6ES5 451-7LA11 on 6ES7 322-1BL00-0AA0	**FLKM S115/S7/FLK50/PLC/SO137**	**2306294**	1

Commissioning adapters for extending the existing S5-115 field wiring

All signals of the existing S5-115 wiring 3 or 5 are extended with the help of the universal commissioning adapters. The open cable end can be connected to various controllers such as S7-400 or S7-300. Therefore, the existing field wiring of S5-115 can communicate with the new controller for test purposes. Since the new control unit is temporarily arranged before the control cabinet, the original status of the system can be restored if required.

If the system functions with the new controller without problems, the S5-115 can now be replaced.

Technical data

Max. perm. operating voltage	250 V AC/DC
Max. permissible current	6 A (per path)
Ambient temperature (operation)	-20°C ... 50°C
Ambient temperature (storage / transport)	-20°C ... 80°C
Mounting position	Any
Standards / regulations	EN 60664-1

Ordering data

Description	Type	Order No.	Pcs. / Pkt.
Connection of all S5-115 connections (1 to 23, 25 to 47) at the open cable end			
	FLKM S115/47X0,75/3,0M/OE	**2314985**	1
	FLKM S115/47X0,75/5,0M/OE	**2314998**	1

YOKOGAWA Centum CS3000 R3 System cable

These shielded system cables for digital (50-pole) and analog (40-pole) I/O modules are connected directly to the modules. An intermediate adapter is not required. Features:

– Molded plug connector
– Can be screwed
– Lateral cable outlet of the I/O module
– KS/AKB-compatible plug connectors on the module side

Technical data

Max. perm. operating voltage		30 V DC
Max. perm. current carrying capacitance per path		500 mA
Max. conductor resistance		0.16 Ω/m
Ambient temperature (operation)		-20°C ... 50°C
Conductor cross section		AWG 26 / 0.14 mm²
Conductor structure: stranded wires / material		7 / Cu tin-plated
Outside diameter		
	50-pole	11 mm
	40-pole	11 mm

Ordering data

Description	No. of poles	Cable length	Type	Order No.	Pcs. / Pkt.
50-pole YUC cables, for digital I/O modules					
	50	2 m	**FLK 50-PA/EZ-DR/KS/ 200/YUC**	**2314299**	1
	50	3 m	**FLK 50-PA/EZ-DR/KS/ 300/YUC**	**2314309**	1
	50	4 m	**FLK 50-PA/EZ-DR/KS/ 400/YUC**	**2314312**	1
	50	5 m	**FLK 50-PA/EZ-DR/KS/ 500/YUC**	**2321499**	1
	50	6 m	**FLK 50-PA/EZ-DR/KS/ 600/YUC**	**2314927**	1
	50	7 m	**FLK 50-PA/EZ-DR/KS/ 700/YUC**	**2321509**	1
	50	8 m	**FLK 50-PA/EZ-DR/KS/ 800/YUC**	**2314930**	1
	50	9 m	**FLK 50-PA/EZ-DR/KS/ 900/YUC**	**2321512**	1
	50	10 m	**FLK 50-PA/EZ-DR/KS/1000/YUC**	**2314325**	1
	50	11 m	**FLK 50-PA/EZ-DR/KS/1100/YUC**	**2321389**	1
	50	12 m	**FLK 50-PA/EZ-DR/KS/1200/YUC**	**2321525**	1
	50	13 m	**FLK 50-PA/EZ-DR/KS/1300/YUC**	**2321392**	1
	50	14 m	**FLK 50-PA/EZ-DR/KS/1400/YUC**	**2321402**	1
	50	15 m	**FLK 50-PA/EZ-DR/KS/1500/YUC**	**2314338**	1
	50	16 m	**FLK 50-PA/EZ-DR/KS/1600/YUC**	**2321538**	1
	50	17 m	**FLK 50-PA/EZ-DR/KS/1700/YUC**	**2321541**	1
	50	18 m	**FLK 50-PA/EZ-DR/KS/1800/YUC**	**2321554**	1
	50	19 m	**FLK 50-PA/EZ-DR/KS/1900/YUC**	**2321567**	1
	50	20 m	**FLK 50-PA/EZ-DR/KS/2000/YUC**	**2314503**	1
	50	25 m	**FLK 50-PA/EZ-DR/KS/2500/YUC**	**2314516**	1
	50	30 m	**FLK 50-PA/EZ-DR/KS/3000/YUC**	**2314529**	1
40-pole YUC cables, for analog I/O modules					
	40	1 m	**FLK 40-PA/EZ-DR/KS/ 100/YUC**	**2322786**	1
	40	2 m	**FLK 40-PA/EZ-DR/KS/ 200/YUC**	**2314341**	1
	40	3 m	**FLK 40-PA/EZ-DR/KS/ 300/YUC**	**2314354**	1
	40	4 m	**FLK 40-PA/EZ-DR/KS/ 400/YUC**	**2314367**	1
	40	5 m	**FLK 40-PA/EZ-DR/KS/ 500/YUC**	**2321570**	1
	40	6 m	**FLK 40-PA/EZ-DR/KS/ 600/YUC**	**2314943**	1
	40	7 m	**FLK 40-PA/EZ-DR/KS/ 700/YUC**	**2321583**	1
	40	8 m	**FLK 40-PA/EZ-DR/KS/ 800/YUC**	**2314956**	1
	40	9 m	**FLK 40-PA/EZ-DR/KS/ 900/YUC**	**2321415**	1
	40	10 m	**FLK 40-PA/EZ-DR/KS/1000/YUC**	**2314370**	1
	40	11 m	**FLK 40-PA/EZ-DR/KS/1100/YUC**	**2321428**	1
	40	12 m	**FLK 40-PA/EZ-DR/KS/1200/YUC**	**2321431**	1
	40	13 m	**FLK 40-PA/EZ-DR/KS/1300/YUC**	**2321444**	1
	40	14 m	**FLK 40-PA/EZ-DR/KS/1400/YUC**	**2321457**	1
	40	15 m	**FLK 40-PA/EZ-DR/KS/1500/YUC**	**2314383**	1
	40	16 m	**FLK 40-PA/EZ-DR/KS/1600/YUC**	**2321596**	1
	40	17 m	**FLK 40-PA/EZ-DR/KS/1700/YUC**	**2321606**	1
	40	18 m	**FLK 40-PA/EZ-DR/KS/1800/YUC**	**2321619**	1
	40	19 m	**FLK 40-PA/EZ-DR/KS/1900/YUC**	**2321622**	1
	40	20 m	**FLK 40-PA/EZ-DR/KS/2000/YUC**	**2314532**	1
	40	25 m	**FLK 40-PA/EZ-DR/KS/2500/YUC**	**2314545**	1
	40	30 m	**FLK 40-PA/EZ-DR/KS/3000/YUC**	**2314558**	1

YOKOGAWA Centum CS3000 R3 System cable

These system cables for digital I/O modules are connected directly to the modules. An intermediate adapter is not required.
Features:
– Lateral cable outlet of the I/O module
– Four 14-pole plug connectors on the module side for connection of four 8-channel VARIOFACE modules of the system cabling

Technical data

Max. perm. operating voltage		30 V DC
Max. perm. current carrying capacitance per path		500 mA
Max. conductor resistance		0.16 Ω/m
Ambient temperature (operation)		-20°C ... 50°C
Conductor cross section		AWG 26 / 0.14 mm²
Outside diameter		
	50-pole	11 mm

Ordering data

Description	No. of poles	Cable length	Type	Order No.	Pcs. / Pkt.
System cable for digital I/O modules for coupling four 8-channel VARIOFACE modules					
	50	2 m	**CABLE-50/4FLK14/ 2,0M/YUC**	**2314655**	1
	50	4 m	**CABLE-50/4FLK14/ 4,0M/YUC**	**2314671**	1
	50	6 m	**CABLE-50/4FLK14/ 6,0M/YUC**	**2318978**	1
	50	10 m	**CABLE-50/4FLK14/10,0M/YUC**	**2314684**	1
	50	15 m	**CABLE-50/4FLK14/15,0M/YUC**	**2322773**	1
	50	20 m	**CABLE-50/4FLK14/20,0M/YUC**	**2314778**	1

YOKOGAWA Centum CS3000 R3 System cable for MINI Analog system cabling

The Yokogawa system cable **CABLE-40/2FLK16/.../YUC** makes it possible to connect 16 MINI Analog modules to a Yokogawa control system. In conjunction with two MINI Analog system adapters MINI MCR-SL-V8-FLK-16-A, the Yokogawa system cable provides a simple and economical "Plug and Play" solution.

The system cable is plugged directly at the Yokogawa module. Two 16-pole flat-ribbon cable connectors are provided for connecting the module to the MINI Analog system adapters.

The system cable in conjunction with **4-wire measuring transducers** is suitable for the following analog cards:
– AAI 141
– AAI 143

Technical data

Max. perm. operating voltage		30 V DC
Max. perm. current carrying capacitance per path		500 mA
Max. conductor resistance		0.16 Ω/m
Ambient temperature (operation)		-20°C ... 50°C
Conductor cross section		AWG 26 / 0.14 mm²
Conductor structure: stranded wires / material		7 / Cu tin-plated
Outside diameter		
	40-pole	11 mm

Ordering data

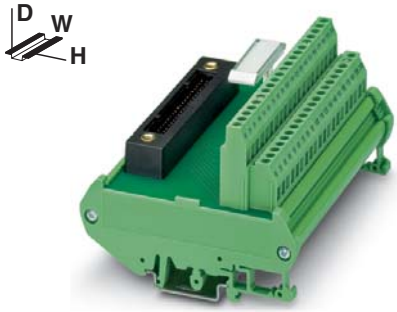
Description	No. of poles	Cable length	Type	Order No.	Pcs. / Pkt.
System cable, for analog I/O modules for coupling two 8-channel MINI Analog system adapters					
	40	2 m	**CABLE-40/2FLK16/ 2,0M/YUC**	**2321334**	1
	40	4 m	**CABLE-40/2FLK16/ 4,0M/YUC**	**2321347**	1
	40	10 m	**CABLE-40/2FLK16/10,0M/YUC**	**2321350**	1
	40	15 m	**CABLE-40/2FLK16/15,0M/YUC**	**2321376**	1
	40	20 m	**CABLE-40/2FLK16/20,0M/YUC**	**2321363**	1

YOKOGAWA Centum CS3000 R3 Controller boards

These modules are connected to the I/O modules through the YUC system cable.

FLKM-KS40/YCS:
– For analog modules
– Universal interface module with 40 connecting terminal blocks

For more cabling solutions for Yokogawa: www.phoenixcontact.com



Passive interface modules

Technical data

Max. perm. operating voltage		24 V AC/DC ±10%
Max. perm. current (per branch)		1 A
Test voltage (contact / contact)		500 V (50 Hz, 1 min.)
Ambient temperature (operation)		-20°C ... 50°C
Mounting position		Any
Standards / regulations		DIN EN 50178
Connection method	Field level	Screw connection
	Control system level	Yokogawa KS-compatible
Connection data solid / stranded / AWG		0.2 ... 4 mm² / 0.2 ... 2.5 mm² / 24 - 12
Dimensions	H / D	90 mm / 68 mm

Ordering data

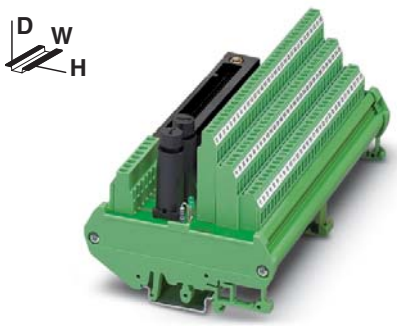
Description	No. of poles	Module width W	Type	Order No.	Pcs. / Pkt.
Controller board, for analog I/O modules					
	40	112 mm	**FLKM-KS40/YCS**	**2314642**	1

YOKOGAWA Centum CS3000 R3 Controller boards

These modules are connected to the I/O modules through the YUC system cable.

FLKMS-KS50/32IM/YCS:
– For digital modules ADV 151 and ADV 551
– Three-wire connection (signal, plus, minus)
– Redundant voltage supply (fuse IEC 127-2, 5 x 20, 2 A)

For more cabling solutions for Yokogawa: www.phoenixcontact.com



Passive interface modules

Technical data

Max. perm. operating voltage		24 V AC/DC ±10%
Max. perm. current (per branch)		1 A
Test voltage (contact / contact)		500 V (50 Hz, 1 min.)
Ambient temperature (operation)		-20°C ... 50°C
Mounting position		Any
Standards / regulations		DIN EN 50178
Connection method	Field level	Screw connection
	Control system level	Yokogawa KS-compatible
Connection data solid / stranded / AWG		0.2 ... 4 mm² / 0.2 ... 2.5 mm² / 24 - 12
Dimensions	H / D	90 mm / 81 mm

Ordering data

Description	No. of poles	Module width W	Type	Order No.	Pcs. / Pkt.
Controller board, for digital I/O modules ADV 151 and ADV 551					
	50	174 mm	**FLKMS-KS50/32IM/YCS**	**2314451**	1

YOKOGAWA Centum CS3000 R3 Controller boards

These modules are connected to the analog I/O modules through the 40-pole YUC system cable.

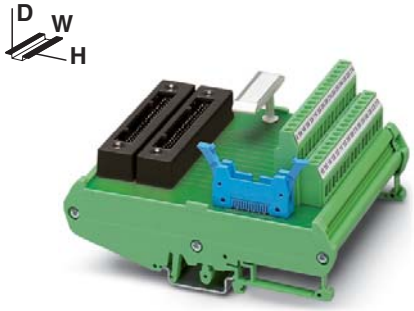
The modules are designed for redundant signal transmission (two plug connectors in parallel). A separate connection to the HART multiplexer is possible.

FLKM-KS40/AO16/YCS
– For analog module AAI 543

FLKMS-KS40/SI/AI16/YCS
– For analog modules AAI 141 and AAI 143 (operation of modules in the 4-wire mode)
– Transfer of 16 channels with separate positive and negative connections
– 16 pluggable fuses (IEC 127-2, 5 x 20, 0.1 A) per positive supply and LED status indicator
– Redundant voltage supply (fuse IEC 127-2, 5 x 20, 2 A)

FLKMS-KS40/AI/YCS
– For analog modules AAI 141 and AAI 143 (operation of modules in the 4-wire mode)
– Transfer of 16 channels with separate positive and negative connections
– Redundant voltage supply (fuse IEC 127-2, 5 x 20, 2 A)

For more cabling solutions for Yokogawa: www.phoenixcontact.com



Interface modules for analog I/O modules

Technical data

Max. perm. operating voltage		24 V DC ±10%
Max. perm. current (per branch)		100 mA
Test voltage (contact / contact)		500 V (50 Hz, 1 min.)
Ambient temperature (operation)		-20°C ... 50°C
Mounting position		Any
Standards / regulations		DIN EN 50178
Connection method	Field level	Screw connection
	Control system level	Yokogawa KS-compatible
Connection data solid / stranded / AWG		0.2 ... 4 mm² / 0.2 ... 2.5 mm² / 24 - 12
Dimensions	H / D	126 mm / 68 mm

Ordering data

Description	No. of poles	Module width W	Type	Order No.	Pcs. / Pkt.
Controller board, for analog output modules AAI 543	40	108 mm	**FLKM-KS40/AO16/YCS**	**2314260**	1
Controller board, with fuses and LED, for analog input modules AAI 141 and AAI 143	40	214 mm	**FLKMS-KS40/SI/AI16/YCS**	**2314273**	1
Controller board, for analog input modules AAI 141 and AAI 143, without fuses and LED	40	214 mm	**FLKMS-KS40/AI/YCS**	**2314286**	1

VIP termination boards

These VIP VARIOFACE Professional modules are used in combination with the respective front adapters.

Similar to the front adapters, the modules are connected through 14-pole system cables. The following module types are available:

VIP-2/SC/FLK14/PLC
VIP-2/SC/FLK14/LED/PLC

– Byte-wise labeling
– Can be used for digital I/O modules
– Optionally with LED

Notes:

For marking systems and mounting material, see CLIPLINE catalog, part 2.

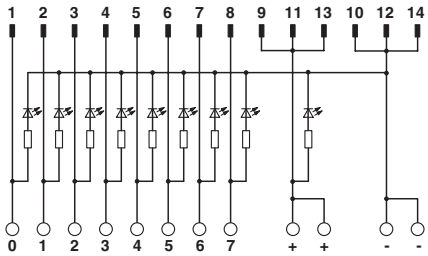
Passive interface modules for input/output of 8 channels

Technical data

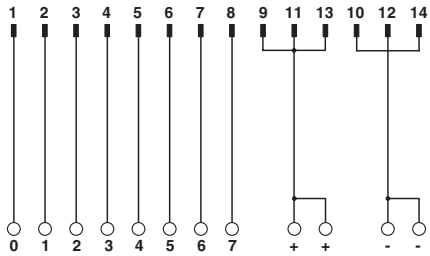
		VIP-2/SC/FLK14/PLC	VIP-2/SC/FLK14/LED/PLC
Max. perm. operating voltage		60 V AC/DC	20 V DC (up to 26.5 V DC)
Max. perm. current (per branch)		1 A	1 A
Max. total current (voltage supply)		3 A	3 A
Rated surge voltage		0.6 kV	-
Ambient temperature (operation)		-20°C ... 50°C	-20°C ... 50°C
Mounting position		Any	Any
Standards / regulations		IEC 60664, DIN EN 50178, IEC 62103	
Connection method	Field level	Screw connection	Screw connection
	Control system level	Flat-ribbon cable plug connector in acc. with IEC 60603-13	Flat-ribbon cable plug connector in acc. with IEC 60603-13
Connection data solid / stranded / AWG		0.2 ... 4 mm² / 0.2 ... 2.5 mm² / 24 - 12	
Dimensions	H / D	65.5 mm / 56 mm	

Ordering data

Description	No. of poles	Module width W	Type	Order No.	Pcs. / Pkt.
VARIOFACE interface module, for - eight channels	14	39.8 mm	**VIP-2/SC/FLK14/PLC**	**2315214**	1
VARIOFACE interface module, with light indicator for: - eight channels	14	39.8 mm	**VIP-2/SC/FLK14/LED/PLC**	**2322249**	1



VIP-2/SC/FLK14/LED/PLC connection scheme



VIP-2/SC/FLK14/PLC connection scheme

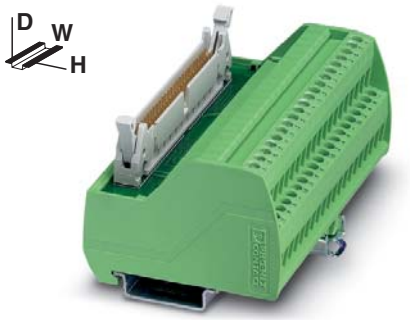
VIP termination boards

These VIP VARIOFACE Professional modules are used in combination with the respective front adapters.

Similarly to the front adapters, the modules are connected through 50-pole system cables. The following module types are available:

VIP-2/SC/FLK50/PLC
VIP-2/SC/FLK50/LED/PLC
– Byte-wise labeling
– Can be used for digital I/O modules
– Optionally with LED.

Notes:
For marking systems and mounting material, see CLIPLINE catalog, part 2.



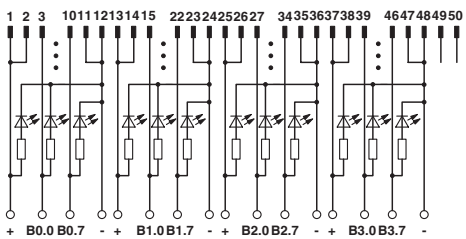
Passive interface modules for input/output of 32 channels

Technical data

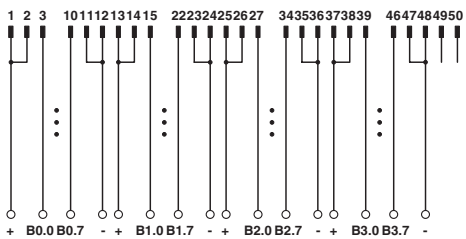
		VIP-2/SC/FLK50/PLC	VIP-2/SC/FLK50/LED/PLC
Max. perm. operating voltage		60 V AC/DC	20 V DC (up to 26.5 V DC)
Max. perm. current (per branch)		1 A	1 A
Max. total current (voltage supply)		2 A	2 A (per byte)
Rated surge voltage		0.6 kV	-
Ambient temperature (operation)		-20°C ... 50°C	-20°C ... 50°C
Mounting position		Any	Any
Standards / regulations		IEC 60664, DIN EN 50178, IEC 62103	
Connection method	Field level	Screw connection	Screw connection
	Control system level	Flat-ribbon cable plug connector in acc. with IEC 60603-13	Flat-ribbon cable plug connector in acc. with IEC 60603-13
Connection data solid / stranded / AWG		0.2 ... 4 mm² / 0.2 ... 2.5 mm² / 24 - 12	
Dimensions	H / D	65.5 mm / 56 mm	

Ordering data

Description	No. of poles	Module width W	Type	Order No.	Pcs. / Pkt.
VARIOFACE interface module, for - 32 channels	50	106.1 mm	**VIP-2/SC/FLK50/PLC**	**2315227**	1
VARIOFACE interface module, for - 32 channels	50	106.1 mm	**VIP-2/SC/FLK50/LED/PLC**	**2322252**	1



VIP-2/SC/FLK50/LED/PLC connection scheme



VIP-2/SC/FLK50/PLC connection scheme

VIP termination boards for SIMATIC® S7

These VIP VARIOFACE Professional modules are used in combination with the respective front adapters for SIMATIC® S7.

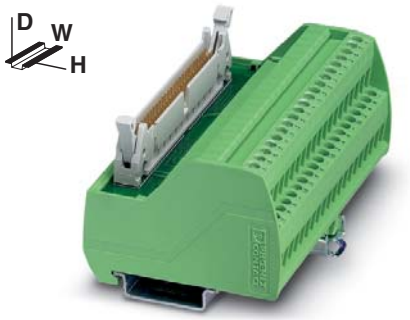
Similarly to the front adapters, the modules are connected through 50-pole system cables. The following module types are available:

VIP-2/SC/FLK50 (1-40)/S7
– Numerical labeling (1-40)
– Specially for S7 300

VIP-2/SC/FLK50/S7/A-S400
– Numerical labeling (3-48)
– Specially for S7 400

Notes:

For marking systems and mounting material, see CLIPLINE catalog, part 2.



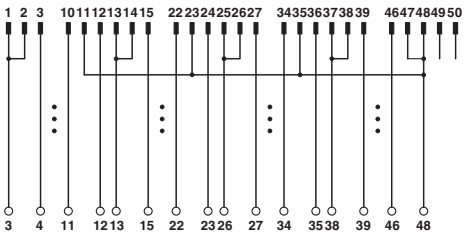
Passive interface modules for input/output of 32 channels, with SIMATIC®-specific labeling

Technical data

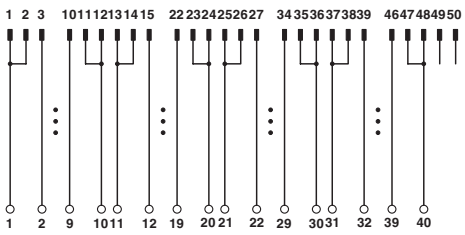
Max. perm. operating voltage		60 V AC/DC
Max. perm. current (per branch)		1 A
Rated surge voltage		0.6 kV
Ambient temperature (operation)		-20°C ... 50°C
Mounting position		Any
Standards / regulations		IEC 60664, DIN EN 50178, IEC 62103
Connection method	Field level	Screw connection
	Control system level	Flat-ribbon cable plug connector in acc. with IEC 60603-13
Connection data solid / stranded / AWG		0.2 ... 4 mm² / 0.2 ... 2.5 mm² / 24 - 12
Dimensions	H / D	65.5 mm / 56 mm

Ordering data

Description	No. of poles	Module width W	Type	Order No.	Pcs. / Pkt.
VARIOFACE interface module, for SIMATIC®S7-300, with SIMATIC®-specific labeling	50	106.1 mm	**VIP-2/SC/FLK50 (1-40) /S7**	**2315243**	1
VARIOFACE interface module, for SIMATIC®S7-400, with SIMATIC®-specific labeling	50	106.1 mm	**VIP-2/SC/FLK50/S7/A-S400**	**2322359**	1



VIP-2/SC/FLK50/S7/A-S400 connecction scheme



VIP-2/SC/FLK50 (1-40) /S7 connecction scheme

VIP termination boards for MODICON® TSX Quantum and Allen-Bradley ControlLogix

These VIP VARIOFACE Professional modules are used in combination with the respective front adapters for MODICON® TSX Quantum.

Similar to the front adapters, the modules are connected through 50-pole system cables.

VIP-2/SC/FLK50/MODI-TSX/Q

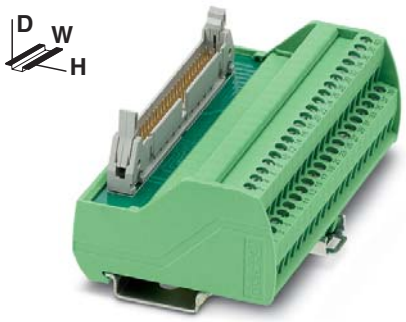
– Numerical labeling (1-40)
– Specially for MODICON TSX Quantum

VIP-2/SC/FLK50/AB-1756

– Numerical labeling (1-36)
– Specially for ControlLogix

Notes:

For marking systems and mounting material, see CLIPLINE catalog, part 2.



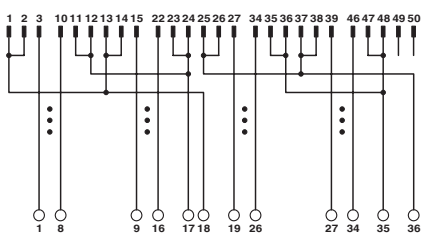
Passive interface modules for input/output of 32 channels

Technical data

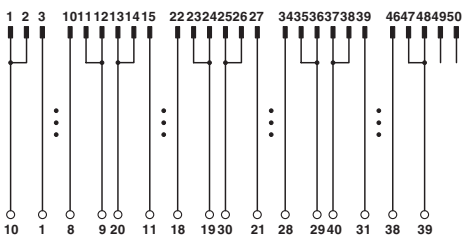
Max. perm. operating voltage		60 V DC
Max. perm. current (per branch)		1 A
Rated surge voltage		-
Ambient temperature (operation)		-20°C ... 50°C
Mounting position		Any
Standards / regulations		IEC 60664, DIN EN 50178, IEC 62103
Connection method	Field level	Screw connection
	Control system level	Flat-ribbon cable plug connector in acc. with IEC 60603-13
Connection data solid / stranded / AWG		0.2 ... 4 mm² / 0.2 ... 2.5 mm² / 24 - 12
Dimensions	H / D	65.5 mm / 56 mm

Ordering data

Description	No. of poles	Module width W	Type	Order No.	Pcs. / Pkt.
VARIOFACE interface module, for MODICON® TSX Quantum, with MODICON®-specific labeling	50	106.1 mm	**VIP-2/SC/FLK50/MODI-TSX/Q**	**2322304**	1
VARIOFACE interface module for Allen-Bradley, with ControlLogix-specific labeling	50	95.9 mm	**VIP-2/SC/FLK50/AB-1756**	**2322317**	1



VIP-2/SC/FLK50/AB-1756 connecction scheme



VIP-2/SC/FLK50/MODI-TSX/Q connecction scheme

VIP termination boards for Siemens SIMATIC® S7-300 and Allen-Bradley

These VIP VARIOFACE Professional modules are used in combination with the respective front adapters for Siemens SIMATIC® S7-300 and Allen-Bradley. The following modules are available:

VIP-2/SC/2FLK14 (1-20) /S7

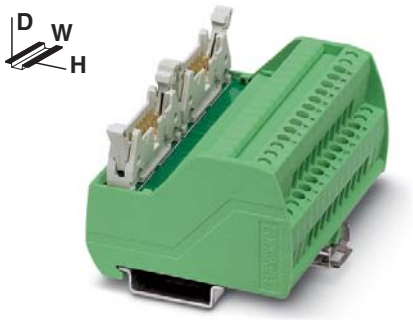
– Screw or spring-cage connection
– Numerical labeling (1-20)
– Specially for S7 300.

VIP-2/SC/2FLK14/AB-1756

– Screw connection
– Numerical labeling (1-20)
– Specially for ControlLogix

Notes:

For marking systems and mounting material, see CLIPLINE catalog, part 2.



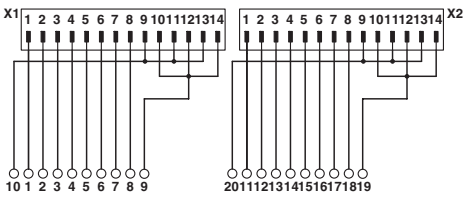
Passive interface modules for SIMATIC S7 300 and Allen-Bradley ControlLogix

Technical data

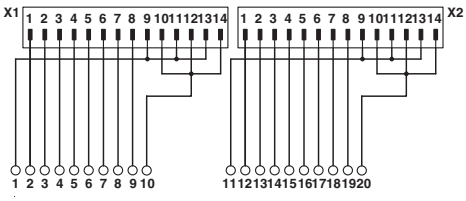
Max. perm. operating voltage		60 V AC/DC
Max. perm. current (per branch)		1 A
Rated surge voltage		0.6 kV
Ambient temperature (operation)		-20°C ... 50°C
Mounting position		Any
Standards / regulations		IEC 60664, DIN EN 50178, IEC 62103
Connection method	Field level	Screw connection
	Control system level	Flat-ribbon cable plug connector in acc. with IEC 60603-13
Connection data solid / stranded / AWG		0.2 ... 4 mm² / 0.2 ... 2.5 mm² / 24 - 12
Dimensions	H / D	65.5 mm / 56 mm

Ordering data

Description	No. of poles	Module width W	Type	Order No.	Pcs. / Pkt.
VARIOFACE interface module, for SIMATIC®S7-300, with SIMATIC®-specific labeling					
With screw connection	14	80.6 mm	**VIP-2/SC/2FLK14 (1-20) /S7**	**2315230**	1
VARIOFACE interface module for Allen-Bradley, with ControlLogix-specific labeling					
With screw connection	14	80.6 mm	**VIP-2/SC/2FLK14/AB-1756**	**2322333**	1



VIP-2/SC/2FLK14/AB-1756 connection scheme



VIP-2/SC/2FLK14 (1-20) /S7 and UM 45-2FLK14/ZFKDS/S7

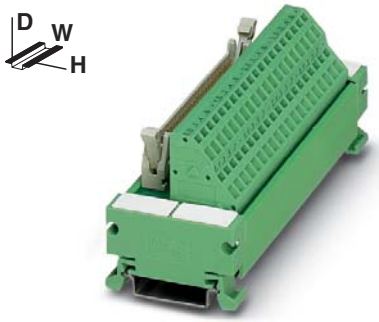
COMPACT-LINE
Controller boards with spring-cage connection

These VARIOFACE modules are used in combination with the respective front adapters. Like the front adapters, the modules are connected via 14-pole or 50-pole system cables. The following Compact-Line modules are available:

UM 45-FLK14.../PLC (for 8 channels)
UM 45-FLK50.../PLC (for 32 channels)
– Byte-wise labeling
– Can be used for digital I/O modules
– Optionally with LED.

UM 45-FLK50/.../S7-300
– Numerical labeling (1-40)
– Specially for S7 300

UM 45-2FLK14/ZFKDS/S7
– Numerical labeling (1-20)
– Specially for S7 300
– Connection via two 14-pole system cables



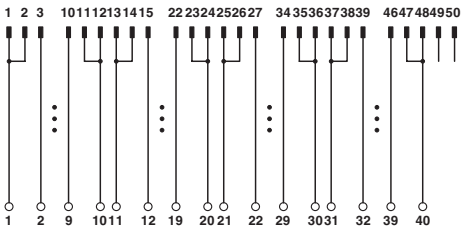
Passive interface module for eight or 32 channels with a spring-cage connection

Technical data

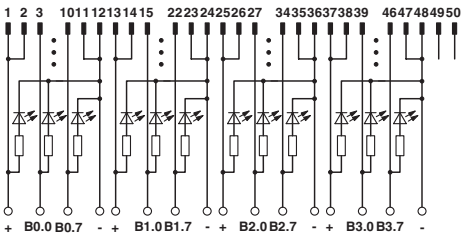
		... 14/PLC	... 50/PLC	... 14/LA/PLC	... 50/LA/PLC
Max. perm. operating voltage		60 V DC	60 V DC	20 V DC (up to 30 V DC)	20 V DC (up to 30 V DC)
Max. perm. current (per branch)		1 A	1 A	1 A	1 A
Max. total current (voltage supply)		3 A	2 A (per byte)	3 A	2 A (per byte)
Status indication		No	No	LED	LED
Rated surge voltage		0.8 kV	0.8 kV	0.8 kV	0.8 kV
Ambient temperature (operation)		-20°C ... 50°C			
Mounting position		Any			
Standards / regulations		IEC 60664, DIN EN 50178, IEC 62103			
Connection method	Field level	Spring-cage connection			
	Control system level	Flat-ribbon cable plug connector in acc. with IEC 60603-13			
Connection data solid / stranded / AWG		0.2 ... 2.5 mm² / 0.2 ... 1.5 mm² / 24 - 14			
Dimensions	H / D	45 mm / 50 mm			

Ordering data

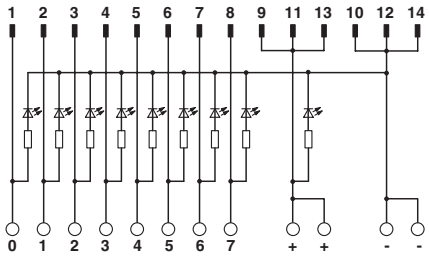
Description	No. of poles	Module width W	Type	Order No.	Pcs. / Pkt.
VARIOFACE interface module for eight channels	14	59 mm	UM 45-FLK14/ZFKDS/PLC	2965172	1
VARIOFACE interface module for 32 channels	50	126 mm	UM 45-FLK50/ZFKDS/PLC	2965198	1
VARIOFACE interface module for eight channels, with light indicator	14	59 mm	UM 45-FLK14/LA/ZFKDS/PLC	2965334	1
VARIOFACE interface module for 32 channels, with light indicator	50	138 mm	UM 45-FLK50/LA/ZFKDS/PLC	2965347	1
VARIOFACE interface module, for SIMATIC®S7-300, with SIMATIC®-specific labeling	50	126 mm	UM 45-FLK50/ZFKDS/S7-300	2968111	1
VARIOFACE interface module, for SIMATIC® S7-300, with SIMATIC®-specific labeling and 2 FLK connectors	14	98 mm	UM 45- 2FLK14/ZFKDS/S7	2965156	1



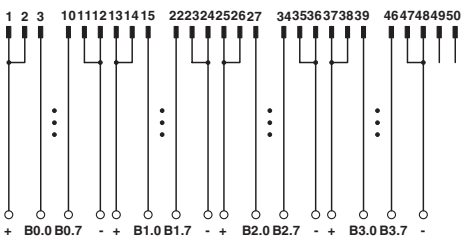
UM 45-FLK50/ZFKDS/S7-300 connection scheme



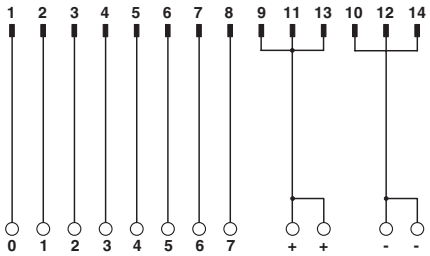
45-FLK50/LA/ZFKDS/PLC connection scheme



UM 45-FLK14/LA/ZFKDS/PLC connection scheme



UM 45-FLK50/ZFKDS/PLC connection scheme



UM 45-FLK14/ZFKDS/PLC connection scheme

VIP termination boards in 2-wire connection method

These VIP VARIOFACE modules are used in combination with the respective front adapters.

Similar to the front adapters, the modules are connected through 14-pole system cables. The following module types with the 2-wire connection method are available:

VIP-2/SC/FLK14/8M/PLC
- Byte-wise labeling
- Can be used for digital I/O modules
- Negative connection for each signal

VIP-2/SC/FLK14/8P/PLC
- Byte-wise labeling
- Can be used for digital I/O modules
- Positive connection per signal

Notes:

For marking systems and mounting material, see CLIPLINE catalog, part 2.

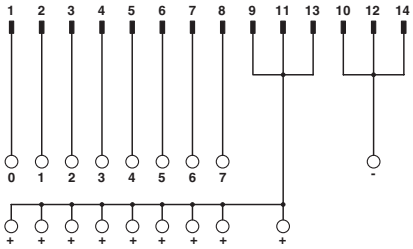
Passive interface modules for 8 channels

Technical data

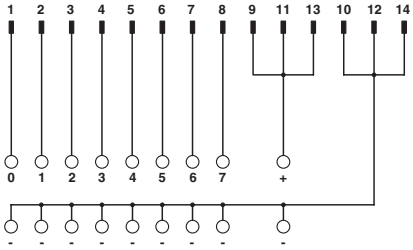
Max. perm. operating voltage		60 V DC
Max. perm. current (per branch)		1 A
Max. total current (voltage supply)		3 A (per byte)
Rated surge voltage		-
Ambient temperature (operation)		-20°C ... 50°C
Mounting position		Any
Standards / regulations		IEC 60664, DIN EN 50178, IEC 62103
Connection method	Field level	Screw connection
	Control system level	Flat-ribbon cable plug connector in acc. with IEC 60603-13
Connection data solid / stranded / AWG		0.2 ... 4 mm² / 0.2 ... 2.5 mm² / 24 - 12
Dimensions	H / D	65.5 mm / 56 mm

Ordering data

Description	No. of poles	Module width W	Type	Order No.	Pcs. / Pkt.
VARIOFACE interface module, for eight channels, each with an additional terminal block per signal for a common minus potential	14	50 mm	**VIP-2/SC/FLK14/8M/PLC**	**2322281**	1
VARIOFACE interface module, for eight channels, each with an additional terminal block per signal for a common plus potential	14	50 mm	**VIP-2/SC/FLK14/8P/PLC**	**2322294**	1



VIP-2/SC/FLK14/8P/PLC connection scheme



VIP-2/SC/FLK14/8M/PLC connection scheme

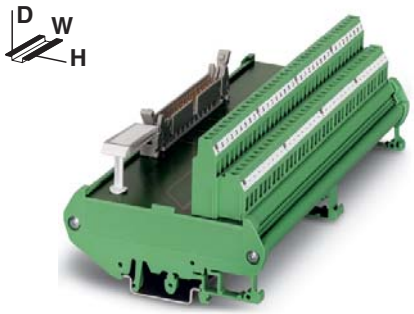
Termination boards in 2-wire connection method

These VARIOFACE modules are used in combination with the respective front adapters.

Similar to the front adapters, the modules are connected through 50-pole system cables. The following module types with the 2-wire connection method are available:

FLKM 50/32M/PLC (for 32 channels)
– Byte-wise labeling
– Can be used for digital I/O modules
– Negative connection for each signal

FLKM50/32P/PLC (for 32 channels)
– Byte-wise labeling
– Can be used for all digital I/O modules
– Positive connection per signal



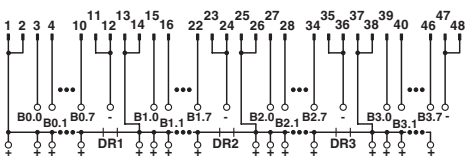
Passive interface modules for 32 channels

Technical data

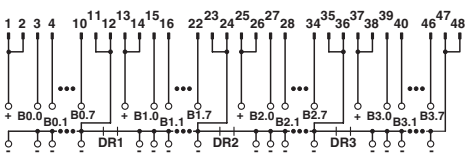
Max. perm. operating voltage		60 V DC
Max. perm. current (per branch)		1 A
Max. total current (voltage supply)		8 A (per byte)
Rated surge voltage		0.8 kV
Ambient temperature (operation)		-20°C ... 50°C
Mounting position		Any
Standards / regulations		IEC 60664, DIN EN 50178, IEC 62103
Connection method	Field level	Screw connection
	Control system level	Flat-ribbon cable plug connector in acc. with IEC 60603-13
Connection data solid / stranded / AWG		0.2 ... 4 mm² / 0.2 ... 2.5 mm² / 24 - 12
Dimensions	H / D	90 mm / 68 mm

Ordering data

Description	No. of poles	Module width W	Type	Order No.	Pcs. / Pkt.
VARIOFACE interface module, for 32 channels, each with an additional terminal block per signal for a common minus potential	50	192 mm	**FLKM 50/32M/PLC**	**2289719**	1
VARIOFACE interface module, for 32 channels, each with an additional terminal block per signal for a common plus potential	50	192 mm	**FLKM 50/32P/PLC**	**2291121**	1



Connection scheme: FLKM 50/32P/PLC



Connection scheme: FLKM 50/32M/PLC

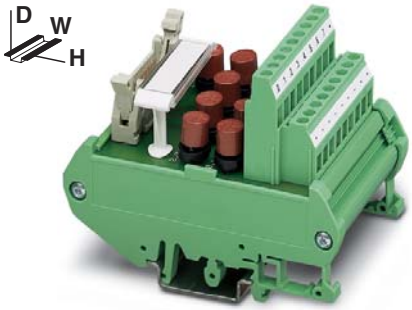
Termination boards with fuses in 2-wire connection method

These VARIOFACE modules are used in combination with the respective front adapters.

Like the front adapters, the modules are connected via 14-pole or 50-pole system cables. The following module types with fuses in the 2-wire and 4-wire connection method are available:

FLKM 14/8M/SI/PLC (for 8 channels)
FLKM 50/32M/SI/PLC (for 32 channels)

- Byte-wise labeling
- Can be used for digital I/O modules
- Pluggable fuse (IEC 127-3, 1AF) per signal path (F1)
- Pluggable fuse (IEC 127-3, 2AF) per voltage supply (F2)
- Negative connection for each signal



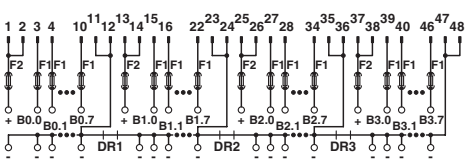
Passive fuse modules for 8 or 32 channels

Technical data

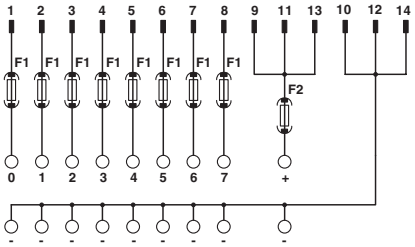
		FLKM 14/8M/SI/PLC	FLKM 50/32M/PLC
Max. perm. operating voltage		60 V DC	60 V DC
Max. perm. current (per branch)		1 A	1 A
Max. total current (voltage supply)		2 A	2 A (per byte)
Rated surge voltage		0.8 kV	0.8 kV
Ambient temperature (operation)		-20°C ... 50°C	-20°C ... 50°C
Mounting position		Any	Any
Standards / regulations		IEC 60664, DIN EN 50178, IEC 62103	
Connection method	Field level	Screw connection	Screw connection
	Control system level	Flat-ribbon cable plug connector in acc. with IEC 60603-13	Flat-ribbon cable plug connector in acc. with IEC 60603-13
Connection data solid / stranded / AWG		0.2 ... 4 mm² / 0.2 ... 2.5 mm² / 24 - 12	
Dimensions	H / D	90 mm / 68 mm	

Ordering data

Description	No. of poles	Module width W	Type	Order No.	Pcs. / Pkt.
VARIOFACE module, for eight channels, each with an additional terminal block and fuse per signal (common minus potential)	14	57 mm	**FLKM 14/8M/SI/PLC**	**2294487**	1
VARIOFACE module, for 32 channels, each with an additional terminal block and fuse per signal (common minus potential)	50	192 mm	**FLKM 50/32M/SI/PLC**	**2294490**	1



Connection scheme: FLKM 50/32M/SI/PLC



Connection scheme: FLKM 14/8M/SI/PLC

VIP initiator modules

These VIP VARIOFACE Professional modules are used in combination with the respective front adapters.

Similar to the front adapters, the modules are connected through 14-pole system cables. The following VIP initiator modules are available:

VIP-3/SC/FLK14/8IM/...
(for 8 channels)
– Byte-wise labeling
– Can be used for digital I/O modules
– Positive and negative connection per signal
– Optionally with LED.

Notes:
For marking systems and mounting material, see CLIPLINE catalog, part 2.

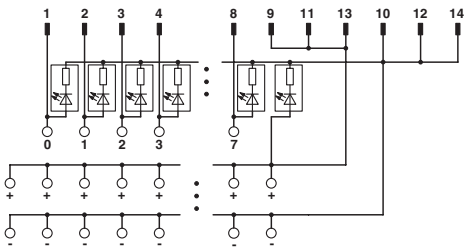
Sensor modules for 8 channels

Technical data

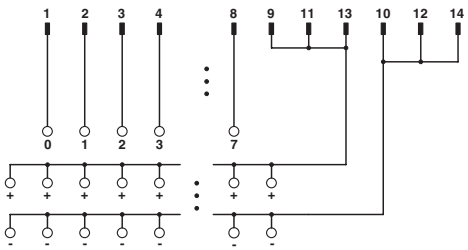
Max. perm. operating voltage		60 V DC
Max. perm. current (per branch)		1 A
Max. total current (voltage supply)		3 A
Rated surge voltage		-
Ambient temperature (operation)		-20°C ... 50°C
Mounting position		Any
Standards / regulations		IEC 60664, DIN EN 50178, IEC 62103
Connection method	Field level	Screw connection
	Control system level	Flat-ribbon cable plug connector in acc. with IEC 60603-13
Connection data solid / stranded / AWG		0.2 ... 4 mm² / 0.2 ... 2.5 mm² / 24 - 12
Dimensions	H / D	69 mm / 62 mm

Ordering data

Description	No. of poles	Module width W	Type	Order No.	Pcs. / Pkt.
VARIOFACE initiator module, for connection of eight PNP initiators					
	14	52.3 mm	**VIP-3/SC/FLK14/8IM/PLC**	**2322278**	1
	14	52.3 mm	**VIP-3/SC/FLK14/8IM/LED/PLC**	**2322265**	1



VIP-3/SC/FLK14/8IM/LED/PLC connection scheme

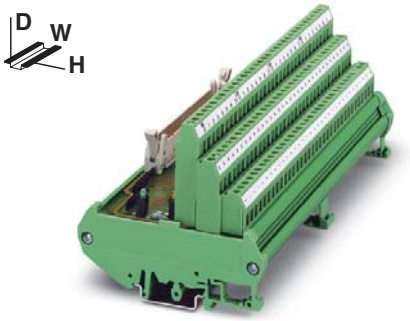


VIP-3/SC/FLK14/8IM/PLC connection scheme

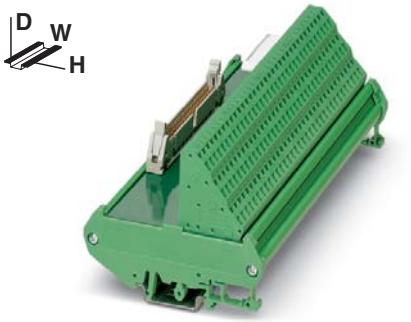
Sensor modules

These VARIOFACE modules are used in combination with the respective front adapters for digital I/O modules.

- For 32 channels
- Byte-wise labeling
- Positive and negative connection per signal
- Screw or spring-cage connection
- Optionally with LED



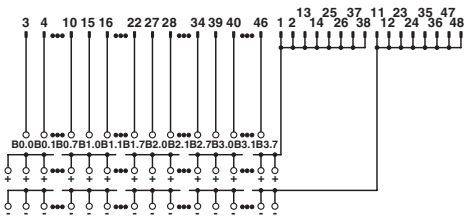
Initiator modules for 32 channels, with screw connection



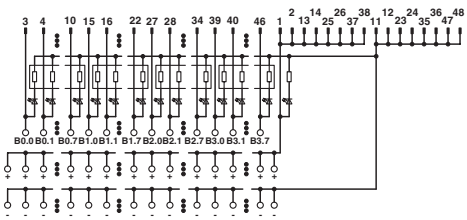
Initiator modules for 32 channels, with spring-cage connection

		Technical data		Technical data
		... 50/32 IM	... 50/32 IM/LA	
Max. perm. operating voltage		60 V DC	20 V DC (up to 30 V DC)	60 V DC
Max. perm. current (per branch)		1 A	1 A	1 A
Max. total current (voltage supply)		2 A (per byte)	2 A (per byte)	2 A (per byte)
Status indication		No	LED	-
Rated surge voltage		0.8 kV	0.8 kV	0.6 kV
Ambient temperature (operation)		-20°C ... 50°C	-20°C ... 50°C	-20°C ... 50°C
Mounting position		Any	Any	Any
Standards / regulations		IEC 60664, DIN EN 50178, IEC 62103		DIN EN 50178
Connection method	Field level	Screw connection	Screw connection	Spring-cage connection
	Control system level	Flat-ribbon cable plug connector in acc. with IEC 60603-13	Flat-ribbon cable plug connector in acc. with IEC 60603-13	Flat-ribbon cable plug connector in acc. with IEC 60603-13
Connection data solid / stranded / AWG		0.2 ... 4 mm² / 0.2 ... 2.5 mm² / 24 - 12		0.2 ... 2.5 mm² / 0.2 ... 1.5 mm² / 24 - 12
Dimensions	H / D	90 mm / 81 mm		90 mm / 73.5 mm

Description	No. of poles	Module width W	Ordering data: Type	Order No.	Pcs. / Pkt.	Ordering data: Type	Order No.	Pcs. / Pkt.
VARIOFACE initiator module, for connection of 32 PNP initiators	50	180 mm	**FLKMS 50/32IM/PLC**	**2284523**	1			
VARIOFACE initiator module, same as before, however with light indicator	50	180 mm	**FLKMS 50/32IM/LA/PLC**	**2284510**	1			
VARIOFACE initiator module, for connection of 32 PNP initiators						**FLKMS 50/32IM/ZFKDS/PLC**	**2901389**	1



Connection scheme: FLKMS 50/32IM/PLC, ...50/32IM/ZFKDS/PLC



FLKMS 50/32IM/LA/PLC connection scheme

COMPACT-LINE initiator modules with spring-cage connection

These VARIOFACE modules are used in combination with the respective front adapters.

Like the front adapters, the modules are connected via 14-pole or 50-pole system cables. The following Compact-Line sensor modules are available:

UM 45-FLK14/8IM/.../PLC (for 8 channels)
UM 45-FLK 50/32IM/.../PLC (for 32 channels)

- Byte-wise labeling
- Can be used for digital I/O modules
- Positive and negative connection for every signal

Notes:

Due to the geometry, it is not possible to couple any molded FLK connectors (e.g., VIP-PA...S7).

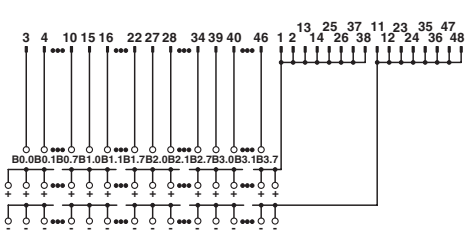
Sensor modules for 8 or 32 channels
With spring-cage connection

Technical data

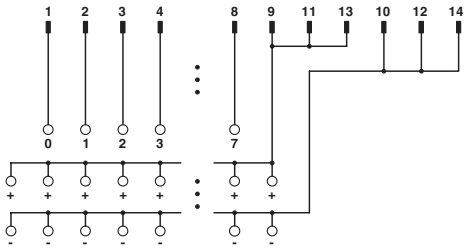
		UM 45-FLK 14/.../PLC	UM 45-FLK 50/.../PLC
Max. perm. operating voltage		60 V DC	60 V DC
Max. perm. current (per branch)		1 A	1 A
Max. total current (voltage supply)		3 A	2 A (per byte)
Rated surge voltage		0.8 kV	0.8 kV
Ambient temperature (operation)		-20°C ... 50°C	-20°C ... 50°C
Mounting position		Any	Any
Standards / regulations		IEC 60664, DIN EN 50178, IEC 62103	
Connection method	Field level	Spring-cage connection	Spring-cage connection
	Control system level	Flat-ribbon cable plug connector in acc. with IEC 60603-13	Flat-ribbon cable plug connector in acc. with IEC 60603-13
Connection data solid / stranded / AWG		0.2 ... 2.5 mm² / 0.2 ... 1.5 mm² / 24 - 14	
Dimensions	H / D	45 mm / 61 mm	

Ordering data

Description	No. of poles	Module width W	Type	Order No.	Pcs. / Pkt.
VARIOFACE-COMPACT-LINE initiator module, for connection of eight PNP initiators	14	75 mm	**UM 45-FLK14/ 8IM/ZFKDS/PLC**	**2965211**	1
VARIOFACE-COMPACT-LINE initiator module, for connection of 32 PNP initiators	50	197 mm	**UM 45-FLK50/32IM/ZFKDS/PLC**	**2965224**	1



UM 45-FLK50/32IM/ZFKDS/PLC connection scheme



UM 45-FLK14/8IM/ZFKDS/PLC connection scheme

Controller boards with knife disconnect terminal blocks

These VARIOFACE modules with knife disconnection and test connection for each signal (2 or 2.3 mm Ø test plug) are used in combination with the respective front adapters.

FLKM14/KDS3-MT/PPA/PLC (for 8 channels)
FLKM 50/KDS3-MT/PPA/PLC (for 32 channels)

– Byte-wise labeling
– Can be used for digital I/O modules

FLKM-2FLK14/KDS3-MT/PPA/S7

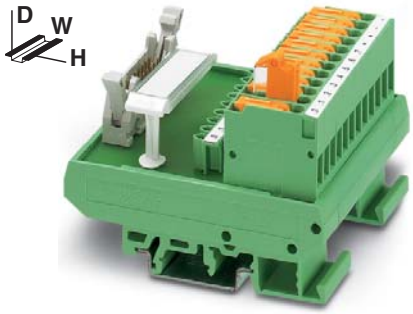
– Numerical labeling (1-20)
– Specially for S7-300 (in conjunction with the front adapter FLKM 14-PA-S300, Order No.: 2299770)

FLKM 50/KDS3-MT/PPA/7-300

– Numerical labeling (1-40)
– Specially for S7-300 (in conjunction with the front adapter FLKM 50-PA-S300, Order No.: 2294445)

FLKM 50/KDS3-MT/PPA/AN/PLC

– Numerical labeling (1-50)
– Specially for S7-400 (in conjunction with the front adapter FLKM 50-PA-S400 (3-48) Order No. 2294908)



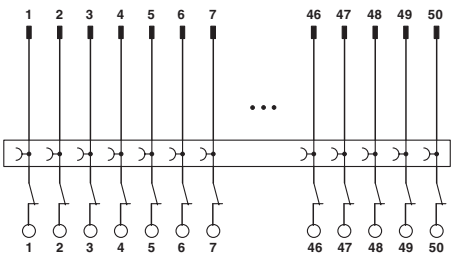
Passive interface modules for eight or 32 channels with knife disconnect terminal blocks

Technical data

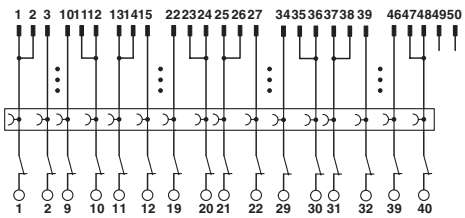
		FLKM...14/KDS 3-MT...	FLKM 50/KDS 3-MT...
Max. perm. operating voltage		60 V DC	60 V DC
Max. perm. current (per branch)		1 A	1 A
Max. total current (voltage supply)		3 A	2 A (per byte)
Rated surge voltage		0.8 kV	0.8 kV
Ambient temperature (operation)		-20°C ... 50°C	-20°C ... 50°C
Mounting position		Any	Any
Standards / regulations		IEC 60664, DIN EN 50178, IEC 62103	
Connection method	Field level	Screw connection with disconnect knife	Screw connection with disconnect knife
	Control system level	Flat-ribbon cable plug connector in acc. with IEC 60603-13	Flat-ribbon cable plug connector in acc. with IEC 60603-13
Connection data solid / stranded / AWG		0.2 ... 4 mm² / 0.2 ... 2.5 mm² / 24 - 12	
Dimensions	H / D	77 mm / 61 mm	

Ordering data

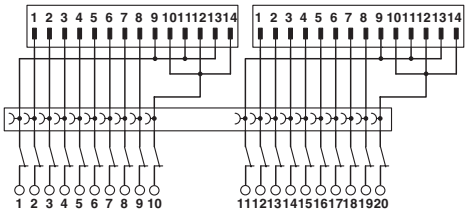
Description	No. of poles	Module width W	Type	Order No.	Pcs. / Pkt.
VARIOFACE interface module, for eight channels, with knife disconnect terminal blocks and test sockets to the field and the system	14	67 mm	**FLKM 14/KDS3-MT/PPA/PLC**	**2290423**	1
VARIOFACE interface module, for 32 channels, with knife disconnect terminal blocks and test sockets to the field and the system	50	214 mm	**FLKM 50/KDS3-MT/PPA/PLC**	**2290614**	1
VARIOFACE interface module, for SIMATIC S7-300 with SIMATIC-specific labeling (1-20), knife disconnect terminal blocks and test sockets to the field and the system	14	113 mm	**FLKM-2FLK14/KDS3-MT/PPA/S7**	**2295062**	1
VARIOFACE interface module, same as before, however, with SIMATIC-specific labeling (1-40)	50	214 mm	**FLKM 50/KDS3-MT/PPA/S7-300**	**2304490**	1
VARIOFACE interface module, same as before, however, for SIMATIC S7-400 with SIMATIC-specific labeling (3-48)	50	259 mm	**FLKM 50/KDS3-MT/PPA/AN/PLC**	**2291587**	1



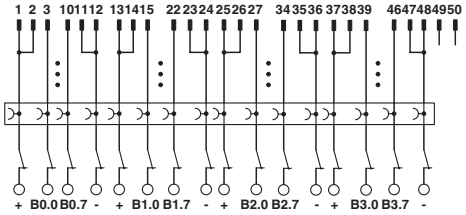
FLKM 50/KDS3-MT/PPA/AN/PLC connection scheme



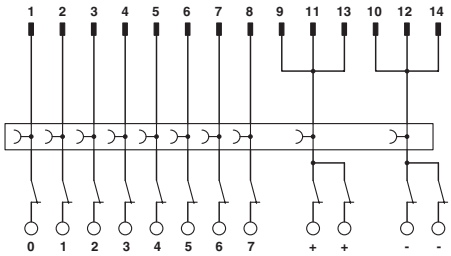
FLKM 50/KDS3-MT/PPA/S7-300 connection scheme



FLKM-2FLK14/KDS3-MT/PPA/S7 connection scheme



FLKM 50/KDS3-MT/PPA/PLC connection scheme



FLKM 14/KDS3-MT/PPA/PLC connection scheme

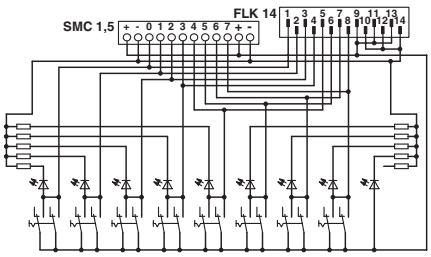
Simulation module with switches

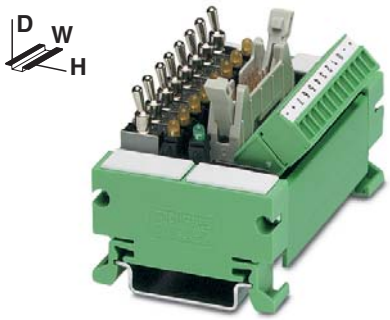
These VARIOFACE modules enable simple simulation of the control and peripheral hardware for 8 signals.

The UM 45-DI/DO/S/LA/SIM8 switch module is assembled for signal transmission with COMBICON screw connector for single-wire wiring. Alternatively, connection to the PLC system cabling is established through a 14-pole flat-ribbon cable pin strip. Connection to the front adapters of the PLC system cabling is established through 14-pole system cables with socket strips.

Each signal path is allocated an LED which signals the "high active" signal state. The supply voltage to the modules is signaled via a green LED.

Notes:
Type of housing: Terminal blocks: Polyamide PA non-reinforced, color: Green. Housing: PVC
For marking systems and mounting material, see CLIPLINE catalog, part 2.





Switch module

Technical data

Max. perm. operating voltage	24 V DC
Max. perm. current (per branch)	1 A
Max. total current (voltage supply)	8 A (+, - terminal block)
Rated surge voltage	0.8 kV
Ambient temperature (operation)	-20°C ... 50°C
Mounting position	Any
Standards / regulations	IEC 60664, DIN EN 50178, IEC 62103
Connection data solid / stranded / AWG	0.14 ... 1.5 mm² / 0.14 ... 1.5 mm² / 28 - 16
Dimensions H / D	45 mm / 51 mm

Ordering data

Description	No. of poles	Module width W	Type	Order No.	Pcs. / Pkt.
VARIOFACE switch module, for simulation		75 mm	**UM 45-DI/DO/S/LA/SIM8**	**2968205**	1

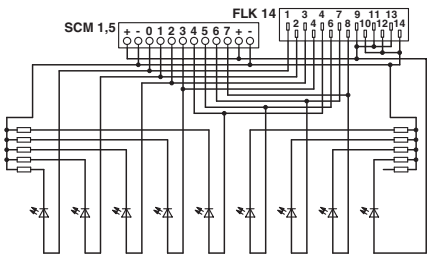
Simulation module for display

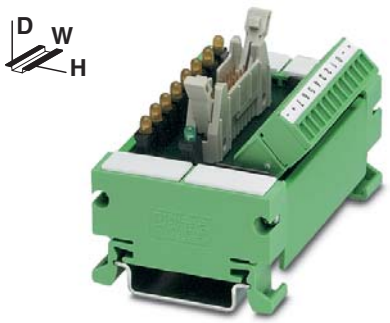
These VARIOFACE modules enable simple simulation of the control and peripheral hardware for 8 signals.

The UM 45-DO/LA/SIM8 display module is assembled for signal transmission with COMBICON screw connector for single-wire wiring. Alternatively, connection to the PLC system cabling is established through a 14-pole flat-ribbon cable pin strip. Connection to the front adapters of the PLC system cabling is established through 14-pole system cables with socket strips.

Each signal path is allocated an LED which signals the "high active" signal state. The supply voltage to the modules is signaled via a green LED.

Notes:
Type of housing: Terminal blocks: Polyamide PA non-reinforced, color: Green. Housing: PVC
For marking systems and mounting material, see CLIPLINE catalog, part 2.





Indicator module

Technical data

Max. perm. operating voltage	24 V DC
Max. perm. current (per branch)	1 A
Max. total current (voltage supply)	8 A (+, - terminal block)
Rated surge voltage	0.8 kV
Ambient temperature (operation)	-20°C ... 50°C
Mounting position	Any
Standards / regulations	IEC 60664, DIN EN 50178, IEC 62103
Connection data solid / stranded / AWG	0.14 ... 1.5 mm² / 0.14 ... 1.5 mm² / 28 - 16
Dimensions H / D	45 mm / 51 mm

Ordering data

Description	No. of poles	Module width W	Type	Order No.	Pcs. / Pkt.
VARIOFACE display module, for simulation		75 mm	**UM 45-DO/LA/SIM8**	**2968195**	1

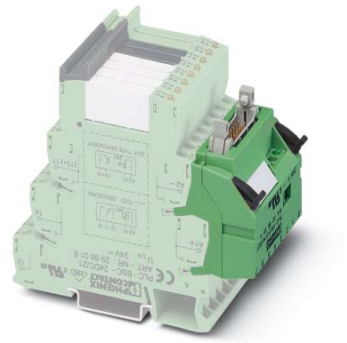
Adapter for PLC-INTERFACE (6.2 mm)

PLC-V8/... are the VARIOFACE adapters connecting the eight slim 6.2 mm PLC-INTERFACE modules to the VARIOFACE system cabling:

- Can be plugged into the bridge shafts of eight aligned PLC-INTERFACE modules
- Freely definable configuration with relays, optocouplers and passive feed-through terminal blocks
- With D-SUB connection as an option for universal connections

Notes:

Cross-reference list with matching PLC-INTERFACE modules, see page 266.



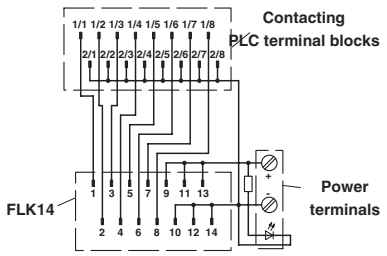
VARIOFACE adapter for 6.2 mm PLC-INTERFACE

Technical data

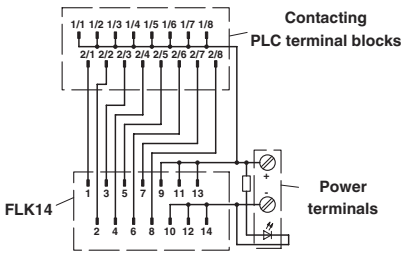
Max. perm. operating voltage		24 V DC ±25%
Max. perm. current (per branch)		1 A (per signal path)
Max. total current (voltage supply)		3 A
Rated surge voltage		0.8 kV
Ambient temperature (operation)		-40°C ... 70°C
Standards / regulations		IEC 60664, DIN EN 50178, IEC 62103
Connection method	Power supply	Screw connection
	Signal level	Flat-ribbon cable connector, in acc. with IEC 60603-13 (engagement catches based on IEC 60603-13)
Connection data solid / stranded / AWG		0.2 ... 4 mm² / 0.2 ... 2.5 mm² / 24 - 12
Dimensions	H / D	100 mm / 94 mm

Ordering data

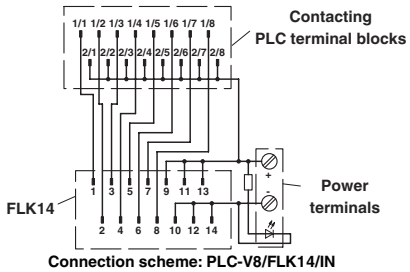
Description	No. of poles	Module width W	Type	Order No.	Pcs. / Pkt.
V8 adapter, for 8 PLC interfaces (6.2 mm), with FLK connection, for PLC system cabling, **positive switching**					
OUTPUT	14	49.6 mm	**PLC-V8/FLK14/OUT**	**2295554**	1
INPUT	14	49.6 mm	**PLC-V8/FLK14/IN**	**2296553**	1
V8 adapter, for 8 PLC interfaces (6.2 mm), with FLK connection, for PLC system cabling, **negative switching**					
OUTPUT	14	49.6 mm	**PLC-V8/FLK14/OUT/M**	**2304102**	1
INPUT	14	49.6 mm	**PLC-V8/FLK14/IN/M**	**2304115**	1
V8 output adapter, for 8 PLC interfaces (6.2 mm), with 15-pole D-SUB connection					
Pin strip	15	49.6 mm	**PLC-V8/D15S/OUT**	**2296058**	1
Socket strip	15	49.6 mm	**PLC-V8/D15B/OUT**	**2296061**	1
V8 input adapter, for 8 PLC interfaces (6.2 mm), with 15-pole D-SUB connection					
Pin strip	15	49.6 mm	**PLC-V8/D15S/IN**	**2296074**	1
Socket strip	15	49.6 mm	**PLC-V8/D15B/IN**	**2296087**	1



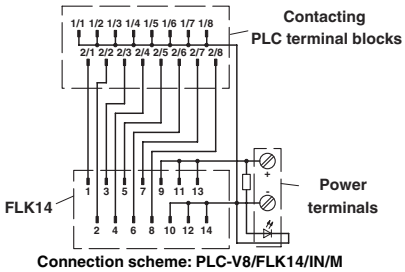
PLC-V8/FLK14/OUT connection scheme



PLC-V8/FLK14/OUT/M connection scheme



Connection scheme: PLC-V8/FLK14/IN

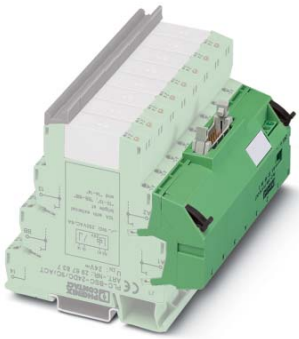


Connection scheme: PLC-V8/FLK14/IN/M

Adapter for PLC-INTERFACE (14 mm)

PLC-V8L/... are the VARIOFACE adapters connecting the eight 14 mm PLC-INTERFACE modules (2 PDT, HC, and IC types) to the system cabling:
– Can be plugged into the bridge shafts of eight aligned PLC-INTERFACE modules
– Freely selectable assembly with relays or optocouplers

Notes:
Cross-reference list with matching PLC-INTERFACE modules, see page 266.



VARIOFACE adapter for 14 mm PLC-INTERFACE

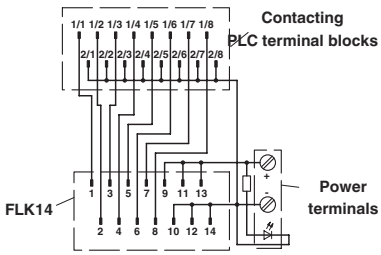
Applied for: UL / CUL

Technical data

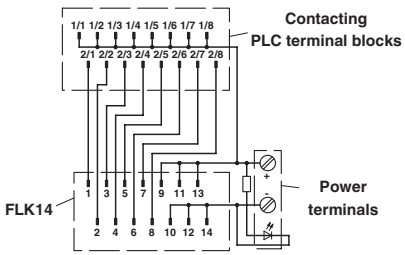
Max. perm. operating voltage		24 V DC ±25%
Max. perm. current (per branch)		1 A (per signal path)
Max. total current (voltage supply)		3 A
Rated surge voltage		0.8 kV
Ambient temperature (operation)		-40°C ... 70°C
Mounting position		Any
Standards / regulations		IEC 60664, DIN EN 50178, IEC 62103
Connection method	Power supply	Screw connection
	Signal level	Flat-ribbon cable connector, in acc. with IEC 60603-13 (engagement catches based on IEC 60603-13)
Connection data solid / stranded / AWG		0.2 ... 4 mm² / 0.2 ... 2.5 mm² / 24 - 12
Dimensions	H / D	100 mm / 94 mm

Ordering data

Description	No. of poles	Module width W	Type	Order No.	Pcs. / Pkt.
V8 adapter, for 8 PLC interfaces (14 mm), with FLK connection, for PLC system cabling, **positive switching**	14	112.3 mm	**PLC-V8L/FLK14/OUT**	**2299660**	1
V8 adapter, for 8 PLC interfaces (14 mm), with FLK connection, for PLC system cabling, **negative switching**	14	112.3 mm	**PLC-V8L/FLK14/OUT/M**	**2304306**	1



PLC-V8L/FLK14/OUT connection scheme



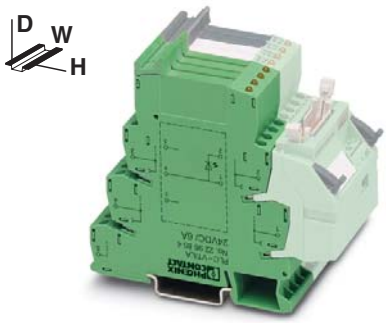
PLC-V8L/FLK14/OUT/M connection scheme

Feed-through terminal blocks for PLC-INTERFACE

The VARIOFACE PLC-VT terminals are passive feed-through terminal blocks, with the same shape as the 6.2 mm slim relay and optocoupler interfaces PLC-INTERFACE. It is therefore possible to implement 8-channel interface blocks for the system cabling, which can be adapted to a bit for the particular application. For individual requirements, the relay, optocoupler or the PLC-VT terminal blocks for passive signal transmission can be combined as needed.

PLC-VT
PLC-VT/LA

- Can be combined with PLC-INTERFACE universal series
- Signal path with additional potential level for free assignment (two-wire connection)
- Optionally with LED



VARIOFACE feed-through terminal blocks for PLC-INTERFACE universal series

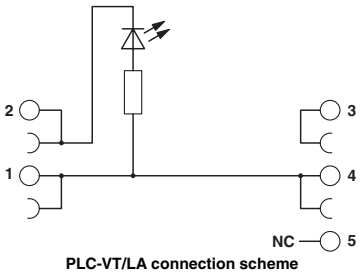
Technical data

	PLC-VT	PLC-VT/LA
Max. perm. operating voltage	Max. 250 V AC/DC	24 V DC
Max. perm. current (per branch)	6 A (per signal conductor)	6 A (per signal conductor)
Ambient temperature (operation)	-40°C ... 70°C	-40°C ... 70°C
Mounting position	Any	Any
Standards / regulations	DIN EN 50178, IEC 62103	
Connection data solid / stranded / AWG	0.2 ... 4 mm² / 0.2 ... 2.5 mm² / 24 - 12	
Dimensions H / D	80 mm / 94 mm	

Ordering data

Description	No. of poles	Module width W	Type	Order No.	Pcs. / Pkt.
VARIOFACE feed-through terminal block (two-wire connection), for PLC-INTERFACE universal series		6.2 mm	**PLC-VT**	**2296870**	10
VARIOFACE feed-through terminal block, same as before, however, with 24 V DC light indicator		6.2 mm	**PLC-VT/LA**	**2296854**	10

PLC-VT connection scheme



PLC-VT/LA connection scheme

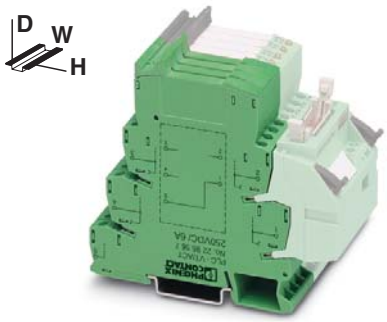
Feed-through terminal blocks for PLC-INTERFACE

The VARIOFACE PLC-VT terminals are passive feed-through terminal blocks, with the same shape as the 6.2 mm slim relay and optocoupler interfaces PLC-INTERFACE. It is therefore possible to implement 8-channel interface blocks for the system cabling, which can be adapted to a bit for the particular application. For individual requirements, the relay, optocoupler or the PLC-VT terminal blocks for passive signal transmission can be combined as needed.

PLC-VT/ACT
PLC-VT/ACT/LA

- Can be combined with PLC-INTERFACE actuator series
- Signal path with two additional potential levels for free assignment (three-wire connection)
- Optionally with LED

The system connection is made via the PLC-V8 adapter.



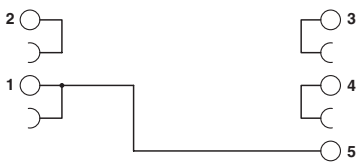
VARIOFACE feed-through terminal blocks for PLC-INTERFACE actuator series

Technical data

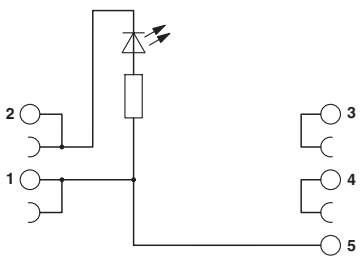
	PLC-VT/AKT	PLC-VT/AKT/LA
Max. perm. operating voltage	Max. 250 V AC/DC	24 V DC
Max. perm. current (per branch)	6 A (per signal conductor)	6 A (per signal conductor)
Ambient temperature (operation)	-40°C ... 70°C	-40°C ... 70°C
Mounting position	Any	Any
Standards / regulations	DIN EN 50178, IEC 62103	
Connection data solid / stranded / AWG	0.2 ... 4 mm² / 0.2 ... 2.5 mm² / 24 - 12	
Dimensions H / D	80 mm / 94 mm	

Ordering data

Description	No. of poles	Module width W	Type	Order No.	Pcs. / Pkt.
VARIOFACE feed-through terminal block (three-wire connection), for PLC-INTERFACE actuator series		6.2 mm	**PLC-VT/ACT**	**2295567**	10
VARIOFACE feed-through terminal block, same as before, however, with 24 V DC light indicator		6.2 mm	**PLC-VT/ACT/LA**	**2296867**	10



PLC-VT/ACT connection scheme



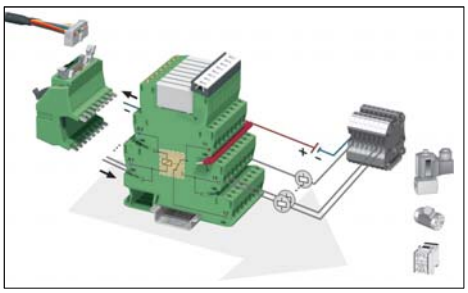
PLC-VT/ACT/LA connection scheme

Cross-reference list for PLC-V8 adapters with matching PLC-INTERFACE modules

Series	Function	Contact	Input	Output	Page	Spring-cage connection	Order No.:
Universal	Relay	1 PDT	24 V DC	250 V AC/DC / 6 A	82	PLC-RSP-24DC/21	2966472
			24 V DC	250 V AC/DC / 10 A	93	PLC-RSP-24DC/21HC	2912277
			12 V DC	30 V AC/36 V DC / 50 mA	83	PLC-RSP-12DC/21AU	2967442
			24 V DC	30 V AC/36 V DC / 50 mA	83	PLC-RSP-24DC/21AU	2966540
			24 V AC/DC	30 V AC/36 V DC / 50 mA	83	PLC-RSP-24UC/21AU	2966553
			48 V DC	30 V AC/36 V DC / 50 mA	83	PLC-RSP-48DC/21AU	2966566
			60 V DC	30 V AC/36 V DC / 50 mA	83	PLC-RSP-60DC/21AU	2966579
			120 V AC/DC	30 V AC/36 V DC / 50 mA	83	PLC-RSP-120UC/21AU	2966582
			230 V AC/DC	30 V AC/36 V DC / 50 mA	83	PLC-RSP-230UC/21AU	2966647
			120 V AC	30 V AC/36 V DC / 50 mA[1])	94	PLC-BSP-120UC/21/SO46	2980351[3])
			230 V AC	30 V AC/36 V DC / 50 mA[1])	94	PLC-BSP-230UC/21/SO46	2980377[3])
		2 PDT	24 V DC	250 V AC/DC / 6 A	83	PLC-RSP-24DC/21-21	2912507
			24 V DC	30 V AC/DC / 50 mA	83	PLC-RSP-24DC/21-21AU	2912578
	Relay switch	1 N/O contact	24 V AC/DC	250 V AC/DC / 6 A	110	PLC-RSP-24UC/1/S/H	2982249
			24 V AC/DC	250 V AC/DC / 6 A	110	PLC-RSP-24UC/1/S/L	2834889
	Optocoupler	1 N/O contact, electronic	24 V DC	24 V DC / 3 A	85	PLC-OSP-24DC/24DC/2	2967471
			24 V DC	24 V DC / 10 A	113	PLC-OSP-24DC/24DC/10/R	2982715
			24 V DC	250 V AC / 0.75 A	85	PLC-OSP-24DC/230AC/1	2967895
			24 V DC	300 V DC / 1 A	112	PLC-OSP-24DC/300DC/1	2980830
			24 V DC	48 V DC / 100 mA	84	PLC-OSP-24DC/48DC/100	2967549
			48 V DC	48 V DC / 100 mA	84	PLC-OSP-48DC/48DC/100	2967743
			60 V DC	48 V DC / 100 mA	84	PLC-OSP-60DC/48DC/100	2967756
			120 V AC/DC	48 V DC / 100 mA	84	PLC-OSP-120UC/48DC/100	2967552
			230 V AC/DC	48 V DC / 100 mA	84	PLC-OSP-230UC/48DC/100	2967565
			NAMUR	24 V DC / 50 mA	122	PLC-SP-EIK 1-SVN 24P/P	2982676
			120 V AC	48 V DC / 100 mA[2])	94	PLC-BSP-120UC/21/SO46	2980351[3])
			230 V AC	48 V DC / 100 mA[2])	94	PLC-BSP-230UC/21/SO46	2980377[3])
		1 PDT, electronic	24 V DC	48 V DC / 0.5 A	113	PLC-OSP-24DC/48DC/500/W	2980649
	Feed-through	–	250 V AC/DC	250 V AC/DC	264	–	
			24 V DC	24 V DC	264	–	
Actuator	Relay	1 N/O contact	24 V DC	250 V AC/DC / 6 A	86	PLC-RSP-24DC/1/ACT	2967345
			24 V DC	250 V AC/DC / 10 A (80 A; 20 ms)	92	PLC-RSP-24DC/1IC/ACT	2912413
		2 N/O contacts	24 V DC	250 V AC/DC / 6 A	87	–	
	Optocoupler	1 N/O contact, electronic	24 V DC	24 V DC / 3 A	87	PLC-OSP-24DC/24DC/2/ACT	2967507
			24 V DC	24 V DC / 5 A	88	–	
			24 V DC	250 V AC / 0.75 A	87	–	
			24 V DC	250 V AC / 2 A	88	–	
	Feed-through	–	250 V AC/DC	250 V AC/DC	265	–	
			24 V DC	24 V DC	265	–	
Sensor[4])	Relay	1 N/O contact	24 V DC	30 V AC/36 V DC / 50 mA	90	PLC-RSP-24DC/1AU/SEN	2967374
			120 V AC/DC	30 V AC/36 V DC / 50 mA	90	PLC-RSP-120UC/1AU/SEN	2967390
			230 V AC/DC	30 V AC/36 V DC / 50 mA	90	PLC-RSP-230UC/1AU/SEN	2967413
			120 V AC	30 V AC/36 V DC / 50 mA[1])	95	PLC-BSP-120UC/1/SEN/SO46	2980364[3])
			230 V AC	30 V AC/36 V DC / 50 mA[1])	95	PLC-BSP-230UC/1/SEN/SO46	2980380[3])
	Optocoupler	1 N/O contact, electronic	24 V DC	48 V DC / 100 mA	91	PLC-OSP-24DC/48DC/100/SEN	2967578
			120 V AC/DC	48 V DC / 100 mA	91	PLC-OSP-120UC/48DC/100/SEN	2967581
			230 V AC/DC	48 V DC / 100 mA	91	PLC-OSP-230UC/48DC/100/SEN	2967594
			120 V AC	48 V DC / 100 mA[2])	95	PLC-BSP-120UC/1/SEN/SO46	2980364[3])
			230 V AC	48 V DC / 100 mA[2])	95	PLC-BSP-230UC/1/SEN/SO46	2980380[3])

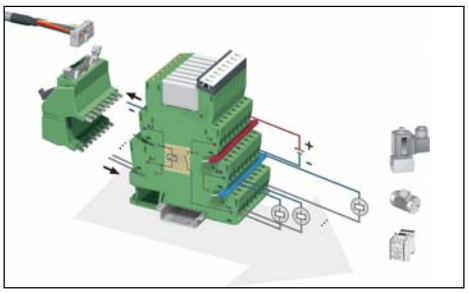
[1]) Plug-in miniature relay insert: REL-MR-60DC/21AU, 2961134
[2]) Plug-in solid-state relay insert: OPT-60DC/48DC/100, 2966621
[3]) PLC-...SO46 is supplied as a basic terminal block with filter, but without relay or solid-state relay.
[4]) Cannot be combined with the universal series (within a byte)

Push-in connection	Order No.:	Screw connection	Order No.:	PLC-V8...OUT(/M)	PLC-V8...IN(/M)	PLC-V8L...OUT
PLC-RPIT-24DC/21	2900299	PLC-RSC-24DC/21	2966171	X		
PLC-RPIT-24DC/21HC	2900291	PLC-RSC-24DC/21HC	2967620			X
PLC-RPIT-12DC/21AU	2900317	PLC-RSC-12DC/21AU	2966919		X	
PLC-RPIT-24DC/21AU	2900306	PLC-RSC-24DC/21AU	2966265	X	X	
PLC-RPIT-24UC/21AU	2900307	PLC-RSC-24UC/21AU	2966278	X	X	
PLC-RPIT-48DC/21AU	2900308	PLC-RSC-48DC/21AU	2966126		X	
PLC-RPIT-60DC/21AU	2900309	PLC-RSC-60DC/21AU	2966142		X	
PLC-RPIT-120UC/21AU	2900310	PLC-RSC-120UC/21AU	2966281		X	
PLC-RPIT-230UC/21AU	2900311	PLC-RSC-230UC/21AU	2966294		X	
PLC-RPIT-120UC/21/SO46	2900453[3])	PLC-BSC-120UC/21/SO46	2980319[3])		X	
PLC-RPIT-230UC/21/SO46	2900455[3])	PLC-BSC-230UC/21/SO46	2980335[3])		X	
PLC-RPIT-24DC/21-21	2900330	PLC-RSC-24DC/21-21	2967060			X
PLC-RPIT-24DC/21-21AU	2900338	PLC-RSC-24DC/21-21AU	2967125			X
PLC-RPIT-24UC/1/S/H	2900328	PLC-RSC-24UC/1/S/H	2982236	X		
PLC-RPIT-24UC/1/S/L	2900327	PLC-RSC-24UC/1/S/L	2834876	X		
PLC-OPIT-24DC/24DC/2	2900364	PLC-OSC-24DC/24DC/2	2966634	X		
PLC-OPIT-24DC/24DC/10/R	2900398	PLC-OSC-24DC/24DC/10/R	2982702	X		
PLC-OPIT-24DC/230AC/1	2900369	PLC-OSC-24DC/230AC/1	2967840	X		
PLC-OPIT-24DC/300DC/1	2900383	PLC-OSC-24DC/300DC/1	2980678	X		
PLC-OPIT-24DC/48DC/100	2900352	PLC-OSC-24DC/48DC/100	2966728	X	X	
PLC-OPIT-48DC/48DC/100	2900353	PLC-OSC-48DC/48DC/100	2966993		X	
PLC-OPIT-60DC/48DC/100	2900354	PLC-OSC-60DC/48DC/100	2967455		X	
PLC-OPIT-120UC/48DC/100	2900355	PLC-OSC-120UC/48DC/100	2966744		X	
PLC-OPIT-230UC/48DC/100	2900356	PLC-OSC-230UC/48DC/100	2966757		X	
PLC-PIT-EIK 1-SVN 24P/P	2900397	PLC-SC-EIK 1-SVN 24P/P	2982663		X	
PLC-BPIT-120UC/21/SO46	2900453[3])	PLC-BSC-120UC/21/SO46	2980319[3])		X	
PLC-BPIT-230UC/21/SO46	2900455[3])	PLC-BSC-230UC/21/SO46	2980335[3])		X	
PLC-OPIT-24DC/48DC/500/W	2900378	PLC-OSC-24DC/48DC/500/W	2980636	X		
–		PLC-VT	2296870	X	X	
–		PLC-VT/LA	2296854	X	X	
PLC-RPIT-24DC/1/ACT	2900312	PLC-RSC-24DC/1/ACT	2966210	X		
PLC-RPIT-24DC/1IC/ACT	2900298	PLC-RSC-24DC/1IC/ACT	2967604			X
–		PLC-RSC-24DC/1-1/ACT	2967109			X
PLC-OPIT-24DC/24DC/2/ACT	2900376	PLC-OSC-24DC/24DC/2/ACT	2966676	X		
–		PLC-OSC-24DC/24DC/5/ACT	2982786			X
–		PLC-OSC-24DC/230AC/1/ACT	2967947	X		
–		PLC-OSC-24DC/230AC/2/ACT	2982760			X
–		PLC-VT/AKT	2295567	X		
–		PLC-VT/AKT/LA	2296867	X		
PLC-RPIT-24DC/1AU/SEN	2900313	PLC-RSC-24DC/1AU/SEN	2966317		X	
PLC-RPIT-120UC/1AU/SEN	2900314	PLC-RSC-120UC/1AU/SEN	2966320		X	
PLC-RPIT-230UC/1AU/SEN	2900315	PLC-RSC-230UC/1AU/SEN	2966333		X	
PLC-BPIT-120UC/1/SEN/SO46	2900456[3])	PLC-BSC-120UC/1/SEN/SO46	2980322[3])		X	
PLC-BPIT-230UC/1/SEN/SO46	2900457[3])	PLC-BSC-230UC/1/SEN/SO46	2980348[3])		X	
PLC-OPIT-24DC/48DC/100/SEN	2900358	PLC-OSC-24DC/48DC/100/SEN	2966773		X	
PLC-OPIT-120UC/48DC/100/SEN	2900359	PLC-OSC-120UC/48DC/100/SEN	2966799		X	
PLC-OPIT-230UC/48DC/100/SEN	2900361	PLC-OSC-230UC/48DC/100/SEN	2966809		X	
PLC-BPIT-120UC/1/SEN/SO46	2900456[3])	PLC-BSC-120UC/1/SEN/SO46	2980322[3])		X	
PLC-BPIT-230UC/1/SEN/SO46	2900457[3])	PLC-BSC-230UC/1/SEN/SO46	2980348[3])		X	



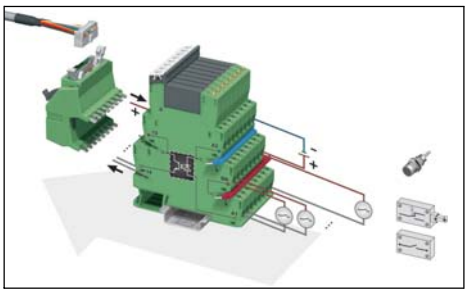
PLC universal series

The universal series of products can be used as either input or output interfaces. Each product consists of a basic terminal block with a plug-in miniature relay (PDT contact) or a plug-in solid-state relay.



PLC actuator series

In applications involving an interface between the PLC and actuators (e.g., motors, contactors or solenoid valves) often only an N/O function is required. In such cases, the PLC...ACT output interface is used. All actuator connections, including the load return line, are connected directly. This eliminates the need for additional output terminal blocks.



PLC sensor series

In applications involving an interface between the PLC and sensors (e.g., proximity switches, limit switches or auxiliary contacts), an N/O function is often required. In such cases, the PLC…SEN input interface is used. All sensor connections, including the supply voltage for the sensors/switches, are connected directly. This eliminates the need for additional modular terminal blocks.

COMPACT-LINE output modules with relays, one N/O contact

These VARIOFACE Compact Line output modules are used in combination with the respective front adapters.

Like the front adapters, the modules are connected via 14-pole or 50-pole system cables. The following features characterize these relay modules:

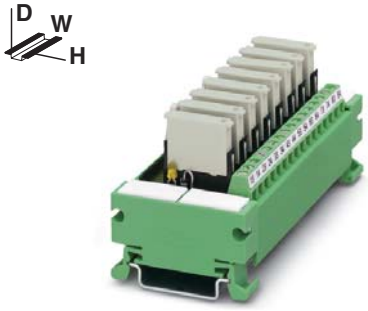
- Pluggable miniature relays, each with an N/O contact
- Universal applications from 1 mA to 3 A continuous current through 2-layer double contact with hard gold plating
- Low construction height of only 45 mm
- LED status display for each signal path and supply voltage
- Free-wheeling and reverse polarity protection diode for each signal path

With the 32-channel version, the system cable is connected to the 16-channel base module UM 45-16RM/MR-G24/1/PLC. The output expansion module UM 45-16RM/MR-G24/1/E/PLC with a further 16 channels is coupled to the base module via a 20-pole flat-ribbon cable (length: 10 cm).

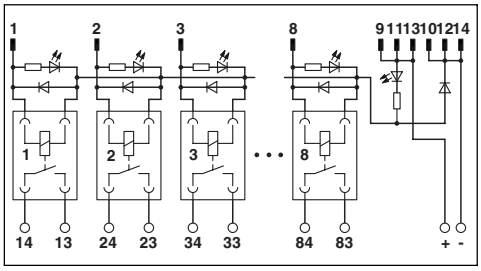
Notes:

The connecting cable between the base and the extension modules is delivered with the extension unit.

Due to the geometry, it is not possible to couple any molded FLK connectors (e.g., VIP-PA...S7).



Output module with eight miniature relays, one N/O contact



Technical data

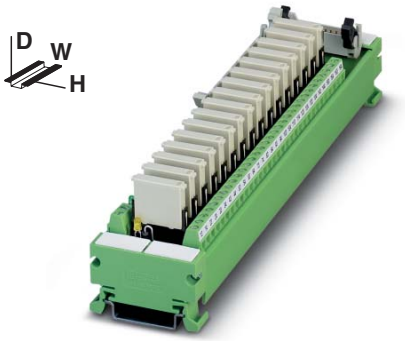
Coil side		
Operating voltage U_N		24 V DC
Typ. input current at U_N		6.5 mA
Typ. response time at U_N		5 ms
Typ. release time at U_N		15 ms
Input circuit		Free-wheeling diode, protection against polarity reversal
Status display/channel		Yellow LED
Connection method		Flat-ribbon cable plug connector in acc. with IEC 60603-13
No. of poles		14
Contact side		
Contact type		1 N/O contact (double contact)
Contact material		AgNi, 5 µm hard gold-plated
Max. switching voltage		250 V AC / 125 V DC
Min. switching voltage		5 V
Max. inrush current		5 A
Limiting continuous current		3 A
Min. switching current		1 mA
Max. interrupting rating:	24 V DC	72 W
	48 V DC	60 W
	60 V DC	50 W
	110 V DC	50 W
	250 V AC	750 VA
Connection method		Screw connection
Connection data solid / stranded / AWG		0.14 ... 1.5 mm^2 / 0.14 ... 1.5 mm^2 / 26 - 14
General data		
Test voltage		2 kV AC (50 Hz, 1 min.)
Ambient temperature (operation)		-20°C ... 50°C
Nominal operating mode		100% operating factor
Mechanical service life		2 x 10^7 cycles
Standards / regulations		IEC 60664, DIN EN 50178, IEC 62103
Mounting position		Any
Mounting		In rows with zero spacing
Dimensions	H / D	45 mm / 50 mm

Ordering data

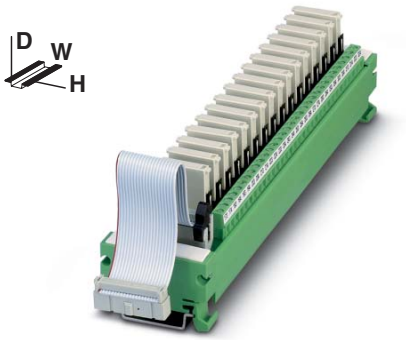
Description	Module width W	Type	Order No.	Pcs. / Pkt.
VARIOFACE COMPACT LINE output module, for 24 V DC (including relays)				
- With 8 miniature relays	103	**UM 45- 8RM/MR-G24/1/PLC**	**2962900**	1
- With 16 miniature relays	215			
VARIOFACE COMPACT LINE output expansion module, for 24 V DC (including relays)				
- With 16 miniature relays	200			

Accessories

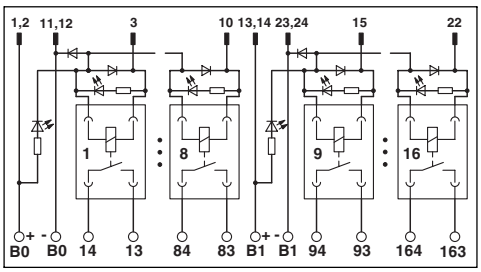
Pluggable miniature relays	**REL-MR-G 24/1**	**2961037**	8

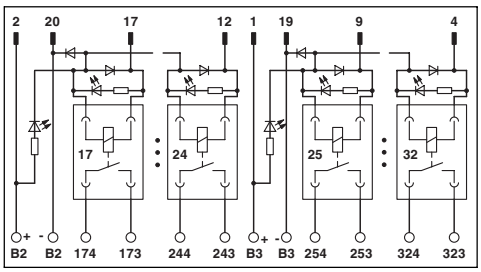


Output base module with 16 miniature relays, one N/O contact



Output extension module with 16 miniature relays, one N/O contact





Technical data

24 V DC	24 V DC
6.5 mA	6.5 mA
5 ms	5 ms
15 ms	15 ms
Free-wheeling diode, protection against polarity reversal	Free-wheeling diode, protection against polarity reversal
Yellow LED	Yellow LED
Flat-ribbon cable plug connector in acc. with IEC 60603-13	Flat-ribbon cable plug connector in acc. with IEC 60603-13
50	20
1 N/O contact (double contact)	1 N/O contact (double contact)
AgNi, 5 µm hard gold-plated	AgNi, 5 µm hard gold-plated
250 V AC / 125 V DC	250 V AC / 125 V DC
5 V	5 V
5 A	5 A
3 A	3 A
1 mA	1 mA
72 W	72 W
60 W	60 W
50 W	50 W
50 W	50 W
750 VA	750 VA
Screw connection	Screw connection
0.14 ... 1.5 mm² / 0.14 ... 1.5 mm² / 26 - 14	0.14 ... 1.5 mm² / 0.14 ... 1.5 mm² / 26 - 14
2 kV (50 Hz, 1 min.)	2 kV (50 Hz, 1 min.)
-20°C ... 50°C	-20°C ... 50°C
100% operating factor	100% operating factor
2 x 10^7 cycles	2 x 10^7 cycles
IEC 60664, DIN EN 50178, IEC 62103	IEC 60664, DIN EN 50178, IEC 62103
Any	Any
In rows with zero spacing	In rows with zero spacing
45 mm / 50 mm	45 mm / 50 mm

Ordering data

Type	Order No.	Pcs. / Pkt.
UM 45-16RM/MR-G24/1/PLC	**2962913**	1

Accessories

REL-MR-G 24/1	**2961037**	8

Ordering data

Type	Order No.	Pcs. / Pkt.
UM 45-16RM/MR-G24/1/E/PLC	**2962926**	1

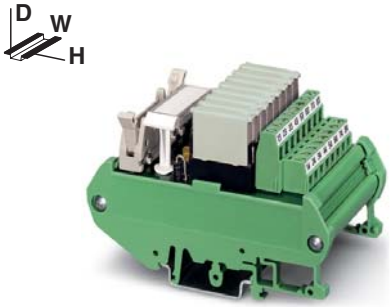
Accessories

REL-MR-G 24/1	**2961037**	8

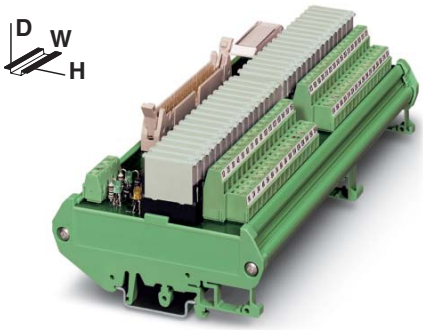
Output modules with relays, one N/O contact

These VARIOFACE output modules are used in combination with the respective front adapters.

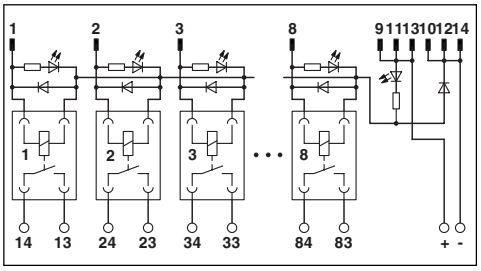
- Pluggable miniature relays, each with an N/O contact
- Universal applications from 1 mA to 3 A continuous current through 2-layer double contact with hard gold plating
- Slim construction widths of only 55 mm (8 channels) or 202 mm (32 channels)
- LED status display for each signal path and supply voltage
- Free-wheeling and reverse polarity protection diode for each signal path

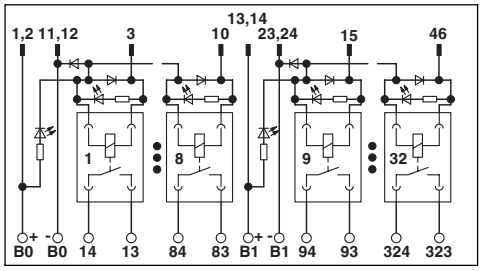


Output module with eight miniature relays, one N/O contact



Output modules with 32 miniature relays, one N/O contact





		Technical data	Technical data
Coil side			
Operating voltage U_N		24 V DC	24 V DC
Typ. input current at U_N		6.5 mA	6.5 mA
Typ. response time at U_N		5 ms	5 ms
Typ. release time at U_N		15 ms	15 ms
Input circuit		Free-wheeling diode, protection against polarity reversal	Free-wheeling diode, protection against polarity reversal
Status display/channel		Yellow LED	Yellow LED
Connection method		Flat-ribbon cable plug connector in acc. with IEC 60603-13	Flat-ribbon cable plug connector in acc. with IEC 60603-13
No. of poles		14	50
Contact side			
Contact type		1 N/O contact (double contact)	1 N/O contact (double contact)
Contact material		AgNi, 5 µm hard gold-plated	AgNi, 5 µm hard gold-plated
Max. switching voltage		250 V AC / 125 V DC	250 V AC / 125 V DC
Min. switching voltage		5 V	5 V
Max. inrush current		5 A	5 A
Limiting continuous current		3 A	3 A
Min. switching current		1 mA	1 mA
Max. interrupting rating:	24 V DC	72 W	72 W
	48 V DC	60 W	60 W
	60 V DC	50 W	50 W
	110 V DC	50 W	50 W
	250 V AC	750 VA	750 VA
Connection method		Screw connection	Screw connection
Connection data solid / stranded / AWG		0.14 ... 1.5 mm² / 0.14 ... 1.5 mm² / 26 - 14	0.14 ... 1.5 mm² / 0.14 ... 1.5 mm² / 26 - 16
General data			
Test voltage		3 kV AC	3 kV AC
Ambient temperature (operation)		-20°C ... 50°C	-20°C ... 50°C
Nominal operating mode		100% operating factor	100% operating factor
Mechanical service life		2 x 10^7 cycles	2 x 10^7 cycles
Standards / regulations		IEC 60664, DIN EN 50178, IEC 62103	IEC 60664, DIN EN 50178, IEC 62103
Mounting position		Any	Any
Mounting		In rows with zero spacing	In rows with zero spacing
Dimensions	H / D	90 mm / 58 mm	90 mm / 58 mm

Ordering data

Description	Module width W	Type	Order No.	Pcs. / Pkt.
VARIOFACE output module, with eight miniature relays, plugged, for 24 V DC (incl. relays)	56	**UMK- 8 RM/MR-G24/ 1/PLC**	**2979469**	1
VARIOFACE output module, with 32 miniature relays, plugged in, for 24 V DC (including relays)	202	**UMK-32 RM/MR-G24/1/PLC**	**2979472**	1

Accessories

Pluggable miniature relays	**REL-MR-G 24/1**	**2961037**	8
	REL-MR-G 24/1	**2961037**	8

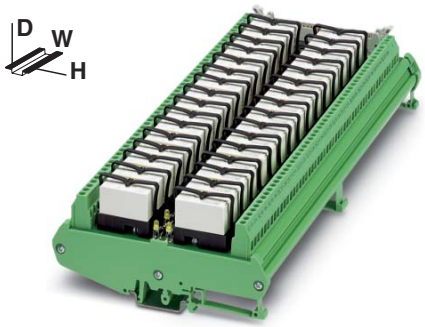
Output modules with relay, 1 PDT

These VARIOFACE output modules are used in combination with the respective front adapters.

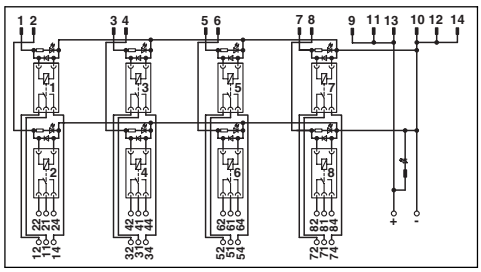
Like the front adapters, the modules are connected via 14-pole or 50-pole system cables. The following features characterize these relay modules:

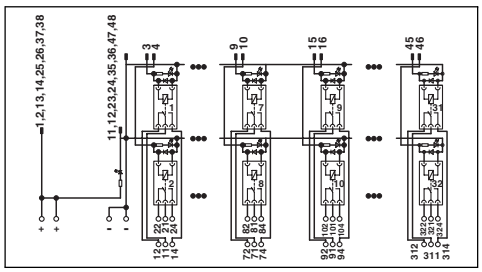
– Pluggable miniature relays, each with a PDT contact
– Slim construction widths of only 80 mm (8 channels) or 271 mm (32 channels)
– LED status display for each signal path and supply voltage
– Free-wheeling diode for each signal path

Output module with eight miniature relays, 1 PDT



Output module with 32 miniature relays, 1 PDT





		Technical data	Technical data
Coil side			
Operating voltage U_N		24 V DC	24 V DC
Typ. input current at U_N		18 mA	18 mA
Typ. response time at U_N		8 ms	8 ms
Typ. release time at U_N		10 ms	10 ms
Input circuit		Free-wheeling diode	Free-wheeling diode
Status display/channel		Yellow LED	Yellow LED
Connection method		Flat-ribbon cable plug connector in acc. with IEC 60603-13	Flat-ribbon cable plug connector in acc. with IEC 60603-13
No. of poles		14	50
Contact side			
Contact type		Single contact, 1 PDT	Single contact, 1 PDT
Contact material		AgNi	AgNi
Max. switching voltage		250 V AC/DC	250 V AC/DC
Min. switching voltage		12 V AC/DC	12 V AC/DC
Limiting continuous current		5 A	5 A
Min. switching current		100 mA	100 mA
Max. interrupting rating:	24 V DC	120 W	120 W
	48 V DC	58 W	58 W
	60 V DC	48 W	48 W
	110 V DC	50 W	50 W
	220 V DC	80 W	80 W
	250 V AC	1250 VA	1250 VA
Connection method		Screw connection	Screw connection
Connection data solid / stranded / AWG		0.2 ... 4 mm² / 0.2 ... 2.5 mm² / 24 - 12	0.2 ... 4 mm² / 0.2 ... 2.5 mm² / 24 - 12
General data			
Test voltage		2.5 kV (50 Hz, 1 min.)	2.5 kV (50 Hz, 1 min.)
Ambient temperature (operation)		-20°C ... 50°C	-20°C ... 50°C
Nominal operating mode		100% operating factor	100% operating factor
Mechanical service life		3 x 10^7 cycles	3 x 10^7 cycles
Standards / regulations		IEC 60664, DIN EN 50178, IEC 62103	IEC 60664, DIN EN 50178, IEC 62103
Mounting position		Any	Any
Mounting		In rows with zero spacing	In rows with zero spacing
Dimensions	H / D	123 mm / 68 mm	123 mm / 68 mm

Description	Module width W	Ordering data: Type	Order No.	Pcs. / Pkt.	Ordering data: Type	Order No.	Pcs. / Pkt.
VARIOFACE output module, with eight miniature relays, plugged, for 24 V DC (incl. relays)	80	**UM- 8 RM/RT-G24/21/PLC**	**2968386**	1			
VARIOFACE output module, with 32 miniature relays, plugged in, for 24 V DC (including relays)	271				**UM-32 RM/RT-G24/21/PLC**	**2968373**	1
		Accessories			**Accessories**		
Pluggable miniature relays		**REL-MR- 24DC/21HC**	**2961312**	10	**REL-MR- 24DC/21HC**	**2961312**	10

Output modules with relay, 1 PDT

These VARIOFACE output modules are used in combination with the respective front adapters.

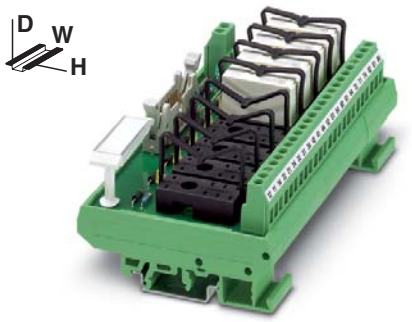
Like the front adapters, the modules are connected via 14-pole or 50-pole system cables. The following features characterize these relay modules:

- Plug-in miniature relays with one PDT each
- LED status display for each signal path and supply voltage
- Free-wheeling and reverse polarity protection diode for each signal path

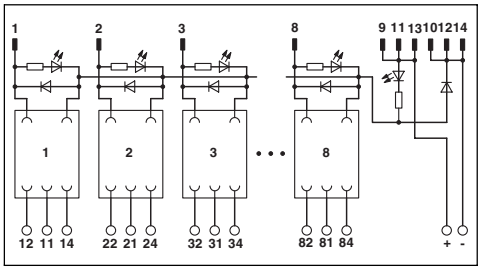
With the 32-channel version, the system cable is connected to the base module with 16 channels UMK-16R.../KSR-G24/21/PLC. The output expansion module UMK-16R.../ KSR-G24/21/E/PLC with a further 16 channels is coupled to the base module via a 20-pole flat-ribbon cable (length: 10 cm).

Notes:

The connecting cable between the base and the extension modules is delivered with the extension unit.



Output module with eight miniature relays, 1 PDT



Technical data

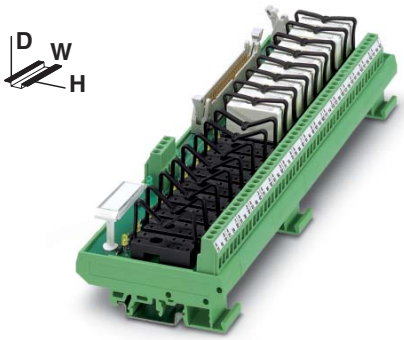
Coil side	
Operating voltage U_N	24 V DC ±10%
Input circuit	Free-wheeling diode, protection against polarity reversal
Operating voltage display	Green LED
Status display/channel	Yellow LED
Connection method	Flat-ribbon cable plug connector in acc. with IEC 60603-13
No. of poles	14
Contact side	
Contact type	1 PDT
Max. switching voltage	250 V AC/DC
Limiting continuous current	5 A
Connection method	Screw connection
Connection data solid / stranded / AWG	0.2 ... 4 mm^2 / 0.2 ... 2.5 mm^2 / 24 - 12
General data	
Test voltage	2.5 kV (50 Hz, 1 min.)
Ambient temperature (operation)	-20°C ... 50°C
Standards / regulations	IEC 60664, DIN EN 50178, IEC 62103
Mounting position	Any
Mounting	In rows with zero spacing
Dimensions H / D	90 mm / 68 mm

Ordering data

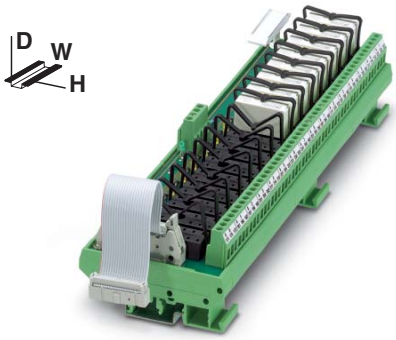
Description	Module width W	Type	Order No.	Pcs. / Pkt.
VARIOFACE output module, with eight miniature relays, plugged, for 24 V DC (incl. relays)	135	**UMK- 8 RM/KSR-G 24/21/PLC**	**2979485**	1
VARIOFACE output module, with plug-in bases for eight miniature relays, for 24 V DC (without relays)	135	**UMK- 8 RELS/KSR-G24/21/PLC**	**2974914**	1
VARIOFACE output module, with 16 miniature relays, plugged, for 24 V DC (base module, including relays)	259			
VARIOFACE output module, with plug-in bases for 16 miniature relays, for 24 V DC (base module, without relays)	259			
VARIOFACE output extension module, with 16 miniature relays, plugged, for 24 V DC (including relays)	259			
VARIOFACE output extension module, with plug-in bases for 16 miniature relays, for 24 V DC (without relays)	259			

Accessories

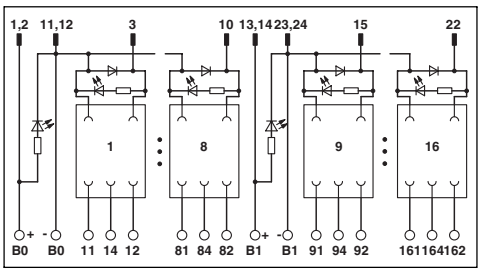
Pluggable miniature relays	**REL-MR- 24DC/21HC**	**2961312**	10

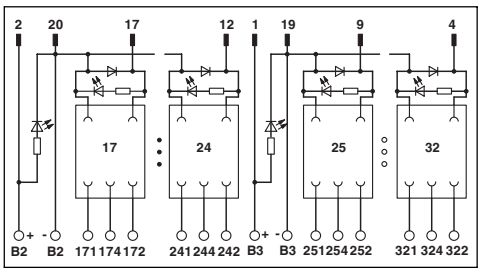


Output base module with 16 miniature relays, 1 PDT



Output extension module with 16 miniature relays, 1 PDT





Technical data

24 V DC ±10%	
Free-wheeling diode, protection against polarity reversal	
Green LED	
Yellow LED	
Flat-ribbon cable plug connector in acc. with IEC 60603-13	
50	20
1 PDT	
250 V AC/DC	
5 A	
Screw connection	
0.2 ... 4 mm² / 0.2 ... 2.5 mm² / 24 - 12	
2.5 kV (50 Hz, 1 min.)	
-20°C ... 50°C	
IEC 60664, DIN EN 50178, IEC 62103	
Any	
In rows with zero spacing	
90 mm / 68 mm	

Ordering data

Type	Order No.	Pcs. / Pkt.
UMK-16 RM/KSR-G 24/21/PLC	2979498	1
UMK-16 RELS/KSR-G24/21/PLC	2974901	1

Accessories

REL-MR- 24DC/21HC	2961312	10

Technical data

24 V DC ±10%	
Free-wheeling diode, protection against polarity reversal	
Green LED	
Yellow LED	
Flat-ribbon cable plug connector in acc. with IEC 60603-13	
50	20
1 PDT	
250 V AC/DC	
5 A	
Screw connection	
0.2 ... 4 mm² / 0.2 ... 2.5 mm² / 24 - 12	
2.5 kV (50 Hz, 1 min.)	
-20°C ... 50°C	
IEC 60664, DIN EN 50178, IEC 62103	
Any	
In rows with zero spacing	
90 mm / 68 mm	

Ordering data

Type	Order No.	Pcs. / Pkt.
UMK-16 RM/KSR-G 24/21/E/PLC	2979508	1
UMK-16 RELS/KSR-G24/21/E/PLC	2974891	1

Accessories

REL-MR- 24DC/21HC	2961312	10

Output module for relays
- 2 PDTs
- 1 PDT with disconnect terminal blocks

These VARIOFACE output modules are used in combination with the respective front adapters.

8 channels are controlled via 14-pole cables. All modules feature the following:

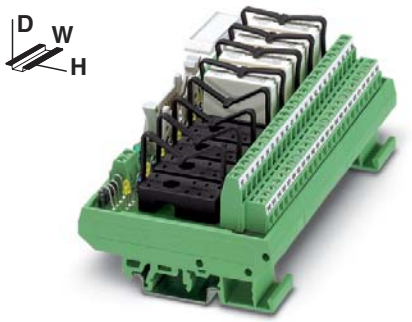
– Plug-in miniature relays
– LED status indicator and free-wheeling diode per signal path
– Supply voltage indicator (LED)
– Polarity protection diode

With the 32-channel version (1 PDT with knife disconnect terminal blocks), the 50-pole system cable is connected to the base module with 16 channels.

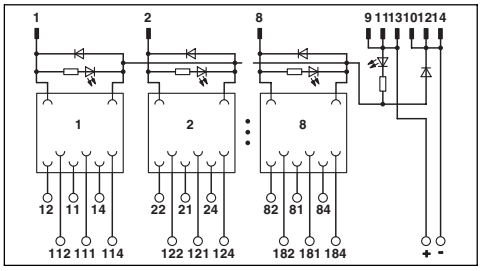
The output expansion module with a further 16 channels is coupled to the base module via a 20-pole flat-ribbon cable (length: 10 cm).

Notes:

The connecting cable between the base and the extension modules is delivered with the extension unit.



Output module for 8 miniature relays, 2 PDTs



Technical data

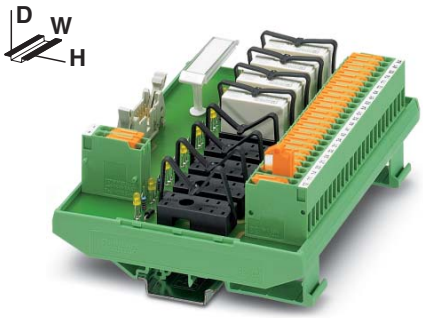
Coil side	
Operating voltage U_N	24 V DC
Input circuit	Free-wheeling diode
Operating voltage display	Green LED
Status display/channel	Yellow LED
Connection method	Flat-ribbon cable plug connector in acc. with IEC 60603-13
No. of poles	14
Contact side	
Contact type	2 PDT
Max. switching voltage	250 V AC/DC
Limiting continuous current	3 A
Connection method	Screw connection
Connection data solid / stranded / AWG	0.14 ... 1.5 mm² / 0.14 ... 1.5 mm² / 26 - 14
General data	
Test voltage	2.5 kV AC
Ambient temperature (operation)	-20°C ... 50°C
Standards / regulations	IEC 60664, DIN EN 50178, IEC 62103
Mounting position	Any
Mounting	In rows with zero spacing
Dimensions H / D	90 mm / 68 mm

Ordering data

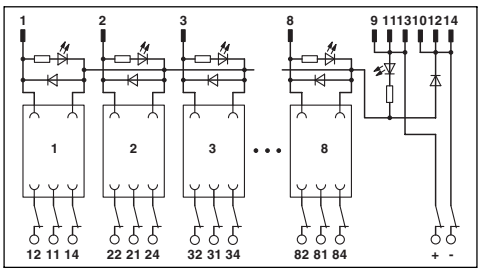
Description	Module width W	Type	Order No.	Pcs. / Pkt.
VARIOFACE output module, with plug-in bases for eight miniature relays, for 24 V DC, each with two PDTs (without relays)	135	**UMK- 8 RELS/KSR-G24/21-21/PLC**	**2976187**	1
VARIOFACE output module, with plug-in bases for 8 miniature relays, for 24 V DC and knife disconnect terminal blocks, each with 1 PDT (without relays)	145			
VARIOFACE output module, with plug-in bases for 16 miniature relays, for 24 V DC and knife disconnect terminal blocks, each with 1 PDT (without relays)	285			
VARIOFACE output extension module, with plug-in bases for 16 miniature relays, for 24 V DC and knife disconnect terminal blocks, each with 1 PDT (without relays)	285			

Accessories

Pluggable miniature relays	**REL-MR- 24DC/21-21**	**2961192**	10



Output module for 8 miniature relays with knife/disconnect terminal blocks, 1 PDT



Technical data

24 V DC
Free-wheeling diode, protection against polarity reversal
Green LED
Yellow LED
Flat-ribbon cable plug connector in acc. with IEC 60603-13

14

1 PDT
250 V AC/DC
5 A
Screw connection with disconnect knife
0.2 ... 4 mm² / 0.2 ... 2.5 mm² / 24 - 12

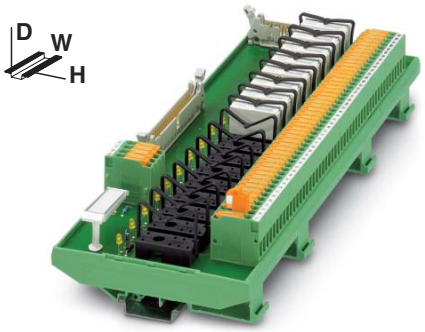
2.5 kV (50 Hz, 1 min.)
-20°C ... 50°C
IEC 60664, DIN EN 50178, IEC 62103
Any
In rows with zero spacing
111.5 mm / 59 mm

Ordering data

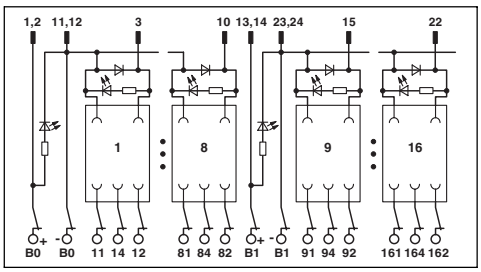
Type	Order No.	Pcs. / Pkt.
UM- 8 RELS/KSR-G24/21/MT/PLC	2962463	1

Accessories

REL-MR- 24DC/21-21	2961192	10



Output module for 16 miniature relays with knife/disconnect terminal blocks, 1 PDT



Technical data

24 V DC
Free-wheeling diode
Green LED
Yellow LED
Flat-ribbon cable plug connector in acc. with IEC 60603-13

50

1 PDT
250 V AC/DC
5 A
Screw connection with disconnect knife
0.2 ... 4 mm² / 0.2 ... 2.5 mm² / 24 - 12

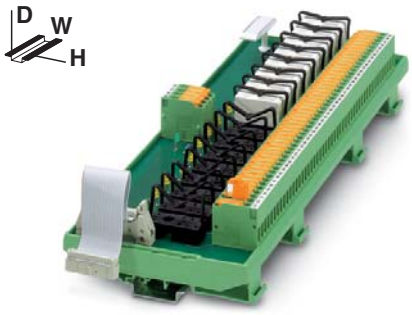
2.5 kV (50 Hz, 1 min.)
-20°C ... 50°C
IEC 60664, DIN EN 50178, IEC 62103
Any
In rows with zero spacing
111.5 mm / 59 mm

Ordering data

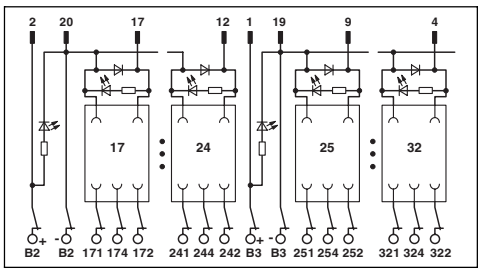
Type	Order No.	Pcs. / Pkt.
UM-16 RELS/KSR-G24/21/MT/PLC	2962382	1

Accessories

REL-MR- 24DC/21-21	2961192	10



Output extension module for 16 miniature relays with knife/disconnect terminal blocks, 1 PDT



Technical data

24 V DC
Free-wheeling diode
Green LED
Yellow LED
Flat-ribbon cable plug connector in acc. with IEC 60603-13

20

1 PDT
250 V AC/DC
5 A
Screw connection with disconnect knife
0.2 ... 4 mm² / 0.2 ... 2.5 mm² / 24 - 12

2.5 kV (50 Hz, 1 min.)
-20°C ... 50°C
IEC 60664, DIN EN 50178, IEC 62103
Any
In rows with zero spacing
111.5 mm / 59 mm

Ordering data

Type	Order No.	Pcs. / Pkt.
UM-16 RELS/KSR-G24/21/E/MT/PLC	2962379	1

Accessories

REL-MR- 24DC/21-21	2961192	10

Output modules with relays, 1 PDT with detectable manual operation

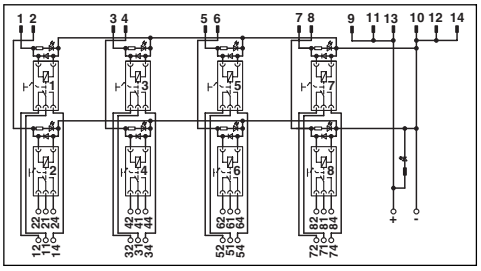
These VARIOFACE output modules are used in combination with the respective front adapters.

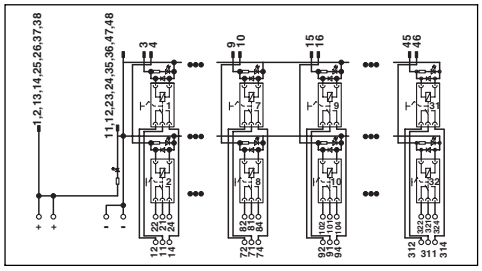
The modules are connected via 14 or 50-pole system cable. These relay modules offer the following features:

- Plug-in miniature relays each with a PDT contact and detectable manual operation
- Slim design width of just 92 mm (8 channels) or 285 mm (32 channels)
- LED status indicator and free-wheeling diode per signal path (integrated in relay)
- Supply voltage indicator (LED)

Output module with 8 miniature relays, 1 PDT with detectable manual operation

Output module with 32 miniature relays, 1 PDT with detectable manual operation





		Technical data	Technical data
Coil side			
Operating voltage U_N		24 V DC	24 V DC
Typ. input current at U_N		18 mA	18 mA
Typ. response time at U_N		9 ms	9 ms
Typ. release time at U_N		6 ms	6 ms
Input circuit		Free-wheeling diode (integrated in relay)	Free-wheeling diode (integrated in relay)
Status display/channel		Yellow LED (integrated in relay)	Yellow LED (integrated in relay)
Connection method		Flat-ribbon cable plug connector in acc. with IEC 60603-13	Flat-ribbon cable plug connector in acc. with IEC 60603-13
No. of poles		14	50
Contact side			
Contact type		Single contact, 1 PDT	Single contact, 1 PDT
Contact material		AgNi	AgNi
Max. switching voltage		250 V AC/DC	250 V AC/DC
Min. switching voltage		12 V AC/DC	12 V AC/DC
Limiting continuous current		5 A	5 A
Min. switching current		100 mA	100 mA
Max. interrupting rating:	24 V DC	120 W	120 W
	48 V DC	62 W	62 W
	60 V DC	42 W	42 W
	110 V DC	55 W	55 W
	220 V DC	66 W	66 W
	250 V AC	1250 VA	1250 VA
Connection method		Screw connection	Screw connection
Connection data solid / stranded / AWG		0.2 ... 4 mm² / 0.2 ... 2.5 mm² / 24 - 12	0.2 ... 4 mm² / 0.2 ... 2.5 mm² / 24 - 12
General data			
Rated insulation voltage		260 V AC	260 V AC
Rated surge voltage		4 kV (basic insulation (safe isolation, reinforced insulation, and 6 kV between input and output))	4 kV (basic insulation (safe isolation, reinforced insulation, and 6 kV between input and output))
Pollution degree / surge voltage category		2 / III	2 / III
Ambient temperature (operation)		-20°C ... 50°C	-20°C ... 50°C
Nominal operating mode		100% operating factor	100% operating factor
Mechanical service life		5 x 10^6 cycles	5 x 10^6 cycles
Standards / regulations		DIN EN 50178	DIN EN 50178
Mounting position		Any	Any
Mounting		In rows with zero spacing	In rows with zero spacing
Dimensions	H / D	111 mm / 64 mm	111 mm / 64 mm

Ordering data

Description	Module width W	Type	Order No.	Pcs. / Pkt.
VARIOFACE output module, with 8 miniature relays, plugged in, for 24 V DC (including relays)	92	**UM- 8RM/KSR-G24/21/MS/PLC**	**2900890**	1
VARIOFACE output module, with 32 miniature relays, plugged in, for 24 V DC (including relays)	285	**UM-32RM/KSR-G24/21/MS/PLC**	**2900891**	1

Accessories

	Type	Order No.	Pcs. / Pkt.
Miniature relay with manual checking function	**REL-MR- 24DC/21HC/MS**	**2987888**	10

Output modules with relays, 1 PDT with or without manual operation and fuses

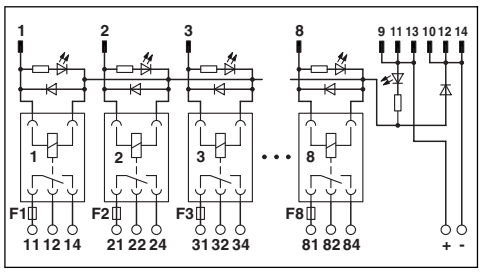
These VARIOFACE output modules are used in combination with the respective front adapters.

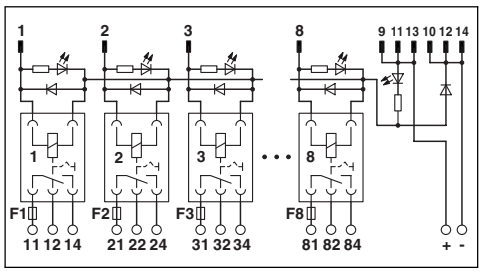
The modules are connected via 14-pole system cable. These relay modules offer the following features:

- Plug-in miniature relays each with a PDT contact with or without manual operation
- Fuse per output circuit as short-circuit protection
- Slim design width of just 127 mm
- LED status indicator and free-wheeling diode per signal path
- Supply voltage indicator (LED)
- Polarity protection diode

Output module with 8 miniature relays, 1 PDT and fuse per output circuit

Output module with 8 miniature relays, 1 PDT with detectable manual operation and fuse per output circuit





		Technical data	Technical data
Coil side			
Operating voltage U_N		24 V DC	24 V DC
Typ. input current at U_N		17 mA	18 mA
Typ. response time at U_N		8 ms	9 ms
Typ. release time at U_N		10 ms	6 ms
Input circuit		Free-wheeling diode	Free-wheeling diode (integrated in relay)
Status display/channel		Yellow LED	Yellow LED (integrated in relay)
Connection method		Flat-ribbon cable plug connector in acc. with IEC 60603-13	Flat-ribbon cable plug connector in acc. with IEC 60603-13
No. of poles		14	14
Contact side			
Contact type		Single contact, 1 PDT	Single contact, 1 PDT
Contact material		AgNi	AgNi
Max. switching voltage		250 V AC/DC	250 V AC/DC
Min. switching voltage		12 V AC/DC	12 V AC/DC
Output fuse		4 A 5x20 fuse (slow-blow)	4 A 5x20 fuse (slow-blow)
Limiting continuous current		3.9 A (observe derating)	3.9 A (observe derating)
Min. switching current		100 mA	100 mA
Max. interrupting rating:	24 V DC	93 W	93 W
	48 V DC	58 W	62 W
	60 V DC	48 W	42 W
	110 V DC	50 W	55 W
	220 V DC	80 W	66 W
	250 V AC	975 VA	975 VA
Connection method		Screw connection	Screw connection
Connection data solid / stranded / AWG		0.2 ... 4 mm^2 / 0.2 ... 2.5 mm^2 / 24 - 12	0.2 ... 4 mm^2 / 0.2 ... 2.5 mm^2 / 24 - 12
General data			
Rated insulation voltage		260 V AC	260 V AC
Rated surge voltage		4 kV (basic insulation (safe isolation, reinforced insulation, and 6 kV between input and output))	4 kV (basic insulation (safe isolation, reinforced insulation, and 6 kV between input and output))
Pollution degree / surge voltage category		2 / III	2 / III
Ambient temperature (operation)		-20°C ... 50°C	-20°C ... 50°C
Nominal operating mode		100% operating factor	100% operating factor
Mechanical service life		3 x 10^7 cycles	5 x 10^6 cycles
Standards / regulations		DIN EN 50178	DIN EN 50178
Mounting position		Any	Any
Mounting		In rows with zero spacing	In rows with zero spacing
Dimensions	H / D	111 mm / 60 mm	111 mm / 64 mm

Description	Module width W	Ordering data: Type	Order No.	Pcs. / Pkt.	Ordering data: Type	Order No.	Pcs. / Pkt.
VARIOFACE output module, with 8 miniature relays, plugged in, for 24 V DC (including relays)	127	**UM- 8RM/KSR-G24/21/SI/PLC**	**2900892**	1	**UM- 8RM/KSR-G24/21/MS/SI/PLC**	**2900893**	1
		Accessories			**Accessories**		
Pluggable miniature relays		**REL-MR- 24DC/21HC**	**2961312**	10	**REL-MR- 24DC/21HC/MS**	**2987888**	10

VIP – VARIOFACE Professional system cables with flat-ribbon connectors

- 1:1 connection
- 10 to 20-pole
- Connectors as per IEC 60603-13
- In the desired lengths
- Individual serial number

Note:

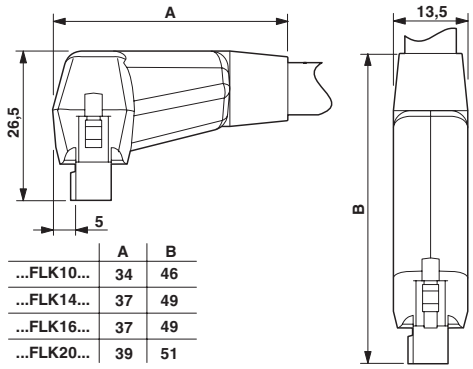
Due to the enlarged outer contour of the molded connectors, module types with UM45 profile and three-level terminal blocks cannot be connected with the VIP-CAB-FLK... system cable.

The following module types (10 to 50-pole) can be connected.

For example, for 20 poles:

- VIP-2/SC/FLK 20
- VIP-2/SC/FLK20/LED
- FLKM 20/ZFKDS
- UM45-FLK 20/ZFKDS (double-level connection)

The VIP-CAB-FLK... system cables are not suitable for front adapters (see the dimensional drawing).



	A	B
...FLK10...	34	46
...FLK14...	37	49
...FLK16...	37	49
...FLK20...	39	51

Not shielded

Technical data

Max. perm. operating voltage	< 50 V AC / 60 V DC
Max. perm. current carrying capacitance per path	1 A
Max. conductor resistance	0.16 Ω/m
Ambient temperature (operation)	-20°C ... 50°C
Assembly	Insulation displacement, IEC 60352-4 / DIN EN 60352-4
Conductor cross section	AWG 26 / 0.14 mm²
Outside diameter	
10-pole	6.1 mm
14-pole	6.4 mm
16-pole	6.8 mm
20-pole	7.6 mm

Ordering data

Description	No. of poles	Cable length	Type	Order No.	Pcs. / Pkt.
Round cable, with two molded socket strips					
	10	0.5 m	**VIP-CAB-FLK10/0,14/0,5M**	**2318305**	1
	10	1 m	**VIP-CAB-FLK10/0,14/1,0M**	**2318318**	1
	10	1.5 m	**VIP-CAB-FLK10/0,14/1,5M**	**2318321**	1
	10	2 m	**VIP-CAB-FLK10/0,14/2,0M**	**2318334**	1
	10	3 m	**VIP-CAB-FLK10/0,14/3,0M**	**2318347**	1
	10	4 m	**VIP-CAB-FLK10/0,14/4,0M**	**2318350**	1
	10	6 m	**VIP-CAB-FLK10/0,14/6,0M**	**2318363**	1
Round cable, same as before, in variable lengths (minimum ordering quantity five pieces)	10		**VIP-CAB-FLK10-0,14/...**	**2318376**	1
Round cable, with two molded socket strips					
	14	0.5 m	**VIP-CAB-FLK14/0,14/0,5M**	**2318389**	1
	14	1 m	**VIP-CAB-FLK14/0,14/1,0M**	**2318392**	1
	14	1.5 m	**VIP-CAB-FLK14/0,14/1,5M**	**2318402**	1
	14	2 m	**VIP-CAB-FLK14/0,14/2,0M**	**2318415**	1
	14	3 m	**VIP-CAB-FLK14/0,14/3,0M**	**2318428**	1
	14	4 m	**VIP-CAB-FLK14/0,14/4,0M**	**2318431**	1
	14	6 m	**VIP-CAB-FLK14/0,14/6,0M**	**2318444**	1
Round cable, same as before, in variable lengths (minimum ordering quantity five pieces)	14		**VIP-CAB-FLK14-0,14/...**	**2318457**	1
Round cable, with two molded socket strips					
	16	0.5 m	**VIP-CAB-FLK16/0,14/0,5M**	**2318460**	1
	16	1 m	**VIP-CAB-FLK16/0,14/1,0M**	**2318473**	1
	16	1.5 m	**VIP-CAB-FLK16/0,14/1,5M**	**2318486**	1
	16	2 m	**VIP-CAB-FLK16/0,14/2,0M**	**2318499**	1
	16	3 m	**VIP-CAB-FLK16/0,14/3,0M**	**2318509**	1
	16	4 m	**VIP-CAB-FLK16/0,14/4,0M**	**2318512**	1
	16	6 m	**VIP-CAB-FLK16/0,14/6,0M**	**2318525**	1
Round cable, same as before, in variable lengths (minimum ordering quantity five pieces)	16		**VIP-CAB-FLK16-0,14/...**	**2318538**	1
Round cable, with two molded socket strips					
	20	0.5 m	**VIP-CAB-FLK20/0,14/0,5M**	**2318541**	1
	20	1 m	**VIP-CAB-FLK20/0,14/1,0M**	**2318554**	1
	20	1.5 m	**VIP-CAB-FLK20/0,14/1,5M**	**2318567**	1
	20	2 m	**VIP-CAB-FLK20/0,14/2,0M**	**2318570**	1
	20	3 m	**VIP-CAB-FLK20/0,14/3,0M**	**2318583**	1
	20	4 m	**VIP-CAB-FLK20/0,14/4,0M**	**2318596**	1
	20	6 m	**VIP-CAB-FLK20/0,14/6,0M**	**2318606**	1
Round cable, same as before, in variable lengths (minimum ordering quantity five pieces)	20		**VIP-CAB-FLK20-0,14/...**	**2318619**	1

Ordering example for system cable:

– 10-pos. cable, 7.6 m long

Quantity	Order No.	Length [m]
1	2318376 /	7.6

Min.	0.5 m
Max.	100.0 m
Step width	0.1 m

VIP – VARIOFACE Professional system cables with flat-ribbon connectors

– 1:1 connection
– 26 to 50-pole
– Connectors as per IEC 60603-13
– In the desired lengths
– Individual serial number

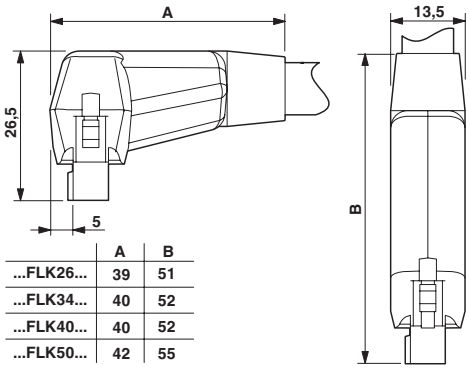
Note:

Due to the enlarged outer contour of the molded connectors, module types with UM45 profile and three-level terminal blocks cannot be connected with the VIP-CAB-FLK... system cable.

The following module types (10 to 50-pole) can be connected.

For example, for 20 poles:
– VIP-2/SC/FLK 20
– VIP-2/SC/FLK20/LED
– FLKM 20/ZFKDS
– UM45-FLK 20/ZFKDS (double-level connection)

The VIP-CAB-FLK... system cables are not suitable for front adapters (see the dimensional drawing).



	A	B
...FLK26...	39	51
...FLK34...	40	52
...FLK40...	40	52
...FLK50...	42	55

Not shielded

Technical data

Max. perm. operating voltage		< 50 V AC / 60 V DC
Max. perm. current carrying capacitance per path		1 A
Max. conductor resistance		0.16 Ω/m
Ambient temperature (operation)		-20°C ... 50°C
Assembly		Insulation displacement, IEC 60352-4 / DIN EN 60352-4
Conductor cross section		AWG 26 / 0.14 mm²
Outside diameter		
	26-pole	8.3 mm
	34-pole	8.7 mm
	40-pole	9.9 mm
	50-pole	10.3 mm

Ordering data

Description	No. of poles	Cable length	Type	Order No.	Pcs. / Pkt.
Round cable, with two molded socket strips					
	26	0.5 m	**VIP-CAB-FLK26/0,14/0,5M**	**2318622**	1
	26	1 m	**VIP-CAB-FLK26/0,14/1,0M**	**2318635**	1
	26	1.5 m	**VIP-CAB-FLK26/0,14/1,5M**	**2318648**	1
	26	2 m	**VIP-CAB-FLK26/0,14/2,0M**	**2318651**	1
	26	3 m	**VIP-CAB-FLK26/0,14/3,0M**	**2318664**	1
	26	4 m	**VIP-CAB-FLK26/0,14/4,0M**	**2318677**	1
	26	6 m	**VIP-CAB-FLK26/0,14/6,0M**	**2318680**	1
Round cable, same as before, in variable lengths (minimum ordering quantity five pieces)	26		**VIP-CAB-FLK26-0,14/...**	**2318693**	1
Round cable, with two molded socket strips					
	34	0.5 m	**VIP-CAB-FLK34/0,14/0,5M**	**2318703**	1
	34	1 m	**VIP-CAB-FLK34/0,14/1,0M**	**2318716**	1
	34	1.5 m	**VIP-CAB-FLK34/0,14/1,5M**	**2318729**	1
	34	2 m	**VIP-CAB-FLK34/0,14/2,0M**	**2318732**	1
	34	3 m	**VIP-CAB-FLK34/0,14/3,0M**	**2318745**	1
	34	4 m	**VIP-CAB-FLK34/0,14/4,0M**	**2318758**	1
	34	6 m	**VIP-CAB-FLK34/0,14/6,0M**	**2318761**	1
Round cable, same as before, in variable lengths (minimum ordering quantity five pieces)	34		**VIP-CAB-FLK34-0,14/...**	**2318774**	1
Round cable, with two molded socket strips					
	40	0.5 m	**VIP-CAB-FLK40/0,14/0,5M**	**2318787**	1
	40	1 m	**VIP-CAB-FLK40/0,14/1,0M**	**2318790**	1
	40	1.5 m	**VIP-CAB-FLK40/0,14/1,5M**	**2318800**	1
	40	2 m	**VIP-CAB-FLK40/0,14/2,0M**	**2318813**	1
	40	3 m	**VIP-CAB-FLK40/0,14/3,0M**	**2318826**	1
	40	4 m	**VIP-CAB-FLK40/0,14/4,0M**	**2318839**	1
	40	6 m	**VIP-CAB-FLK40/0,14/6,0M**	**2318842**	1
Round cable, same as before, in variable lengths (minimum ordering quantity five pieces)	40		**VIP-CAB-FLK40-0,14/...**	**2318855**	1
Round cable, with two molded socket strips					
	50	0.5 m	**VIP-CAB-FLK50/0,14/0,5M**	**2318868**	1
	50	1 m	**VIP-CAB-FLK50/0,14/1,0M**	**2318871**	1
	50	1.5 m	**VIP-CAB-FLK50/0,14/1,5M**	**2318884**	1
	50	2 m	**VIP-CAB-FLK50/0,14/2,0M**	**2318897**	1
	50	3 m	**VIP-CAB-FLK50/0,14/3,0M**	**2318907**	1
	50	4 m	**VIP-CAB-FLK50/0,14/4,0M**	**2318910**	1
	50	6 m	**VIP-CAB-FLK50/0,14/6,0M**	**2318923**	1
Round cable, same as before, in variable lengths (minimum ordering quantity five pieces)	50		**VIP-CAB-FLK50-0,14/...**	**2318936**	1

Ordering example for system cable**:**
– 26-pos. cable, 12.6 m long

Quantity	Order No.	Length [m]
1	2318693 /	12.6

Min.	0.5 m
Max.	100.0 m
Step width	0.1 m

System cable with a flat-ribbon cable connector and an open end

– 1:1 connection
– 14- and 16-pole
– Connectors as per IEC 60603-13
– Open end at the other end
The individual wires at the open end are labeled (1, 2, 3, 4, ...) and equipped with a ferrule.

Notes:

In the case of molded connectors, please observe the dimensional drawing and note, see page 278.

Molded connectors, not shielded

Not shielded

	Technical data	Technical data
Max. perm. operating voltage	< 50 V AC / 60 V DC	< 50 V AC / 60 V DC
Max. perm. current carrying capacitance per path	1 A	1 A
Max. conductor resistance	0.16 Ω/m	0.16 Ω/m
Ambient temperature (operation)	-20°C ... 50°C	-20°C ... 50°C
Assembly	Insulation displacement, IEC 60352-4 / DIN EN 60352-4	Insulation displacement, IEC 60352-4 / DIN EN 60352-4
Conductor cross section	AWG 26 / 0.14 mm²	AWG 26 / 0.14 mm²
Conductor structure: stranded wires / material	7 / Cu tin-plated	7 / Cu tin-plated
Outside diameter		
14-pole	6.4 mm	6.4 mm
16-pole	6.5 mm	6.5 mm

Description	No. of poles	Cable length	Ordering data: Type	Order No.	Pcs. / Pkt.	Ordering data: Type	Order No.	Pcs. / Pkt.
Round cable with an open end								
	14	0.5 m	**VIP-CAB-FLK14/FR/OE/0,14/0,5M**	**2900122**	1	**CABLE-FLK14/OE/0,14/ 50**	**2305761**	1
	14	1 m	**VIP-CAB-FLK14/FR/OE/0,14/1,0M**	**2900123**	1	**CABLE-FLK14/OE/0,14/ 100**	**2305253**	1
	14	1.5 m	**VIP-CAB-FLK14/FR/OE/0,14/1,5M**	**2900125**	1	**CABLE-FLK14/OE/0,14/ 150**	**2305266**	1
	14	2 m	**VIP-CAB-FLK14/FR/OE/0,14/2,0M**	**2900126**	1	**CABLE-FLK14/OE/0,14/ 200**	**2305279**	1
	14	2.5 m				**CABLE-FLK14/OE/0,14/ 250**	**2305282**	1
	14	3 m	**VIP-CAB-FLK14/FR/OE/0,14/3,0M**	**2900127**	1	**CABLE-FLK14/OE/0,14/ 300**	**2305295**	1
	14	4 m	**VIP-CAB-FLK14/FR/OE/0,14/4,0M**	**2900128**	1	**CABLE-FLK14/OE/0,14/ 400**	**2305774**	1
	14	6 m	**VIP-CAB-FLK14/FR/OE/0,14/6,0M**	**2900129**	1	**CABLE-FLK14/OE/0,14/ 600**	**2305787**	1
	14	8 m				**CABLE-FLK14/OE/0,14/ 800**	**2305790**	1
	14	10 m				**CABLE-FLK14/OE/0,14/1000**	**2305800**	1
Round cable, same as before, however in variable lengths								
	14					**CABLE-FLK14/OE/0,14/...**	**2305732**	1
Round cable with an open end								
	16	0.5 m	**VIP-CAB-FLK16/FR/OE/0,14/0,5M**	**2900130**	1	**CABLE-FLK16/OE/0,14/ 0,5M**	**2318127**	1
	16	1 m	**VIP-CAB-FLK16/FR/OE/0,14/1,0M**	**2900131**	1	**CABLE-FLK16/OE/0,14/ 1,0M**	**2318130**	1
	16	1.5 m	**VIP-CAB-FLK16/FR/OE/0,14/1,5M**	**2900132**	1	**CABLE-FLK16/OE/0,14/ 1,5M**	**2318143**	1
	16	2 m	**VIP-CAB-FLK16/FR/OE/0,14/2,0M**	**2900133**	1	**CABLE-FLK16/OE/0,14/ 2,0M**	**2318156**	1
	16	2.5 m				**CABLE-FLK16/OE/0,14/ 2,5M**	**2318169**	1
	16	3 m	**VIP-CAB-FLK16/FR/OE/0,14/3,0M**	**2900134**	1	**CABLE-FLK16/OE/0,14/ 3,0M**	**2318172**	1
	16	4 m	**VIP-CAB-FLK16/FR/OE/0,14/4,0M**	**2900135**	1	**CABLE-FLK16/OE/0,14/ 4,0M**	**2318185**	1
	16	6 m	**VIP-CAB-FLK16/FR/OE/0,14/6,0M**	**2900136**	1	**CABLE-FLK16/OE/0,14/ 6,0M**	**2318198**	1
	16	8 m				**CABLE-FLK16/OE/0,14/ 8,0M**	**2318208**	1
	16	10 m				**CABLE-FLK16/OE/0,14/10,0M**	**2318211**	1
Round cable, same as before, however in variable lengths								
	16					**CABLE-FLK16/OE/0,14/...**	**2318224**	1

System cable with a flat-ribbon cable connector and an open end

– 1:1 connection
– 20- and 50-pole
– Connectors as per IEC 60603-13
– Open end at the other end
The individual wires at the open end are labeled (1, 2, 3, 4, ...) and equipped with a ferrule.

Notes:
In the case of molded connectors, please observe the dimensional drawing and note, see page 278.

Molded connectors, not shielded

Not shielded

	Technical data	Technical data
Max. perm. operating voltage	< 50 V AC / 60 V DC	< 50 V AC / 60 V DC
Max. perm. current carrying capacitance per path	1 A	1 A
Max. conductor resistance	0.16 Ω/m	0.16 Ω/m
Ambient temperature (operation)	-20°C ... 50°C	-20°C ... 50°C
Assembly	Insulation displacement, IEC 60352-4 / DIN EN 60352-4	Insulation displacement, IEC 60352-4 / DIN EN 60352-4
Conductor cross section	AWG 26 / 0.14 mm²	AWG 26 / 0.14 mm²
Conductor structure: stranded wires / material	7 / Cu tin-plated	7 / Cu tin-plated
Outside diameter		
20-pole	7.6 mm	7.6 mm
50-pole	10.3 mm	10.3 mm

Description	No. of poles	Cable length	Ordering data: Type	Order No.	Pcs. / Pkt.	Ordering data: Type	Order No.	Pcs. / Pkt.
Round cable with an open end								
	20	0.5 m	**VIP-CAB-FLK20/FR/OE/0,14/0,5M**	**2900138**	1	**CABLE-FLK20/OE/0,14/ 50**	**2305826**	1
	20	1 m	**VIP-CAB-FLK20/FR/OE/0,14/1,0M**	**2900139**	1	**CABLE-FLK20/OE/0,14/ 100**	**2305305**	1
	20	1.5 m	**VIP-CAB-FLK20/FR/OE/0,14/1,5M**	**2900141**	1	**CABLE-FLK20/OE/0,14/ 150**	**2305318**	1
	20	2 m	**VIP-CAB-FLK20/FR/OE/0,14/2,0M**	**2900142**	1	**CABLE-FLK20/OE/0,14/ 200**	**2305321**	1
	20	2.5 m				**CABLE-FLK20/OE/0,14/ 250**	**2305334**	1
	20	3 m	**VIP-CAB-FLK20/FR/OE/0,14/3,0M**	**2900143**	1	**CABLE-FLK20/OE/0,14/ 300**	**2305347**	1
	20	4 m	**VIP-CAB-FLK20/FR/OE/0,14/4,0M**	**2900144**	1	**CABLE-FLK20/OE/0,14/ 400**	**2305839**	1
	20	6 m	**VIP-CAB-FLK20/FR/OE/0,14/6,0M**	**2900145**	1	**CABLE-FLK20/OE/0,14/ 600**	**2305842**	1
	20	8 m				**CABLE-FLK20/OE/0,14/ 800**	**2305855**	1
	20	10 m				**CABLE-FLK20/OE/0,14/1000**	**2305868**	1
Round cable, same as before, however in variable lengths								
	20					**CABLE-FLK20/OE/0,14/...**	**2305745**	1
Round cable with an open end								
	50	0.5 m	**VIP-CAB-FLK50/FR/OE/0,14/0,5M**	**2900146**	1	**CABLE-FLK50/OE/0,14/ 50**	**2305871**	1
	50	1 m	**VIP-CAB-FLK50/FR/OE/0,14/1,0M**	**2900147**	1	**CABLE-FLK50/OE/0,14/ 100**	**2305350**	1
	50	1.5 m	**VIP-CAB-FLK50/FR/OE/0,14/1,5M**	**2900148**	1	**CABLE-FLK50/OE/0,14/ 150**	**2305363**	1
	50	2 m	**VIP-CAB-FLK50/FR/OE/0,14/2,0M**	**2900149**	1	**CABLE-FLK50/OE/0,14/ 200**	**2305376**	1
	50	2.5 m				**CABLE-FLK50/OE/0,14/ 250**	**2305389**	1
	50	3 m	**VIP-CAB-FLK50/FR/OE/0,14/3,0M**	**2900150**	1	**CABLE-FLK50/OE/0,14/ 300**	**2305392**	1
	50	4 m	**VIP-CAB-FLK50/FR/OE/0,14/4,0M**	**2900151**	1	**CABLE-FLK50/OE/0,14/ 400**	**2305884**	1
	50	6 m	**VIP-CAB-FLK50/FR/OE/0,14/6,0M**	**2900152**	1	**CABLE-FLK50/OE/0,14/ 600**	**2305897**	1
	50	8 m				**CABLE-FLK50/OE/0,14/ 800**	**2305907**	1
	50	10 m				**CABLE-FLK50/OE/0,14/1000**	**2305910**	1
Round cable, same as before, however in variable lengths								
	50					**CABLE-FLK50/OE/0,14/...**	**2305758**	1

System cable with flat-ribbon cable connector

Standard lengths

Round cable sets are used to connect the PLC front adapters to the corresponding VARIOFACE controller boards.

The following versions are available with 14 and 50 poles:

– Not shielded
– Shielded
– Halogen-free

Connector strips are fitted on both sides of the cables in accordance with IEC 60603-13/DIN 41651 (1:1 connection).

In case of shielded cables, a cable end with a ferrule is additionally provided as a shield connection (length: approx. 0.5 m; cable H05V-K 1 mm², black).

Special lengths are defined using an order key, refer to page 288.

Not shielded

Technical data

Max. perm. operating voltage	< 50 V AC / 60 V DC
Max. perm. current carrying capacitance per path	1 A
Max. conductor resistance	0.16 Ω/m
Ambient temperature (operation)	-20°C ... 50°C
Shield	-
Assembly	Insulation displacement, IEC 60352-4 / DIN EN 60352-4
Conductor cross section	AWG 26 / 0.14 mm²
Conductor structure: stranded wires / material	7 / Cu tin-plated
Outside diameter	
14-pole	6.4 mm
50-pole	10.3 mm

Ordering data

Description	No. of poles	Cable length	Type	Order No.	Pcs. / Pkt.
Assembled round cables[1]), with two 14-pole socket strips in fixed lengths, for transfer of eight channels among other things					
	14	0.3 m	**FLK 14/EZ-DR/ 30/KONFEK**	**2295729**	5
	14	0.5 m	**FLK 14/EZ-DR/ 50/KONFEK**	**2288901**	5
	14	1 m	**FLK 14/EZ-DR/ 100/KONFEK**	**2288914**	1
	14	1.5 m	**FLK 14/EZ-DR/ 150/KONFEK**	**2288927**	1
	14	2 m	**FLK 14/EZ-DR/ 200/KONFEK**	**2288930**	1
	14	2.5 m	**FLK 14/EZ-DR/ 250/KONFEK**	**2288943**	1
	14	3 m	**FLK 14/EZ-DR/ 300/KONFEK**	**2288956**	1
	14	3.5 m	**FLK 14/EZ-DR/ 350/KONFEK**	**2288969**	1
	14	4 m	**FLK 14/EZ-DR/ 400/KONFEK**	**2288972**	1
	14	4.5 m	**FLK 14/EZ-DR/ 450/KONFEK**	**2290847**	1
	14	5 m	**FLK 14/EZ-DR/ 500/KONFEK**	**2290834**	1
	14	5.5 m	**FLK 14/EZ-DR/ 550/KONFEK**	**2290850**	1
	14	6 m	**FLK 14/EZ-DR/ 600/KONFEK**	**2290863**	1
	14	7 m			
	14	8 m	**FLK 14/EZ-DR/ 800/KONFEK**	**2299563**	1
	14	10 m	**FLK 14/EZ-DR/1000/KONFEK**	**2299576**	1
Assembled round cables[2]), with two 50-pole socket strips in fixed lengths, for transfer of 32 channels among other things					
	50	0.5 m	**FLK 50/EZ-DR/ 50/KONFEK**	**2289065**	5
	50	1 m	**FLK 50/EZ-DR/ 100/KONFEK**	**2289078**	1
	50	1.5 m	**FLK 50/EZ-DR/ 150/KONFEK**	**2289081**	1
	50	2 m	**FLK 50/EZ-DR/ 200/KONFEK**	**2289094**	1
	50	2.5 m	**FLK 50/EZ-DR/ 250/KONFEK**	**2289104**	1
	50	3 m	**FLK 50/EZ-DR/ 300/KONFEK**	**2289117**	1
	50	3.5 m	**FLK 50/EZ-DR/ 350/KONFEK**	**2289120**	1
	50	4 m	**FLK 50/EZ-DR/ 400/KONFEK**	**2289133**	1
	50	4.5 m	**FLK 50/EZ-DR/ 450/KONFEK**	**2289573**	1
	50	5 m	**FLK 50/EZ-DR/ 500/KONFEK**	**2289586**	1
	50	5.5 m	**FLK 50/EZ-DR/ 550/KONFEK**	**2289599**	1
	50	6 m	**FLK 50/EZ-DR/ 600/KONFEK**	**2289609**	1
	50	6.5 m	**FLK 50/EZ-DR/ 650/KONFEK**	**2289612**	1
	50	7 m	**FLK 50/EZ-DR/ 700/KONFEK**	**2289625**	1
	50	7.5 m	**FLK 50/EZ-DR/ 750/KONFEK**	**2289638**	1
	50	8 m	**FLK 50/EZ-DR/ 800/KONFEK**	**2289641**	1
	50	8.5 m	**FLK 50/EZ-DR/ 850/KONFEK**	**2289654**	1
	50	9 m	**FLK 50/EZ-DR/ 900/KONFEK**	**2289667**	1
	50	9.5 m	**FLK 50/EZ-DR/ 950/KONFEK**	**2289670**	1
	50	10 m	**FLK 50/EZ-DR/1000/KONFEK**	**2289683**	1

Shielded

Halogen-free (only the cable)

Applied for: UL / CUL

Technical data

< 50 V AC / 60 V DC
1 A
0.16 Ω/m
-20°C ... 50°C
Tinned copper-braided shield, approx. 85% covering

Insulation displacement, IEC 60352-4 / DIN EN 60352-4

AWG 26 / 0.14 mm²
7 / Cu tin-plated

6.7 mm
11 mm

Technical data

< 50 V AC / 60 V DC
1 A
0.16 Ω/m
-20°C ... 50°C
-

Insulation displacement, IEC 60352-4 / DIN EN 60352-4

AWG 26 / 0.14 mm²
7 / Cu tin-plated

6.4 mm
10.3 mm

Ordering data

Type	Order No.	Pcs. / Pkt.
FLK 14/EZ-DR/ 50/KONFEK/S	2296977	1
FLK 14/EZ-DR/ 100/KONFEK/S	2296980	1
FLK 14/EZ-DR/ 150/KONFEK/S	2296993	1
FLK 14/EZ-DR/ 200/KONFEK/S	2297002	1
FLK 14/EZ-DR/ 300/KONFEK/S	2299013	1
FLK 14/EZ-DR/ 400/KONFEK/S	2299026	1
FLK 14/EZ-DR/ 600/KONFEK/S	2299039	1
FLK 14/EZ-DR/ 800/KONFEK/S	2299042	1
FLK 14/EZ-DR/1000/KONFEK/S	2299055	1
FLK 50/EZ-DR/ 50/KONFEK/S	2299097	1
FLK 50/EZ-DR/ 100/KONFEK/S	2299107	1
FLK 50/EZ-DR/ 150/KONFEK/S	2299110	1
FLK 50/EZ-DR/ 200/KONFEK/S	2299123	1
FLK 50/EZ-DR/ 300/KONFEK/S	2299136	1
FLK 50/EZ-DR/ 400/KONFEK/S	2299149	1
FLK 50/EZ-DR/ 600/KONFEK/S	2299152	1
FLK 50/EZ-DR/ 800/KONFEK/S	2299165	1
FLK 50/EZ-DR/1000/KONFEK/S	2299178	1

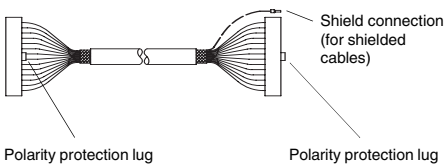
Ordering data

Type	Order No.	Pcs. / Pkt.
FLK 14/EZ-DR/HF/ 50/KONFEK	2305952	1
FLK 14/EZ-DR/HF/ 100/KONFEK	2305965	1
FLK 14/EZ-DR/HF/ 150/KONFEK	2305978	1
FLK 14/EZ-DR/HF/ 200/KONFEK	2305981	1
FLK 14/EZ-DR/HF/ 250/KONFEK	2305994	1
FLK 14/EZ-DR/HF/ 300/KONFEK	2304759	1
FLK 14/EZ-DR/HF/ 400/KONFEK	2304762	1
FLK 14/EZ-DR/HF/ 500/KONFEK	2304717	1
FLK 14/EZ-DR/HF/ 600/KONFEK	2306003	1
FLK 14/EZ-DR/HF/ 700/KONFEK	2314011	1
FLK 14/EZ-DR/HF/ 800/KONFEK	2314024	1
FLK 14/EZ-DR/HF/1000/KONFEK	2314037	1
CABLE-FLK50/0,14/HF/ 0,5M	2314134	1
CABLE-FLK50/0,14/HF/ 1,0M	2314147	1
CABLE-FLK50/0,14/HF/ 1,5M	2314150	1
CABLE-FLK50/0,14/HF/ 2,0M	2314163	1
CABLE-FLK50/0,14/HF/ 2,5M	2314176	1
CABLE-FLK50/0,14/HF/ 3,0M	2314189	1
CABLE-FLK50/0,14/HF/ 4,0M	2314192	1
CABLE-FLK50/0,14/HF/ 5,0M	2314202	1
CABLE-FLK50/0,14/HF/ 6,0M	2314215	1
CABLE-FLK50/0,14/HF/ 7,0M	2314228	1
CABLE-FLK50/0,14/HF/ 8,0M	2314231	1
CABLE-FLK50/0,14/HF/10,0M	2314244	1

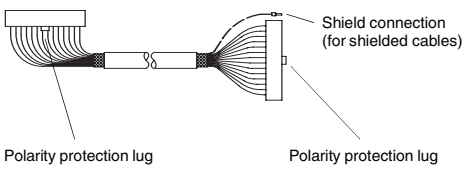
Color code of the system cables

No. of cores	PIN	Core color
	1	black
	2	brown
	3	red
	4	orange
	5	yellow
	6	green
	7	blue
	8	violet
	9	gray
10-pos.	10	white
	11	white-black
	12	white-brown
	13	white-red
14-pos.	14	white-orange
	15	white-yellow
16-pos.	16	white-green
	17	white-blue
	18	white-violet
	19	white-gray
20-pos.	20	brown-black
	21	brown-red
	22	brown-orange
	23	brown-yellow
	24	brown-green
	25	brown-blue
26-pos.	26	brown-violet
	27	brown-gray
	28	brown-white
	29	green-black
	30	green-brown
	31	green-red
	32	green-orange
	33	green-blue
34-pos.	34	green-violet
	35	green-gray
	36	green-white
	37	yellow-black
	38	yellow-brown
	39	yellow-red
40-pos.	40	yellow-orange
	41	yellow-blue
	42	yellow-violet
	43	yellow-gray
	44	yellow-white
	45	gray-black
	46	gray-brown
	39	gray-red
	48	gray-orange
	49	gray-yellow
50-pos.	50	gray-green

[1]) straight socket strips fitted at both ends.



[2]) Socket strips fitted, straight at one end and angled at the other.



System cable with flat-ribbon cable connector

Standard lengths

Pre-assembled round cables to couple the VARIOFACE interface modules.

Connector strips are fitted on both sides of the cables in accordance with IEC 60603-13/DIN 41651 (1:1 connection).

Special lengths are defined using an order key, refer to page 288.

Notes:
Outside diameter of the cable
10-pole: 6 mm 16-pole: 6.5 mm 20-pole: 7.6 mm 26-pole: 7.8 mm 34-pole: 10 mm

Not shielded

Applied for: UL / CUL

Technical data

Max. perm. operating voltage	< 50 V AC / 60 V DC
Max. perm. current carrying capacitance per path	1 A
Max. conductor resistance	0.16 Ω/m
Ambient temperature (operation)	-20°C ... 50°C
Assembly	Insulation displacement, IEC 60352-4 / DIN EN 60352-4
Conductor cross section	AWG 26 / 0.14 mm²
Conductor structure: stranded wires / material	7 / Cu tin-plated

Ordering data

Description	No. of poles	Cable length	Type	Order No.	Pcs. / Pkt.
Round cable[1]), with two socket strips					
	10	0.5 m	**FLK 10/EZ-DR/ 50/KONFEK**	**2299204**	1
	10	1 m	**FLK 10/EZ-DR/ 100/KONFEK**	**2299217**	1
	10	1.5 m	**FLK 10/EZ-DR/ 150/KONFEK**	**2299220**	1
	10	2 m	**FLK 10/EZ-DR/ 200/KONFEK**	**2299233**	1
	10	3 m	**FLK 10/EZ-DR/ 300/KONFEK**	**2299246**	1
	10	4 m	**FLK 10/EZ-DR/ 400/KONFEK**	**2299259**	1
	10	6 m	**FLK 10/EZ-DR/ 600/KONFEK**	**2299262**	1
	10	8 m	**FLK 10/EZ-DR/ 800/KONFEK**	**2299275**	1
	10	10 m	**FLK 10/EZ-DR/1000/KONFEK**	**2299288**	1
Round cable[1]), with two socket strips					
	16	0.5 m	**FLK 16/EZ-DR/ 50/KONFEK**	**2299291**	1
	16	1 m	**FLK 16/EZ-DR/ 100/KONFEK**	**2299301**	1
	16	1.5 m	**FLK 16/EZ-DR/ 150/KONFEK**	**2299314**	1
	16	2 m	**FLK 16/EZ-DR/ 200/KONFEK**	**2299327**	1
	16	3 m	**FLK 16/EZ-DR/ 300/KONFEK**	**2299330**	1
	16	4 m	**FLK 16/EZ-DR/ 400/KONFEK**	**2299343**	1
	16	6 m	**FLK 16/EZ-DR/ 600/KONFEK**	**2299356**	1
	16	8 m	**FLK 16/EZ-DR/ 800/KONFEK**	**2299369**	1
	16	10 m	**FLK 16/EZ-DR/1000/KONFEK**	**2299372**	1
Round cable[1]), with two socket strips					
	20	0.5 m	**FLK 20/EZ-DR/ 50KONFEK**	**2296391**	1
	20	1 m	**FLK 20/EZ-DR/ 100KONFEK**	**2296401**	1
	20	1.5 m	**FLK 20/EZ-DR/ 150KONFEK**	**2296472**	1
	20	2 m	**FLK 20/EZ-DR/ 200KONFEK**	**2296485**	1
	20	3 m	**FLK 20/EZ-DR/ 300KONFEK**	**2296498**	1
	20	4 m	**FLK 20/EZ-DR/ 400KONFEK**	**2296508**	1
	20	6 m	**FLK 20/EZ-DR/ 600KONFEK**	**2296511**	1
	20	8 m	**FLK 20/EZ-DR/ 800KONFEK**	**2296524**	1
	20	10 m	**FLK 20/EZ-DR/1000KONFEK**	**2296537**	1
Round cable[1]), with two socket strips					
	26	0.5 m	**FLK 26/EZ-DR/ 50/KONFEK**	**2299385**	1
	26	1 m	**FLK 26/EZ-DR/ 100/KONFEK**	**2299398**	1
	26	1.5 m	**FLK 26/EZ-DR/ 150/KONFEK**	**2299408**	1
	26	2 m	**FLK 26/EZ-DR/ 200/KONFEK**	**2299411**	1
	26	3 m	**FLK 26/EZ-DR/ 300/KONFEK**	**2299424**	1
	26	4 m	**FLK 26/EZ-DR/ 400/KONFEK**	**2299437**	1
	26	6 m	**FLK 26/EZ-DR/ 600/KONFEK**	**2299440**	1
	26	8 m	**FLK 26/EZ-DR/ 800/KONFEK**	**2299453**	1
	26	10 m	**FLK 26/EZ-DR/1000/KONFEK**	**2299466**	1
Round cable[1]), with two socket strips					
	34	0.5 m	**FLK 34/EZ-DR/ 50/KONFEK**	**2299479**	1
	34	1 m	**FLK 34/EZ-DR/ 100/KONFEK**	**2299482**	1
	34	1.5 m	**FLK 34/EZ-DR/ 150/KONFEK**	**2299495**	1
	34	2 m	**FLK 34/EZ-DR/ 200/KONFEK**	**2299505**	1
	34	3 m	**FLK 34/EZ-DR/ 300/KONFEK**	**2299518**	1
	34	4 m	**FLK 34/EZ-DR/ 400/KONFEK**	**2299521**	1
	34	6 m	**FLK 34/EZ-DR/ 600/KONFEK**	**2299534**	1
	34	8 m	**FLK 34/EZ-DR/ 800/KONFEK**	**2299547**	1
	34	10 m	**FLK 34/EZ-DR/1000/KONFEK**	**2299550**	1

System cable with flat-ribbon cable connector

Standard lengths

Round cable sets are used to connect the PLC front adapters to the corresponding VARIOFACE controller boards.

Connector strips are fitted on both sides of the cables in accordance with IEC 60603-13/DIN 41651 (1:1 connection).

Special lengths are defined using an order key, refer to page 288.

Not shielded

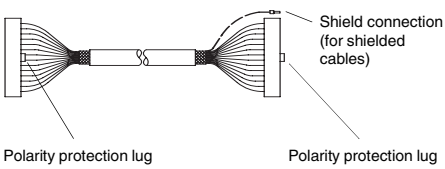
Technical data

Max. perm. operating voltage	< 50 V AC / 60 V DC
Max. perm. current carrying capacitance per path	1 A
Max. conductor resistance	0.16 Ω/m
Ambient temperature (operation)	-20°C ... 50°C
Assembly	Insulation displacement, IEC 60352-4 / DIN EN 60352-4
Conductor cross section	AWG 26 / 0.14 mm²
Conductor structure: stranded wires / material	7 / Cu tin-plated
Outside diameter	
40-pole	9.9 mm

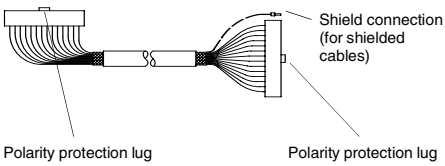
Ordering data

Description	No. of poles	Cable length	Type	Order No.	Pcs. / Pkt.
Round cable[2]), with two socket strips					
	40	0.5 m	**FLK 40/EZ-DR/ 50/KONFEK**	**2288985**	5
	40	1 m	**FLK 40/EZ-DR/ 100/KONFEK**	**2288998**	1
	40	1.5 m	**FLK 40/EZ-DR/ 150/KONFEK**	**2289007**	1
	40	2 m	**FLK 40/EZ-DR/ 200/KONFEK**	**2289010**	1
	40	2.5 m	**FLK 40/EZ-DR/ 250/KONFEK**	**2289023**	1
	40	3 m	**FLK 40/EZ-DR/ 300/KONFEK**	**2289036**	1
	40	3.5 m	**FLK 40/EZ-DR/ 350/KONFEK**	**2289049**	1
	40	4 m	**FLK 40/EZ-DR/ 400/KONFEK**	**2289052**	1
	40	6 m	**FLK 40/EZ-DR/ 600/KONFEK**	**2299589**	1
	40	8 m	**FLK 40/EZ-DR/ 800/KONFEK**	**2299592**	1
	40	10 m	**FLK 40/EZ-DR/1000/KONFEK**	**2299602**	1

[1]) Straight socket strips fitted at both ends.



[2]) Socket strips fitted, straight at one end and angled at the other.



System cable with flat-ribbon cable connector

The FLK 50... types are plugged onto the VARIOFACE front adapters for 32 channels and make it possible to split the channels into 4 x 8 channels. All 8-channel VARIOFACE modules and the PLC-V8 adapters for PLC-INTERFACE can therefore be connected.

In case of shielded cables, a cable end with a ferrule is additionally provided as a shield connection (length: approx. 0.5 m; cable H05V-K 1 mm², black).

Splitting cable unshielded
50 poles on 4 x 14

Splitting cable shielded
50 poles on 4 x 14

	Technical data	Technical data
Max. perm. operating voltage	< 50 V AC / 60 V DC	< 50 V AC / 60 V DC
Max. perm. current carrying capacitance per path	1 A	1 A
Max. conductor resistance	0.16 Ω/m	0.16 Ω/m
Ambient temperature (operation)	-20°C ... 50°C	-20°C ... 50°C
Shield	-	Tinned copper-braided shield, approx. 85% covering
Assembly	Insulation displacement, IEC 60352-4 / DIN EN 60352-4	Insulation displacement, IEC 60352-4 / DIN EN 60352-4
Conductor cross section	AWG 26 / 0.14 mm²	AWG 26 / 0.14 mm²
Conductor structure: stranded wires / material	7 / Cu tin-plated	7 / Cu tin-plated
Number of connectors on the module side	4	4
Outside diameter 50-pole	6.3 mm	6.3 mm

Description	No. of poles	Cable length	Ordering data: Type	Order No.	Pcs. / Pkt.	Ordering data: Type	Order No.	Pcs. / Pkt.
Round cable sets, for connection to the VARIOFACE system cabling, with a 50-pole female connector and four 14-pole female connectors, for splitting max. 32 channels into 4 x 8 channels.								
	50	0.5 m	**FLK 50/4X14/EZ-DR/ 50/KONFEK**	**2296689**	1			
	50	1 m	**FLK 50/4X14/EZ-DR/ 100/KONFEK**	**2296692**	1			
	50	1.5 m	**FLK 50/4X14/EZ-DR/ 150/KONFEK**	**2296702**	1			
	50	2 m	**FLK 50/4X14/EZ-DR/ 200/KONFEK**	**2296715**	1			
	50	2.5 m	**FLK 50/4X14/EZ-DR/ 250/KONFEK**	**2305402**	1			
	50	3 m	**FLK 50/4X14/EZ-DR/ 300/KONFEK**	**2296728**	1			
	50	4 m	**FLK 50/4X14/EZ-DR/ 400/KONFEK**	**2296731**	1			
	50	6 m	**FLK 50/4X14/EZ-DR/ 600/KONFEK**	**2296744**	1			
	50	8 m	**FLK 50/4X14/EZ-DR/ 800/KONFEK**	**2296757**	1			
	50	10 m	**FLK 50/4X14/EZ-DR/1000/KONFEK**	**2296773**	1			
Assembled round cables, same as before, however in variable lengths								
	50		**FLK50-4X14-EZ-DR ...**	**2302405**	1			
Assembled round cables, same as before, however shielded and in variable lengths								
	50					**FLK50-4X14-EZ-DR-S ...**	**2302447**	1

Ordering example for system cable:

– Unshielded splitting cable 12.75 m long

Quantity	Order No.	Length [m][1])
1	2302405	12.75

[1]) min. 0.30 m

– Shielded splitting cable 11.00 m long

Quantity	Order No.	Length [m][1])
1	2302447	11.00

[1]) min. 0.30 m

System cable with flat-ribbon cable connector

Special lengths

Pre-assembled **round cables** are used to connect the PLC front adapters to the corresponding VARIOFACE termination boards. Connector strips are fitted on both ends of the cables in accordance with IEC 60603-13/DIN 41651. In case of shielded cables, a cable end with a ferrule is additionally provided as a shield connection (length: Approx. 0.5 m; cable H05V-K 1 mm², black).

The order key for special lengths is defined by three features.

The features in the appropriate sequence are:
- Cable type
- Assembly,
- Length in meters.

There are two order keys, one for the non-shielded round cable FLK EZ-DR/.../.../... and one for the shielded round cable FLK EZ-DR-S/.../.../.... The features necessary for clear identification of an order are described below:

Cable type

- The number of individual conductors of the cable is defined here.

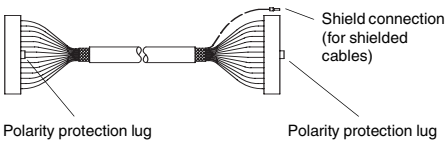
Assembly

- None,
  the cable is not assembled at either end;
- socket strip at both ends, 10-pos.,
  the cable is fitted at both ends with 10-pos. connectors (1:1 connection);
- socket strip at both ends, 14-pos.,
  the cable is fitted at both ends with 14-pos. connectors (1:1 connection);
- socket strip at both ends, 50-pos.,
  the cable is fitted at both ends with 50-pos. connectors (1:1 connection);
- socket strip at one end, 14-pos.,
  socket strip at one end, 16-pos.,
  the cable is fitted with a 14-pos. connector at one end and with a 16-pos. connector at the other (for SIMATIC S7; no 1:1 connection).

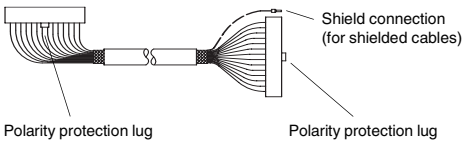
Features of permissible assemblies:

Cable type / Assembly	Non-shielded round cables FLK EZ-DR.../.../...								Shielded round cables FLK EZ-DR-S.../.../...			
	10-pos.	14-pos.	16-pos.	20-pos.	26-pos.	34-pos.	40-pos.	50-pos.	14-pos.	16-pos.	40-pos.	50-pos.
no assembly	**10U/C00/...**	**14U/C00/...**	**16U/C00/...**	**20U/C00/...**	**26U/C00/...**	**34U/C00/...**	**40U/C00/...**	**50U/C00/...**	**14S/C00/...**	**16S/C00/....**	**40S/C00/...**	**50S/C00/...**
socket strip at both ends, 10-pos.	**10U/C55/...**[1])											
socket strip at both ends, 14-pos.		**14U/C23/...**[1])							**14S/C23/...**[1])			
socket strip at both ends, 16-pos.			**16U/C58/...**[1])							**16S/C58/...**[1])		
socket strip at both ends, 20-pos.				**20U/C61/...**[1])								
socket strip at both ends, 26-pos.					**26U/C63/...**[1])							
socket strip at both ends, 34-pos.						**34U/C65/...**[1])						
socket strip at both ends, 40-pos.							**40U/C30/...**[3])				**40S/C30/...**[3])	
socket strip at both ends, 50-pos.								**50U/C38/...**[2])				**50S/C38/...**[2])
socket strip at one end, 14-pos.; socket strip at one end, 16-pos.		**14U/C52/...**[1])							**14S/C52/...**[1])			

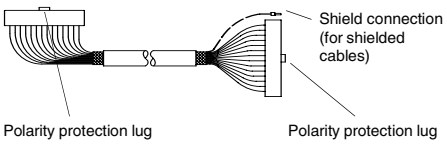
[1]) straight socket strips fitted at both ends.



[2]) Socket strips fitted, straight at one end and angled at the other.



[3]) Socket strips fitted, straight at one end and angled at the other.



Sample order for round cable **unshielded:**

– Unshielded 50-position round cable sets with two 50-pos. socket strips and a length of 11.5 m

Quantity	Order No.	Cable type	Assembly	Length [m][4])
1	2295059	50U	C38	11.50

10U ≙ 10-pos. unshielded
14U ≙ 14-pos. unshielded
16U ≙ 16-pos. unshielded
20U ≙ 20-pos. unshielded
26U ≙ 26-pos. unshielded
34U ≙ 34-pos. unshielded
40U ≙ 40-pos. unshielded
50U ≙ 50-pos. unshielded

C00 ≙ no assembly
C55 ≙ 10-pos. socket strip at both ends
C23 ≙ 14-pos. socket strip at both ends
C52 ≙ 14-pos. socket strip at one end
16-pos. socket strip at one end (for S7)
C58 ≙ 16-pos. socket strip at both ends
C61 ≙ 20-pos. socket strip at both ends
C63 ≙ 26-pos. socket strip at both ends
C65 ≙ 34-pos. socket strip at both ends
C30 ≙ 40-pos. socket strip at both ends
C38 ≙ 50-pos. socket strip at both ends

[4]) min. 0.20 m

Sample orders for round cable **shielded:**

– Shielded 14-position round cable sets with two 14-pos. socket strips and a length of 12.75 m

Quantity	Order No.	Cable type	Assembly	Length [m][4])
1	2295046	14S	C23	12.75

14S ≙ 14-pos. shielded
16S ≙ 16-pos. shielded
40S ≙ 40-pos. shielded
50S ≙ 50-pos. shielded

C00 ≙ no assembly
C23 ≙ 14-pos. socket strip at both ends
C52 ≙ 14-pos. socket strip at one end
16-pos. socket strip at one end (for S7)
C58 ≙ 16-pos. socket strip at both ends
C30 ≙ 40-pos. socket strip at both ends
C38 ≙ 50-pos. socket strip at both ends

[4]) min. 0.20 m

Not shielded

Shielded

	Technical data	Technical data
Max. perm. operating voltage	< 50 V AC / 60 V DC	< 50 V AC / 60 V DC
Max. perm. current carrying capacitance per path	1 A	1 A
Max. conductor resistance	0.16 Ω/m	0.16 Ω/m
Ambient temperature (operation)	-20°C ... 50°C	-20°C ... 50°C
Shield	-	Tinned copper-braided shield, approx. 85% covering
Conductor cross section	AWG 26 / 0.14 mm²	AWG 26 / 0.14 mm²
Conductor structure: stranded wires / material	7 / Cu tin-plated	7 / Cu tin-plated

Description	No. of poles	Cable length	Ordering data: Type	Order No.	Pcs. / Pkt.	Ordering data: Type	Order No.	Pcs. / Pkt.
Assembled round cables, with socket strips in variable lengths								
			FLK EZ-DR.../.../...	**2295059**	1	**FLK EZ-DR-S.../.../...**	**2295046**	1

System cable with D-SUB socket and pin strip

Standard lengths

Shielded round cable sets to connect the control level with the corresponding VARIOFACE interface modules.

Assembly with D-SUB strips as per IEC 60807-2/DIN 41652, (1:1 connection).

- D-SUB socket strip on one side and D-SUB pin strip on the other
- D-SUB socket strips on both sides
- D-SUB pin strips on both sides
- Cable exit: Straight
- Screw connection: 2 UNC 4-40 screws

Special lengths and assembly versions are defined using an order key, refer to page 292.

Socket at one end and pin strip at the other

Technical data

Max. perm. operating voltage		125 V AC/DC
Max. perm. current carrying capacitance per path		2 A
Max. conductor resistance		0.09 Ω/m
Ambient temperature (operation)		-20°C ... 50°C
Shield		Tinned copper-braided shield, approx. 85% covering
Insertion/withdrawal cycles		> 200
Conductor cross section		AWG 24 / 0.25 mm²
Outside diameter		
	9-pole	7.5 mm
	15-pole	9 mm
	25-pole	10.5 mm
	37-pole	12.5 mm
	50-pole	13.5 mm

Ordering data

Description	No. of poles	Cable length	Type	Order No.	Pcs. / Pkt.
Shielded round cable, fitted with two D-SUB strips, various numbers of poles and lengths					
	9	0.5 m	**CABLE-D 9SUB/B/S/ 50/KONFEK/S**	**2299987**	1
	9	1 m	**CABLE-D 9SUB/B/S/100/KONFEK/S**	**2299990**	1
	9	1.5 m	**CABLE-D 9SUB/B/S/150/KONFEK/S**	**2300009**	1
	9	2 m	**CABLE-D 9SUB/B/S/200/KONFEK/S**	**2302010**	1
	9	3 m	**CABLE-D 9SUB/B/S/300/KONFEK/S**	**2302023**	1
	9	4 m	**CABLE-D 9SUB/B/S/400/KONFEK/S**	**2302036**	1
	9	6 m	**CABLE-D 9SUB/B/S/600/KONFEK/S**	**2302049**	1
	15	0.5 m	**CABLE-D15SUB/B/S/ 50/KONFEK/S**	**2302052**	1
	15	1 m	**CABLE-D15SUB/B/S/100/KONFEK/S**	**2302065**	1
	15	1.5 m	**CABLE-D15SUB/B/S/150/KONFEK/S**	**2302078**	1
	15	2 m	**CABLE-D15SUB/B/S/200/KONFEK/S**	**2302081**	1
	15	3 m	**CABLE-D15SUB/B/S/300/KONFEK/S**	**2302094**	1
	15	4 m	**CABLE-D15SUB/B/S/400/KONFEK/S**	**2302104**	1
	15	6 m	**CABLE-D15SUB/B/S/600/KONFEK/S**	**2302117**	1
	25	0.5 m	**CABLE-D25SUB/B/S/ 50/KONFEK/S**	**2302120**	1
	25	1 m	**CABLE-D25SUB/B/S/100/KONFEK/S**	**2302133**	1
	25	1.5 m	**CABLE-D25SUB/B/S/150/KONFEK/S**	**2302146**	1
	25	2 m	**CABLE-D25SUB/B/S/200/KONFEK/S**	**2302159**	1
	25	3 m	**CABLE-D25SUB/B/S/300/KONFEK/S**	**2302162**	1
	25	4 m	**CABLE-D25SUB/B/S/400/KONFEK/S**	**2302175**	1
	25	6 m	**CABLE-D25SUB/B/S/600/KONFEK/S**	**2302188**	1
	37	0.5 m	**CABLE-D37SUB/B/S/ 50/KONFEK/S**	**2302191**	1
	37	1 m	**CABLE-D37SUB/B/S/100/KONFEK/S**	**2302201**	1
	37	1.5 m	**CABLE-D37SUB/B/S/150/KONFEK/S**	**2302214**	1
	37	2 m	**CABLE-D37SUB/B/S/200/KONFEK/S**	**2302227**	1
	37	3 m	**CABLE-D37SUB/B/S/300/KONFEK/S**	**2302230**	1
	37	4 m	**CABLE-D37SUB/B/S/400/KONFEK/S**	**2302243**	1
	37	6 m	**CABLE-D37SUB/B/S/600/KONFEK/S**	**2302256**	1
	37	8 m			
	37	10 m			
	37	15 m			
	37	20 m			
	50	0.5 m	**CABLE-D50SUB/B/S/ 50/KONFEK/S**	**2302269**	1
	50	1 m	**CABLE-D50SUB/B/S/100/KONFEK/S**	**2302272**	1
	50	1.5 m	**CABLE-D50SUB/B/S/150/KONFEK/S**	**2302285**	1
	50	2 m	**CABLE-D50SUB/B/S/200/KONFEK/S**	**2302298**	1
	50	3 m	**CABLE-D50SUB/B/S/300/KONFEK/S**	**2302308**	1
	50	4 m	**CABLE-D50SUB/B/S/400/KONFEK/S**	**2302311**	1
	50	6 m	**CABLE-D50SUB/B/S/600/KONFEK/S**	**2302324**	1

Socket strip at both ends

Male connector at both ends

Technical data

125 V AC/DC
2 A
0.09 Ω/m
-20°C ... 50°C
Tinned copper-braided shield, approx. 85% covering

> 200
AWG 24 / 0.25 mm²

7.5 mm
9 mm
10.5 mm
12 mm
13.5 mm

Technical data

125 V AC/DC
2 A
0.09 Ω/m
-20°C ... 50°C
Tinned copper-braided shield, approx. 85% covering

> 200
AWG 24 / 0.25 mm²

7.5 mm
9 mm
10.5 mm
12 mm
13.5 mm

Ordering data

Type	Order No.	Pcs. / Pkt.
CABLE-D 9SUB/B/B/100/KONFEK/S	2305415	1
CABLE-D 9SUB/B/B/200/KONFEK/S	2305428	1
CABLE-D 9SUB/B/B/300/KONFEK/S	2305431	1
CABLE-D15SUB/B/B/100/KONFEK/S	2305444	1
CABLE-D15SUB/B/B/200/KONFEK/S	2305457	1
CABLE-D15SUB/B/B/300/KONFEK/S	2305460	1
CABLE-D25SUB/B/B/100/KONFEK/S	2305473	1
CABLE-D25SUB/B/B/200/KONFEK/S	2305486	1
CABLE-D25SUB/B/B/300/KONFEK/S	2305499	1
CABLE-D37SUB/B/B/ 100/KONFEK/S	2305509	1
CABLE-D37SUB/B/B/ 200/KONFEK/S	2305512	1
CABLE-D37SUB/B/B/ 300/KONFEK/S	2305525	1
CABLE-D37SUB/B/B/ 400/KONFEK/S	2900759	1
CABLE-D37SUB/B/B/ 600/KONFEK/S	2900760	1
CABLE-D37SUB/B/B/ 800/KONFEK/S	2900761	1
CABLE-D37SUB/B/B/1000/KONFEK/S	2900762	1
CABLE-D37SUB/B/B/1500/KONFEK/S	2900763	1
CABLE-D37SUB/B/B/2000/KONFEK/S	2900764	1
CABLE-D50SUB/B/B/100/KONFEK/S	2305541	1
CABLE-D50SUB/B/B/200/KONFEK/S	2305554	1
CABLE-D50SUB/B/B/300/KONFEK/S	2305567	1

Ordering data

Type	Order No.	Pcs. / Pkt.
CABLE-D 9SUB/S/S/100/KONFEK/S	2305570	1
CABLE-D 9SUB/S/S/200/KONFEK/S	2305583	1
CABLE-D 9SUB/S/S/300/KONFEK/S	2305596	1
CABLE-D15SUB/S/S/100/KONFEK/S	2305606	1
CABLE-D15SUB/S/S/200/KONFEK/S	2305619	1
CABLE-D15SUB/S/S/300/KONFEK/S	2305622	1
CABLE-D25SUB/S/S/100/KONFEK/S	2305635	1
CABLE-D25SUB/S/S/200/KONFEK/S	2305648	1
CABLE-D25SUB/S/S/300/KONFEK/S	2305651	1
CABLE-D37SUB/S/S/100/KONFEK/S	2305664	1
CABLE-D37SUB/S/S/200/KONFEK/S	2305677	1
CABLE-D37SUB/S/S/300/KONFEK/S	2305680	1
CABLE-D50SUB/S/S/100/KONFEK/S	2305693	1
CABLE-D50SUB/S/S/200/KONFEK/S	2305703	1
CABLE-D50SUB/S/S/300/KONFEK/S	2305716	1

Color code of the system cables
CABLE-D...SUB/...

No. of cores	PIN	Core color
	1	white
	2	brown
	3	green
	4	yellow
	5	gray
	6	pink
	7	blue
	8	red
9-pos.	9	black
	10	violet
	11	gray-pink
	12	red-blue
	13	white-green
	14	brown-green
15-pos.	15	white-yellow
	16	yellow-brown
	17	white-gray
	18	gray-brown
	19	white-pink
	20	pink-brown
	21	white-blue
	22	brown-blue
	23	white-red
	24	brown-red
25-pos.	25	white-black
	26	brown-black
	27	gray-green
	28	yellow-gray
	29	pink-green
	30	yellow-pink
	31	green-blue
	32	yellow-blue
	33	green-red
	34	yellow-red
	35	green-black
	36	yellow-black
37-pos.	37	gray-blue
	38	pink-blue
	39	gray-red
	40	pink-red
	41	gray-black
	42	pink-black
	43	blue-black
	44	red-black
	45	white-brown-black
	46	yellow-green-black
	47	gray-pink-black
	48	blue-red-black
	49	white-green-black
50-pos.	50	green-brown-black

System cable with D-SUB sockets and pin strip

Special lengths

Preassembled shielded **round cables** for connecting VARIOFACE termination boards. The cables are assembled with D-SUB strips in accordance with IEC 60807-2/DIN 41652.

The order key is defined by three features.

The features in the appropriate sequence are:
- Cable type
- Assembly
- Length in meters

There are three assembly variants of the shielded round cable:
- CABLE D-SUB-S/.../.../...
  D-SUB socket strip on one end and D-SUB pin strip on the other
- CABLE D-SUB-B-B-S/.../.../... D-SUB socket strip at both ends
- CABLE D-SUB-S-S-S/.../.../... D-SUB pin strip at both ends

The features necessary for clear identification of an order are described below:

Cable type

- The number of individual conductors of the cable is defined here.

Assembly

- (example for CABLE D-SUB-S/.../.../...)
- None,
  the cable is not assembled at either ends
- 9-pos. D-SUB socket strip at one end
  9-pos. D-SUB pin strip at one end
  the cable connects (1:1) a 9-pos. D-SUB socket and pin strip
- 15-pos. D-SUB socket strip at one end
  15-pos. D-SUB pin strip at one end
  the cable connects (1:1) a 15-pos. D-SUB socket and pin strip; or up to
- 50-pos. D-SUB socket strip at one end
  50-pos. D-SUB pin strip at one end
  the cable connects (1:1) a 50-pos. D-SUB socket and pin strip.

Sample order for round cable set assembled with pin strip on one side and socket strip on one side
– unshielded 25-position round cable set, assembled with one 25-pos. D-SUB socket strip and one 25-pos. D-SUB pin strip, 11.5 mm long

Quantity	Order No.		Cable type		Assembly		Length [m][1])
1	2302340	/	25S	/	C36	/	11.50
			09S ≙ 9-pos. shielded **15S** ≙ 15-pos. shielded **25S** ≙ 25-pos. shielded **37S** ≙ 37-pos. shielded **50S** ≙ 50-pos. shielded		**C00** ≙ no assembly **C01** ≙ 9-pos. D-SUB socket strip at one end 9-pos. D-SUB pin strip at one end **C28** ≙ 15-pos. D-SUB socket strip at one end 15-pos. D-SUB pin strip at one end **C36** ≙ 25-pos. D-SUB socket strip at one end 25-pos. D-SUB pin strip at one end **C43** ≙ 37-pos. D-SUB socket strip at one end 37-pos. D-SUB pin strip at one end **C49** ≙ 50-pos. D-SUB socket strip at one end 50-pos. D-SUB pin strip at one end		[1]) min. 0.20 m

Sample order for round cable set assembled with socket strip at both ends
– Shielded 37-pos. round cable, assembled with two 37-pos. D-SUB socket strips, 12.75 m long

Quantity	Order No.		Cable type		Assembly		Length [m][1])
1	2302421	/	37S	/	C44	/	12.75
			09S ≙ 9-pos. shielded **15S** ≙ 15-pos. shielded **25S** ≙ 25-pos. shielded **37S** ≙ 37-pos. shielded **50S** ≙ 50-pos. shielded		**C00** ≙ no assembly **C22** ≙ 9-pos. D-SUB socket strip at both ends **C29** ≙ 15-pos. D-SUB socket strip at both ends **C37** ≙ 25-pos. D-SUB socket strip at both ends **C44** ≙ 37-pos. D-SUB socket strip at both ends **C50** ≙ 50-pos. D-SUB socket strip at both ends		[1]) min. 0.20 m

Sample order for round cable set assembled with pin strip at both ends
– Shielded 15-pos. round cable, assembled with two 15-pos. D-SUB pin strips, 8.5 m long

Quantity	Order No.		Cable type		Assembly		Length [m][1])
1	2302434	/	15S	/	C71	/	8.50
			09S ≙ 9-pos. shielded **15S** ≙ 15-pos. shielded **25S** ≙ 25-pos. shielded **37S** ≙ 37-pos. shielded **50S** ≙ 50-pos. shielded		**C00** ≙ no assembly **C70** ≙ 9-pos. D-SUB pin strip at both ends **C71** ≙ 15-pos. D-SUB pin strip at both ends **C72** ≙ 25-pos. D-SUB pin strip at both ends **C73** ≙ 37-pos. D-SUB pin strip at both ends **C74** ≙ 50-pos. D-SUB pin strip at both ends		[1]) min. 0.20 m

Shielded

Technical data

Max. perm. operating voltage	125 V AC/DC
Max. perm. current carrying capacitance per path	2 A
Max. conductor resistance	0.09 Ω/m
Ambient temperature (operation)	-20°C ... 50°C
Shield	Tinned copper-braided shield, approx. 85% covering
Insertion/withdrawal cycles	> 200
Conductor cross section	AWG 24 / 0.25 mm^2

Ordering data

Description	No. of poles	Cable length	Type	Order No.	Pcs. / Pkt.
Assembled round cables, in variable lengths, **pin strip on one side** and **socket strip on one side**			**CABLE D-SUB-S/.../.../...**	**2302340**	1
Assembled round cables, in variable lengths, **socket strip on both sides**			**CABLE D-SUB-B-B-S/.../.../...**	**2302421**	1
Assembled round cables, in variable lengths, **pin strip on both sides**			**CABLE D-SUB-S-S-S/.../.../...**	**2302434**	1

System cable with D-SUB female connector or pin strip and one open end

- 1:1 connection
- D-SUB female connector or pin strip at one end
- Connector according to IEC 60807-2/DIN 41652
- Gland: 2 UNC 4-40 screws
- Open end at the other end
- Individual wire marking: 1, 2, 3, 4, etc.
- Individual wires fitted with ferrules
- Shield connection: H05V-K 1 mm² cable, black, 0.5 m in length

Female connector at one end and open end at the other end

Pin strip at one end and open end at the other end

	Technical data	Technical data
Max. perm. operating voltage	125 V AC/DC	125 V AC/DC
Max. perm. current carrying capacitance per path	2 A	2 A
Max. conductor resistance	0.09 Ω/m	0.09 Ω/m
Ambient temperature (operation)	-20°C ... 50°C	-20°C ... 50°C
Shield	Tinned copper-braided shield, approx. 85% covering	Tinned copper-braided shield, approx. 85% covering
Insertion/withdrawal cycles	> 200	> 200
Conductor cross section	AWG 24 / 0.25 mm²	AWG 24 / 0.25 mm²
Outside diameter		
9-pole	7.5 mm	7.5 mm
15-pole	9 mm	9 mm
25-pole	10.5 mm	10.5 mm

Description	No. of poles	Cable length	Ordering data: Type	Order No.	Pcs. / Pkt.	Ordering data: Type	Order No.	Pcs. / Pkt.
Round cable with an open end								
	9	0.5 m	CABLE-D- 9SUB/F/OE/0,25/S/0,5M	2926014	1	CABLE-D- 9SUB/M/OE/0,25/S/0,5M	2926360	1
	9	1 m	CABLE-D- 9SUB/F/OE/0,25/S/1,0M	2926027	1	CABLE-D- 9SUB/M/OE/0,25/S/1,0M	2926373	1
	9	1.5 m	CABLE-D- 9SUB/F/OE/0,25/S/1,5M	2926030	1	CABLE-D- 9SUB/M/OE/0,25/S/1,5M	2926386	1
	9	2 m	CABLE-D- 9SUB/F/OE/0,25/S/2,0M	2926043	1	CABLE-D- 9SUB/M/OE/0,25/S/2,0M	2926399	1
	9	3 m	CABLE-D- 9SUB/F/OE/0,25/S/3,0M	2926056	1	CABLE-D- 9SUB/M/OE/0,25/S/3,0M	2926409	1
	9	4 m	CABLE-D- 9SUB/F/OE/0,25/S/4,0M	2926069	1	CABLE-D- 9SUB/M/OE/0,25/S/4,0M	2926412	1
	9	6 m	CABLE-D- 9SUB/F/OE/0,25/S/6,0M	2926072	1	CABLE-D- 9SUB/M/OE/0,25/S/6,0M	2926425	1
Round cable, same as before, however in variable lengths			CABLE-D- 9SUB-F-OE-0,25-S/...	2900903	1	CABLE-D- 9SUB-M-OE-0,25-S/...	2900909	1
Round cable with an open end								
	15	0.5 m	CABLE-D-15SUB/F/OE/0,25/S/0,5M	2926085	1	CABLE-D-15SUB/M/OE/0,25/S/0,5M	2926438	1
	15	1 m	CABLE-D-15SUB/F/OE/0,25/S/1,0M	2926098	1	CABLE-D-15SUB/M/OE/0,25/S/1,0M	2926441	1
	15	1.5 m	CABLE-D-15SUB/F/OE/0,25/S/1,5M	2926108	1	CABLE-D-15SUB/M/OE/0,25/S/1,5M	2926454	1
	15	2 m	CABLE-D-15SUB/F/OE/0,25/S/2,0M	2926111	1	CABLE-D-15SUB/M/OE/0,25/S/2,0M	2926467	1
	15	3 m	CABLE-D-15SUB/F/OE/0,25/S/3,0M	2926124	1	CABLE-D-15SUB/M/OE/0,25/S/3,0M	2926470	1
	15	4 m	CABLE-D-15SUB/F/OE/0,25/S/4,0M	2926137	1	CABLE-D-15SUB/M/OE/0,25/S/4,0M	2926483	1
	15	6 m	CABLE-D-15SUB/F/OE/0,25/S/6,0M	2926140	1	CABLE-D-15SUB/M/OE/0,25/S/6,0M	2926496	1
Round cable, same as before, however in variable lengths			CABLE-D-15SUB-F-OE-0,25-S/...	2900905	1	CABLE-D-15SUB-M-OE-0,25-S/...	2900910	1
Round cable with an open end								
	25	0.5 m	CABLE-D-25SUB/F/OE/0,25/S/0,5M	2926153	1	CABLE-D-25SUB/M/OE/0,25/S/0,5M	2926506	1
	25	1 m	CABLE-D-25SUB/F/OE/0,25/S/1,0M	2926166	1	CABLE-D-25SUB/M/OE/0,25/S/1,0M	2926519	1
	25	1.5 m	CABLE-D-25SUB/F/OE/0,25/S/1,5M	2926179	1	CABLE-D-25SUB/M/OE/0,25/S/1,5M	2926522	1
	25	2 m	CABLE-D-25SUB/F/OE/0,25/S/2,0M	2926182	1	CABLE-D-25SUB/M/OE/0,25/S/2,0M	2926535	1
	25	3 m	CABLE-D-25SUB/F/OE/0,25/S/3,0M	2926195	1	CABLE-D-25SUB/M/OE/0,25/S/3,0M	2926548	1
	25	4 m	CABLE-D-25SUB/F/OE/0,25/S/4,0M	2926205	1	CABLE-D-25SUB/M/OE/0,25/S/4,0M	2926551	1
	25	6 m	CABLE-D-25SUB/F/OE/0,25/S/6,0M	2926218	1	CABLE-D-25SUB/M/OE/0,25/S/6,0M	2926564	1
Round cable, same as before, however in variable lengths			CABLE-D-25SUB-F-OE-0,25-S/...	2900906	1	CABLE-D-25SUB-M-OE-0,25-S/...	2900911	1

Special lengths of D-SUB cable with open ends can be configured using separate order numbers.

Ordering example:

One system cable assembled with a 37-pole D-SUB female connector and one open end, 12.75 m in length:

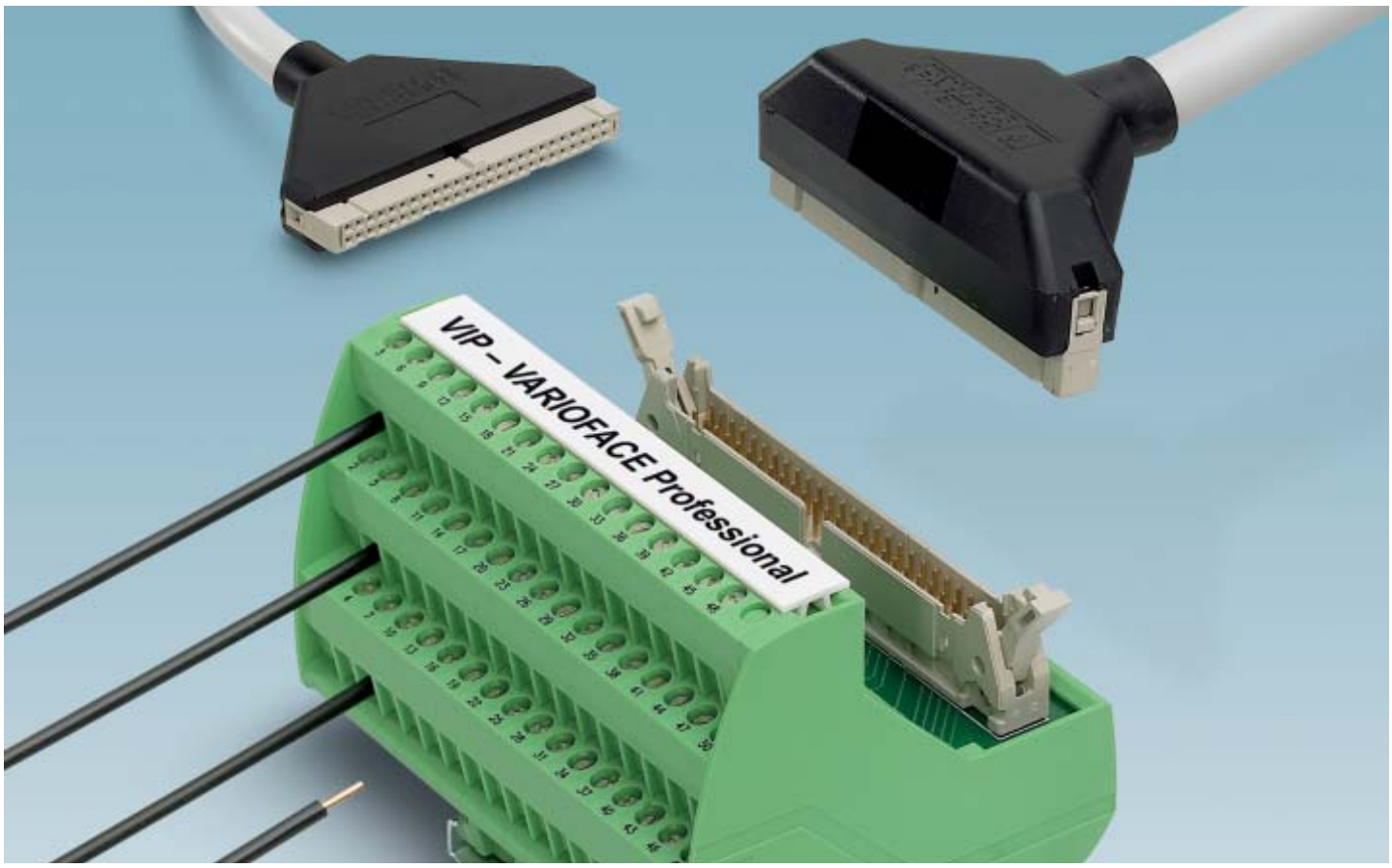
1 pcs. 2900907/12,75

Female connector at one end and open end at the other end

Pin strip at one end and open end at the other end

	Technical data	Technical data
Max. perm. operating voltage	125 V AC/DC	125 V AC/DC
Max. perm. current carrying capacitance per path	2 A	2 A
Max. conductor resistance	0.09 Ω/m	0.09 Ω/m
Ambient temperature (operation)	-20°C ... 50°C	-20°C ... 50°C
Shield	Tinned copper-braided shield, approx. 85% covering	Tinned copper-braided shield, approx. 85% covering
Insertion/withdrawal cycles	> 200	> 200
Conductor cross section	AWG 24 / 0.25 mm²	AWG 24 / 0.25 mm²
Outside diameter		
37-pole	12 mm	12 mm
50-pole	13.5 mm	13.5 mm

Description	No. of poles	Cable length	Ordering data: Type	Order No.	Pcs. / Pkt.	Ordering data: Type	Order No.	Pcs. / Pkt.
Round cable with an open end								
	37	0.5 m	**CABLE-D-37SUB/F/OE/0,25/S/0,5M**	**2926221**	1	**CABLE-D-37SUB/M/OE/0,25/S/0,5M**	**2926577**	1
	37	1 m	**CABLE-D-37SUB/F/OE/0,25/S/1,0M**	**2926234**	1	**CABLE-D-37SUB/M/OE/0,25/S/1,0M**	**2926580**	1
	37	1.5 m	**CABLE-D-37SUB/F/OE/0,25/S/1,5M**	**2926247**	1	**CABLE-D-37SUB/M/OE/0,25/S/1,5M**	**2926593**	1
	37	2 m	**CABLE-D-37SUB/F/OE/0,25/S/2,0M**	**2926250**	1	**CABLE-D-37SUB/M/OE/0,25/S/2,0M**	**2926603**	1
	37	3 m	**CABLE-D-37SUB/F/OE/0,25/S/3,0M**	**2926263**	1	**CABLE-D-37SUB/M/OE/0,25/S/3,0M**	**2926616**	1
	37	4 m	**CABLE-D-37SUB/F/OE/0,25/S/4,0M**	**2926276**	1	**CABLE-D-37SUB/M/OE/0,25/S/4,0M**	**2926629**	1
	37	6 m	**CABLE-D-37SUB/F/OE/0,25/S/6,0M**	**2926289**	1	**CABLE-D-37SUB/M/OE/0,25/S/6,0M**	**2926632**	1
Round cable, same as before, however in variable lengths			**CABLE-D-37SUB-F-OE-0,25-S/...**	**2900907**	1	**CABLE-D-37SUB-M-OE-0,25-S/...**	**2900912**	1
Round cable with an open end								
	50	0.5 m	**CABLE-D-50SUB/F/OE/0,25/S/0,5M**	**2926292**	1	**CABLE-D-50SUB/M/OE/0,25/S/0,5M**	**2926645**	1
	50	1 m	**CABLE-D-50SUB/F/OE/0,25/S/1,0M**	**2926302**	1	**CABLE-D-50SUB/M/OE/0,25/S/1,0M**	**2926658**	1
	50	1.5 m	**CABLE-D-50SUB/F/OE/0,25/S/1,5M**	**2926315**	1	**CABLE-D-50SUB/M/OE/0,25/S/1,5M**	**2926661**	1
	50	2 m	**CABLE-D-50SUB/F/OE/0,25/S/2,0M**	**2926328**	1	**CABLE-D-50SUB/M/OE/0,25/S/2,0M**	**2926674**	1
	50	3 m	**CABLE-D-50SUB/F/OE/0,25/S/3,0M**	**2926331**	1	**CABLE-D-50SUB/M/OE/0,25/S/3,0M**	**2926687**	1
	50	4 m	**CABLE-D-50SUB/F/OE/0,25/S/4,0M**	**2926344**	1	**CABLE-D-50SUB/M/OE/0,25/S/4,0M**	**2926690**	1
	50	6 m	**CABLE-D-50SUB/F/OE/0,25/S/6,0M**	**2926357**	1	**CABLE-D-50SUB/M/OE/0,25/S/6,0M**	**2926700**	1
Round cable, same as before, however in variable lengths			**CABLE-D-50SUB-F-OE-0,25-S/...**	**2900908**	1	**CABLE-D-50SUB-M-OE-0,25-S/...**	**2900913**	1



VIP – VARIOFACE Professional – Secure and reliable connections in even the tightest of spaces

Switch cabinet space is extremely valuable. That is why the I/Os of automation devices feature high-pole connectors. To enable the individual wires of the sensor/actuator level to be connected to the automation interface in accordance with industry requirements, Phoenix Contact is now able to offer new interface modules and new system cables inside a professional and compact housing. Thanks to the enclosed system cables, the control and process levels can be connected securely and reliably within harsh industrial environments.

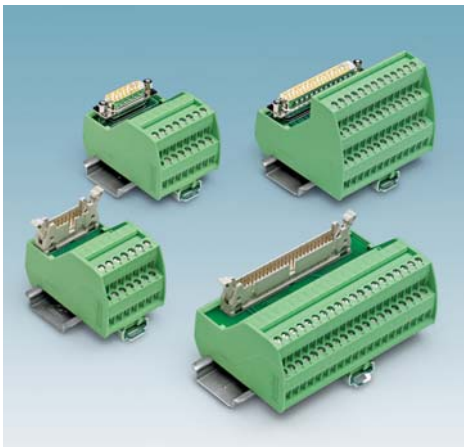
To allow all components to be supplied with power, potential distributors are available with the same housing design.

VARIOFACE Professional means:

New modules:
- Space-saving
- Vibration-resistant thanks to metal foot
- Optional labeling
- New housing design

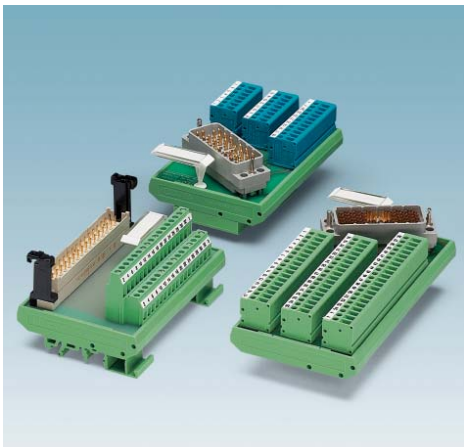
New FLK system cables:
- Enclosed FLK connectors
- Professional strain relief
- Rugged design

VIP - VARIOFACE Professional interface modules



Interface modules with various connection methods and designs are available for the widely used FLK, D-SUB, and high-density D-SUB connectors. Modules with a status indicator can be selected for operation monitoring purposes.

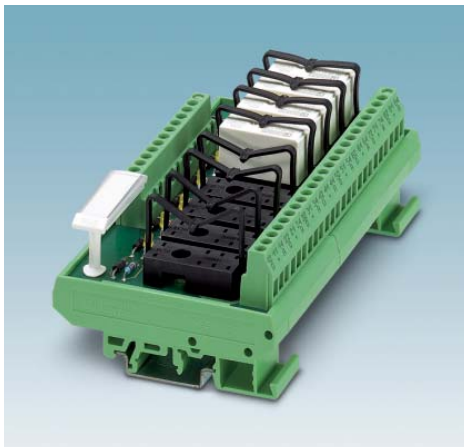
Interface modules with ELCO or DIN connectors



Modules with ELCO connectors are available for tough environments or where increased safety requirements apply.

Interface modules are also available for DIN strip types C, D, E, and F.

Relay/solid-state relay modules

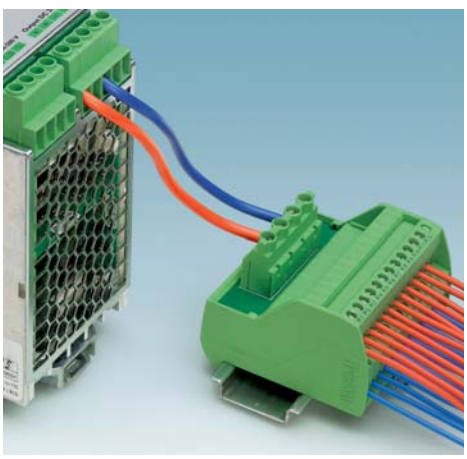


The active modules are configured as a 4-channel, 8-channel or 16-channel interface. There is a choice of multi-channel modules for relays and signal/power optocouplers. This means that functions such as signal conditioning, electrical isolation, and power amplification can be supported.

System cables with enclosed FLK or D-SUB connectors

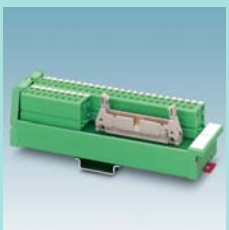
Ready-assembled FLK and D-SUB cables ensure a reliable connection between the automation equipment and the module. 1 A (FLK cable) and 2 A (D-SUB cable) currents can be transmitted on each signal path thanks to the large conductor cross sections.

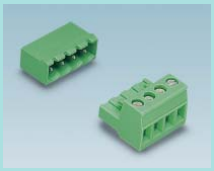
VIP - VARIOFACE Professional potential distributors



Designed for up to 250 V/30 V, the potential distributors are suitable for universal use – for both operating voltage and control voltage distribution. The screw or spring-cage connection method can be selected as required for the application concerned.

VIP - VARIOFACE Professional product overview

Device series		Passive modules (connection method)				
		Flat-ribbon cable strip	D-SUB strip	DIN strip	ELCO strip	Potential distributor
		Page	Page	Page	Page	Page
VIP Line		300	306 313			322
Standard Line				314	318	
Slim Line		304	309			
Feed-through modules		305	310			
Cables		278	290			

	COMBICON	Device series	Active modules (function)	
			Relays/solid-state relays	Solid-state relays
	Page		Page	Page
		Standard Line	324	327
	321	Accessories	328	332
	321			

VIP – VARIOFACE Professional
Modules with flat-ribbon cable connectors

– 1:1 connection
– 10 to 64-pos.
– Screw connection
– Metal foot
– As per IEC 60603-13
– Optional with status indicator
Low and high engagement latches are supplied with all modules.

Notes:

For marking systems and mounting material, see CLIPLINE catalog, part 2.

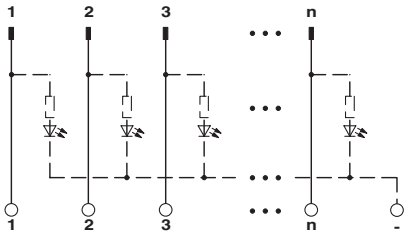
10 to 20 positions with screw connection

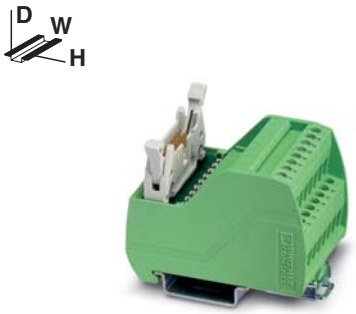
Technical data

Operating voltage	60 V AC/DC
Max. perm. current (per branch)	1 A
Ambient temperature (operation)	-20°C ... 50°C
Mounting position	Any
Standards / regulations	IEC 60664, DIN EN 50178, IEC 62103
Connection data solid / stranded / AWG	0.2 - 4 mm² / 0.2 - 2.5 mm² / 24 - 12
Dimensions H / D	65.5 mm / 56 mm

Ordering data

Description	No. of poles	Module width W	Type	Order No.	Pcs. / Pkt.
VARIOFACE module, with pin strip					
	10	34.70	**VIP-2/SC/FLK10**	**2315010**	1
	14	39.80	**VIP-2/SC/FLK14**	**2315023**	1
	16	45.00	**VIP-2/SC/FLK16**	**2315036**	1
	20	55.10	**VIP-2/SC/FLK20**	**2315049**	1
VARIOFACE module, with pin strip and light indicator					
	10	34.70			
	14	44.90			
	16	50.00			
	20	60.20			
VARIOFACE module, with pin strip					
	26	57.10			
	34	67.30			
	40	77.40			
	50	92.70			
	60	108.00			
	64	118.00			
VARIOFACE module, with pin strip and light indicator					
	26	57.40			
	34	67.60			
	40	77.80			
	50	93.10			
	60	113.50			
	64	118.60			





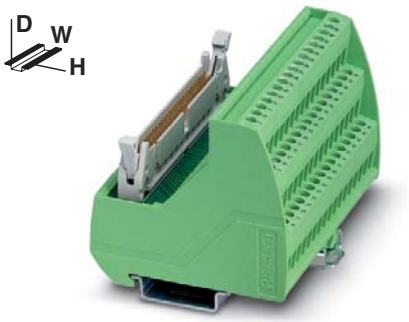
10 to 20 positions
with screw connection and light indicator

Technical data

24 V DC
1 A
-20°C ... 50°C
Any
IEC 60664, DIN EN 50178, IEC 62103
0.2 - 4 mm² / 0.2 - 2.5 mm² / 24 - 12
65.5 mm / 56 mm

Ordering data

Type	Order No.	Pcs. / Pkt.
VIP-2/SC/FLK10/LED	2322045	1
VIP-2/SC/FLK14/LED	2322058	1
VIP-2/SC/FLK16/LED	2322061	1
VIP-2/SC/FLK20/LED	2322074	1



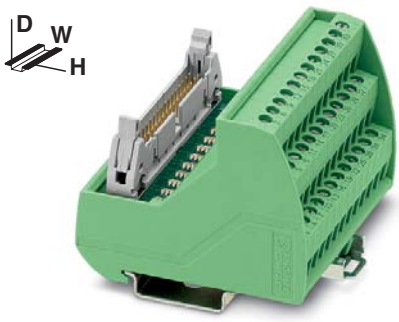
26 to 64 positions
with screw connection

Technical data

60 V AC/DC
1 A
-20°C ... 50°C
Any
IEC 60664, DIN EN 50178, IEC 62103
0.2 - 4 mm² / 0.2 - 2.5 mm² / 24 - 12
69 mm / 62 mm

Ordering data

Type	Order No.	Pcs. / Pkt.
VIP-3/SC/FLK26	2315052	1
VIP-3/SC/FLK34	2315065	1
VIP-3/SC/FLK40	2315078	1
VIP-3/SC/FLK50	2315081	1
VIP-3/SC/FLK60	2315094	1
VIP-3/SC/FLK64	2315104	1



26 to 64 positions
with screw connection and light indicator

Technical data

24 V DC
1 A
-20°C ... 50°C
Any
IEC 60664, DIN EN 50178, IEC 62103
0.2 - 4 mm² / 0.2 - 2.5 mm² / 24 - 12
69 mm / 62 mm

Ordering data

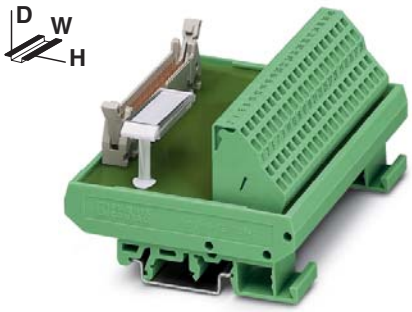
Type	Order No.	Pcs. / Pkt.
VIP-3/SC/FLK26/LED	2322087	1
VIP-3/SC/FLK34/LED	2322090	1
VIP-3/SC/FLK40/LED	2322100	1
VIP-3/SC/FLK50/LED	2322113	1
VIP-3/SC/FLK60/LED	2322126	1
VIP-3/SC/FLK64/LED	2322139	1

Modules with flat-ribbon cable connectors

The following VARIOFACE modules (1:1 connection) for flat-ribbon cable plug connectors (in accordance with IEC 60603-13/DIN 41651) are available with spring-cage connection:

- FLK modules with double-level terminal blocks with 10 to 64 positions
- UM 45-FLK... modules with double-level terminal blocks with 10 to 64 positions
- UM 45-FLKS... modules with double-level terminal blocks with 10 to 64 positions

Low and high engagement latches are supplied with all modules.



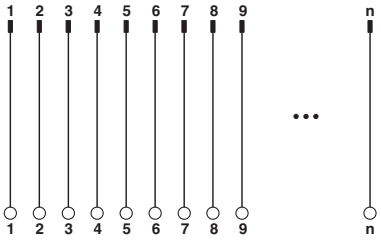
10 to 64 positions with spring-cage connection

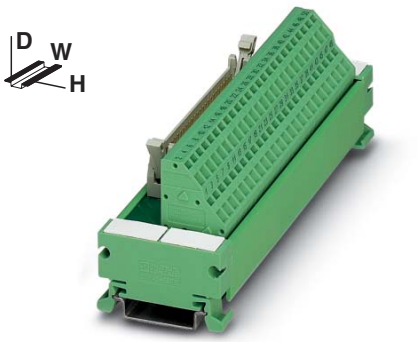
Technical data

Operating voltage	< 50 V AC / 60 V DC
Max. perm. current (per branch)	1 A
Ambient temperature (operation)	-20°C ... 50°C
Mounting position	Any
Standards / regulations	IEC 60664, DIN EN 50178, IEC 62103
Connection data solid / stranded / AWG	0.2 - 4 mm² / 0.2 - 2.5 mm² / 24 - 12
Dimensions H / D	77 mm / 51 mm

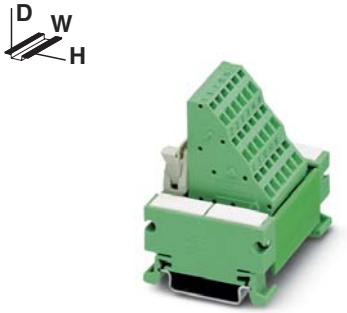
Ordering data

Description	No. of poles	Module width W	Type	Order No.	Pcs. / Pkt.
VARIOFACE module, with pin strip					
	10	34.00	**FLKM 10/ZFKDS**	**2302887**	1
	14	45.00	**FLKM 14/ZFKDS**	**2302890**	1
	16	45.00	**FLKM 16/ZFKDS**	**2302900**	1
	20	57.00	**FLKM 20/ZFKDS**	**2302913**	1
	26	79.00	**FLKM 26/ZFKDS**	**2302926**	1
	34	90.00	**FLKM 34/ZFKDS**	**2302939**	1
	40	113.00	**FLKM 40/ZFKDS**	**2302942**	1
	50	135.00	**FLKM 50/ZFKDS**	**2302955**	1
	60	158.00	**FLKM 60/ZFKDS**	**2302968**	1
	64	169.00	**FLKM 64/ZFKDS**	**2302971**	1
VARIOFACE module, with pin strip					
	10	54.00			
	14	59.00			
	16	64.00			
	20	75.00			
	26	90.00			
	34	110.00			
	40	126.00			
	50	151.00			
	60	176.00			
	64	186.00			
VARIOFACE module, with pin strip					
	16	61.00			
	20	66.00			
	26	74.00			
	34	86.00			
	40	96.00			
	50	111.00			
	60	126.00			
	64	136.00			





10 to 64 positions
with spring-cage connection



16 to 64 positions
with spring-cage connection

Technical data

< 50 V AC / 60 V DC
1 A
-20°C ... 50°C
Any
IEC 60664, DIN EN 50178, IEC 62103
0.2 - 2.5 mm² / 0.2 - 1.5 mm² / 24 - 14
45 mm / 50 mm

Ordering data

Type	Order No.	Pcs. / Pkt.
UM 45-FLK10/ZFKDS	2293514	1
UM 45-FLK14/ZFKDS	2293527	1
UM 45-FLK16/ZFKDS	2293530	1
UM 45-FLK20/ZFKDS	2293543	1
UM 45-FLK26/ZFKDS	2293556	1
UM 45-FLK34/ZFKDS	2293569	1
UM 45-FLK40/ZFKDS	2293572	1
UM 45-FLK50/ZFKDS	2293585	1
UM 45-FLK60/ZFKDS	2293598	1
UM 45-FLK64/ZFKDS	2293608	1

Technical data

< 50 V AC / 60 V DC
1 A
-20°C ... 50°C
Any
IEC 60664, DIN EN 50178, IEC 62103
0.2 - 2.5 mm² / 0.2 - 1.5 mm² / 24 - 14
45 mm / 61 mm

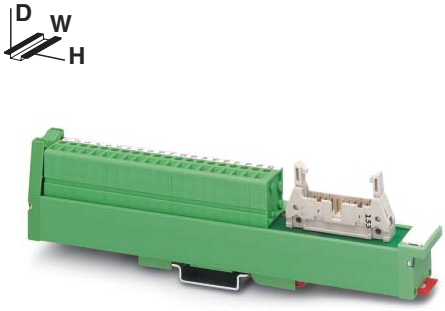
Ordering data

Type	Order No.	Pcs. / Pkt.
UM 45-FLKS16/ZFKDS	2968399	1
UM 45-FLKS20/ZFKDS	2968409	1
UM 45-FLKS26/ZFKDS	2968412	1
UM 45-FLKS34/ZFKDS	2968425	1
UM 45-FLKS40/ZFKDS	2968438	1
UM 45-FLKS50/ZFKDS	2968470	1
UM 45-FLKS60/ZFKDS	2968441	1
UM 45-FLKS64/ZFKDS	2968454	1

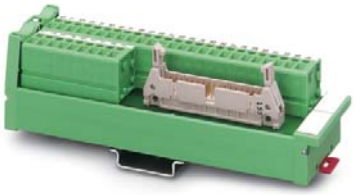
SLIM-LINE modules for flat-ribbon cable connectors

VARIOFACE SLIM-LINE modules connect flat-ribbon cable plug connectors in accordance with IEC 60603-13/DIN 41651 to front connecting terminal blocks.

The modules are provided with low and high engagement catches to protect the flat-ribbon cable connector against being accidentally released.



20 and 26-pos. with screw connection



34 to 50 positions with screw connection

	Technical data	Technical data
Operating voltage	< 50 V AC / 60 V DC	< 50 V AC / 60 V DC
Max. perm. current (per branch)	0.8 A (data valid for 100% coincidence factor)	1 A (data valid for 100% coincidence factor)
Ambient temperature (operation)	-10°C ... 50°C	-10°C ... 50°C
Mounting position	Any	Any
Standards / regulations	IEC 60664, DIN EN 50178, IEC 62103	IEC 60664, DIN EN 50178, IEC 62103
Screw connection solid / stranded / AWG	0.2 ... 4 mm² / 0.2 ... 2.5 mm² / 24 - 12	0.2 ... 4 mm² / 0.2 ... 2.5 mm² / 24 - 12
Dimensions D / W	45 mm / 25 mm	45 mm / 45 mm

Description	No. of poles	Module height H	Ordering data: Type	Order No.	Pcs. / Pkt.	Ordering data: Type	Order No.	Pcs. / Pkt.
VARIOFACE-SLIM-LINE module, with pin strip								
	20	177.00	**UM 25-FLK20/FRONT/Q**	**2959515**	1			
	26	217.00	**UM-25 FLK26/FRONT/Q**	**2959528**	1			
VARIOFACE-SLIM-LINE module, with pin strip								
	34	147.00				**UM 45-FLK34/FRONT/Q**	**2959531**	1
	40	167.00				**UM 45-FLK40/FRONT/Q**	**2959544**	1
	50	197.00				**UM 45-FLK50/FRONT/Q**	**2959557**	1

Panel feed-through modules for flat-ribbon cable connectors

VARIOFACE panel feed-through modules DFLK... connect the flat-ribbon cable connectors in accordance with IEC 60603-13/DIN 41651 to the screw connection terminal blocks.

These modules are suitable for mounting on a side panel with an appropriate housing cutout (see dimensioning table).

The modules are provided with low and high engagement catches to protect the flat-ribbon cable connector against being accidentally released.

16 to 50 positions with screw connection

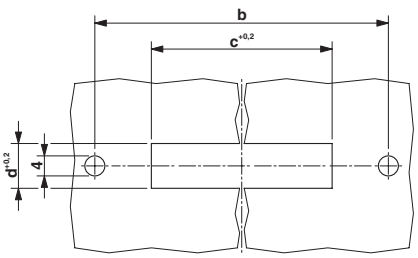
Technical data

Operating voltage	< 50 V AC / 60 V DC
Max. perm. current (per branch)	1 A
Ambient temperature (operation)	-20°C ... 45°C
Mounting position	Any
Standards / regulations	IEC 60664, DIN EN 50178, IEC 62103
Connection data solid / stranded / AWG	0.2 - 4 mm² / 0.2 - 2.5 mm² / 24 - 12

Ordering data

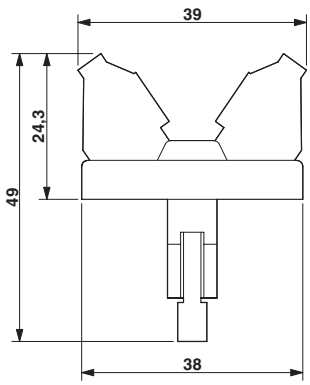
Description	No. of poles	Module width W	Type	Order No.	Pcs. / Pkt.
VARIOFACE feed-through module, with pin strip					
	16	39.00	**DFLK 16**	**2280239**	5
	20	39.00	**DFLK 20**	**2280242**	5
	26	39.00	**DFLK 26**	**2280255**	5
	34	39.00	**DFLK 34**	**2280268**	5
	40	39.00	**DFLK 40**	**2280271**	5
	50	39.00	**DFLK 50**	**2280284**	5

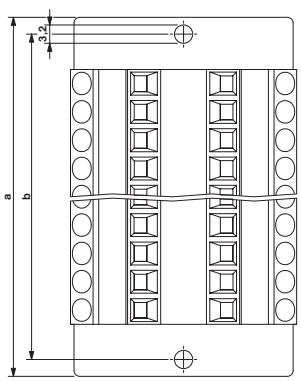
Dimensioning of the housing cutout



Type	a	b	c	d
DFLK 16	58.4	52.5	40.1 + 0.2	9 + 0.2
DFLK 20	68.4	62.5	45.2 + 0.2	9 + 0.2
DFLK 26	83.4	77.5	52.8 + 0.2	9 + 0.2
DFLK 34	103.4	97.5	63.0 + 0.2	9 + 0.2
DFLK 40	128.4	122.5	70.6 + 0.2	9 + 0.2
DFLK 50	143.4	137.5	83.3 + 0.2	9 + 0.2

Dimensional drawing DFLK:





VIP – VARIOFACE Professional Modules with D-SUB connectors

- 1:1 connection
- 9 to 50-pos.
- Screw connection
- Metal foot
- As per IEC 60807-2
- Optional with status indicator
  The D-SUB-4-40 UNC threads are led on to a connecting terminal block directly.

Notes:

For marking systems and mounting material, see CLIPLINE catalog, part 2.

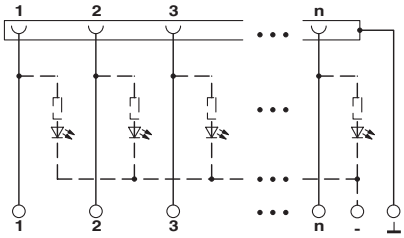
9 to 15 positions with screw connection

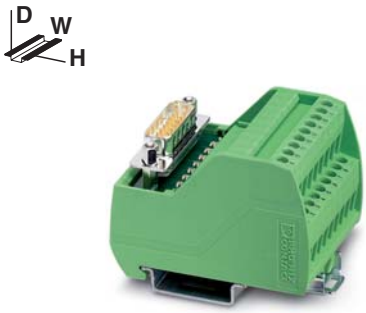
Technical data

Operating voltage	125 V AC/DC
Max. perm. current (per branch)	2 A
Ambient temperature (operation)	-20°C ... 50°C
Mounting position	Any
Standards / regulations	IEC 60664, DIN EN 50178, IEC 62103
Connection data solid / stranded / AWG	0.2 - 4 mm² / 0.2 - 2.5 mm² / 24 - 12
Dimensions H / D	65.5 mm / 45.1 mm

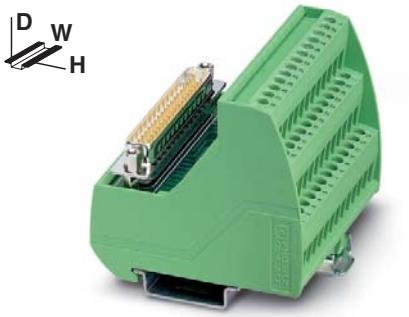
Ordering data

Description	No. of poles	Module width W	Type	Order No.	Pcs. / Pkt.
VARIOFACE module, with D-Subminiature pin strip					
	9	34.70	**VIP-2/SC/D 9SUB/M**	**2315117**	1
	15	45.00	**VIP-2/SC/D15SUB/M**	**2315120**	1
VARIOFACE module, with D-Subminiature pin strip and light indicator					
	9	34.70			
	15	50.00			
VARIOFACE module, with D-Subminiature socket					
	9	34.70	**VIP-2/SC/D 9SUB/F**	**2315162**	1
	15	45.00	**VIP-2/SC/D15SUB/F**	**2315175**	1
VARIOFACE module, with D-Subminiature socket and light indicator					
	9	34.70			
	15	50.00			
VARIOFACE module, with D-Subminiature pin strip					
	25	57.40			
	37	72.70			
	50	98.20			
VARIOFACE module, with D-Subminiature pin strip and light indicator					
	25	57.40			
	37	72.70			
	50	98.20			
VARIOFACE module, with D-Subminiature socket					
	25	57.40			
	37	72.70			
	50	98.20			
VARIOFACE module, with D-Subminiature socket and light indicator					
	25	57.40			
	37	72.70			
	50	98.20			

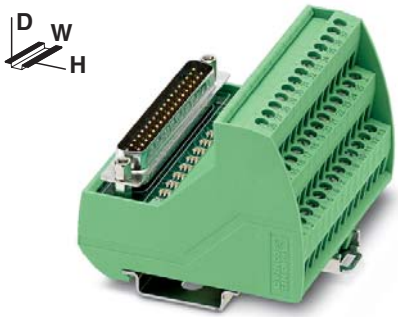




9 to 15 positions
with screw connection and light indicator



25 to 50 positions
with screw connection



25 to 50 positions
with screw connection and light indicator

Technical data

24 V DC
2.5 A
-20°C ... 50°C
Any
IEC 60664, DIN EN 50178, IEC 62103
0.2 - 4 mm² / 0.2 - 2.5 mm² / 24 - 12
65.5 mm / 45.1 mm

Ordering data

Type	Order No.	Pcs. / Pkt.
VIP-2/SC/D 9SUB/M/LED	2322142	1
VIP-2/SC/D15SUB/M/LED	2322155	1
VIP-2/SC/D 9SUB/F/LED	2322197	1
VIP-2/SC/D15SUB/F/LED	2322207	1

Technical data

125 V AC/DC
2 A
-20°C ... 50°C
Any
IEC 60664, DIN EN 50178, IEC 62103
0.2 - 4 mm² / 0.2 - 2.5 mm² / 24 - 12
69 mm / 62 mm

Ordering data

Type	Order No.	Pcs. / Pkt.
VIP-3/SC/D25SUB/M	2315133	1
VIP-3/SC/D37SUB/M	2315146	1
VIP-3/SC/D50SUB/M	2315159	1
VIP-3/SC/D25SUB/F	2315188	1
VIP-3/SC/D37SUB/F	2315191	1
VIP-3/SC/D50SUB/F	2315201	1

Technical data

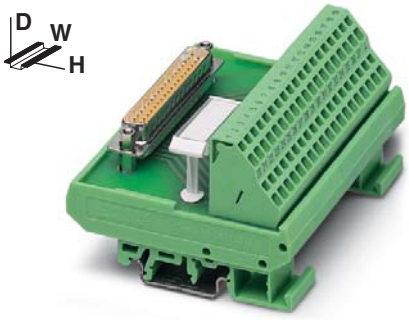
24 V DC
2.5 A
-20°C ... 50°C
Any
IEC 60664, DIN EN 50178, IEC 62103
0.2 - 4 mm² / 0.2 - 2.5 mm² / 24 - 12
69 mm / 62 mm

Ordering data

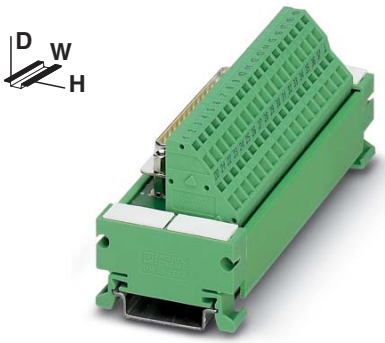
Type	Order No.	Pcs. / Pkt.
VIP-3/SC/D25SUB/M/LED	2322168	1
VIP-3/SC/D37SUB/M/LED	2322171	1
VIP-3/SC/D50SUB/M/LED	2322184	1
VIP-3/SC/D25SUB/F/LED	2322210	1
VIP-3/SC/D37SUB/F/LED	2322223	1
VIP-3/SC/D50SUB/F/LED	2322236	1

Modules for D-subminiature connectors

– 1:1 connection
– 9 to 50-pos.
– Spring-cage connection method
– As per IEC 60807-2
The D-SUB-4-40 UNC threads are led on to a connecting terminal block directly.



9 to 50 positions with spring-cage connection



9 to 50 positions with spring-cage connection

Technical data

Operating voltage	125 V AC/DC	125 V AC/DC
Max. perm. current (per branch)	2.5 A	2.5 A
Ambient temperature (operation)	-20°C ... 50°C	-20°C ... 50°C
Mounting position	Any	Any
Standards / regulations	IEC 60664, DIN EN 50178, IEC 62103	IEC 60664, DIN EN 50178, IEC 62103
Connection data solid / stranded / AWG	0.2 - 4 mm² / 0.2 - 2.5 mm² / 24 - 12	0.2 - 2.5 mm² / 0.2 - 1.5 mm² / 24 - 14
Dimensions H / D	77 mm / 52 mm	45 mm / 50 mm

Ordering data

Description	No. of poles	Module width W	Type	Order No.	Pcs. / Pkt.	Type	Order No.	Pcs. / Pkt.
VARIOFACE module, with D-Subminiature pin strip								
	9	33.80	**FLKM-D 9 SUB/S/ZFKDS**	**2302984**	1			
	15	45.00	**FLKM-D15 SUB/S/ZFKDS**	**2302997**	1			
	25	78.80	**FLKM-D25 SUB/S/ZFKDS**	**2303006**	1			
	37	101.30	**FLKM-D37 SUB/S/ZFKDS**	**2304018**	1			
	50	146.30	**FLKM-D50 SUB/S/ZFKDS**	**2304021**	1			
VARIOFACE module, with D-Subminiature socket								
	9	33.80	**FLKM-D 9 SUB/B/ZFKDS**	**2304034**	1			
	15	45.00	**FLKM-D15 SUB/B/ZFKDS**	**2304047**	1			
	25	78.80	**FLKM-D25 SUB/B/ZFKDS**	**2304050**	1			
	37	101.30	**FLKM-D37 SUB/B/ZFKDS**	**2304063**	1			
	50	146.30	**FLKM-D50 SUB/B/ZFKDS**	**2304076**	1			
VARIOFACE COMPACT-LINE module, with D-Subminiature pin strip								
	9	54.00				**UM 45-D 9SUB/S/ZFKDS**	**2293611**	1
	15	65.00				**UM 45-D15SUB/S/ZFKDS**	**2293624**	1
	25	90.00				**UM 45-D25SUB/S/ZFKDS**	**2293637**	1
	37	121.00				**UM 45-D37SUB/S/ZFKDS**	**2293640**	1
	50	156.00				**UM 45-D50SUB/S/ZFKDS**	**2293653**	1
VARIOFACE COMPACT-LINE module, with D-Subminiature socket								
	9	54.00				**UM 45-D 9SUB/B/ZFKDS**	**2293666**	1
	15	65.00				**UM 45-D15SUB/B/ZFKDS**	**2293679**	1
	25	90.00				**UM 45-D25SUB/B/ZFKDS**	**2293682**	1
	37	121.00				**UM 45-D37SUB/B/ZFKDS**	**2293695**	1
	50	156.00				**UM 45-D50SUB/B/ZFKDS**	**2293705**	1

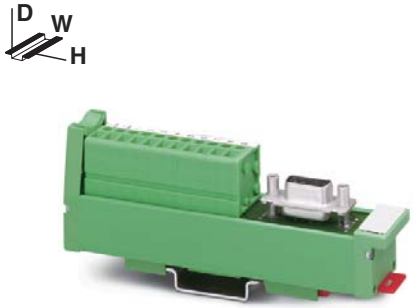
Accessories

Screwdriver Blade: 0,4 x 2.5 x 75 mm, length: 156 mm	**SZF 0-0,4X2,5**	**1204504**	10	**SZF 0-0,4X2,5**	**1204504**	10

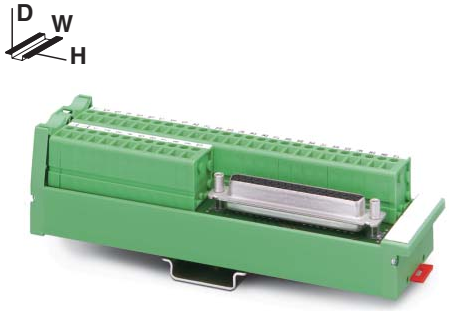
SLIM-LINE modules for D-subminiature connectors

These VARIOFACE modules connect D-Sub strips with front connection terminal blocks in accordance with IEC 60807-2/DIN 41652.

To make the ground connection, the metallic plug shell (4-40 UNC thread) makes contact with a connecting terminal block.



9 to 25 positions with screw connection



37 to 50 positions with screw connection

	Technical data	Technical data
Operating voltage	125 V AC/DC	125 V AC/DC
Max. perm. current (per branch)	2.5 A	2.5 A
Ambient temperature (operation)	-10°C ... 50°C	-10°C ... 50°C
Mounting position	Any	Any
Standards / regulations	IEC 60664, IEC 60664 A, DIN VDE 0110, DIN VDE 0160 (in parts)	IEC 60664, DIN EN 50178, IEC 62103
Dimensions D / W	45 mm / 25 mm	45 mm / 45 mm

Description	No. of poles	Module height H	Ordering data: Type	Order No.	Pcs. / Pkt.	Ordering data: Type	Order No.	Pcs. / Pkt.
VARIOFACE-SLIM-LINE module, with D-Subminiature pin strip								
	9	117.00	**UM 25-D 9SUB/S/FRONT/Q**	**2959573**	1			
	15	147.00	**UM 25-D15SUB/S/FRONT/Q**	**2959599**	1			
	25	217.00	**UM 25-D25SUB/S/FRONT/Q**	**2959612**	1			
VARIOFACE-SLIM-LINE module, with D-Subminiature socket strip								
	9	117.00	**UM 25-D 9SUB/B/FRONT/Q**	**2959560**	1			
	15	147.00	**UM 25-D15SUB/B/FRONT/Q**	**2959586**	1			
	25	217.00	**UM 25-D25SUB/B/FRONT/Q**	**2959609**	1			
VARIOFACE-SLIM-LINE module, with D-Subminiature pin strip								
	37					**UM 45-D37SUB/S/FRONT/Q**	**2959638**	1
	50					**UM 45-D50SUB/S/FRONT/Q**	**2959654**	1
VARIOFACE-SLIM-LINE module, with D-Subminiature socket strip								
	37					**UM 45-D37SUB/B/FRONT/Q**	**2959625**	1
	50					**UM 45-D50SUB/B/FRONT/Q**	**2959641**	1

Panel feed-through modules for D-subminiature connectors

- 1:1 connection
- 9 to 50-pos.
- Screw connection
- As per IEC 60807-2
- D-SUB 4-40 UNC thread
- 9- to 37-pos.: Separate ground tap
- 50-pos.: No ground tap

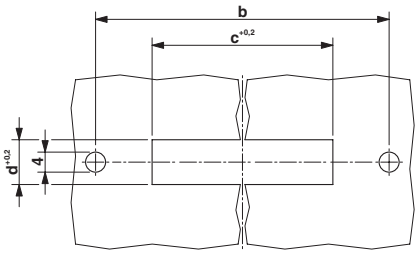
With D-subminiature male connector

With D-subminiature female connector

	Technical data	Technical data
Operating voltage	125 V AC/DC	125 V AC/DC
Max. perm. current (per branch)	2.5 A	2.5 A
Ambient temperature (operation)	-20°C ... 50°C	-20°C ... 50°C
Mounting position	Any	Any
Standards / regulations		DIN EN 50178
Connection data solid / stranded / AWG	0.2 - 4 mm² / 0.2 - 2.5 mm² / 24 - 12	0.2 - 4 mm² / 0.2 - 2.5 mm² / 24 - 12

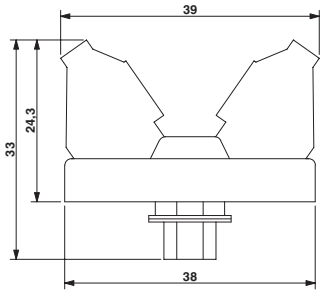
Description	No. of poles	Module width W	Ordering data: Type	Order No.	Pcs. / Pkt.	Ordering data: Type	Order No.	Pcs. / Pkt.
VARIOFACE feed-through module, with D-subminiature male connector								
	9	39.00	**DFLK-D 9 SUB/S**	**2283870**	5	**DFLK-D 9 SUB/B**	**2287135**	5
	15	39.00	**DFLK-D15 SUB/S**	**2280297**	5	**DFLK-D15 SUB/B**	**2280307**	5
	25	39.00	**DFLK-D25 SUB/S**	**2280310**	5	**DFLK-D25 SUB/B**	**2280323**	5
	37	39.00	**DFLK-D37 SUB/S**	**2280336**	5	**DFLK-D37 SUB/B**	**2280349**	5
	50	39.00	**DFLK-D50 SUB/S**	**2291286**	5	**DFLK-D50 SUB/B**	**2287669**	5

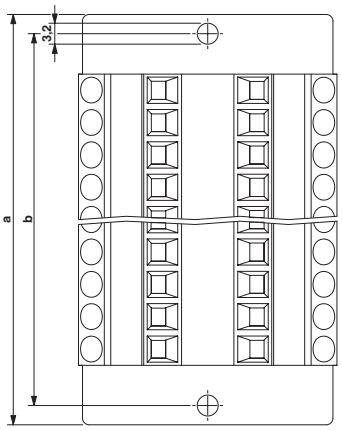
Dimensioning of the housing cutout



Type	a	b	c	d
DFLK-D 9 SUB/S	58.4	52.5	40.2 + 0.2	13 + 0.2
DFLK-D 15 SUB/S	58.4	52.5	40.2 + 0.2	13 + 0.2
DFLK-D 25 SUB/S	83.4	77.5	54.2 + 0.2	13 + 0.2
DFLK-D 37 SUB/S	128.4	122.5	70.6 + 0.2	13 + 0.2
DFLK-D 50 SUB/S	143.4	137.5	67.8 + 0.2	15.8 + 0.2
DFLK-D 9 SUB/B	58.4	52.5	40.2 + 0.2	13 + 0.2
DFLK-D 15 SUB/B	58.4	52.5	40.2 + 0.2	13 + 0.2
DFLK-D 25 SUB/B	83.4	77.5	54.2 + 0.2	13 + 0.2
DFLK-D 37 SUB/B	128.4	122.5	70.6 + 0.2	13 + 0.2
DFLK-D 50 SUB/B	143.4	137.5	67.8 + 0.2	15.8 + 0.2

Dimensional drawing: DFLK-D...SUB:





Feed-through module for high-density D-subminiature male connector with screw connection

- 1:1 connection
- 62-pole pin strip
- Screw connection
- As per IEC 60807-2
- D-SUB 4-40 UNC thread

With high-density D-subminiature pin strip

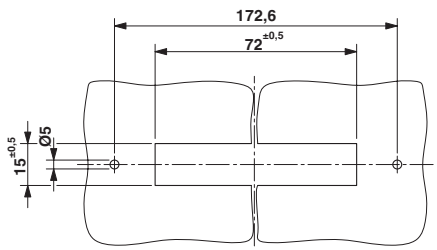
Technical data

Operating voltage	48 V AC/DC
Max. perm. current (per branch)	0.5 A
Ambient temperature (operation)	-20°C ... 50°C
Mounting position	Any
Standards / regulations	DIN EN 50178
Connection data solid / stranded / AWG	0.2 - 4 mm² / 0.2 - 2.5 mm² / 24 - 12

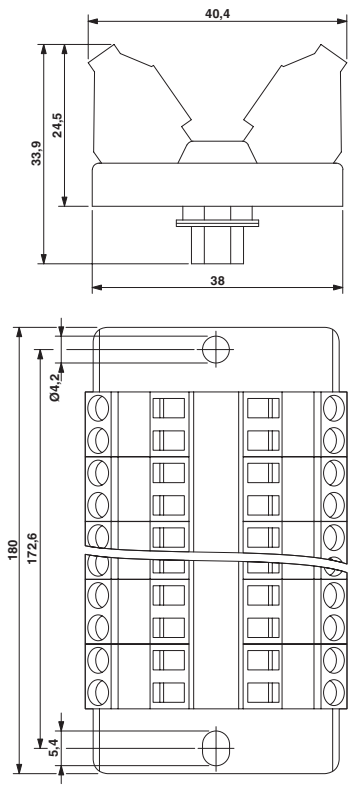
Ordering data

Description	No. of poles	Module width W	Type	Order No.	Pcs. / Pkt.
VARIOFACE feed-through module, with D-subminiature pin strip					
	62	40.40	**DFLK-D62 SUBH/S**	**2300863**	10

Dimensioning of the housing cutout



Dimensional drawing DFLK-D62 SUBH/S



Feed-through module for high-density D-subminiature male connector with spring-cage connection

- 1:1 connection
- 62-pole pin strip
- Spring-cage connection with direct plug-in method
- As per IEC 60807-2
- D-SUB 4-40 UNC thread

With high-density D-subminiature pin strip

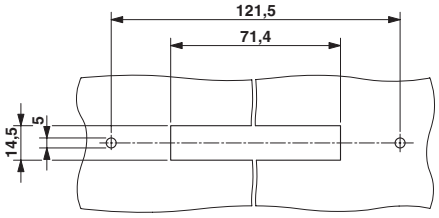
Technical data

Operating voltage	48 V DC
Max. perm. current (per branch)	0.5 A
Ambient temperature (operation)	-20°C ... 50°C
Mounting position	Any
Standards / regulations	DIN EN 50178, basic insulation
Connection data solid / stranded / AWG	0.2 - 1.5 mm² / 0.2 - 1.5 mm² / 24 - 16

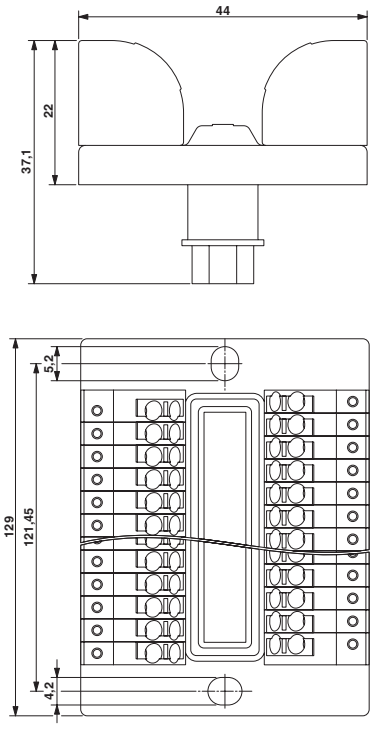
Ordering data

Description	No. of poles	Module width W	Type	Order No.	Pcs. / Pkt.
VARIOFACE feed-through module, with D-subminiature pin strip					
	62		**DFLK-HD62SUB/M/PTDA-1,5**	**2900472**	1

Dimensioning of the housing cutout



Dimensional drawing DFLK-HD62SUB/M/PTDA-1,5



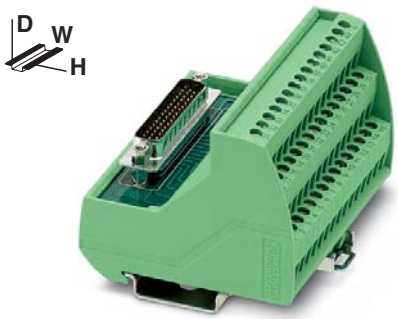
VIP – VARIOFACE Professional modules for high-density D-Subminiature plug connectors

These modules connect D subminiature male or female connectors with screw terminal blocks.

To make the ground connection, the metallic plug shell (4-40 UNC thread) makes contact with a connecting terminal block.

Notes:

For marking systems and mounting material, see CLIPLINE catalog, part 2.



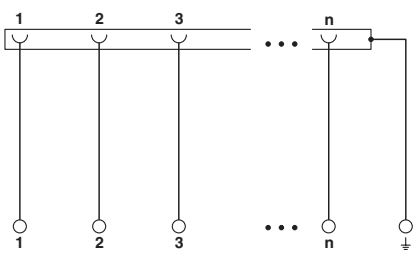
15 to 62 positions with screw connection

Technical data

Operating voltage	125 V
Max. perm. current (per branch)	1 A
Ambient temperature (operation)	-20°C ... 50°C
Mounting position	Any
Connection data solid / stranded / AWG	0.2 - 4 mm² / 0.2 - 2.5 mm² / 24 - 12
Dimensions H / D	69 mm / 62 mm

Ordering data

Description	No. of poles	Module width W	Type	Order No.	Pcs. / Pkt.
VARIOFACE module, with D-Subminiature pin strip					
Three-level terminal blocks	15	44.90	**VIP-2/SC/HD15SUB/M**	**2322326**	1
Three-level terminal blocks	26	52.30	**VIP-3/SC/HD26SUB/M**	**2322375**	1
Three-level terminal blocks	44	82.90	**VIP-3/SC/HD44SUB/M**	**2322388**	1
Three-level terminal blocks	62	113.50	**VIP-3/SC/HD62SUB/M**	**2322391**	1
VARIOFACE module, with D-Subminiature socket					
Three-level terminal blocks	15	44.90	**VIP-2/SC/HD15SUB/F**	**2322401**	1
Three-level terminal blocks	26	52.30	**VIP-3/SC/HD26SUB/F**	**2322414**	1
Three-level terminal blocks	44	82.90	**VIP-3/SC/HD44SUB/F**	**2322427**	1
Three-level terminal blocks	62	113.50	**VIP-3/SC/HD62SUB/F**	**2322430**	1



Modules for connectors IEC 60603/DIN 41612

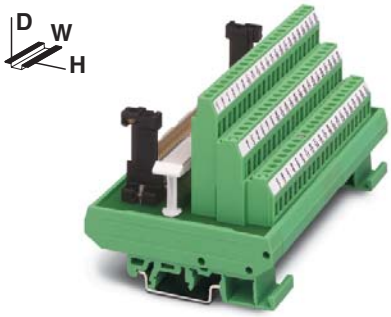
These VARIOFACE interface modules connect high-pole plug connectors in acc. with IEC 60603/DIN 41612 to screw connection terminal blocks.

The following VARIOFACE modules are available:

– **UMK** modules with double-level connecting terminal blocks
– **UMKS** modules with three-level connecting terminal blocks

Notes:

Suitable cable housings, see the table on page 336



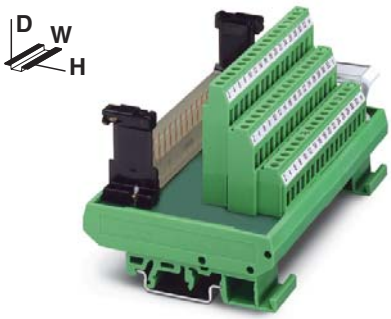
Design C, 64-position, a, c assembled

Technical data

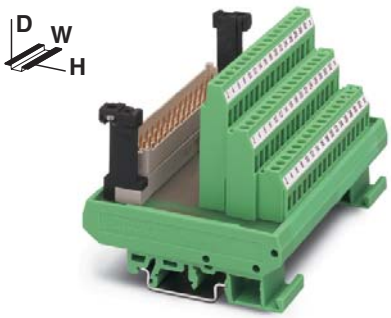
Operating voltage	125 V AC/DC
Max. perm. current (per branch)	1 A
Ambient temperature (operation)	-20°C ... 50°C
Mounting position	Any
Standards / regulations	IEC 60664, DIN EN 50178, IEC 62103
Connection data solid / stranded / AWG	0.2 - 4 mm² / 0.2 - 2.5 mm² / 24 - 12
Dimensions H / D	77 mm / 72 mm

Ordering data

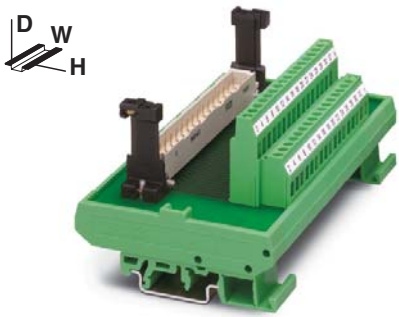
Description	No. of poles	Module width W	Type	Order No.	Pcs. / Pkt.
VARIOFACE module, C 64-pos., screw-on cable housing, with:					
- Male connector	64	135.00	**UMKS- C64M-VS**	**2970565**	1
VARIOFACE module, E 48-pos., screw-on cable housing, with:					
- Male connector	48	123.80			
VARIOFACE module, F 48-pos., screw-on cable housing, with:					
- Male connector	48	112.50			
VARIOFACE module, F 48-pos., snap-on cable housing, with:					
- Male connector	48	112.50			
VARIOFACE module, D 32-pos., screw-on cable housing, with:					
- Male connector	32	135.00			



Design E, 48-position, a, c, e assembled



Design F, 48-position, z, b, d assembled



Design D, 32-position, a, c assembled

Technical data

125 V AC/DC
4 A
-20°C ... 50°C
Any
IEC 60664, DIN EN 50178, IEC 62103
0.2 - 4 mm² / 0.2 - 2.5 mm² / 24 - 12
77 mm / 72 mm

Ordering data

Type	Order No.	Pcs. / Pkt.
UMKS- E48M-VS	2970154	1

Technical data

250 V AC
4 A
-20°C ... 45°C
Any
IEC 60664, DIN EN 50178, IEC 62103
0.2 - 4 mm² / 0.2 - 2.5 mm² / 24 - 12
77 mm / 72 mm

Ordering data

Type	Order No.	Pcs. / Pkt.
UMKS- F48M-VS	2970714	1
UMKS- F48M-VR	2970167	1

Technical data

250 V AC/DC
2 A
-20°C ... 50°C
Any
IEC 60664, DIN EN 50178, IEC 62103
0.2 - 4 mm² / 0.2 - 2.5 mm² / 24 - 12
77 mm / 62.5 mm

Ordering data

Type	Order No.	Pcs. / Pkt.
UMK- D32M-VS	2970060	1

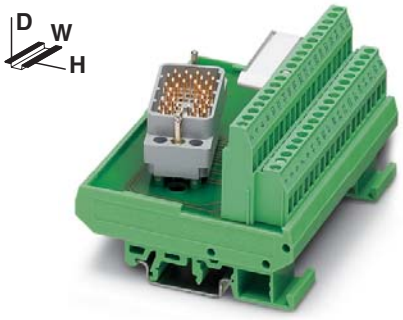
Modules for ELCO connectors

These modules can be used to connect ELCO plug connectors of the 8016 series to screw connection terminal blocks.

The diagonal position of the ELCO plug connector means that the wires leading out of the cable housing at the side can be led away without restricting neighboring modules.

Notes:

Dimensional drawings and pin assignments, see page 336.



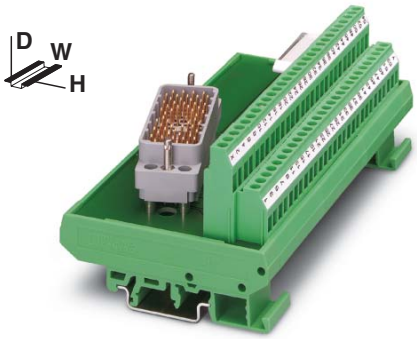
38-pos.

Technical data

Operating voltage	25 V AC / 60 V DC
Max. perm. current (per branch)	1.5 A
Total current	19 A (38 branches with 0.5 A each)
Ambient temperature (operation)	-20°C ... 40°C
Mounting position	Any
Standards / regulations	IEC 60664, DIN EN 50178, IEC 62103
Connection data solid / stranded / AWG	0.2 - 4 mm^2 / 0.2 - 2.5 mm^2 / 24 - 12
Dimensions H / D	77 mm / 58.5 mm

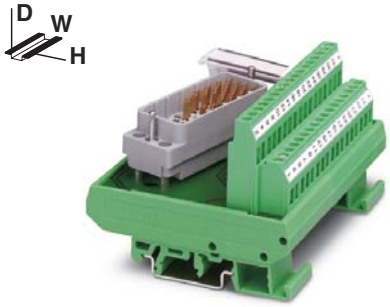
Ordering data

Description	No. of poles	Module width W	Type	Order No.	Pcs. / Pkt.
VARIOFACE module, with:					
- Pin strip 8016 right	38	101.50	**UMK- EC38/38-XOR**	**2976297**	1
- Pin strip 8016 left	38	101.50	**UMK- EC38/38-XOL**	**2976284**	1
VARIOFACE module, with:					
- Pin strip 8016 right	56	157.50			
- Pin strip 8016 left	56	157.50			
VARIOFACE module, with:					
- Pin strip 8016 right	56	77.00			
- Pin strip 8016 left	56	77.00			
VARIOFACE module, with:					
- Pin strip 8016 right above	32	101.30			
- Pin strip 8016 right below	32	101.30			
- Pin strip 8016 left above	32	101.30			
- Pin strip 8016 left below	32	101.30			



56-pos.

56-pos.,
with front connection terminal blocks



32-pos.

Technical data

125 V AC/DC
1.5 A
28 A (56 branches with 0.5 A each)
-20°C ... 50°C
Any
IEC 60664, DIN EN 50178, IEC 62103
0.2 - 4 mm² / 0.2 - 2.5 mm² / 24 - 12
77 mm / 58.5 mm

Ordering data

Type	Order No.	Pcs. / Pkt.
UMK- EC56/56-XOR	**2975900**	1
UMK- EC56/56-XOL	**2975890**	1

Technical data

< 25 V AC / 30 V DC
1.5 A
28 A (56 branches with 0.5 A each)
-20°C ... 50°C
Any
IEC 60664, DIN EN 50178, IEC 62103
0.2 - 2.5 mm² / 0.2 - 1.5 mm² / 26 - 16
146.3 mm / 47.5 mm

Ordering data

Type	Order No.	Pcs. / Pkt.
UMK- EC56/FRONT 2,5V/R	**2976161**	1
UMK- EC56/FRONT 2,5V/L	**2976158**	1

Technical data

25 V AC / 60 V DC
2 A
32 A (32 branches with 1 A each)
-20°C ... 40°C
Any
IEC 60664, DIN EN 50178, IEC 62103
0.2 - 4 mm² / 0.2 - 2.5 mm² / 24 - 12
77 mm / 58.5 mm

Ordering data

Type	Order No.	Pcs. / Pkt.
UMK- EC56/32-XOR	**2975858**	1
UMK- EC56/32-XUR	**2975777**	1
UMK- EC56/32-XOL	**2975764**	1
UMK- EC56/32-XUL	**2975780**	1

Modules for ELCO connectors for use in Ex i circuits

The VARIOFACE modules connect ELCO connectors of the 8016 series to screw connection terminal blocks. The modules for ELCO connectors can be used as simple electrical equipment for applications in intrinsically safe circuits as per EN 60079-14. They fulfill the requirements of the intrinsic safety as per EN 60079-11 (EN 50020) and can be used for various intrinsically safe circuits taking into account the pin configuration.

The voltage of an intrinsically safe circuit may not exceed 30 V. The voltage difference between two intrinsically safe circuits can be up to 60 V.

The modules are equipped with blue screw connection terminal blocks in order to clearly label intrinsically safe circuits.

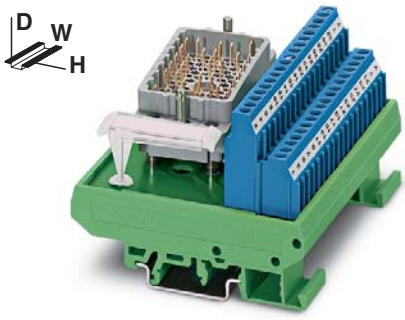
The arrangement of angled ELCO connectors makes it possible to lead the lines led out from the cable housing away from the adjacent modules without any negative effects.

For the disconnection of intrinsically safe and non-intrinsically safe circuits, a distance of at least 50 mm should be kept between the connection points using partition plates or spaces.

Notes:

Dimensional drawings and pin assignments, see page 337.

Facts about explosion protection, see page 432.



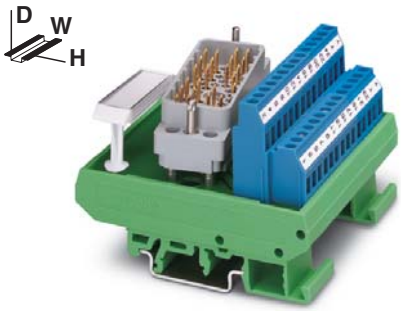
32-pos.

Technical data

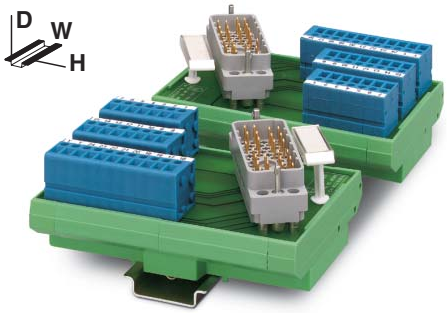
Operating voltage	Max. 30 V DC (max. voltage between two intrinsically safe circuits: 60 V DC)
Max. perm. current (per branch)	500 mA
Ambient temperature (operation)	-20°C ... 50°C
Mounting position	Any
Standards / regulations	
Connection data solid / stranded / AWG	0.2 - 4 mm^2 / 0.2 - 2.5 mm^2 / 24 - 12
Dimensions H / D	77 mm / 58.5 mm

Ordering data

Description	No. of poles	Module width W	Type	Order No.	Pcs. / Pkt.
VARIOFACE module, with:					
- Pin strip 8016 right above	32	101.30	**UMK- EC90/32/EX-XOR**	**2900109**	1
- Pin strip 8016 right below	32	101.30	**UMK- EC90/32/EX-XUR**	**2969068**	1
- Pin strip 8016 left above	32	101.30	**UMK- EC90/32/EX-XOL**	**2900110**	1
- Pin strip 8016 left above	32	101.30	**UMK- EC90/32/EX-XUL**	**2969071**	1
VARIOFACE module, with:					
- Pin strip 8016 right	25	78.80			
- Pin strip 8016 left	25	78.80			
VARIOFACE module, with:					
- Pin strip 8016 right	25	77.00			
- Pin strip 8016 left	25	77.00			



25-pos.



25-pos.,
with front connection terminal blocks

Technical data

Max. 30 V DC (max. voltage between two intrinsically safe circuits: 60 V DC)
500 mA
-20°C ... 50°C
Any

0.2 - 4 mm² / 0.2 - 2.5 mm² / 24 - 12
77 mm / 58.5 mm

Ordering data

Type	Order No.	Pcs. / Pkt.
UMK- EC56/25/EX -R	**2900112**	1
UMK- EC56/25/EX -L	**2900113**	1

Technical data

Max. 30 V DC (max. voltage between two intrinsically safe circuits: 60 V DC)
500 mA
-20°C ... 50°C
Any

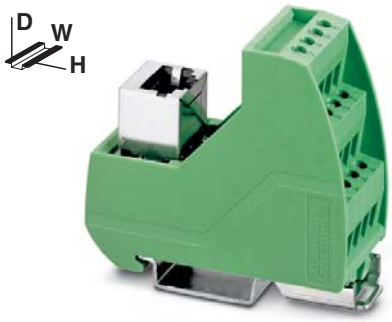
0.2 - 2.5 mm² / 0.2 - 2.5 mm² / 24 - 14
112.5 mm / 52.5 mm

Ordering data

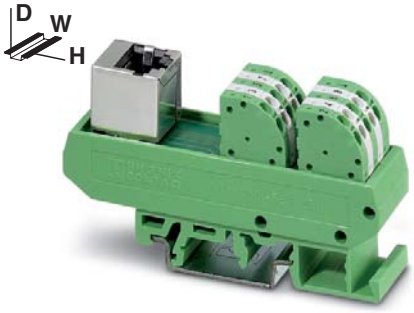
Type	Order No.	Pcs. / Pkt.
UMK- EC56/25/EX -FRONT 2,5V/R	**2900114**	1
UMK- EC56/25/EX -FRONT 2,5V/L	**2900115**	1

Modules with RJ45 connector

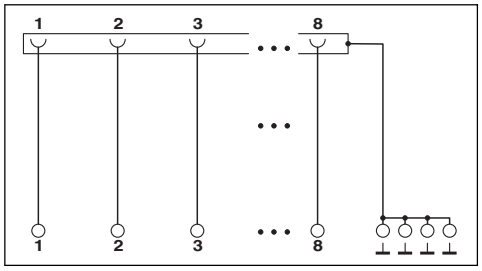
- 1:1 connection
- 8 positions, RJ45 connector
- Screw or spring-cage connection (direct plug-in method)
- Connector housing led to separate connection terminal blocks

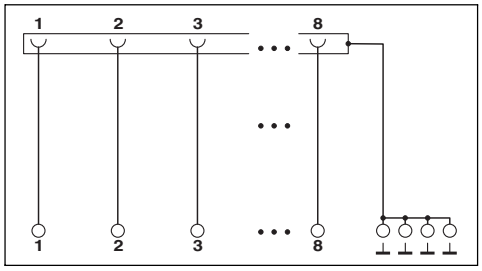


8 positions with screw connection



8 positions with spring-cage connection





Technical data

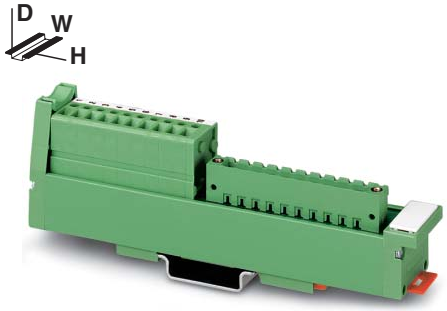
Operating voltage	48 V AC/DC	48 V AC/DC
Max. perm. current (per branch)	1 A	1 A
Ambient temperature (operation)	-20°C ... 50°C	-20°C ... 50°C
Mounting position	Any	Any
Standards / regulations	DIN EN 50178	DIN EN 50178
Connection data solid / stranded / AWG	0.2 - 4 mm^2 / 0.2 - 2.5 mm^2 / 24 - 12	0.2 - 1.5 mm^2 / 0.2 - 1.5 mm^2 / 24 - 16
Dimensions H / D	62 mm / 69 mm	91 mm / 51 mm

Ordering data

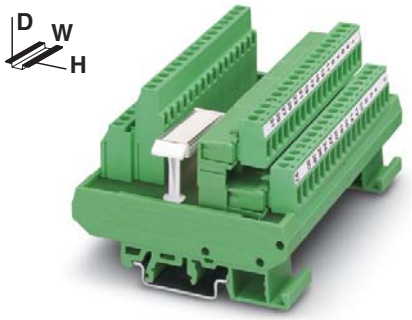
Description	No. of poles	Module width W	Type	Order No.	Pcs. / Pkt.
VARIOFACE module, with RJ45 connector and screw connection terminal blocks					
RJ45	8	26.90	**VIP-3/SC/RJ45**	**2900701**	1
VARIOFACE module, with RJ45 connector and spring-cage connection (direct plug-in method)					
	8	25.00	**UMK-RJ45/S/8PTDA**	**2900682**	1

Modules with COMBICON connection

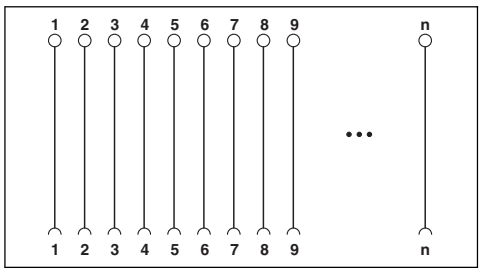
– The slim 10 and 18-pos. VARIOFACE SLIM-LINE modules connect the front connection terminal blocks to a COMBICON header. The corresponding COMBICON connectors (5.0 mm pitch) can be found in the COMBICON catalog PCB Connection Technique.
– The 32-pos. module UMK-32 MDSTB/MKKDS 3/R connects screw connection terminal blocks with coded COMBICON plug-in screw connectors.

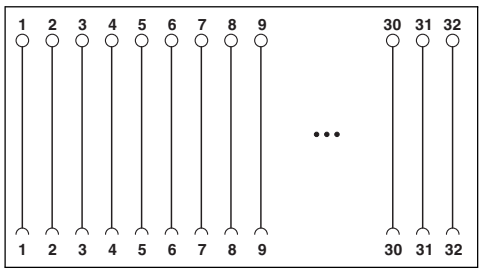


10 and 18-pos.
with screw connection



32-pos.
with screw connection





		Technical data	Technical data
Operating voltage		250 V AC/DC	250 V AC/DC
Max. perm. current (per branch)		2.5 A	3 A
Ambient temperature (operation)		-10°C ... 50°C	-20°C ... 50°C
Mounting position		Any	Any
Standards / regulations		IEC 60664, DIN EN 50178, IEC 62103	IEC 60664, DIN EN 50178, IEC 62103
Dimensions	D / W	45 mm / 25 mm	58.5 mm / 112.5 mm

Description	No. of poles	Module height H	Ordering data: Type	Order No.	Pcs. / Pkt.	Ordering data: Type	Order No.	Pcs. / Pkt.
VARIOFACE-SLIM-LINE module, with a COMBICON header (without a COMBICON connector)								
	10	137.00	**UM 25-10 MSTB/FRONT/Q**	**2959803**	1			
	18	217.00	**UM 25-18 MSTB/FRONT/Q**	**2959502**	1			
VARIOFACE module,with COMBICON plug connector, coded								
	32	77.00				**UMK-32 MDSTB/MKKDS3/R**	**2970196**	1

Modules as compact potential distributors

The VIP-2/SC/PDM... modules have the following features:
– Two potential levels
– Separate supply
– Consecutive labeling

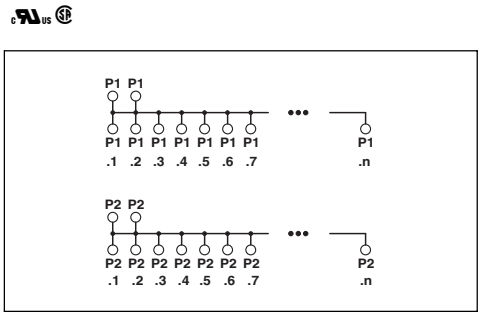
The modules UMK-PVB and UMK-PVB 6 have three or six potential levels.

The modules UMK-PVB 2/.../ZFKDS are available as a variant with spring-cage connection.

Notes:

For marking systems and mounting material, see CLIPLINE catalog, part 2.

With screw connection and 2 potential levels



Technical data

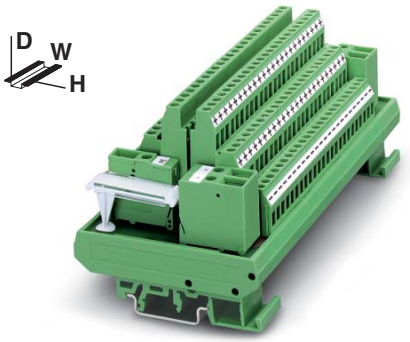
Operating voltage	250 V AC/DC
Max. perm. current (per branch)	15 A
Total current	30 A (per potential)
Ambient temperature (operation)	-20°C ... 50°C
Mounting position	Any
Standards / regulations	IEC 60664, DIN EN 50178, IEC 62103
Supply connection data solid / stranded / AWG	0.2 - 6 mm² / 0.2 - 4 mm² / 24 - 10
Distribution connection data solid / stranded / AWG	0.2 - 4 mm² / 0.2 - 2.5 mm² / 24 - 12
Dimensions H / D	65.5 mm / 50 mm

Ordering data

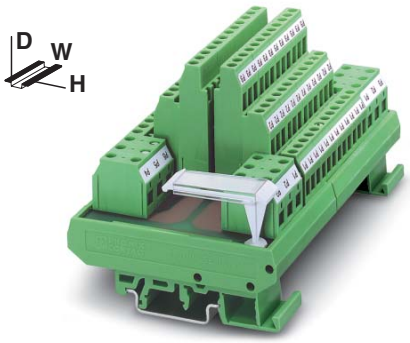
Description	No. of poles	Module width W	Type	Order No.	Pcs. / Pkt.
VARIOFACE module, with two busbars (P1, P2) for potential distribution, per potential:					
2 power terminal blocks/8 distributor terminal blocks		50.00	**VIP-2/SC/PDM-2/16**	**2315256**	1
2 power terminal blocks/12 distributor terminal blocks		70.40	**VIP-2/SC/PDM-2/24**	**2315269**	1
2 power terminal blocks/16 distributor terminal blocks		90.80	**VIP-2/SC/PDM-2/32**	**2315272**	1
VARIOFACE module, with three busbars (+, -, PE) for potential distribution, per potential: (+) two power terminal blocks/48 distributor terminal blocks (-) two power terminal blocks/24 distributor terminal blocks (PE) 2 power/72 distributor terminal blocks		168.80			
VARIOFACE module, with six busbars (P1 to P6) for potential distribution, per potential:					
2 power terminal blocks/12 distributor terminal blocks		123.80			
VARIOFACE module, with two busbars (P1, P2) for potential distribution, per potential:					
2 power terminal blocks/8 distributor terminal blocks		45.00			
2 power terminal blocks/12 distributor terminal blocks		67.50			
2 power terminal blocks/16 distributor terminal blocks		90.00			
2 power terminal blocks/24 distributor terminal blocks		135.00			

Accessories

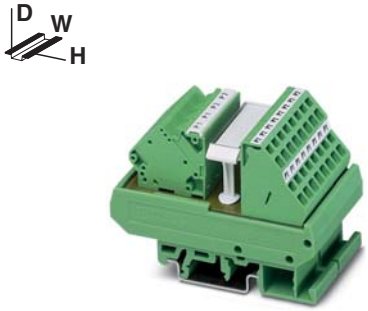
Screwdriver Blade: 0,6 x 3.5 x 100 mm, length: 181 mm			



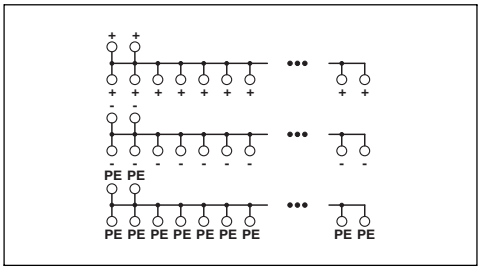
With screw connection and 3 potential levels

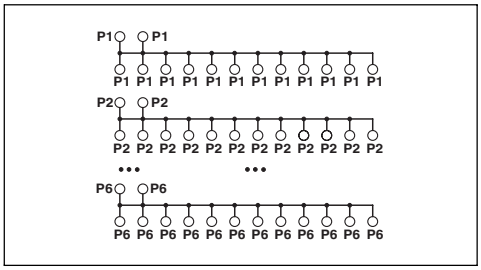


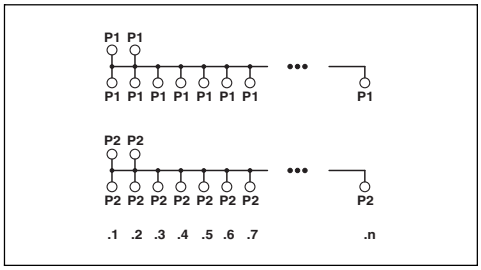
With screw connection and 6 potential levels



With spring-cage connection and 2 potential levels







Technical data

250 V AC/DC
16 A
16 A (per potential)
-20°C ... 50°C
Any
IEC 60664, DIN EN 50178, IEC 62103
0.5 - 6 mm² / 0.5 - 4 mm² / 20 - 10

0.2 - 4 mm² / 0.2 - 2.5 mm² / 24 - 12

77 mm / 72 mm

Ordering data

Type	Order No.	Pcs. / Pkt.
UMK- PVB	2971302	1

Accessories

Technical data

250 V AC/DC
16 A
16 A (per potential)
-20°C ... 50°C
Any
IEC 60664, DIN EN 50178, IEC 62103
0.2 - 6 mm² / 0.2 - 4 mm² / 24 - 10

0.2 - 4 mm² / 0.2 - 2.5 mm² / 24 - 12

77 mm / 72 mm

Ordering data

Type	Order No.	Pcs. / Pkt.
UMK- PVB 6	2972136	1

Accessories

Technical data

250 V AC/DC
17 A
32 A (per potential)
-20°C ... 50°C
Any

0.2 - 6 mm² / 0.2 - 4 mm² / 24 - 10

0.2 - 4 mm² / 0.2 - 2.5 mm² / 24 - 12

77 mm / 52 mm

Ordering data

Type	Order No.	Pcs. / Pkt.
UMK- PVB 2/16/ZFKDS	2302353	1
UMK- PVB 2/24/ZFKDS	2302366	1
UMK- PVB 2/32/ZFKDS	2302379	1
UMK- PVB 2/48/ZFKDS	2302382	1

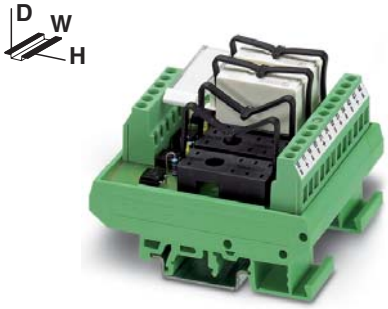
Accessories

SZF 1-0,6X3,5	1204517	10

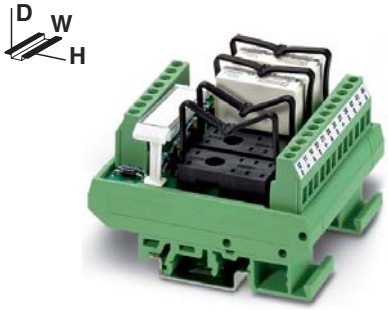
VARIOFACE modules for pluggable miniature relays and/or miniature solid-state relays

The 4, 8, and 16-way relay and solid-state relay interfaces UMK-... RM provide four, eight or 16 slots for commercially available electromechanical relays (REL-MR...) or optoelectronic relays (SIM-EI...). The connections between the I/O module and the electronics, as well as the process cabling, are implemented via screw connection terminal blocks.

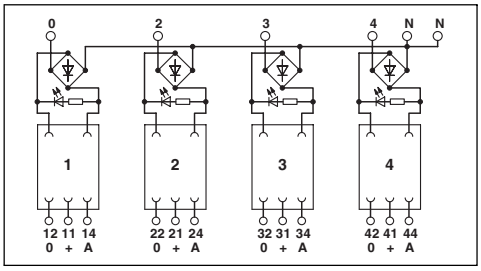
Notes:
For the protection of relay coils and contacts, inductive loads must be dampened with an efficient protective circuit.
Other input voltages on request.
[1]) Not with 230 V AC.
[2]) With 230 V AC glow lamp.
[3]) With 100 V DC and 230 V AC glow lamp.

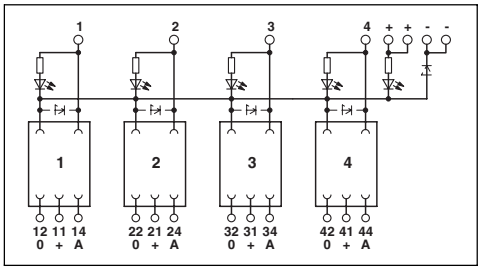


4-channel with bridge rectifier



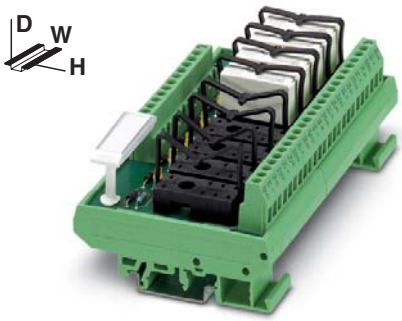
4-channel for relays with a PDT contact



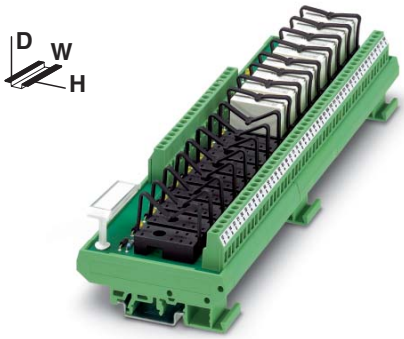


	Technical data	Technical data
Coil side		
Tolerance of the input voltage	±10%	±10%
Input circuit	Bridge rectifier	Free-wheeling diode, protection against polarity reversal
Operating voltage display	-	Yellow LED[1])
Status display/channel	Yellow LED	Yellow LED[2])
Connection method	Screw connection	Screw connection
Connection data solid / stranded / AWG	0.2 ... 4 mm² / 0.2 ... 2.5 mm² / 24 - 12	0.2 ... 4 mm² / 0.2 ... 2.5 mm² / 24 - 24
Contact side		
Contact type	1 PDT	1 PDT
Max. switching voltage	250 V AC/DC	250 V AC/DC
Limiting continuous current	6 A	5 A (optocoupler-dependent)
Connection method	Screw connection	Screw connection
Connection data solid / stranded / AWG	0.2 ... 4 mm² / 0.2 ... 2.5 mm² / 24 - 12	0.2 ... 4 mm² / 0.2 ... 2.5 mm² / 24 - 12
General data		
Test voltage	2.5 kV (50 Hz, 1 min.)	2.5 kV (50 Hz, 1 min.)
Ambient temperature (operation)	-20°C ... 50°C	-20°C ... 50°C
Standards / regulations	DIN VDE 0110	DIN VDE 0110
Mounting position	Any	Any
Dimensions W / H / D	67.5 mm / 77 mm / 59 mm	67.5 mm / 77 mm / 59 mm

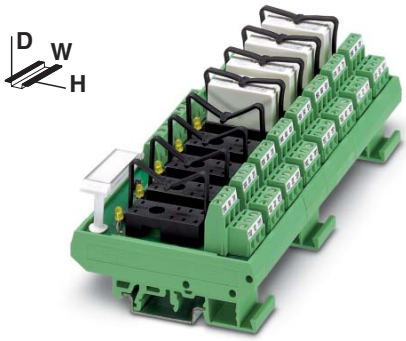
Description	Input voltage	Ordering data: Type	Order No.	Pcs. / Pkt.	Ordering data: Type	Order No.	Pcs. / Pkt.
VARIOFACE module, for four pluggable miniature relays or miniature solid-state relays, with light indicator (without relays)							
	24 V AC/DC	**UMK- 4 RM 24**	**2971344**	1			
VARIOFACE module, for pluggable miniature relays or miniature solid-state relays, with light indicator (without relay)							
	5 V DC				**UMK- 4 RM 5DC**	**2972819**	1
	12 V DC				**UMK- 4 RM 12DC**	**2972822**	1
	24 V DC				**UMK- 4 RM 24DC**	**2972835**	1
	48 V DC				**UMK- 4 RM 60DC**	**2972851**	1
	110 V DC				**UMK- 4 RM110DC**	**2972864**	1
	230 V AC				**UMK- 4 RM230AC**	**2972880**	1



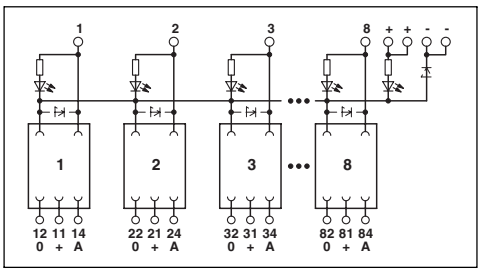
8-channel for relays with a PDT contact

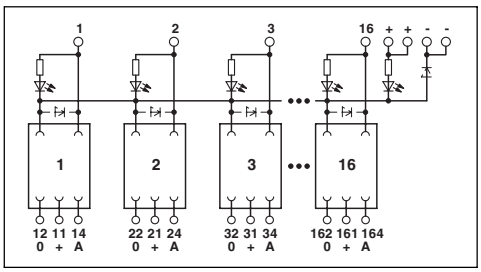


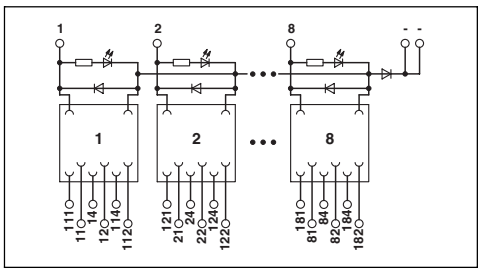
16-channel for relays with a PDT contact



8-channel for relays with two PDT contacts







Technical data

	±10%
	Free-wheeling diode, protection against polarity reversal
	Yellow LED[3])
	Yellow LED[3])
	Screw connection
	0.2 ... 4 mm² / 0.2 ... 2.5 mm² / 24 - 24
	1 PDT
	250 V AC
	5 A
	Screw connection
	0.2 ... 4 mm² / 0.2 ... 2.5 mm² / 24 - 12
	2.5 kV (50 Hz, 1 min.)
	-20°C ... 50°C
	DIN VDE 0110
	Any
	135 mm / 77 mm / 59 mm

Ordering data

Type	Order No.	Pcs. / Pkt.
UMK- 8 RM 5DC/MKDS	2972893	1
UMK- 8 RM 12DC/MKDS	2972903	1
UMK- 8 RM24DC/MKDS	2972916	1
UMK- 8 RM 60DC/MKDS	2972932	1
UMK- 8 RM110DC/MKDS	2972945	1
UMK- 8 RM230AC/MKDS	2972961	1

Technical data

	±10%
	Free-wheeling diode, protection against polarity reversal
	Yellow LED[2])
	Yellow LED[2])
	Screw connection
	0.2 ... 4 mm² / 0.2 ... 2.5 mm² / 24 - 24
	1 PDT
	250 V AC
	5 A
	Screw connection
	0.2 ... 4 mm² / 0.2 ... 2.5 mm² / 24 - 12
	2.5 kV (50 Hz, 1 min.)
	-20°C ... 50°C
	DIN VDE 0110
	Any
	259 mm / 77 mm / 59 mm

Ordering data

Type	Order No.	Pcs. / Pkt.
UMK-16 RM 5DC/MKDS	2972974	1
UMK-16 RM 12DC/MKDS	2972987	1
UMK-16 RM 24DC/MKDS	2972990	1
UMK-16 RM 60DC/MKDS	2973038	1
UMK-16 RM110DC/MKDS	2973041	1
UMK-16 RM230AC/MKDS	2973067	1

Technical data

	±10%
	Free-wheeling diode, protection against polarity reversal
	-
	Yellow LED
	Screw connection
	0.14 ... 1.5 mm² / 0.14 ... 1.5 mm² / 26 - 26
	2 PDT
	250 V AC
	5 A
	Screw connection
	0.14 ... 1.5 mm² / 0.14 ... 1.5 mm² / 26 - 14
	2.5 kV (50 Hz, 1 min.)
	-20°C ... 50°C
	DIN VDE 0110
	Any
	168.8 mm / 77 mm / 59 mm

Ordering data

Type	Order No.	Pcs. / Pkt.
UMK- 8 RELS/KSR-24/21/21	2975722	1

VARIOFACE modules as interface for pluggable solid-state relays or digital I/O modules

The 1, 4, 8 or 16-time INTERFACE modules are the wiring interface and the coupling level in one unit. The connection to the interface module is established using screw connection technology.

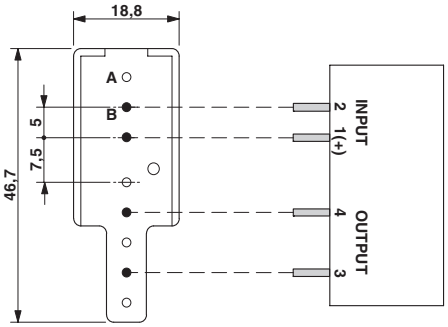
Properties of the single interface:

- Status indicator
- Protection against polarity reversal in input
- Surge protection in input
- Assembly option with solid-state relay for loads up to 350 V DC/1 A or 480 V AC/5 A

Properties of the 4, 8, and 16-time interfaces:

- Status indicator
- Integrated fuse for line protection
- Assembly option with solid-state relay or I/O modules

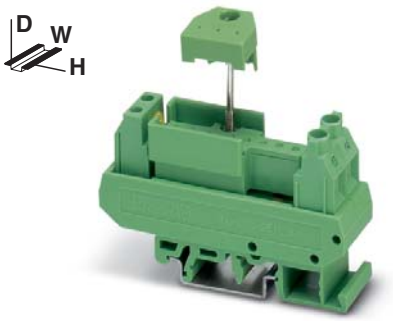
Notes:
Type of housing: Polyamide PA non-reinforced, color: Green.
For marking systems and mounting material, see CLIPLINE catalog, part 2.
For the protection of relay coils and contacts, inductive loads must be dampened with an efficient protective circuit.
Solid-state relays, see page 332.



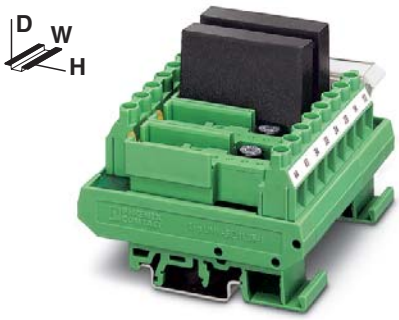
A = without metal
B = with metal

Input data	
Input voltage range	
Input circuit	
Status display/channel	
Connection method	
Connection data solid / stranded / AWG	
Output data	
Connection method	
Connection data solid / stranded / AWG	
General data	
Ambient temperature (operation)	
Standards / regulations	
Mounting position	
Mounting	
Dimensions	H / D

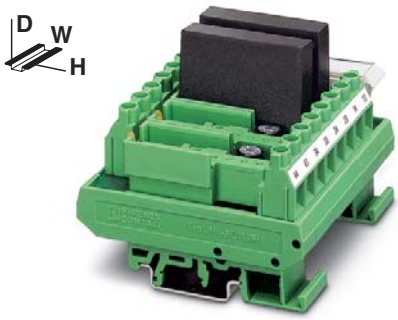
Description	Module width W
Interface module, with plug-in base for one solid-state relay, with locking clip	22.5
Interface module, with plug-in base for four solid-state relays, with locking clip Microfuse: 250 V, 4 A	90
Interface module, with plug-in base for eight digital I/O modules. Microfuse: 250 V, 4 A	180
Interface module, with plug-in base for eight solid-state relays, with locking clip Microfuse: 250 V, 4 A	180
Interface module, with plug-in base for 16 digital I/O modules. Microfuse: 250 V, 4 A	326.5
Interface module, with plug-in base for 16 solid-state relays, with locking clip Microfuse: 250 V, 4 A	326.5



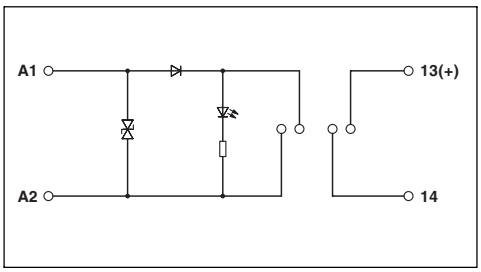
With light indicator

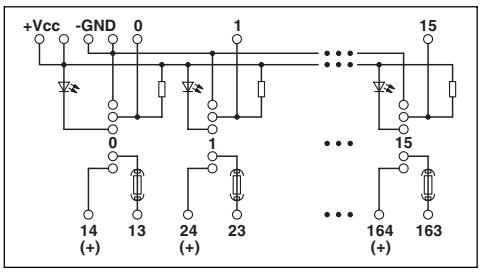


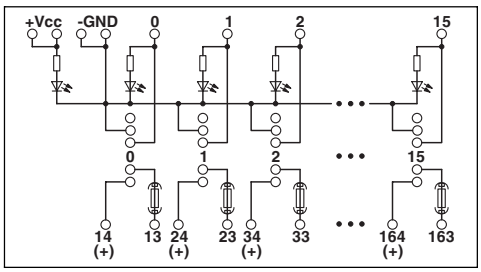
With light indicator and fuse, control logic negative switching



With light indicator and fuse, control logic positive switching







Technical data

4 V ... 32 V
Protection against polarity reversal, surge protection
Yellow LED
Screw connection
0.2 ... 4 mm² / 0.2 ... 2.5 mm² / 24 - 12

Screw connection
0.2 ... 6 mm² / 0.2 ... 4 mm² / 24 - 10

-20°C ... 60°C
DIN EN 50178

Any
In rows with zero spacing
77 mm / 72 mm

Technical data

4 V ... 32 V

Yellow LED
Screw connection
0.2 ... 4 mm² / 0.2 ... 2.5 mm² / 24 - 24

Screw connection
0.2 ... 6 mm² / 0.2 ... 4 mm² / 24 - 10

-20°C ... 55°C
DIN VDE 0110b, Gr. C for 250 V DC, DIN VDE 0160 (in relevant parts)
Any
In rows with zero spacing
77 mm / 72 mm

Technical data

4 V ... 32 V

Yellow LED
Screw connection
0.2 ... 4 mm² / 0.2 ... 2.5 mm² / 24 - 24

Screw connection
0.2 ... 6 mm² / 0.2 ... 4 mm² / 24 - 10

-20°C ... 55°C
DIN VDE 0110b, Gr. C for 250 V DC, DIN VDE 0160 (in relevant parts)
Any
In rows with zero spacing
77 mm / 72 mm

Ordering data

Type	Order No.	Pcs. / Pkt.
UMK- 1 OM-R/AMS	2983002	1

Ordering data

Type	Order No.	Pcs. / Pkt.
UMK- 4 OM-R/MF	2970882	1
UMK- 8 OM/MF/MKDS	2972712	1
UMK- 8 OM-R/MF/MKDS	2972738	1
UMK-16 OM/MF/MKDS	2972754	1
UMK-16 OM-R/MF/MKDS	2972770	1

Ordering data

Type	Order No.	Pcs. / Pkt.
UMK- 4 OM-R/MF/P	2972673	1
UMK- 8 OM-R/MF/MKDS/P	2972699	1
UMK-16 OM-R/MF/MKDS/P	2972796	1

Miniature relay REL-MR

The robust relays are used as interface relays throughout process and production engineering.

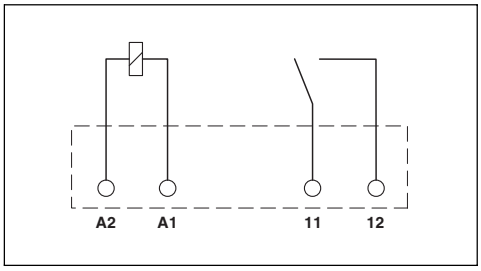
The main features of these relays are their compact design, reliable electrical isolation, and compliance with the most important standards, as well as the number of variants.

Notes:

If the specified maximum values for multi-layer contact relays are exceeded, the gold plating is destroyed. The maximum values of the power contact relay are then valid. This can result in a shorter service life than with a pure power contact.

For diagrams of operating voltage ranges, see page 104.

Pluggable miniature relay
1 N/O contact (1)



Technical data

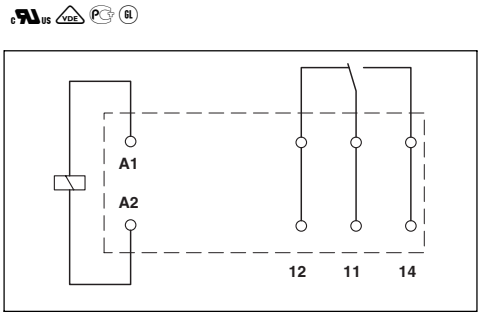
Input data		②
Permissible range (with reference to U_N)		-
Permissible range (with reference to U_N)		0.8 - 1.1
Typ. input current at U_N	[mA]	5
Typ. response time at U_N	[ms]	5
Typ. response time at U_N (depending on phase relation)	[ms]	
Typ. release time at U_N	[ms]	2
Typ. release time at U_N (depending on phase relation)	[ms]	
Output data		
Contact type		Double contact, 1 N/O contact
Contact material		AgNi 90/10, + 5 µm hard gold-plated
Max. switching voltage		250 V AC / 125 V DC
Min. switching voltage		5 V DC
Limiting continuous current		3 A
Max. inrush current		5 A
Max. interrupting rating, ohmic load	250 V AC	-
General data		
Test voltage (winding / contact)		2 kV AC (50 Hz, 1 min.)
Test voltage (contact / contact)		-
Ambient temperature (operation)		-40°C ... 85°C
Nominal operating mode		100% operating factor
Mechanical service life		Approx. 2 x 10^7 cycles
Standards / regulations		DIN VDE 0110, IEC 255 / DIN VDE 0435 (in relevant parts)
Mounting position / mounting		Any
Dimensions	W / H / D	5 mm / 23 mm / 17 mm

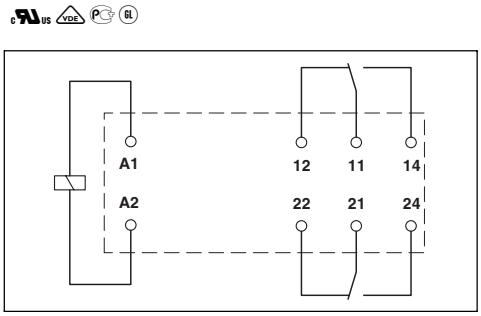
Ordering data

Description		Input voltage U_N	Type	Order No.	Pcs. / Pkt.
Pluggable miniature relays					
with power contact	①	12 V DC			
with power contact	②	24 V DC	**REL-MR-G 24/1**	**2961037**	8
with power contact	③	48 V DC			
with power contact	④	60 V DC			
with power contact	⑤	110 V DC			
with power contact	⑥	230 V AC			
Pluggable miniature relays					
with gold contact	①	12 V DC			
with gold contact	②	24 V DC			
with gold contact	③	48 V DC			
with gold contact	④	60 V DC			
with gold contact	⑤	110 V DC			
with gold contact	⑥	230 V AC			

1 PDT, for high continuous currents

2 PDT





Technical data

①	②	③	④	⑤	⑥
Refer to the diagram					
33	17	8.7	8.2	4.1	3
7	7	7	7	7	
					3 - 12
3	3	3	3	3	
					2 - 9

Single contact, 1 PDT	Single contact, 1 PDT
AgNi	AgNi, hard gold-plated
250 V AC/DC	30 V AC / 36 V DC
12 V (at 10 mA)	100 mV (at 10 mA)
16 A	50 mA
30 A (300 ms)	50 mA
4000 VA	-

5 kV AC (50 Hz, 1 min.)
-
-40°C ... 85°C
100% operating factor
3 x 10^7 cycles
IEC 60664, EN 50178, IEC 62103

Any / can be aligned without spacing (> 70°C ≥ 2.5 mm)

12.7 mm / 29 mm / 15.7 mm

Ordering data

Type	Order No.	Pcs. / Pkt.
REL-MR- 12DC/21HC	**2961309**	10
REL-MR- 24DC/21HC	**2961312**	10
REL-MR- 48DC/21HC	**2834821**	10
REL-MR- 60DC/21HC	**2961325**	10
REL-MR-110DC/21HC	**2961338**	10
REL-MR-230AC/21HC	**2961422**	10
REL-MR- 12DC/21HC AU	**2961532**	10
REL-MR- 24DC/21HC AU	**2961545**	10
REL-MR-110DC/21HC AU	**2961561**	10
REL-MR-230AC/21HC AU	**2961529**	10

Technical data

①	②	③	④	⑤	⑥
Refer to the diagram					
33	17	8.7	8.2	4.1	3
7	7	7	7	7	
					3 - 12
3	3	3	3	3	
					2 - 9

Single contact, 2 PDT	Single contact, 2 PDT
AgNi	AgNi, hard gold-plated
250 V AC/DC	30 V AC / 36 V DC
5 V (at 10 mA)	100 mV (at 10 mA)
8 A	50 mA
15 A (300 ms)	50 mA
2000 VA	-

5 kV AC (50 Hz, 1 min.)
2.5 kV AC (50 Hz, 1 min.)
-40°C ... 85°C
100% operating factor
3 x 10^7 cycles
IEC 60664, EN 50178, IEC 62103

Any / can be aligned without spacing (> 70°C ≥ 2.5 mm)

12.7 mm / 29 mm / 15.7 mm

Ordering data

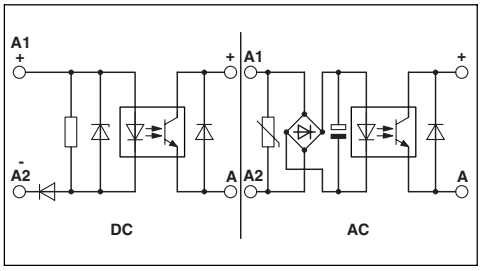
Type	Order No.	Pcs. / Pkt.
REL-MR- 12DC/21-21	**2961257**	10
REL-MR- 24DC/21-21	**2961192**	10
REL-MR- 48DC/21-21	**2834834**	10
REL-MR- 60DC/21-21	**2961273**	10
REL-MR-110DC/21-21	**2961202**	10
REL-MR-230AC/21-21	**2961451**	10
REL-MR- 12DC/21-21AU	**2961299**	10
REL-MR- 24DC/21-21AU	**2961215**	10
REL-MR- 48DC/21-21AU	**2834847**	10
REL-MR- 60DC/21-21AU	**2961286**	10
REL-MR-110DC/21-21AU	**2961228**	10
REL-MR-230AC/21-21AU	**2961480**	10

Miniature solid-state relay SIM-EI

The SIM-EI miniature solid-state relays have connections compatible with commercially available miniature switching relays and are of the same shape.

The modules are used for floating conditioning of process signals as an alternative to electromechanical relays. Substituting mechanical relays for solid-state ones opens new possibilities for solving interface problems in a user-friendly way. The compatibility of the pins with the mechanical relay permits use of solid-state relays without any changes in the layout. The output of the solid-state relay is "high active" and designed as a 2 or 3-wire output.

With DC voltage output, max. = 100 mA



Technical data

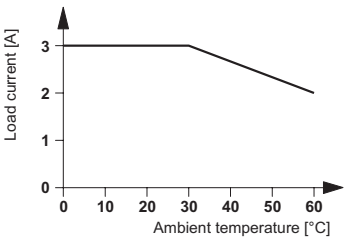
		①	②	③	④	⑤	⑥	⑦	⑧
Input data									
Permissible range (with reference to U_N)		0.9 - 1.1	0.9 - 1.1	0.9 - 1.1	0.9 - 1.1	0.9 - 1.1	0.9 - 1.1	0.9 - 1.1	0.9 - 1.1
Switching level with reference to U_N	1 signal ("H")	≥ 0.8	≥ 0.8	≥ 0.8	≥ 0.8	≥ 0.8	≥ 0.8	≥ 0.8	≥ 0.8
	0 signal ("L")	≤ 0.35	≤ 0.4	≤ 0.4	≤ 0.25	≤ 0.4	≤ 0.4	≤ 0.4	≤ 0.4
Typ. input current at U_N	[mA]	5.4	5.7	5.1	6.8	2.4	2.6	2.1	2.1
Transmission frequency f_{limit}	[Hz]	600	600	600	600	300	300	3	3
Input circuit AC		Protection against polarity reversal, surge protection							
Input circuit DC		Protection against polarity reversal							
Output data									
Operating voltage range		8 V DC ... 48 V DC							
Limiting continuous current		100 mA							
Residual voltage drop at "H"		1 V							
Max. inrush current		-							
Output circuit		2-wire, floating							
Output protection		Protection against polarity reversal							
General data									
Test voltage input/output		2.5 kV (50 Hz, 1 min.)							
Ambient temperature (operation)		-20°C ... 50°C							
Standards / regulations		DIN VDE 0110							
Mounting position / mounting		Any / can be aligned with 2 mm spacing							
Dimensions	W / H / D	13 mm / 29 mm / 25 mm							

Ordering data

Description		Input voltage U_N	Type	Order No.	Pcs. / Pkt.
Solid-state relay, with protective circuit in the input and output circuit					
48 V DC ... 60 V DC	①	5 V DC	**SIM-EI- 5DC/48DC/100**	**2271057**	10
	②	12 V DC	**SIM-EI- 12DC/48DC/100**	**2271060**	10
	③	24 V DC	**SIM-EI- 24DC/48DC/100**	**2271073**	10
	④	60 V DC	**SIM-EI- 60DC/48DC/100**	**2271086**	10
	⑤	110 V DC	**SIM-EI-110DC/48DC/100**	**2271099**	10
	⑥	220 V DC	**SIM-EI-220DC/48DC/100**	**2271109**	10
	⑦	120 V AC	**SIM-EI-120AC/48DC/100**	**2271112**	10
	⑧	230 V AC	**SIM-EI-230AC/48DC/100**	**2271125**	10

Accessories

Plug-in base, for plug-in miniature relays or miniature solid-state relays, for soldering onto the printed circuit board.	**SIM-ERSN**	**2271484**	100
Retaining bracket, for miniature solid-state relay			
- Plastic	**SIM-ERSN-HB-KSR**	**2271468**	10
- Metal	**SIM-ERSN-HB-KSR/MET**	**2271497**	10
Retaining bracket, for miniature relay			
- Plastic	**SIM-ERSN-HB-MR**	**2271471**	10
- Metal	**SIM-ERSN-HB-MR/MET**	**2271510**	10

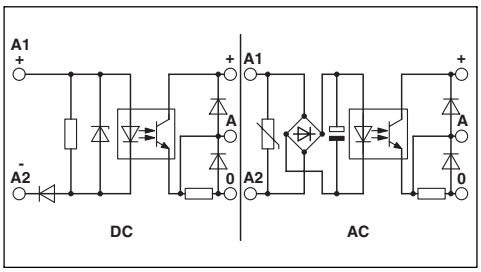


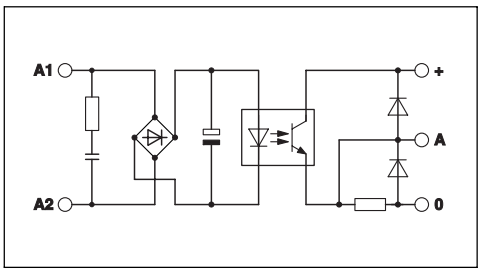
Derating curve for SIM-EI-OV-24 DC/24 DC/3

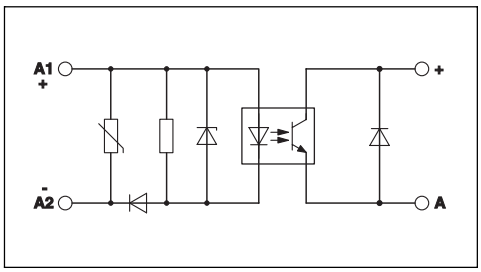
With TTL logic level output, max. = 100 mA

With DC voltage output, max. = 100 mA, RC element in input

With DC voltage output, max. = 3 A







Technical data

①	②	③	④	⑤	⑥	⑦	⑧
0.9 - 1.1	0.9 - 1.1	0.9 - 1.1	0.9 - 1.1	0.9 - 1.1	0.9 - 1.1	0.9 - 1.1	0.9 - 1.1
≥ 0.8	≥ 0.8	≥ 0.8	≥ 0.8	≥ 0.8	≥ 0.8	≥ 0.8	≥ 0.8
≤ 0.35	≤ 0.4	≤ 0.4	≤ 0.25	≤ 0.4	≤ 0.4	≤ 0.4	≤ 0.4
5.4	5.7	5.1	4.7	2.4	2.6	2.1	2.1
4000	4000	4000	4000	1000	1000	3	3

Protection against polarity reversal, surge protection
Protection against polarity reversal

3 V DC ... 5.25 V DC
100 mA
0.3 V
-
3-wire, ground-referenced
Protection against polarity reversal, free running

2.5 kV (50 Hz, 1 min.)
-20°C ... 50°C
DIN VDE 0110
Any / can be aligned with 2 mm spacing
13 mm / 29 mm / 25 mm

Ordering data

Type	Order No.	Pcs. / Pkt.
SIM-EI- 5DC/TTL/100	2271138	10
SIM-EI- 12DC/TTL/100	2271141	10
SIM-EI- 24DC/TTL/100	2271154	10
SIM-EI- 60DC/TTL/100	2271167	10
SIM-EI-110DC/TTL/100	2271170	10
SIM-EI-220DC/TTL/100	2271183	10
SIM-EI-120AC/TTL/100	2271196	10
SIM-EI-230AC/TTL/100	2271206	10

Accessories

SIM-ERSN	2271484	100
SIM-ERSN-HB-KSR	2271468	10
SIM-ERSN-HB-KSR/MET	2271497	10
SIM-ERSN-HB-MR	2271471	10
SIM-ERSN-HB-MR/MET	2271510	10

Technical data

⑦	⑧
0.9 - 1.1	0.9 - 1.1
≥ 0.8	≥ 0.8
≤ 0.4	≤ 0.4
2.2	2.5
3	3

RC element

8 V DC ... 48 V DC
100 mA
1 V
-
2-wire, floating
Protection against polarity reversal

2.5 kV (50 Hz, 1 min.)
-20°C ... 50°C
DIN VDE 0110
Any / can be aligned with 2 mm spacing
13 mm / 29 mm / 25 mm

Ordering data

Type	Order No.	Pcs. / Pkt.
SIM-EI-120AC/48DC/100/RC	2271439	10
SIM-EI-230AC/48DC/100/RC	2271426	10

Accessories

SIM-ERSN	2271484	100
SIM-ERSN-HB-KSR	2271468	10
SIM-ERSN-HB-KSR/MET	2271497	10
SIM-ERSN-HB-MR	2271471	10
SIM-ERSN-HB-MR/MET	2271510	10

Technical data

③
0.8 - 1.2
≥ 0.8
≤ 0.4
7
300

Protection against polarity reversal, surge protection

3 V DC ... 33 V DC
3 A (see derating curve)
≤ 200 mV
15 A (10 ms)
2-wire, floating
Protection against polarity reversal, surge protection

2.5 kV (50 Hz, 1 min.)
-20°C ... 60°C
DIN VDE 0110
Any / can be aligned with 2 mm spacing
13 mm / 29 mm / 25 mm

Ordering data

Type	Order No.	Pcs. / Pkt.
SIM-EI-OV- 24DC/ 24DC/3	2300096	10

Accessories

SIM-ERSN	2271484	100
SIM-ERSN-HB-KSR	2271468	10
SIM-ERSN-HB-KSR/MET	2271497	10
SIM-ERSN-HB-MR	2271471	10
SIM-ERSN-HB-MR/MET	2271510	10

Solid-state relay OV

Solid-state relays for electrical isolation can be mounted directly on the printed circuit board as interfaces or plugged in using the solder-in socket SIM-AMS.

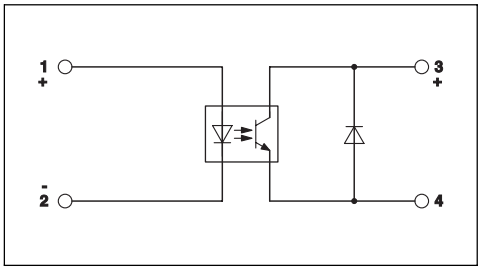
The solid-state relays are suitable for switching ohmic, capacitive or inductive loads. Relays for switching AC circuits have a zero voltage switch to switch the load on in the zero voltage crossing. It is switched off in the zero current crossing. The integrated RC element permits operation up to cos ϕ = 0.5.

Inductive DC loads must be equipped with a fast-acting free-wheeling diode for semiconductor relay protection.

- Switching capacity up to 350 V DC/1 A, 60 V DC/4 A or 480 V AC/5 A
- No wear and tear, even with high switching frequencies
- No contact bounce – no movable parts
- No electromagnetic interference
- Electrically insulated housings
- Small dimensions
- High test voltage of 4 kV between control and load circuits

Notes:
For derating curves see page 338.
For suitable bases, see page 334.
[1]) Turn-on/off time at U_N: Max. ½ period

With DC voltage output, max. = 1 A



Technical data

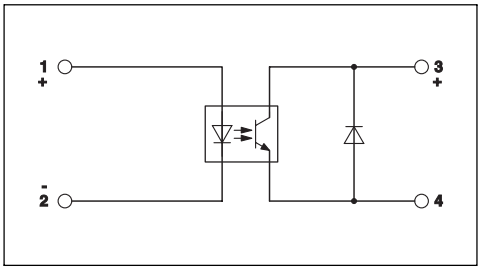
Input data		①
Input voltage range		4.25 V DC ... 32 V DC
Switching level	1 signal ("H") [V DC] ≥	3.3
	0 signal ("L") [V DC] ≤	1
Typ. input current at U_N	[mA]	15
Typ. switch-on time at U_N	[µs]	100
Typ. switch-off time at U_N	[µs]	250
Transmission frequency f_{limit}	[Hz]	100
Output data		
Operating voltage range		1 V DC ... 350 V DC
Periodic peak reverse voltage		-
Limiting continuous current		1 A (see derating curve)
Min. load current		1 mA
Surge current		20 A (tp = 1 s)
Residual voltage drop at "H"		0.5 V
Leakage current in off state		100 µA
Phase angle (cos ϕ)		-
Max. load value		-
Output protection		Protection against polarity reversal
General data		
Test voltage input/output		4 kV (50 Hz, 1 min.)
Ambient temperature (operation)		-20°C ... 80°C
Standards / regulations		EN 61000-4-2, EN 61000-4-3, EN 61000-4-4, EN 55011
Mounting position / mounting		Any / can be aligned with > 9 mm spacing
Dimensions	W / H / D	10.5 mm / 43 mm / 25.4 mm

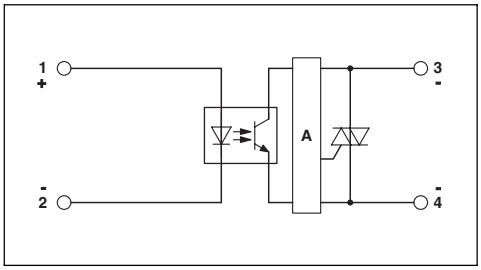
Ordering data

Description		Input voltage U_N	Type	Order No.	Pcs. / Pkt.
Solid-state relay for signal amplification and electrical isolation of the control and load circuits, pluggable in the solder-in plug-in base SIM-AMS or with PCB connection for direct mounting onto the PCB Input: DC voltage Output: DC voltage	①	24 V DC	**OV-24DC/350DC/1**	**2982634**	10
Solid-state relay, same as before, however Input: DC voltage Output: AC voltage	①	24 V DC			

With DC voltage output, max. = 4 A

With alternating voltage output, max. = 5 A





Technical data	Technical data
①	①
4.25 V DC ... 32 V DC	4 V DC ... 32 V DC
3.3	3.5
1	1.2
15	10
100	[1])
250	[1])
100	25
1 V DC ... 60 V DC	12 V AC ... 530 V AC (45/65 Hz)
-	1000 V
4 A (see derating curve)	5 A (see derating curve)
1 mA	20 mA
25 A (tp = 1 s)	80 A (tp = 20 ms)
0.5 V	1.2 V
100 µA	< 1 mA
-	0.5
-	50 A^2s
Protection against polarity reversal	-
4 kV (50 Hz, 1 min.)	4 kV (50 Hz, 1 min.)
-20°C ... 80°C	-20°C ... 70°C
EN 61000-4-2, EN 61000-4-3, EN 61000-4-4, EN 55011	EN 61000-4-2, EN 61000-4-3, EN 61000-4-4, EN 61000-4-5, EN 61000-4-6
Any / can be aligned with > 20 mm spacing	Any / can be aligned with > 20 mm spacing
10.5 mm / 43 mm / 25.4 mm	10.5 mm / 43 mm / 25.4 mm

Ordering data

Type	Order No.	Pcs. / Pkt.
OV-24DC/ 60DC/4	**2982647**	10

Ordering data

Type	Order No.	Pcs. / Pkt.
OV-24DC/480AC/5	**2982650**	10

Solder-in socket for solid-state relays and I/O modules

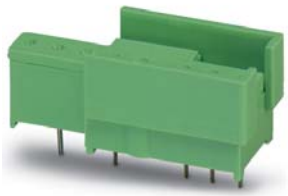
Modern interface solutions for computer and electronic controls are increasingly being designed as I/O systems which are system independent and individually mountable. Electrical isolation and signal conditioning are carried out using standard I/O modules. These are produced by various manufacturers in pin-compatible versions for different functions. The I/O modules are either soldered directly into the PCB or plugged into component sockets for quick interchanging.

SIM sockets facilitate the plugging of I/O modules considerably. All standard I/O modules and solid-state relays with up to eight connections can be plugged into the solder-in plug-in socket.

The I/O modules are securely fixed to the socket using fastening screws which are specific to the module. They are thereby protected against being accidentally released. Optocouplers, now also available in pluggable versions, are secured using the latch which is attached to the socket and which can be labeled. For better identification, each module plug position has its own marking panel on the socket.

The SIM socket has been designed so that it can be used on existing printed circuit boards without any layout modifications. Peripheral components such as LEDs or fuse resistors remain accessible to the user.

Notes:
Type of housing: Polyamide PA non-reinforced, color: Green.
For marking systems and mounting material, see CLIPLINE catalog, part 2.
For dimensional drawings and pin assignments, see page 338.
[1]) Applies only to the sockets SIM-AMS 1, SIM-AMS 1-R, and SIM-AMSC in connection with the standard I/O modules with the corresponding AC voltage output.



Plug-in base for solid-state relays

Technical data

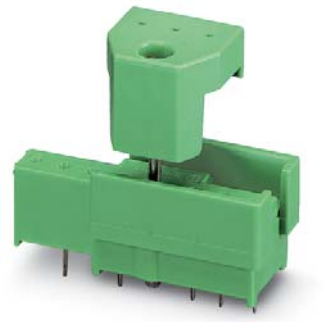
Operating voltage	250 V AC / 380 V AC[1])
Nominal current	5 A
Standards / regulations	DIN VDE 0110b, Gr. C for 250 V DC

Ordering data

Description	No. of poles	Module width W	Type	Order No.	Pcs. / Pkt.
Plug-in base, for solid-state relay and I/O modules, with different numbers of contacts, can be labeled with marker pins BN or BNB					
Partial assembly			**SIM-AMS 1**	**2271015**	10
Complete assembly			**SIM-AMS 2**	**2271028**	10
Plug-in base, as above, however, **with locking clips** for fastening					
Partial assembly					
Complete assembly					
Plug-in base, for standard I/O modules of generation 4 of the company Opto 22, can be labeled using marker pins BN or BNB					

Accessories

Marker pin, made of white plastic, lettering area 7.5 x 4 mm, unprinted for self-marking with B-STIFT			**BN-TRK**	**2701404**	100
Marker pen, not refillable, for manual labeling, line thickness 0.5 mm			**B-STIFT**	**1051993**	10



Plug-in base for solid-state relays with locking clip

Plug-in base for I/O modules

Technical data

250 V AC / 380 V AC[1])

5 A
DIN VDE 0110b, Gr. C for 250 V DC

Ordering data

Type	Order No.	Pcs. / Pkt.
SIM-AMS 1-R	2271031	10
SIM-AMS 2-R	2271044	10

Accessories

BN-TRK	2701404	100
B-STIFT	1051993	10

Technical data

250 V AC / 380 V AC[1])

5 A
DIN VDE 0110b, Gr. C for 250 V DC

Ordering data

Type	Order No.	Pcs. / Pkt.
SIM-AMSC1	2271390	50

Accessories

BN-TRK	2701404	100
B-STIFT	1051993	10

Modules for IEC 60603/DIN 41612 connectors

Cable housings suitable for snap-lock mechanism:

Manufacturer	Type F, 32- and 48-pos.
HARTING	Types "B" and "D"

Cable housings suitable for screw locking:

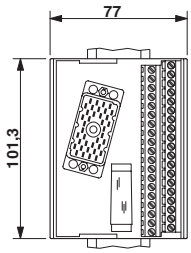
Manufacturer	Type C, 64-pos.	Type D, 32-pos.
ERNI	KSG 173...	KSG 173...
AMP	826196-1	826196-1

Cable housings suitable for screw locking:

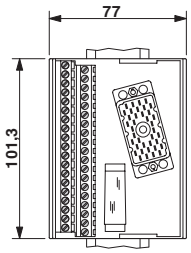
Manufacturer	Type E, 48-pos.	Type F, 32- and 48-pos.
ERNI	KSG 173...	KSG 203...
AMP	–	826198-1

Modules for ELCO connectors

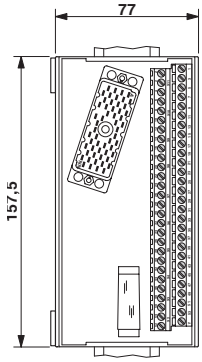
Dimensional drawing for UMK-EC38/38-XOL



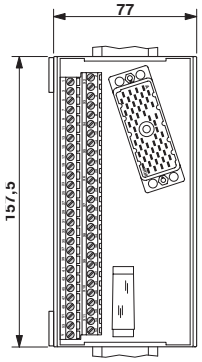
Dimensional drawing for UMK-EC38/38-XOR



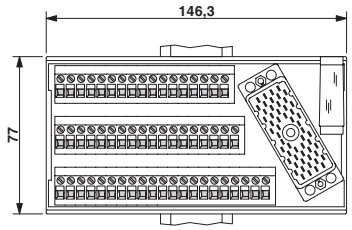
Dimensional drawing for UMK-EC56/56-XOL



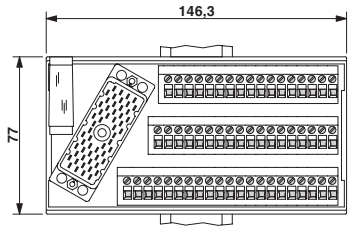
Dimensional drawing for UMK-EC56/56-XOR



Dimensional drawing for UMK-EC56/FRONT 2,5V/R



Dimensional drawing for UMK-EC56/FRONT 2,5V/L



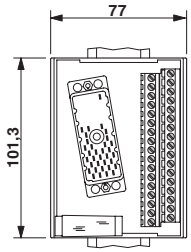
Pin assignment UMK-EC38/38...

Terminal	Pin strip
1	A
2	B
3	C
4	D
5	E
6	F
7	H
8	J
9	K
10	L
11	M
12	N
13	P
14	R
15	S
16	T
17	U
18	V
19	W
20	X
21	Y
22	Z
23	AA
24	BB
25	DD
26	EE
27	FF
28	HH
29	JJ
30	KK
31	LL
32	MM
33	NN
34	PP
35	RR
36	SS
37	TT
CC	CC

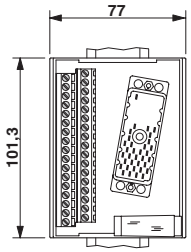
Pin assignment UMK-EC56/56...

Terminal	Pin strip
Z	Z
1	A
2	B
3	C
4	D
5	E
6	F
7	H
8	J
9	K
10	L
11	M
12	N
13	P
14	R
15	S
16	T
17	U
18	V
19	W
20	X
21	a
22	b
23	c
24	d
25	e
26	f
27	h
28	j
29	k
30	l
31	m
32	n
33	p
34	r
35	s
36	t
37	u
38	v
39	w
40	x
41	y
42	z
43	AA
44	BB
45	CC
46	DD
47	EE
48	FF
49	HH
50	JJ
51	KK
52	LL
53	MM
54	NN
Y	Y (shield)

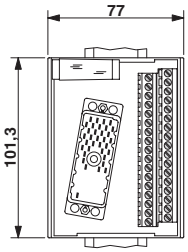
Dimensional drawing for UMK-EC56/32-XOL



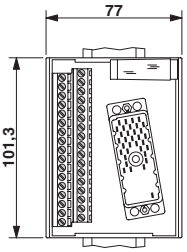
Dimensional drawing for UMK-EC56/32-XOR



Dimensional drawing for UMK-EC56/32-XUL



Dimensional drawing for UMK-EC56/32-XUR



Modules for ELCO connectors with Ex i protection type

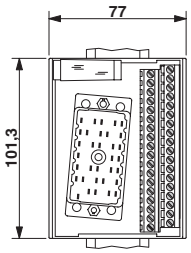
Pin assignment UMK-EC56/FRONT 2,5V/...

Terminal	ELCO connector
X	N.C.
1	A
2	B
3	C
4	D
5	E
6	F
7	H
8	J
9	K
10	L
11	M
12	N
13	P
14	R
15	S
16	T
17	U
18	V
19	W
20	X
21	a
22	b
23	c
24	d
25	e
26	f
27	h
28	j
29	k
30	l
31	m
32	n
33	p
34	r
35	s
36	t
37	u
38	v
39	w
40	x
41	y
42	z
43	AA
44	BB
45	CC
46	DD
47	EE
48	FF
49	HH
50	JJ
51	KK
52	LL
53	MM
54	NN
Y	Y (shield)

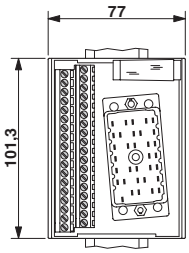
Pin assignment UMK-EC56/32-...

Terminal	ELCO connector
1	A
2	B
3	C
4	D
5	E
6	F
7	H
8	J
9	K
10	L
11	M
12	N
13	P
14	R
15	S
16	T
17	U
18	V
19	W
20	X
21	Z
22	a
23	b
24	c
25	d
26	e
27	f
28	h
29	j
30	k
31	l
32	m
Y	NN + Y

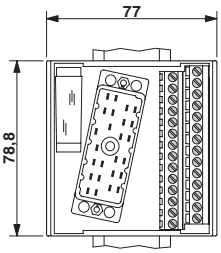
Dimensional drawing for UMK-EC90/32/EX-XUL



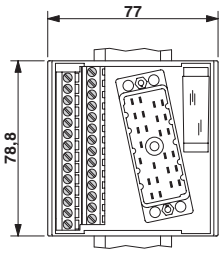
Dimensional drawing for UMK-EC90/32/EX-XUR



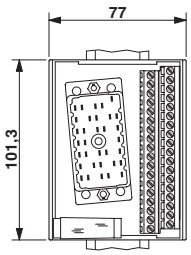
Dimensional drawing for UMK-EC56/25/EX-L



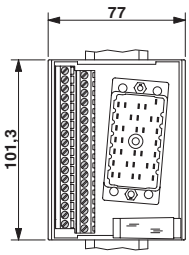
Dimensional drawing for UMK-EC56/25/EX-R



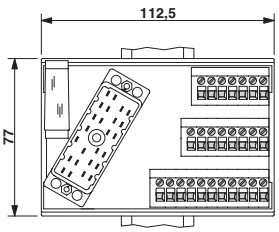
Dimensional drawing for UMK-EC90/32/EX-XOL



Dimensional drawing for UMK-EC90/32/EX-XOR



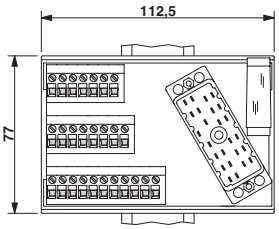
Dimensional drawing for UMK-EC 56/25/EX/FRONT 2,5 V/L



Pin assignment UMK-EC90/32/EX...

Terminal	Pin strip	Channel
1 2	H J	1
3 4	L M	2
5 6	P X	3
7 8	Z AA	4
9 10	AC AD	5
11 12	AM AN	6
13 14	AR AS	7
15 16	AU BC	8
17 18	AZ BA	9
19 20	BJ BK	10
21 22	BM BN	11
23 24	BR BY	12
25 26	CA CB	13
27 28	CD CE	14
29 30	CN CP	15
31 32	CS CT	16
Y	DB	

Dimensional drawing for UMK-EC 56/25/EX/FRONT 2,5 V/R



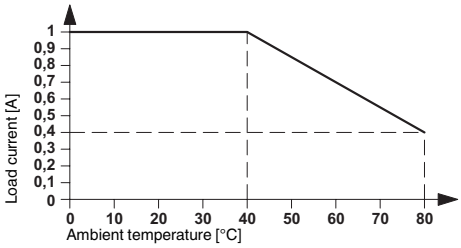
Pin assignment UMK-EC 56/25/EX/...

Terminal	Pin strip	Channel
1 2	C D	1
3 4	E F	2
5 6	N P	3
7 8	R S	4
9 10	a b	5
11 12	d j	6
13 14	k l	7
15 16	s t	8
17 18	u v	9
19 20	BB CC	10
21 22	DD EE	11
23 24	MM NN	12
Y	Y	

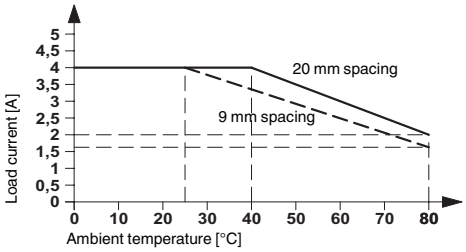
OV solid-state relays

Load current as a function of ambient temperature
Operating time: 100% OT

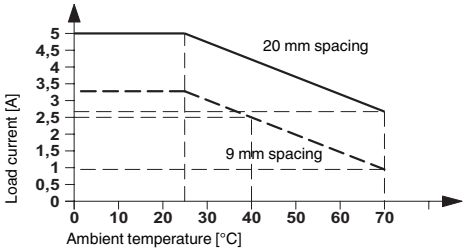
OV-24DC/350DC/1



OV-24DC/60DC/4

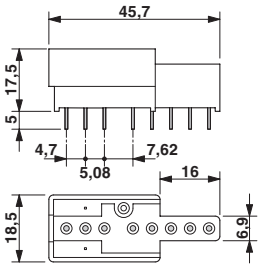


OV-24DC/480AC/5

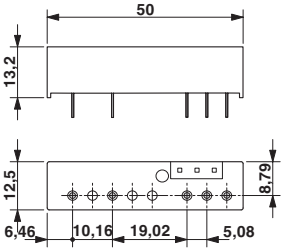


Solder-in SIM-AMS plug-in bases for solid-state relays and I/O modules

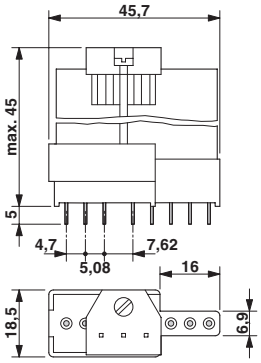
Dimensional drawing for SIM-AMS:



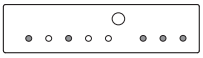
Dimensional drawing for SIM-AMSC:



Dimensional drawing for SIM-AMS...R:



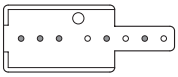
Contacts in the SIM-AMSC plug-in base:



● With metal
○ Without metal

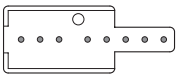
Note:
4th generation optocoupler, available from Opto 22.

Contacts in the SIM-AMS plug-in base
1. Partial mounting for standard I/O modules



SIM-AMS 1

2. Complete mounting for analog I/O modules, for example



SIM-AMS 2

● With metal
○ Without metal

23.45
PHOENIX CONTACT

INTERFACE Analog

Signal conditioners for Measurement and Control Technology

The modular analog converters for measurement and control technology prevent analog signals from being distorted by external interference. By ensuring accurate conversion, isolation, filtering or amplification of analog signals, they provide reliable and improved transmission quality, and so in turn safeguard and boost the quality of closed-loop control circuits.

This is reflected in the following product segments:

MINI Analog

This modular system with a design width of 6 mm offers state-of-the-art technology for the most demanding requirements throughout the entire signal conversion range.

MACX Analog

The extensive range for maximum signal safety:

- Multifunctional high-end devices or reasonably-priced standard modules with exactly the right functions
- Designed solely and specifically for functional safety applications (SIL)
- Safe isolation for high working voltages
- Configurable via DIP switches, operator interface or software (FDT/DTM)

MCR Analog

- Multifunctional high-end devices or reasonably-priced standard modules with exactly the right functions
- Configurable via DIP switches, display or software

Digital displays

- Digital displays for displaying standard analog signals
- Setpoint adjuster for specifying analog current or voltage values, with manual and automatic ramp function

Product range overview

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Digital displays	
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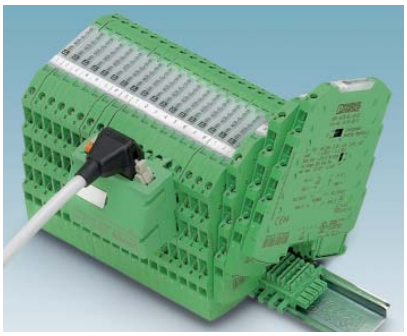
MINI Analog and MACX Analog:

DIN-rail-connector-compatible
The DIN rail connector can be used for modular bridging of the 24 V supply voltage.

Wide-range power supply
The modules featuring a wide-range power supply (...-UP) can be used in all power supply networks the world over without the need for additional power supply units.

Product overview

MINI Analog



Product type	Product details		Page
Analog IN/Analog OUT			
3-way isolating amplifier	- Configurable	MINI MCR-SL-U...-...-UI	352
		MINI MCR-SL-SHUNT-UI	354
	- Fixed signal combinations	MINI MCR-SL-...-...	357
4-way signal duplicator	- Configurable	MINI MCR-SL-UI-2I	358
3-way repeater power supply		MINI MCR-SL-RPS...	359
2-way passive isolator	- Input-loop-powered	MINI MCR-SL-...CP-I-I	360
	- Output-loop-powered		
3-way output isolator	- Fixed signal combinations		
Digital displays	Standard signals		
	Standard signals		
	Setpoint adjuster		
Temperature			
Temperature transducer	Universal, active		
	Universal, passive		
	RTD, active	MINI MCR-SL-PT100-UI...	361
	RTD, passive	MINI MCR-SL-PT100-LP	363
	Thermocouples, active	MINI MCR-SL-TC-UI	364
Frequency			
Frequency transducer		MINI MCR-SL-UI-F	365
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Potiposition transducer		MINI MCR-SL-R-UI	366
Setpoint potentiometer			
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	Cables		
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	1:1 feed-through terminal block	MINI MCR-SL-TB	369
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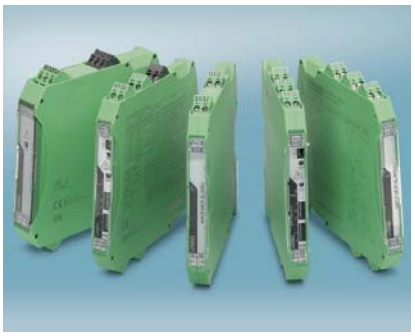
Supply voltage bridging	System components	Power terminal / system power supply unit / T-connectors	370
Marking material		Transparent cover / insert strips / Flat zack marker strip labeling	369
DIN rail adapter			

MACX Analog



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Input

Maximum input signal

The maximum input signal describes the value achieved before any damage occurs to the module and the transducer. If these values are exceeded, suppresser diodes can be triggered to short-circuit this input when a surge voltage is detected. The transmission range of the analog signals is located exclusively within the specified input ranges.

Input resistance

The input resistance of an isolating amplifier or measuring transducer is determined in such a way as to ensure that the input signal is loaded only slightly. This results in a low-resistance input for current inputs and a high-resistance input for voltage inputs.

Voltage drop

In the case of passive isolators, the input voltage drop occurs as a result of the voltage drop of the operational load and the auxiliary power requirements of the module. The greater the auxiliary power requirements of the passive isolator, the smaller the operational output load is allowed to be. Low auxiliary power requirements are regarded as an indicator of device quality.

Common mode rejection

In the case of isolating amplifiers, operational amplifiers are used internally for transmission purposes. In theory, operational amplifiers should display ideal transmission and amplification behavior. However, it is a different matter in practice. When both input voltages are changed in the same direction, i.e., exactly the same voltage to ground is applied to both input terminal blocks, this leads to an unintended output signal. Theoretically, if the operational amplifier is ideal, no output signal should appear since the differential input signal is zero volts. Common mode rejection indicates the factor (in dB) by which the common input voltage at both inputs is amplified to a lesser extent than the difference in voltage between the two inputs.

Analog output

Maximum output signal

If the devices operate without fault conditions, an overload at the input cannot cause greater values than this maximum to occur at the output.

Zero/span adjustment

When the zero point is set, the zero point of an analog output is adjusted and set in relation to the input signal.

When the "amplification" span is set, the analog output is adjusted in relation to the input signal. In this case, the output characteristic is increased or decreased by an amplification factor.

Load

The load on the output side indicates the load-carrying capacitance of a measuring transducer or an isolating amplifier. Current outputs can usually drive a maximum of 500 Ω, voltage outputs can be loaded with a minimum of up to 10 kΩ.

Residual ripple/ripple

A superimposed ripple can appear on the output signal due to signal conditioning required by the circuit. The residual ripple is indicated in mV_{PP} or mV_{rms}.

Open circuit response

With some measuring transducers, the input signal is permanently monitored for possible open circuits in the signal cable. If the signal exceeds or falls below a tolerance limit, an open circuit is detected and a defined output signal is sent. With programmable devices, the output signals can be freely selected.

Binary output

Relay

Many of the products with a relay output that are shown in the catalog feature hard-gold-plated relay contact material. The voltage range has an important role to play in terms of how this contact material can be used. Up to 50 mA can be transmitted with voltage ranges of up to 30 V AC/ 36 V DC, with even very small currents being transmitted perfectly. If the aforementioned voltage range is exceeded and values of 250 V AC/DC are processed, currents of up to 2 A can flow. However, in this case the subsequent transmission of small currents can no longer be guaranteed.

Transistor

A PNP transistor switching output can be used to transmit 24 V DC switching signals up to approximately 100 mA.

General data

Supply voltage

The product range includes DC and AC power supply units for specific products. There is a standard power supply unit available in the form of a 24 V DC version that operates within a voltage range of 20...30 V DC. For different supply voltages, please refer to the technical data.

Current consumption

The value specified here describes the auxiliary power requirements of the devices. It also includes the output current and, where applicable, the switching output load.

Transmission error

The transmission precision is a gauge of the quality of a measuring transducer. It is the deviation from the ideal transmission characteristic curve and includes linearity, span, and offset errors.

Non-linearity

Non-linearity is the deviation from the ideal transmission precision without including span and offset errors.

The non-linearity of a signal makes it possible to evaluate the course from zero to end point. Normally, the linearity errors are expressed as a percentage that indicates the extent of deviation from the ideal transmission characteristic curve.

Temperature coefficient

The temperature coefficient provides an assessment of the extent to which precision deviates when the ambient temperature around an isolating amplifier or measuring transducer changes. In most cases this is specified as a percentage. An alternative definition is ppm/K (parts per million/ Kelvin). Example:
250 ppm/K = 0.025%/K.

Limit frequency

Isolating amplifiers are basically designed to transmit DC signals. However, signal changes call for a dynamic form of behavior so that small AC quantities (normally: 30 Hz) can also be transmitted. This is achieved by defining a limit frequency. At the same time, a low limit frequency can be used to suppress higher-frequency AC components.

Step response

The step response indicates the response time of the output signal when an input signal step occurs (10...90%). The step response is inversely proportional to the limit frequency. This means that the response time decreases as the limit frequency increases.

Test voltage

The test voltage indicates the dielectric strength of an isolated distance and is determined by type tests. In this test, a 50 Hz voltage is applied for one minute; it describes the value achieved before a disruptive electrical charge is able to move to another potential level in the device.

Safe isolation

"Safe isolation" is defined as protection against currents that pose a danger to the human body. When module specifications are provided in accordance with EN 61010, a distinction is made between faultless operation and operation under fault conditions. Nominal supply voltages of 30 V AC/ 60 V DC are deemed valid for faultless operation.

Ambient temperature range

The temperature limits specified here relate exclusively to operation. These limits do not apply to storage and transport, where the temperature limits of the materials used are the decisive factor. If the devices are outside of the specified temperature range during assembly, they must be brought back within the specified temperature range prior to system startup. It is important to make sure that no condensation occurs during this process.

Protective circuit

In order to protect the MCR modules against surge voltages, suppressor diodes are connected upstream of the signal and supply paths. These diodes behave in a similar manner to conventional Zener diodes, except for the fact that suppressor diodes have faster response times and a higher maximum current.

Information on directives and standards

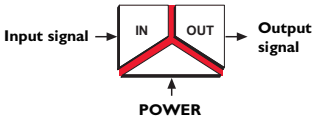
When carrying out further processing of non-independent items (components), the applicable regulations pertaining to installation must be observed.

The relevant device-specific regulations also apply in respect of installation in devices.
(Standards applicable at the time of going to print)

Directives	EU	International
EMC Directive (electromagnetic compatibility)	2004/108/EC	-
Low Voltage Directive (LVD)	2006/95/EC	-
Ex Directive (ATEX)	94/9/EC	-
Product standards		
Electronic equipment for use in power installations	EN 50178:1997	-
Electrical equipment for measurement, control and laboratory use - Part 1: General requirements	EN 61010-1:2001	IEC 61010-1:2004
Programmable controllers - Part 2: Equipment requirements and tests	EN 61131-2:2007	IEC 61131-2:2007
EMC		
EMC - Part 6-2: Generic standards - Immunity for industrial environments	EN 61000-6-2:2005	IEC 61000-6-2:2005
EMC - Part 6-4: Generic standards - Emission standard for industrial environments	EN 61000-6-4:2007	IEC 61000-6-4:2006
Electrical equipment for measurement, control and laboratory use EMC requirements	EN 61326-1:2006	IEC 61326-1:2005
ATEX		
Electrical apparatus for explosive gas atmospheres - Part 0: General requirements	EN 60079-0:2006	IEC 60079-0:2007
Explosive atmospheres - Part 11: Equipment protection by intrinsic safety "i"	EN 60079-11:2007	IEC 60079-11:2006
Electrical apparatus for explosive gas atmospheres - Part 15: Construction, test and marking of type of protection "n" electrical apparatus	EN 60079-15:2005	IEC 60079-15:2005
Environmental tests		
Environmental testing - Part 2-1: Tests - Test A: Cold	EN 60068-2-1:2007	IEC 60068-2-1:2007
Environmental testing - Part 2-2: Tests - Test B: Dry heat	EN 60068-2-2:2007	IEC 60068-2-2:2007
Environmental testing - Part 2-6: Tests - Test Fc: Vibration (sinusoidal)	EN 60068-2-6:2008	IEC 60068-2-6:2008

Active isolation

3-way isolation

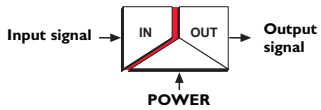


In the case of modules with this isolation method, all components that are connected to the input, output or power supply are protected against interference from each other. All three directions (input, output, and power supply) are electrically isolated from one another accordingly.

The 3-way isolation provides electrical isolation between the measurement sensor and the controller as well as between the controller and the actuator.

On the input side, the modules need active signals. On the output side, they provide a filtered and amplified signal.

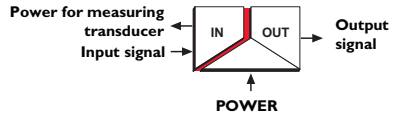
Input isolation



In the case of modules with this isolation method, the electronics connected on the output side (e.g., the controller) are to be protected from interference from the field. For this reason, only the input is electrically isolated from the output and the power supply that are at the same potential.

On the input side, the modules need active signals (e.g., from measurement sensors). On the output side, they provide a filtered and amplified signal (e.g., from the controller).

Repeater power supply



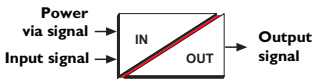
Repeater power supplies use the signal input side not only for measured value acquisition, but also to provide the necessary power to the passive measurement sensors connected on the input side.

On the output side, they provide a filtered and amplified signal (e.g., from the controller).

The isolation method used by these modules is input isolation.

Passive isolation

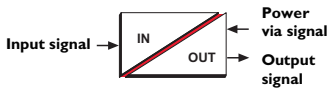
Passive isolation, supplied on the input side



The modules draw the power needed for signal transmission and electrical isolation from the active input circuit. On the output side, a conditioned current signal is provided to the controller or to actuators.

This passive isolation allows signal conditioning (interruption of ground loops) and filtering without an additional power supply.

Loop-powered isolation, supplied on the output side

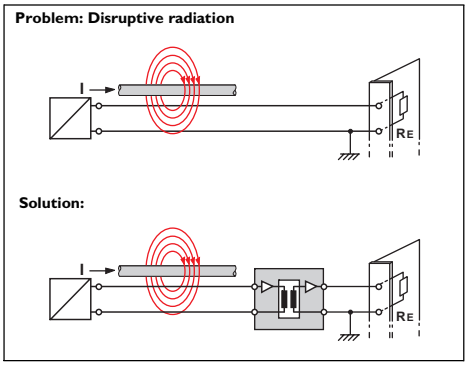


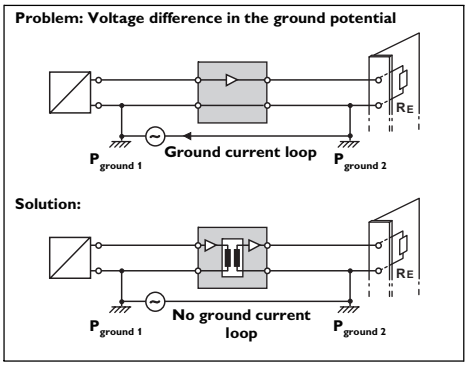
The modules draw the power needed for signal transmission and electrical isolation from the active output circuit, ideally from a PLC input board that supplies power.

On the output side, the loop-powered modules work with a 4...20 mA standard signal. On the input side, the passive isolator processes active signals.

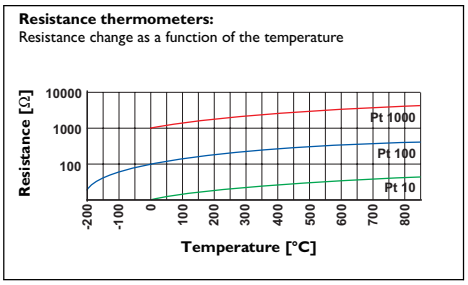
When this isolation method is used, it is important to make sure that the active signal source connected on the output side (e.g., an active PLC input board) is able to supply the passive isolator with power, as well as operate its load.

Applications





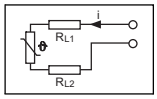
Resistance thermometers



Resistance thermometers (e.g., Pt 100, Ni 1000) change their resistance value depending on the temperature. The MCR temperature transducers detect this change and convert it into a proportional analog signal.

To avoid unwanted self-heating of the sensor, the constant measured current used is kept as low as possible (MCR-T-UI... → 250 µA).

Two-wire connection method

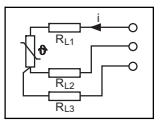


The resistance thermometer is connected to the MCR measuring transducer using a two-core cable. Please note that the supply cable resistances are added to the measured resistance and consequently distort the result.

A distance of 10 m should not be exceeded.

Example: A 50 m long copper cable with a cross section of 0.5 mm² has a specific resistance of 3.4 Ω. A Pt 100 sensor has a resistance change of 0.384 Ω per 1 K temperature change. This corresponds to an error of 8.8°C.

Three-wire connection method



A three-wire method is normally used to minimize the effect of cable resistances. An additional cable is connected to the resistance thermometer so that the latter can be measured using two measurement circuits, one of which acts as a reference. In this way, it is possible to compensate for the cable resistance.

Identical cable lengths and an identical ambient temperature are essential here.

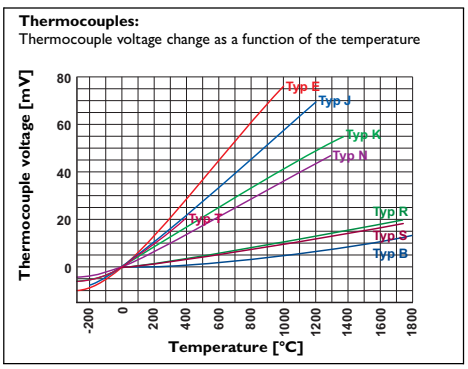
Since this is more or less the case in the majority of applications, the three-wire method is the most commonly encountered today. Line compensation is not necessary.

Four-wire connection method

The four-wire connection method is an ideal connection method for resistance thermometers.

The measurement result is affected neither by cable resistances nor by their temperature-dependent fluctuations. The voltage drop on the supply and return lines can thus be measured and compensated for separately. Line compensation is not necessary.

Thermocouples

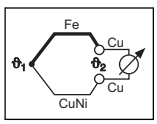


In contrast to resistance thermometers, thermocouples are active sources that generate a voltage in the microvolt range. The temperature difference measured between the measurement junction and the cold junction is converted into an absolute temperature with the help of cold junction compensation.

Functional principle:

If different metals are joined together, a thermal voltage is produced in the metal atoms as a result of the different binding energies of the electrons. This voltage is dependent firstly on the metals themselves and secondly on the temperature.

If the same temperature prevails at the measuring junction (ϑ_1) and the cold junction (ϑ_2), no current will flow because the generated partial voltages cancel each other out.



However, if the temperatures at the measuring junction and the cold junction are different, different voltages are produced. These voltages do not completely cancel each other out, and therefore current flows.

A thermocouple therefore always measures only a temperature difference. This is derived from the difference between the thermal voltages at the measuring junction and at the cold junction.

The voltage produced by the thermoelectric effect is very low; only a few microvolts per Kelvin.

Example: If a thermocouple type J (FE-CuNi) is connected to a copper terminal, thermal voltages with opposite signs will be generated (at the iron-copper and copper constantan transitions) and cancel each other out.

Therefore, only the difference in the thermal voltages between constantan (Cu-Ni) and iron is of relevance.

A role is also played by the temperature at the terminal point. If it is known, the temperature at the measuring junction can be derived by adding the thermal voltage measured at the same junction.

The MCR temperature transducers for thermocouples therefore detect the temperature at the terminal points and compensate this value, which is also referred to as the reference junction or the cold junction.

This process is sometimes called cold junction compensation.

Digital displays

Use of the freely programmable characteristic curve

The freely programmable characteristic curve, i.e., the assignment of the displayed value to the input value, is important in process applications for indicating flow rates or liquid levels.

The purpose of level measurements is very often not to determine how much liquid is still inside the tank, but rather to establish how much has been drawn out of it. In this case, the characteristic curve can simply be inverted in order to display the required value.

Parameterization of the characteristic curve using interpolation points

With non-linear input signals, the received analog values can be assigned to the value to be displayed by means of a programmable characteristic curve. This curve can consist of up to 24 interpolation points. This allows flow sensors with a non-linear characteristic curve to be adapted, for instance. The analog-signal digital displays in the Function Line additionally feature a summing function which - to take a typical example from bottling technology - allows you to switch over at the touch of a key from the instantaneous value (= flow rate in l/min) to the total flow integrated in the background, which can be displayed in any unit. This saves space and money because there is no need for a second digital display.

Limit values can be called up simply by pressing a key as well. Limit values 1 and 2 can be assigned to either the actual value or the cumulative value. If the latter value is exceeded, one of the two output relays is energized.

Other applications include indicating liquid levels, pressures, and temperatures. With servo motors, the analog output signals (0...10 V) generated by the tachometer can be supplied to the input of the digital display in order to indicate the motor speed.

Application:
Pressure measurement and display on MCR-SL-D-U-I

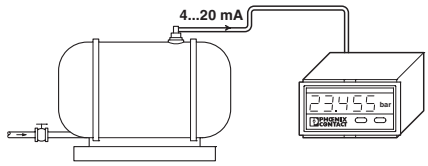
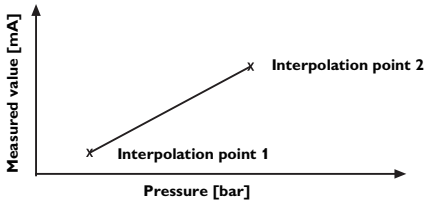


Table:	Analog signal	Display value
Interpolation point 1	4 mA	15 bar
Interpolation point 2	20 mA	30 bar

Characteristic curve:



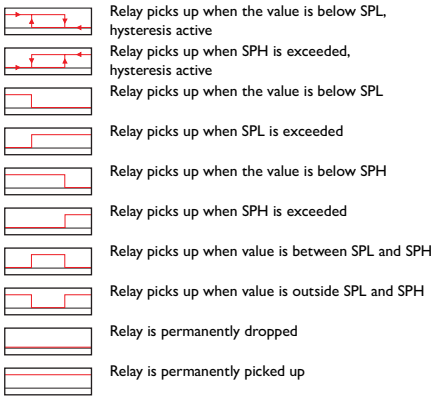
Switching behavior of relay or transistor outputs:

A different kind of switching behavior can be defined for each relay or each transistor when it reaches a preset switching point.

All the possible settings for the switching behavior are shown and explained in the list:

- The first two options include hysteresis, i.e., the behavior of the relay depends on the direction from which a switching point is reached.
- For the remaining options, with the exception of the last two ("on" and "off"), a switching tolerance is taken into account to prevent the relay contact from "chattering". The relay is not switched until the switching point plus switching tolerance has been reached.
- In the "on" state, the relay is permanently picked up. It only responds if there is an open circuit and it has been set to drop out when this happens.
- In the "off" state, the relay only responds if there is an open circuit and it has been set to pick up when this happens.

Possible settings for the switching behavior



SPL = Set Point Low (lower switching point)
SPH = Set Point High (upper switching point)

Non-intrinsically safe signal transmission in potentially explosive areas

Electrical equipment operated in systems with potentially explosive areas is subject to different usage requirements, depending on the application.

For example, electrical equipment could be used in the following locations when analog signals are being transmitted:

– Sensors and actuators can be located in Zone 0, Zone 1 or Zone 2.
– Signal transmitters can be located in Zone 1, Zone 2 or the safe area.
– The controller, e.g., PLC, is in the safe area.

For examples of the kinds of electrical device that can be installed for the purpose of transmitting signals, please see the figure.

Devices must be designed to offer a suitable protection type if they are to be used in Zone 2. The MINI Analog and MACX Analog ranges are designed to provide the "n" protection type for this purpose and must be installed in Zone 2 in a suitable and approved housing (EN 60079-15 and EN 60079-0) with a minimum degree of protection of IP54.

Example:

A sensor/actuator with the "n" protection type can be connected to an isolator from the MINI Analog or MACX Analog ranges in Zone 2.

When selecting suitable devices for Zone 2, it must be ensured that the electrical data of the sensors/actuators is not exceeded.

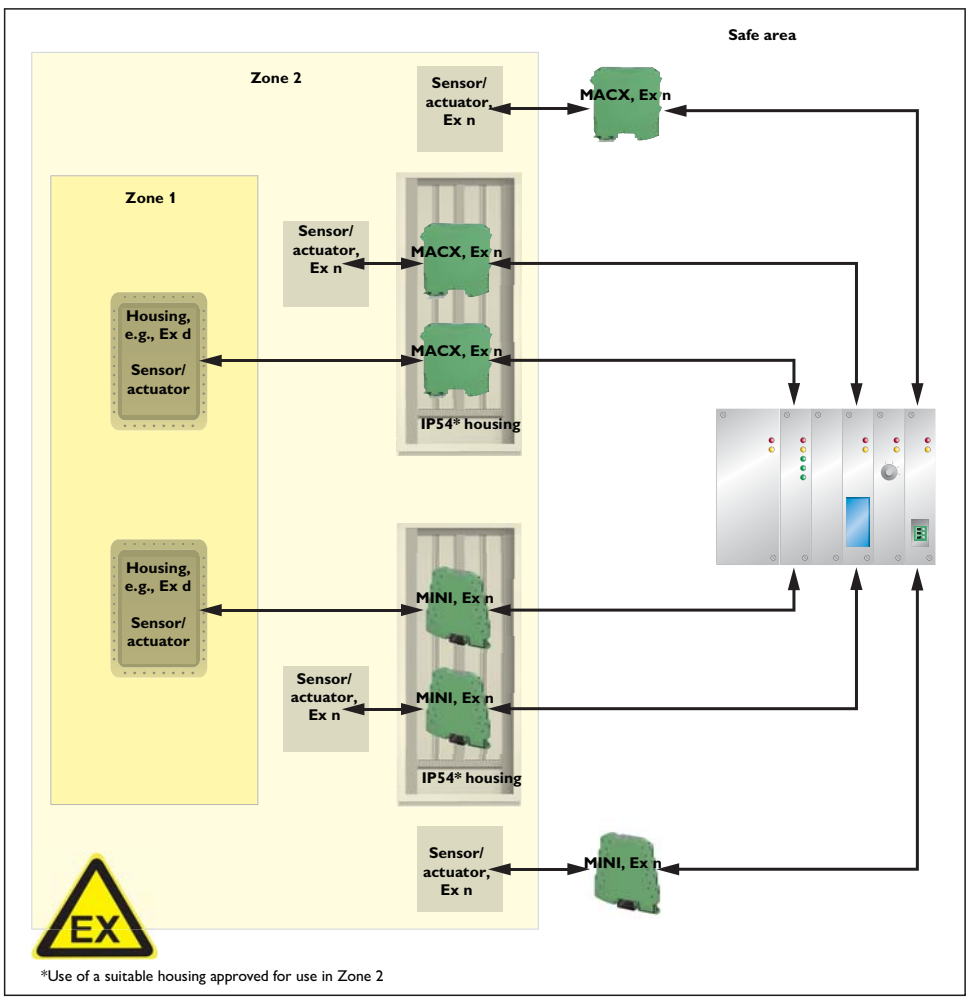
If the sensors/actuators are mounted in an explosion-proof housing or if they have their own explosion-proof housing, they can also be installed in Zone 1.

Installation requirements

The figure shows a range of options for installing electrical devices in areas where there is a risk of gas explosions. Special requirements regarding the configuration, selection, and installation of electrical installations in areas where there is a risk of gas explosions can be found in EN 60079-14.

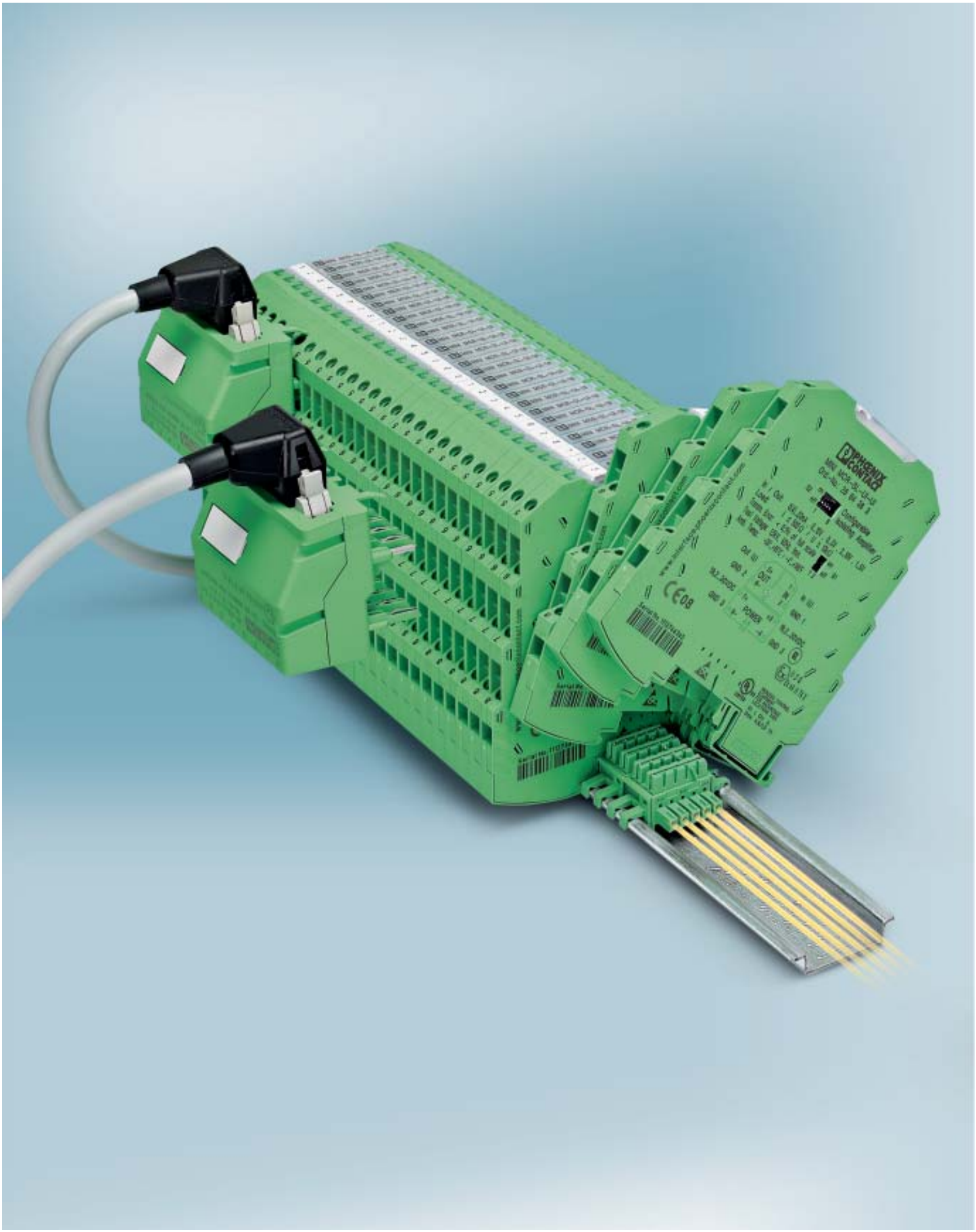
EN 61241-14 must be observed when installing electrical equipment in areas containing combustible dust. Other important factors when it comes to running systems in potentially explosive areas are inspection, maintenance, and repairs. Stipulations regarding these matters can be found in EN 60079-17 and EN 60079-19.

Installation of electrical devices for the purpose of transmitting signals



*Use of a suitable housing approved for use in Zone 2

MINI Analog - Creates space in your control cabinets



State-of-the-art technology for the most demanding requirements

Looking for a product with a design width of just 6.2 mm that allows you to electrically isolate analog signals, convert signals, and measure temperatures, as well as switch threshold values?

Then look no further than the MINI Analog range from Phoenix Contact, which offers all these functions and many more besides.

Analog IN/Analog OUT
- Configurable and standard 3-way isolating amplifiers
- Configurable signal duplicators
- Repeater power supplies
- Passive isolators

Temperature
- Configurable temperature transducers for Pt 100
- Configurable loop-powered temperature transducer for Pt 100
- Configurable temperature measuring transducer for Type J and K thermocouples

Frequency
- Configurable analog frequency transducer

Potentiometer
- Configurable potiposition transducer

Limit values
- Configurable threshold value switch

Digital IN
- Configurable NAMUR switching amplifier

Features

In addition to the extensive range of products to choose from, MINI Analog offers a wide array of features that bring direct benefits to your application.

A high number of channels, therefore, enables analog signal transmission across 6 mm within very confined spaces for many applications. In this kind of context in particular, it is really important to have access to wiring solutions that avoid errors and are time-efficient with a view to cutting costs.

The intelligent supply concept based on DIN rail connectors is complemented by system cabling to ensure the lowest possible wiring overheads.

The DIP switches that are accessible from the side mean that the modules can be configured quickly and easily without the need for laborious software parameterization.

Power bridging
- Bridging from below using T-connectors allows the replacement of a single device without interfering with the rest of the topology.

Operational reliability
- 3-way isolation increases the operational reliability when faced with disturbances in the system.

Approvals

A comprehensive approval package means the products can be used in a variety of areas without any problems.

System cabling
- Time-saving system cabling using the MINI Analog system adapter.

Low current consumption
- This results in minimum self-heating and the longest possible service life.

Connection method
- Clear wiring thanks to eight connections, with a choice of screw or spring-cage terminal blocks.

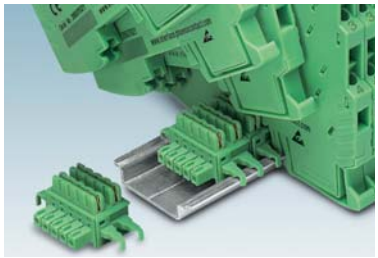
Labeling
- Labeling options based on zack marker strip and/or cover with insert labels.

Configuration

The modules can either be ordered pre-configured or you can carry out the configuration process yourself using DIP switches.

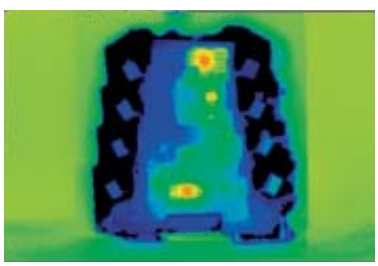
Multiplexer

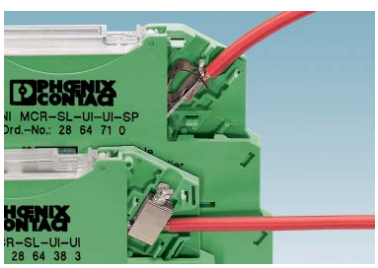
Reduction in analog inputs on controllers thanks to the MINI Analog multiplexer.


Power bridging

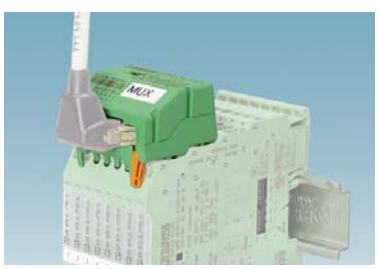
Operational reliability

System cabling


Low current consumption

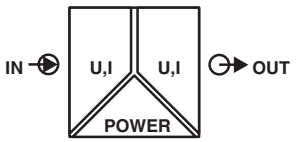


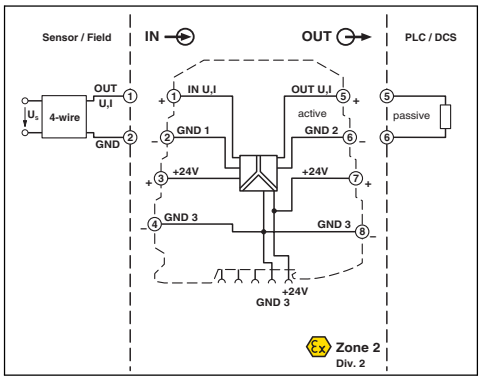
Connection method



Multiplexer

Analog IN / Analog OUT
3-way isolating amplifier





Ex n

Configurable, up to 36 signal combinations

Ex:

Housing width 6.2 mm

- Highly compact isolating amplifier for electrical isolation, conversion, amplification, and filtering of standard analog signals
- Up to 36 signal combinations can be configured using DIP switches
- 3-way isolation
- Low power consumption
- Power supply possible through the foot element (T-connector)
- Standard configuration: 0 ... 10 V input, 0 ... 20 mA output

Notes:

To order a product with an order configuration, enter the required configuration by referring to the adjacent order key.

Information about power bridging, system cabling, and marking components can be found starting at page 369

Technical data

Input data	U input	I input
Input signal	0 ... 5 V / 1 ... 5 V 0 ... 10 V / 2 ... 10 V	0 ... 20 mA / 4 ... 20 mA
Input resistance	Approx. 100 kΩ	Approx. 50 Ω
Output data	U output	I output
Output signal	0 ... 5 V / 1 ... 5 V 0 ... 10 V / 2 ... 10 V	0 ... 20 mA / 4 ... 20 mA
Maximum output signal	Approx. 12.5 V	28 mA
No-load voltage		Approx. 12.5 V
Short-circuit current	Approx. 22 mA	
Load R_B	≥ 10 kΩ	< 500 Ω (at 20 mA)
Ripple	< 20 mV_{PP} (at 10 kΩ)	< 20 mV_{PP} (at 500 Ω)
General data	U output	I output
Supply voltage U_B	19.2 V DC ... 30 V DC	
Nominal supply voltage	24 V DC	
Current consumption	< 9 mA (Voltage output, at 24 V DC incl. load)	< 19 mA (Current output, at 24 V DC incl. load)
Power consumption	< 200 mW (Voltage output)	< 450 mW (Current output)
Maximum transmission error	≤ 0.1% (of final value)	
Temperature coefficient	< 0.01%/K, typ. < 0.002%/K	
Limit frequency (3 dB)	Approx. 100 Hz	
Step response (10 - 90%)	Approx. 3.2 ms	
Electrical isolation	Basic insulation according to EN 61010	
Test voltage, input/output/supply	1.5 kV (50 Hz, 1 min.)	
Degree of protection	IP20	
Ambient temperature (operation)	-20°C ... 65°C	
Mounting	Any	
Housing material	PBT	
Dimensions W / H / D	6.2 / 93.1 / 102.5 mm	
Screw connection solid / stranded / AWG	0.14 ... 2.5 mm^2 / 0.2 ... 2.5 mm^2 / 26 - 12	
Spring-cage connection solid / stranded / AWG	0.2 ... 2.5 mm^2 / 0.2 ... 2.5 mm^2 / 24 - 12	
Conformance/approvals		
Conformance	CE-compliant	
ATEX	II 3 G Ex nA II T4 X	
UL, USA/Canada	UL 508 recognized Class I, Div. 2, Groups A, B, C, D T5	
GL	GL EMC 2 D	

Ordering data

Description		Type	Order No.	Pcs. / Pkt.
MCR 3-way isolating amplifier, for electrical isolation of analog signals				
Order configuration	Screw connection	**MINI MCR-SL-UI-UI**	**2864383**	1
Order configuration	Spring-cage conn.	**MINI MCR-SL-UI-UI-SP**	**2864710**	1
Standard configuration	Screw connection	**MINI MCR-SL-UI-UI-NC**	**2864150**	1
Standard configuration	Spring-cage conn.	**MINI MCR-SL-UI-UI-SP-NC**	**2864163**	1

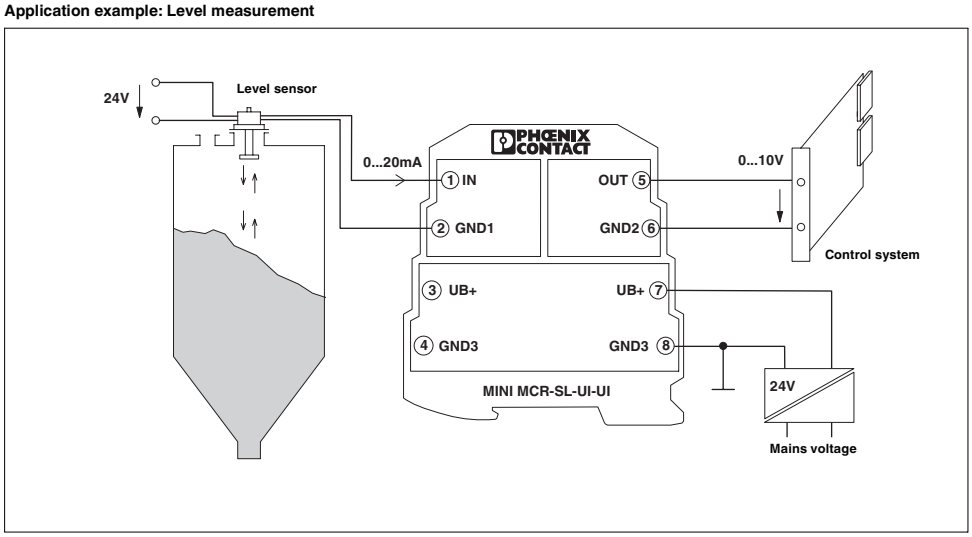
Order key MINI MCR-SL-UI-UI (Standard configuration entered as example)

Order No.		Input		Output		Factory calibration certificate FCC
2864383	/	IN03	/	OUT01	/	NONE
2864383 ≙ ...-UI-UI 2864710 ≙ ...-UI-UI-SP		IN01 ≙ 0...20 mA IN02 ≙ 4...20 mA IN03 ≙ 0...10 V IN04 ≙ 2...10 V IN05 ≙ 0...5 V IN06 ≙ 1...5 V		OUT01 ≙ 0...20 mA OUT02 ≙ 4...20 mA OUT03 ≙ 0...10 V OUT04 ≙ 2...10 V OUT05 ≙ 0...5 V OUT06 ≙ 1...5 V		NONE ≙ without FCC YES ≙ with FCC (a fee is charged) YESPLUS ≙ FCC with 5 measuring points (a fee is charged)

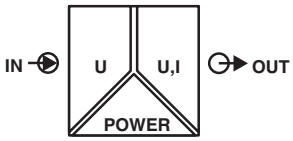
Combination table for input and output signals

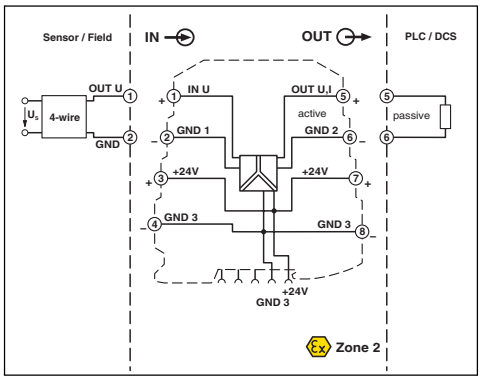
		DIP switch SW 2						DIP switch SW 1	
Input	**Output**	**DIP 1**	**DIP 2**	**DIP 3**	**DIP 4**	**DIP 5**	**DIP 6**	**DIP 1**	**DIP 2**
0 - 10 V	0 - 20 mA	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF
	4 - 20 mA	OFF	OFF	OFF	OFF	OFF	**ON**	OFF	OFF
	0 - 10 V	**ON**	OFF	**ON**	OFF	OFF	OFF	OFF	OFF
	2 - 10 V	**ON**	OFF	**ON**	OFF	OFF	**ON**	OFF	OFF
	0 - 5 V	**ON**	**ON**	OFF	OFF	OFF	OFF	OFF	OFF
	1 - 5 V	**ON**	**ON**	OFF	OFF	OFF	**ON**	OFF	OFF
2 - 10 V	0 - 20 mA	OFF	OFF	OFF	**ON**	**ON**	OFF	OFF	OFF
	4 - 20 mA	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF
	0 - 10 V	**ON**	OFF	**ON**	**ON**	**ON**	OFF	OFF	OFF
	2 - 10 V	**ON**	OFF	**ON**	OFF	OFF	OFF	OFF	OFF
	0 - 5 V	**ON**	**ON**	OFF	**ON**	**ON**	OFF	OFF	OFF
	1 - 5 V	**ON**	**ON**	OFF	OFF	OFF	OFF	OFF	OFF
0 - 5 V	0 - 20 mA	OFF	OFF	OFF	OFF	OFF	OFF	**ON**	OFF
	4 - 20 mA	OFF	OFF	OFF	OFF	OFF	**ON**	**ON**	OFF
	0 - 10 V	**ON**	OFF	**ON**	OFF	OFF	OFF	**ON**	OFF
	2 - 10 V	**ON**	OFF	**ON**	OFF	OFF	**ON**	**ON**	OFF
	0 - 5 V	**ON**	**ON**	OFF	OFF	OFF	OFF	**ON**	OFF
	1 - 5 V	**ON**	**ON**	OFF	OFF	OFF	**ON**	**ON**	OFF
1 - 5 V	0 - 20 mA	OFF	OFF	OFF	**ON**	**ON**	OFF	**ON**	OFF
	4 - 20 mA	OFF	OFF	OFF	OFF	OFF	OFF	**ON**	OFF
	0 - 10 V	**ON**	OFF	**ON**	**ON**	**ON**	OFF	**ON**	OFF
	2 - 10 V	**ON**	OFF	**ON**	OFF	OFF	OFF	**ON**	OFF
	0 - 5 V	**ON**	**ON**	OFF	**ON**	**ON**	OFF	**ON**	OFF
	1 - 5 V	**ON**	**ON**	OFF	OFF	OFF	OFF	**ON**	OFF
0 - 20 mA	0 - 20 mA	OFF	OFF	OFF	OFF	OFF	OFF	OFF	**ON**
	4 - 20 mA	OFF	OFF	OFF	OFF	OFF	**ON**	OFF	**ON**
	0 - 10 V	**ON**	OFF	**ON**	OFF	OFF	OFF	OFF	**ON**
	2 - 10 V	**ON**	OFF	**ON**	OFF	OFF	**ON**	OFF	**ON**
	0 - 5 V	**ON**	**ON**	OFF	OFF	OFF	OFF	OFF	**ON**
	1 - 5 V	**ON**	**ON**	OFF	OFF	OFF	**ON**	OFF	**ON**
4 - 20 mA	0 - 20 mA	OFF	OFF	OFF	**ON**	**ON**	OFF	OFF	**ON**
	4 - 20 mA	OFF	OFF	OFF	OFF	OFF	OFF	OFF	**ON**
	0 - 10 V	**ON**	OFF	**ON**	**ON**	**ON**	OFF	OFF	**ON**
	2 - 10 V	**ON**	OFF	**ON**	OFF	OFF	OFF	OFF	**ON**
	0 - 5 V	**ON**	**ON**	OFF	**ON**	**ON**	OFF	OFF	**ON**
	1 - 5 V	**ON**	**ON**	OFF	OFF	OFF	OFF	OFF	**ON**

Application example: Level measurement



Analog IN / Analog OUT
3-way isolating amplifier





Ex n

D W H

Configurable, for shunt measurements

Ex:

Housing width 6.2 mm

- Highly compact isolating amplifier for electrical isolation, conversion, amplification, and filtering of mV signals to create standard analog signals
- Ideal for converting signals in the case of shunt measurements
- Up to 280 signal combinations can be configured using DIP switches
- 3-way isolation
- Low power consumption
- Power supply possible through the foot element (T-connector)
- Standard configuration: 0 ... 50 mV input, 0 ... 20 mA output

Notes:

To order a product with an order configuration, enter the required configuration by referring to the adjacent order key.

Information about power bridging, system cabling, and marking components can be found starting at page 369

Technical data

Input data		
Input signal (configurable using the DIP switch)	0 ... 50 mV	
Maximum input signal	Approx. 30 V DC	
Input resistance	Approx. 10 kΩ	
Output data	U output	I output
Output signal (configurable using the DIP switch)	0 ... 5 V / 1 ... 5 V 0 ... 10 V / 2 ... 10 V -5 ... 5 V / -10 ... 10 V (The bipolar output can be used only for bipolar input signals.)	0 ... 20 mA / 4 ... 20 mA
Maximum output signal	12.5 V	28 mA
Load R_B	≥ 10 kΩ	< 500 Ω (at 20 mA)
Ripple	< 20 mV_{PP} (at 10 kΩ)	< 20 mV_{PP} (at 500 Ω)
General data		
Supply voltage U_B	19.2 V DC ... 30 V DC	
Nominal supply voltage	24 V DC	
Power consumption	< 450 mW (Current output)	
Maximum transmission error	≤ 0.2%	
Temperature coefficient	< 0.01%/K, typ. < 0.002%/K	
Limit frequency (3 dB)	(100 Hz / 30 Hz switchable)	
Step response (10 - 90%)	3.5 ms (at 100 Hz)	
Electrical isolation	Basic insulation according to EN 61010	
Test voltage, input/output/supply	1.5 kV (50 Hz, 1 min.)	
Degree of protection	IP20	
Ambient temperature (operation)	-20°C ... 65°C	
Mounting	Any	
Housing material	PBT	
Dimensions W / H / D	6.2 / 93.1 / 102.5 mm	
Screw connection solid / stranded / AWG	0.14 ... 2.5 mm^2 / 0.2 ... 2.5 mm^2 / 26 - 12	
Spring-cage connection solid / stranded / AWG	0.2 ... 2.5 mm^2 / 0.2 ... 2.5 mm^2 / 24 - 12	
Conformance/approvals		
Conformance	CE-compliant	
ATEX	II 3 G Ex nA II T4 X	
UL, USA/Canada	UL 508 recognized	
GL	GL EMC 2 D	

Ordering data

Description		Type	Order No.	Pcs. / Pkt.
MCR-3-way isolating amplifier, for realization of mV voltages in standard signals				
Order configuration	Screw connection	**MINI MCR-SL-SHUNT-UI**	**2810858**	1
Order configuration	Spring-cage conn.	**MINI MCR-SL-SHUNT-UI-SP**	**2810874**	1
Standard configuration	Screw connection	**MINI MCR-SL-SHUNT-UI-NC**	**2810780**	1
Standard configuration	Spring-cage conn.	**MINI MCR-SL-SHUNT-UI-SP-NC**	**2810793**	1

Order key MINI MCR-SL-SHUNT-UI-... (standard configuration entered as an example)

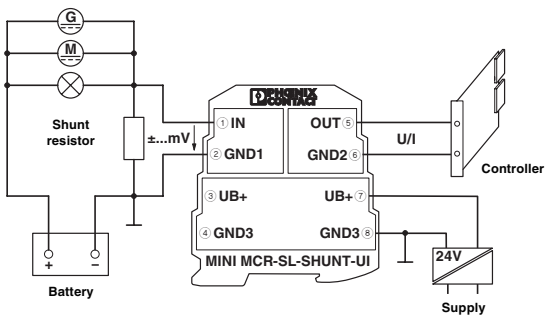
Order No.	Input				Output	Limit frequency	Factory calibration certificate FCC
2810858 /	**IN40**				/ **OUT01**	/ **100**	/ **NONE**
2810858 ≙ ...-SHUNT-UI 2810874 ≙ ...-SHUNT-UI-SP	IN40 ≙ 0...50 mV IN24 ≙ 0...60 mV IN41 ≙ 0...75 mV IN42 ≙ 0...80 mV IN25 ≙ 0...100 mV IN43 ≙ 0...120 mV IN44 ≙ 0...150 mV IN26 ≙ 0...200 mV IN45 ≙ 0...240 mV IN27 ≙ 0...300 mV	IN28 ≙ 0...500 mV IN46 ≙ 0...600 mV IN47 ≙ 0...750 mV IN48 ≙ 0...800 mV IN29 ≙ 0...1.0 V IN49 ≙ 0...1.2 V IN50 ≙ 0...1.5 V IN30 ≙ 0...2.0 V IN51 ≙ 0...2.4 V IN52 ≙ 0...3.0 V	IN53 ≙ -50...+50 mV IN13 ≙ -60...+60 mV IN54 ≙ -75...+75 mV IN55 ≙ -80...+80 mV IN14 ≙ -100...+100 mV IN56 ≙ -120...+120 mV IN57 ≙ -150...+150 mV IN15 ≙ -200...+200 mV IN58 ≙ -240...+240 mV IN16 ≙ -300...+300 mV	IN17 ≙ -500...+500 mV IN59 ≙ -600...+600 mV IN60 ≙ -750...+750 mV IN61 ≙ -800...+800 mV IN18 ≙ -1.0...+1.0 V IN62 ≙ -1.2...+1.2 V IN63 ≙ -1.5...+1.5 V IN19 ≙ -2.0...+2.0 V IN64 ≙ -2.4...+2.4 V IN65 ≙ -3.0...+3.0 V	OUT01 ≙ 0...20 mA OUT02 ≙ 4...20 mA OUT03 ≙ 0...10 V OUT04 ≙ 2...10 V OUT05 ≙ 0...5 V OUT06 ≙ 1...5 V OUT13 ≙ -5...+5 V OUT14 ≙ -10...+10 V	30 ≙ 30 Hz 100 ≙ 100 Hz	NONE ≙ without FCC YES ≙ with FCC (a fee is charged) YESPLUS ≙ Factory calibration certificate with 5 measuring points (a fee is charged)

Note:
A bipolar output (-5...+5 V, -10...+10 V) can only be used for a bipolar input signal.

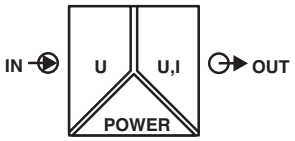
Combination table for input and output signals

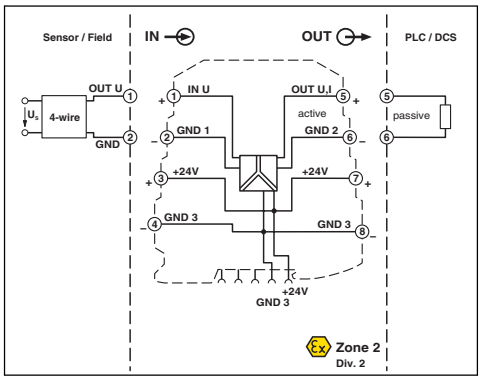
	Voltage output						Current output	
Input	**-10...+10 V**	**0...10 V**	**2...10 V**	**-5...+5 V**	**0...5 V**	**1...5 V**	**0...20 mA**	**4...20 mA**
0...50 mV		x	x		x	x	x	x
0...60 mV		x	x		x	x	x	x
0...75 mV		x	x		x	x	x	x
0...80 mV		x	x		x	x	x	x
0...100 mV		x	x		x	x	x	x
0...120 mV		x	x		x	x	x	x
0...150 mV		x	x		x	x	x	x
0...200 mV		x	x		x	x	x	x
0...240 mV		x	x		x	x	x	x
0...300 mV		x	x		x	x	x	x
0...500 mV		x	x		x	x	x	x
0...600 mV		x	x		x	x	x	x
0...750 mV		x	x		x	x	x	x
0...800 mV		x	x		x	x	x	x
0...1 V		x	x		x	x	x	x
0...1.2 V		x	x		x	x	x	x
0...1.5 V		x	x		x	x	x	x
0...2 V		x	x		x	x	x	x
0...2.4 V		x	x		x	x	x	x
0...3 V		x	x		x	x	x	x
-50...50 mV	x	x	x	x	x	x	x	x
-60...60 mV	x	x	x	x	x	x	x	x
-75...75 mV	x	x	x	x	x	x	x	x
-80...80 mV	x	x	x	x	x	x	x	x
-100...100 mV	x	x	x	x	x	x	x	x
-120...120 mV	x	x	x	x	x	x	x	x
-150...150 mV	x	x	x	x	x	x	x	x
-200...200 mV	x	x	x	x	x	x	x	x
-240...240 mV	x	x	x	x	x	x	x	x
-300...300 mV	x	x	x	x	x	x	x	x
-500...500 mV	x	x	x	x	x	x	x	x
-600...600 mV	x	x	x	x	x	x	x	x
-750...750 mV	x	x	x	x	x	x	x	x
-800...800 mV	x	x	x	x	x	x	x	x
-1...1 V	x	x	x	x	x	x	x	x
-1.2...1.2 V	x	x	x	x	x	x	x	x
-1.5...1.5 V	x	x	x	x	x	x	x	x
-2...2 V	x	x	x	x	x	x	x	x
-2.4...2.4 V	x	x	x	x	x	x	x	x
-3...3 V	x	x	x	x	x	x	x	x

Application example: Monitoring of loading and unloading currents



Analog IN / Analog OUT
3-way isolating amplifier





Configurable,
for 0 ... 24 V / 0 ... 30 V input signals

Ex:
Housing width 6.2 mm

- Highly compact isolating amplifier for electrical isolation, conversion, amplification, and filtering of 24 V or 30 V DC signals to create standard analog signals
- Up to 12 signal combinations can be configured using DIP switches
- 3-way isolation
- Low power consumption
- Power supply possible through the foot element (T-connector)
- Standard configuration:
  0 ... 30 V input, 0 ... 20 mA output

Notes:

To order a product with an order configuration, please enter the desired configuration by referring to the order key; see below.

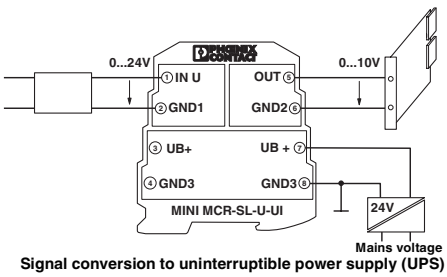
Information about power bridging, system cabling, and marking components can be found starting at page 369

Technical data

Input data		
Input signal	0 ... 24 V / 0 ... 30 V	
Input resistance	Approx. 125 kΩ (0 ... 24 V)	
Output data	U output	I output
Output signal (configurable using the DIP switch)	0 ... 5 V / 1 ... 5 V 0 ... 10 V / 2 ... 10 V	0 ... 20 mA / 4 ... 20 mA
Maximum output signal	≤ 12.5 V	28 mA
No-load voltage		≤ 12.5 V
Short-circuit current	≤ 22 mA	
Load R_B	> 10 kΩ	< 500 Ω (at 20 mA)
Ripple	< 20 mV_{PP} (at 10 kΩ)	< 20 mV_{PP} (at 500 Ω)
General data		
Supply voltage U_B	19.2 V DC ... 30 V DC	
Power consumption	< 450 mW	
Maximum transmission error	< 0.1% (of final value)	
Temperature coefficient	< 0.01%/K, typ. < 0.002%/K	
Limit frequency (3 dB)	Approx. 100 Hz	
Step response (10 - 90%)	Approx. 3.5 ms	
Electrical isolation	Basic insulation according to EN 61010	
Test voltage, input/output/supply	1.5 kV (50 Hz, 1 min.)	
Ambient temperature (operation)	-20°C ... 65°C	
Housing material	PBT	
Dimensions W / H / D	6.2 / 93.1 / 102.5 mm	
Screw connection solid / stranded / AWG	0.14 ... 2.5 mm^2 / 0.2 ... 2.5 mm^2 / 26 - 12	
Spring-cage connection solid / stranded / AWG	0.2 ... 2.5 mm^2 / 0.2 ... 2.5 mm^2 / 24 - 12	
Conformance/approvals		
Conformance	CE-compliant	
ATEX	II 3 G Ex nA II T4 X	
UL, USA/Canada	UL 508 recognized Class I, Div. 2, Groups A, B, C, D T5	
GL	GL EMC 2 D	

Ordering data

Description		Type	Order No.	Pcs. / Pkt.
MCR 3-way isolating amplifier, for electrical isolation of analog signals				
Order configuration	Screw connection	**MINI MCR-SL-U-UI**	**2864053**	1
Order configuration	Spring-cage conn.	**MINI MCR-SL-U-UI-SP**	**2811213**	1
Standard configuration	Screw connection	**MINI MCR-SL-U-UI-NC**	**2865007**	1
Standard configuration	Spring-cage conn.	**MINI MCR-SL-U-UI-SP-NC**	**2810078**	1

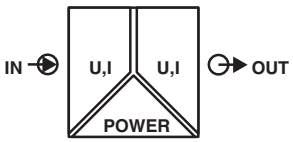


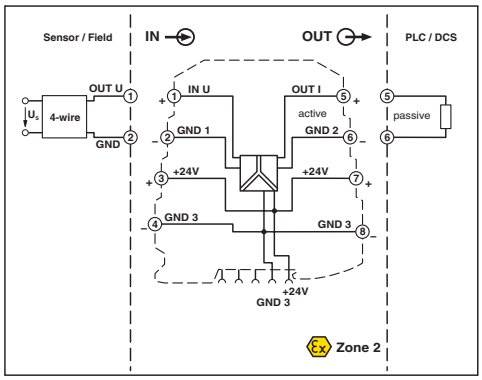
Signal conversion to uninterruptible power supply (UPS)

Order key MINI MCR-SL-U-UI (Standard configuration entered as example)

Order No.	Input	Output
2864053 /	**IN39** /	**OUT01**
2864053 ≙ ...-U-UI	IN38 ≙ 0...24 V IN39 ≙ 0...30 V	OUT01 ≙ 0...20 mA OUT02 ≙ 4...20 mA OUT03 ≙ 0...10 V OUT04 ≙ 2...10 V OUT05 ≙ 0...5 V OUT06 ≙ 1...5 V
2811213 ≙ ...-U-UI-SP		

Analog IN / Analog OUT
3-way isolating amplifier





Ex n

With fixed signal combinations

Ex:

- Highly compact isolating amplifier for electrical isolation, conversion, amplification, and filtering of standard analog signals
- Fixed signal combinations
- Entry-level alternative to configurable isolating amplifiers
- 3-way isolation
- Low power consumption
- Power supply possible through the foot element (T-connector)

Notes:

Information about power bridging, system cabling, and marking components can be found starting at page 369

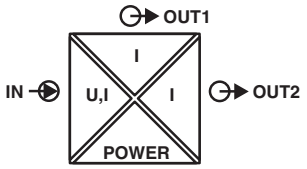
Technical data

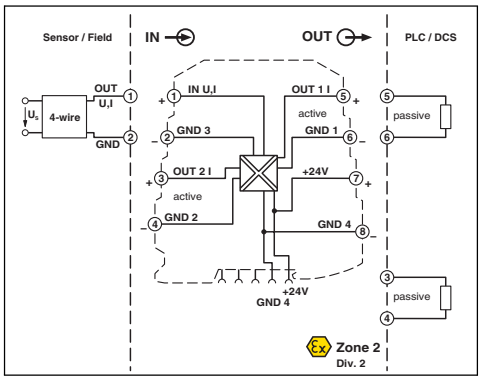
Input data	U input	I input
Input resistance	Approx. 100 kΩ	Approx. 50 Ω
Output data	U output	I output
Maximum output signal	12.5 V	28 mA
No-load voltage		Approx. 12.5 V
Short-circuit current	Approx. 2 mA	
Load R_B	≥ 10 kΩ	≤ 500 Ω
Ripple	< 20 mV_{PP} (at 10 kΩ)	< 20 mV_{PP} (at 500 Ω)
General data		
Supply voltage U_B	19.2 V DC ... 30 V DC	
Nominal supply voltage	24 V DC	
Current consumption	< 20 mA	
Maximum transmission error	≤ 0.1% (of final value)	
Temperature coefficient	< 0.01%/K, typ. < 0.002%/K	
Limit frequency (3 dB)	Approx. 100 Hz	
Step response (10 - 90%)	Approx. 3.5 ms	
Degree of protection	IP20	
Electrical isolation	Basic insulation according to EN 61010	
Test voltage, input/output/supply	1.5 kV (50 Hz, 1 min.)	
Ambient temperature (operation)	-20°C ... 65°C	
Housing material	PBT	
Dimensions W / H / D	6.2 / 93.1 / 102.5 mm	
Screw connection solid / stranded / AWG	0.14 ... 2.5 mm^2 / 0.2 ... 2.5 mm^2 / 26 - 12	
Spring-cage connection solid / stranded / AWG	0.2 ... 2.5 mm^2 / 0.2 ... 2.5 mm^2 / 24 - 12	
Conformance/approvals		
Conformance	CE-compliant	
ATEX	II 3 G Ex nA II T4 X	
UL, USA/Canada	UL 508 recognized Class I, Div. 2, Groups A, B, C, D T5 applied for	
GL	GL EMC 2 D	

Ordering data

Description	Input signal	Output signal	Type	Order No.	Pcs. / Pkt.
MCR 3-way isolating amplifier, for electrical isolation of analog signals					
Screw connection	0 ... 10 V	0 ... 20 mA	**MINI MCR-SL-U-I-0**	**2813512**	1
Spring-cage conn.	0 ... 10 V	0 ... 20 mA	**MINI MCR-SL-U-I-0-SP**	**2813570**	1
Screw connection	0 ... 10 V	4 ... 20 mA	**MINI MCR-SL-U-I-4**	**2813525**	1
Spring-cage conn.	0 ... 10 V	4 ... 20 mA	**MINI MCR-SL-U-I-4-SP**	**2813583**	1
Screw connection	0 ... 20 mA	0 ... 10 V	**MINI MCR-SL-I-U-0**	**2813541**	1
Spring-cage conn.	0 ... 20 mA	0 ... 10 V	**MINI MCR-SL-I-U-0-SP**	**2813554**	1
Screw connection	4 ... 20 mA	0 ... 10 V	**MINI MCR-SL-I-U-4**	**2813538**	1
Spring-cage conn.	4 ... 20 mA	0 ... 10 V	**MINI MCR-SL-I-U-4-SP**	**2813567**	1
Screw connection	0 ... 20 mA 4 ... 20 mA	0 ... 20 mA 4 ... 20 mA	**MINI MCR-SL-I-I**	**2864406**	1
Spring-cage conn.	0 ... 20 mA 4 ... 20 mA	0 ... 20 mA 4 ... 20 mA	**MINI MCR-SL-I-I-SP**	**2864723**	1
Screw connection	0 ... 10 V -10 ... 10 V	0 ... 10 V -10 ... 10 V	**MINI MCR-SL-U-U**	**2864684**	1
Spring-cage conn.	0 ... 10 V -10 ... 10 V	0 ... 10 V -10 ... 10 V	**MINI MCR-SL-U-U-SP**	**2864697**	1

Analog IN / Analog OUT signal duplicators





Ex n

Configurable, with two current output signals

Ex:

Housing width 6.2 mm

- Highly compact isolating amplifier for electrical isolation, conversion, amplification, filtering, and duplication of standard analog signals
- Duplication of a standard analog signal on two current outputs
- Up to 8 signal combinations can be configured using DIP switches
- 4-way isolation
- Power supply possible through the foot element (T-connector)
- Standard configuration: 0 ... 10 V input, 10 ... 20 mA output, 20 ... 20 mA output

Notes:

To order a product with an order configuration, please enter the desired configuration by referring to the order key; see below.

Information about power bridging, system cabling, and marking components can be found starting at page 369

Technical data

Input data	U input	I input
Input signal	0 ... 10 V / 1 ... 5 V	0 ... 20 mA / 4 ... 20 mA
Maximum input signal	30 V	50 mA
Input resistance	Approx. 100 kΩ	Approx. 50 Ω
Output data		
Output signal (configurable using the DIP switch)	2x; 0 ... 20 mA / 4 ... 20 mA	
Maximum output signal	22 mA	
No-load voltage	9 V	
Load R_B	≤ 250 Ω (at 20 mA)	
Ripple	< 20 mV_{PP} (at 250 Ω)	
General data		
Supply voltage U_B	19.2 V DC ... 30 V DC	
Current consumption	< 30 mA (at 24 V DC incl. load)	
Power consumption	< 600 mW	
Maximum transmission error	≤ 0.2% (of final value), typ. < 0.1%	
Temperature coefficient	< 0.01%/K, typ. < 0.004%/K	
Limit frequency (3 dB)	Approx. 35 Hz	
Step response (0–99%)	Approx. 10 ms	
Electrical isolation	Basic insulation according to EN 61010	
Test voltage, input/output/supply	1.5 kV (50 Hz, 1 min.)	
Ambient temperature (operation)	-20°C ... 60°C	
Housing material	PBT	
Dimensions W / H / D	6.2 / 93.1 / 102.5 mm	
Screw connection solid / stranded / AWG	0.14 ... 2.5 mm^2 / 0.2 ... 2.5 mm^2 / 26 - 12	
Spring-cage connection solid / stranded / AWG	0.2 ... 2.5 mm^2 / 0.2 ... 2.5 mm^2 / 24 - 12	
Conformance/approvals		
Conformance	CE-compliant	
ATEX	II 3 G Ex nA II T4 X	
UL, USA/Canada	UL 508 recognized Class I, Div. 2, Groups A, B, C, D T5	
GL	GL EMC 2 D	

Ordering data

Description		Type	Order No.	Pcs. / Pkt.
MCR signal duplicator, for duplicating and electrical isolation of analog signals				
Order configuration	Screw connection	**MINI MCR-SL-UI-2I**	**2864794**	1
Order configuration	Spring-cage conn.	**MINI MCR-SL-UI-2I-SP**	**2864804**	1
Standard configuration	Screw connection	**MINI MCR-SL-UI-2I-NC**	**2864176**	1
Standard configuration	Spring-cage conn.	**MINI MCR-SL-UI-2I-SP-NC**	**2864189**	1

Order key MINI MCR-SL-UI-2I (Standard configuration entered as example)

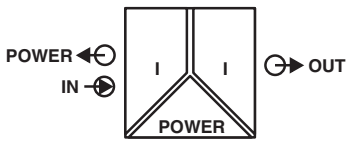
Order No.	Input	Output combination [1]	Behavior of the analog outputs	Factory calibration certificate FCC
2864794 /	**IN03** /	**A** /	**0** /	**NONE**
2864794 ≙ ...-UI-2I 2864804 ≙ ...-UI-2I-SP	IN01 ≙ 0...20 mA IN02 ≙ 4...20 mA IN03 ≙ 0...10 V IN06 ≙ 1...5 V	A B C	0 ≙ Analog behavior 1 ≙ Limit	NONE ≙ without FCC YES ≙ with FCC (a fee is charged) YESPLUS ≙ FCC with 5 measuring points (a fee is charged)

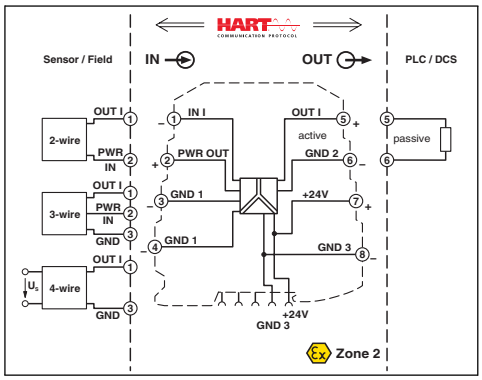
Explanation of the output combination:

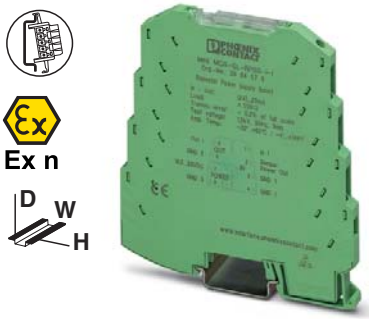
	Output 1	Output 2
A	0...20 mA	0...20 mA
B	0...20 mA	4...20 mA
C	4...20 mA	4...20 mA

[1]) For explanations see adjacent text on the right, for further details see data sheet: www.phoenixcontact.com

Analog IN / Analog OUT repeater power supplies







Optionally available with HART transmission

- Highly compact repeater power supplies for electrical isolation, amplification, and filtering of standard analog signals
- Supply of 2-wire and passive 3-wire sensors
- Can also be used as an isolator without supply
- 3-way isolation
- Alternatively, bidirectional HART transmission
- Power supply possible through the foot element (T-connector)

Notes:

Information about power bridging, system cabling, and marking components can be found starting at page 359

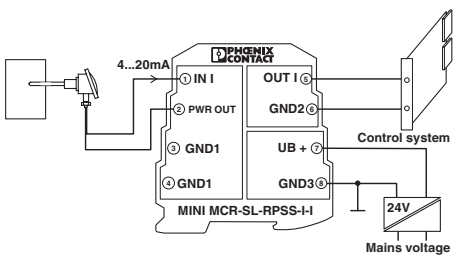
Ex: Ⓔx
Housing width 6.2 mm

Technical data

Input data	MINI MCR-SL-RPSS-I-I	MINI MCR-SL-RPS-I-I
Input signal	0 ... 20 mA, isolator operation / 4 ... 20 mA	0 ... 20 mA, isolator operation / 4 ... 20 mA
Input resistance	Approx. 50 Ω	Approx. 50 Ω
Transmitter supply voltage	16.5 V	14.7 V DC ... 25.5 V DC (U_B - max. 4.5 V for load 0 mA ... 20 mA)
Output data		
Output signal	0 ... 20 mA / 4 ... 20 mA	0 ... 20 mA / 4 ... 20 mA
Maximum output signal	21 mA	28 mA
No-load voltage	Approx. 12.5 V	Approx. 12.5 V
Load R_B	≤ 500 Ω (at I = 20 mA)	≤ 500 Ω (at I = 20 mA)
Ripple	< 20 mV_{rms} (at 500 Ω)	< 20 mV_{rms} (at 500 Ω)
General data		
Supply voltage U_B	20.4 V DC ... 30 V DC	19.2 V DC ... 30 V DC
Nominal supply voltage	24 V DC	24 V DC
Current consumption		
Power consumption	< 900 mW (at 24 V DC and in repeater power supply operation)	< 900 mW (at 24 V DC and in repeater power supply operation)
Maximum transmission error	≤ 0.2% (of final value), typ. ≤ 0.1% (of final value)	≤ 0.2% (of final value), typ. ≤ 0.1% (of final value)
Temperature coefficient	< 0.005%/K, typ. < 0.002%/K	< 0.01%/K, typ. < 0.002%/K
Limit frequency (3 dB)	> 125 Hz (typ.)	Approx. 100 Hz
Communication	HART specification in both operating modes (RPSS isolator / RPSS repeater power supply)	-
Step response (10 - 90%)	< 2 ms (typ.)	Approx. 3.5 ms
Electrical isolation	Basic insulation according to EN 61010	
Test voltage, input/output/supply	1.5 kV (50 Hz, 1 min.)	1.5 kV (50 Hz, 1 min.)
Degree of protection	IP20	IP20
Ambient temperature (operation)	-20°C ... 60°C	-20°C ... 60°C
Mounting	Any	Any
Housing material	PBT	PBT
Dimensions W / H / D	6.2 / 93.1 / 102.5 mm	6.2 / 93.1 / 102.5 mm
Screw connection solid / stranded / AWG	0.14 ... 2.5 mm^2 / 0.2 ... 2.5 mm^2 / 26 - 12	
Spring-cage connection solid / stranded / AWG	0.2 ... 2.5 mm^2 / 0.2 ... 2.5 mm^2 / 24 - 12	
Conformance/approvals		
Conformance	CE-compliant	CE-compliant
ATEX	Ⓔx II 3 G Ex nA II T4 X	Ⓔx II 3 G Ex nA II T4 X
UL, USA/Canada	-	UL 508 recognized Class I, Div. 2, Groups A, B, C, D T5
GL	-	GL EMC 2 D

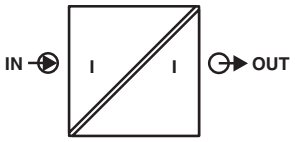
Ordering data

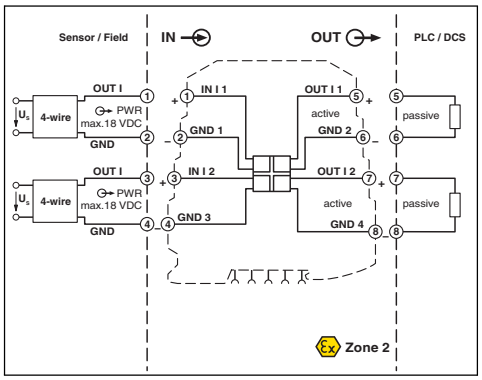
Description		Type	Order No.	Pcs. / Pkt.
MCR repeater power supplies				
with HART® protocol	Screw connection	**MINI MCR-SL-RPSS-I-I**	**2864079**	1
with HART® protocol	Spring-cage conn.	**MINI MCR-SL-RPSS-I-I-SP**	**2810230**	1
	Screw connection	**MINI MCR-SL-RPS-I-I**	**2864422**	1
	Spring-cage conn.	**MINI MCR-SL-RPS-I-I-SP**	**2864752**	1



Repeater power supply operation with a passive sensor

Analog IN / Analog OUT passive isolators





Ex n

Either 1- or 2-channel

Ex:
Housing width 6.2 mm

- Highly compact 2-wire passive isolators for electrical isolation and filtering of standard analog signals
- Input loop-supplied
- Does not require any additional auxiliary voltage
- 2 channels in conj. with a design width of just 6.2 mm
- Voltage drop on isolating amplifier of just 1.7 V

Notes:

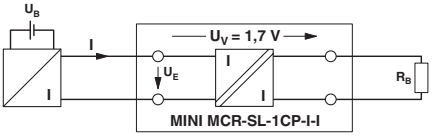
When using passive isolators, make sure that the current sourcing voltage of the measuring transducer U_B is sufficient to drive the maximum current of 20 mA via the passive isolator with a voltage drop U_V = 1.7 V and load R_B.
This means:
$U_B \geq U_E$ = 1.7 V + 20 mA x R_B

Technical data

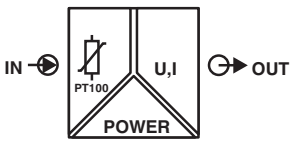
Input data	
Input signal	0 ... 20 mA / 4 ... 20 mA
Voltage drop	1.7 V (at I = 20 mA)
Response current	Approx. 190 µA
Maximum input current / overload	40 mA
Maximum input voltage	18 V
Output data	
Output signal	0 ... 20 mA / 4 ... 20 mA
Load R_B	< 600 Ω (at I = 20 mA output signal)
Ripple	< 10 mV_{rms} (at 600 Ω)
General data	
Maximum transmission error	≤ 0.1% (of final value)
Additional error per 100 Ω load	0.03% (of measured value / 100 Ω load)
Temperature coefficient	≤ 0.002%/K (of measured value / 100 Ω load)
Limit frequency (3 dB)	75 Hz
Step response (10 - 90%)	5 ms (at 600 Ω load)
Electrical isolation	Basic insulation according to EN 61010
Test voltage input/output	1.5 kV (50 Hz, 1 min.)
Degree of protection	IP20
Ambient temperature (operation)	-20°C ... 65°C
Mounting	Any
Housing material	PBT
Dimensions W / H / D	6.2 / 93.1 / 102.5 mm
Screw connection solid / stranded / AWG	0.14 ... 2.5 mm^2 / 0.2 ... 2.5 mm^2 / 26 - 12
Spring-cage connection solid / stranded / AWG	0.2 ... 2.5 mm^2 / 0.2 ... 2.5 mm^2 / 24 - 12
Conformance/approvals	
Conformance	CE-compliant
ATEX	II 3 G Ex nA II T6 X
UL, USA/Canada	UL 508 recognized Class I, Groups A, B, C, D; Class II, Groups E, F, G; Class III
GL	GL EMC 2 D

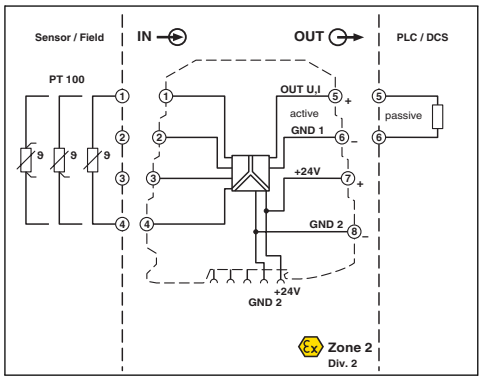
Ordering data

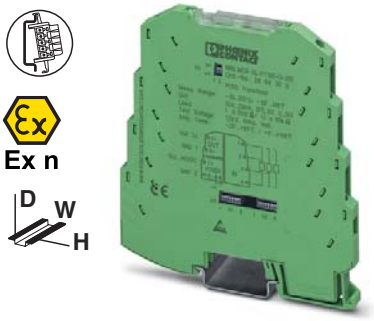
Description		Type	Order No.	Pcs. / Pkt.
MCR passive isolator, for electrical isolation of current signals without auxiliary power				
two-channel	Screw connection	**MINI MCR-SL-2CP-I-I**	**2864655**	1
two-channel	Spring-cage conn.	**MINI MCR-SL-2CP-I-I-SP**	**2864781**	1
single-channel	Screw connection	**MINI MCR-SL-1CP-I-I**	**2864419**	1
single-channel	Spring-cage conn.	**MINI MCR-SL-1CP-I-I-SP**	**2864749**	1



Temperature, temperature transducer for PT 100







Ex n

D W H

Configurable, for a temperature measuring range of -50°C ... +200°C

Ex:

Housing width 6.2 mm

- Highly compact temperature transducer for electrical isolation, conversion, amplification, and filtering of PT 100 signals to create standard signals
- Optimized temperature measuring range of -50°C to +200°C for increased accuracy
- For 2-, 3- or 4-wire PT 100 sensors according to IEC 60751
- Input and output signals can be configured via DIP switches
- 3-way isolation
- Error signaling via diagnostic LED and analog signal
- Power supply possible through the foot element (T-connector)

Notes:

To order a product with an order configuration, please enter the desired configuration by referring to the order key; see below.

Information about power bridging, system cabling, and marking components can be found starting at page 369

Technical data

Input data		
Input signal (can be configured using DIP switches)	Pt 100 (IEC 60751/EN 60751) : 2-, 3-, 4-wire	
Temperature range	-50°C ... 200°C (configurable)	
Measuring range span	Min. 50 K	
Output data	U output	I output
Output signal	0 ... 5 V / 1 ... 5 V 0 ... 10 V / 10 ... 0 V	0 ... 20 mA / 4 ... 20 mA 20 ... 0 mA / 20 ... 4 mA
Maximum output signal	Approx. 12.5 V	23 mA
Load R_B	> 10 kΩ	< 500 Ω (at 20 mA)
Ripple	< 20 mV_{PP} (at 10 kΩ)	< 20 mV_{PP} (at 500 Ω)
General data		
Supply voltage U_B	19.2 V DC ... 30 V DC	
Current consumption	< 21 mA (at 24 V DC)	
Power consumption	< 500 mW	
Transmission error for the full/set measurement range	≤ 0.25%; ((50 K / Δ Temp) + 0.05)%	
Temperature coefficient	< 0.02%/K	
Step response (0–99%)	< 200 ms	
Electrical isolation	Basic insulation according to EN 61010	
Test voltage, input/output/supply	1.5 kV (50 Hz, 1 min.)	
Ambient temperature (operation)	-20°C ... 65°C	
Housing material	PBT	
Dimensions W / H / D	6.2 / 93.1 / 102.5 mm	
Screw connection solid / stranded / AWG	0.14 ... 2.5 mm^2 / 0.2 ... 2.5 mm^2 / 26 - 12	
Spring-cage connection solid / stranded / AWG	0.2 ... 2.5 mm^2 / 0.2 ... 2.5 mm^2 / 24 - 12	
Conformance/approvals		
Conformance	CE-compliant	
ATEX	II 3 G Ex nA II T4 X	
UL, USA/Canada	UL 508 recognized Class I, Div. 2, Groups A, B, C, D T5	
GL	GL EMC 2 D	

Ordering data

Description		Type	Order No.	Pcs. / Pkt.
MCR temperature measuring transducer, for Pt 100 temperature sensors				
Order configuration	Screw connection	**MINI MCR-SL-PT100-UI-200**	**2864309**	1
Order configuration	Spring-cage conn.	**MINI MCR-SL-PT100-UI-200-SP**	**2864192**	1
Unconfigured	Screw connection	**MINI MCR-SL-PT100-UI-200-NC**	**2864370**	1
Unconfigured	Spring-cage conn.	**MINI MCR-SL-PT100-UI-200-SP-NC**	**2864202**	1

Order key MINI MCR-SL-PT100-UI-200 (standard configuration entered as an example)

Order No.	Connection method	Measuring range [°C] Start	End	Output	Failure information [1]	Factory calibration certificate FCC
2864309	**3**	**0**	**100**	**OUT01**	**A**	**NONE**
2864309 ≙ ...-PT100-UI-200	2 ≙ 2-wire 3 ≙ 3-wire	0 -5 -10 -15	**Range** (increment) 0...200 (5 K)	OUT01 ≙ 0...20 mA OUT02 ≙ 4...20 mA OUT03 ≙ 0...10 V OUT05 ≙ 0...5 V	A B C D	NONE ≙ without FCC YES ≙ with FCC (a fee is charged)
2864192 ≙ ...-PT100-UI-200-SP	4 ≙ 4-wire	-20 -30 -40 -50		OUT06 ≙ 1...5 V OUT07 ≙ 20...0 mA OUT08 ≙ 20...4 mA OUT09 ≙ 10...0 V		YESPLUS ≙ Factory calibration certificate with 5 measuring points (a fee is charged)

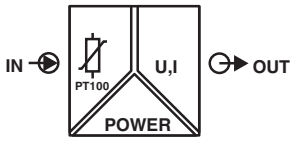
[1]) For explanations see adjacent text on the right, for further details see data sheet: www.phoenixcontact.com.

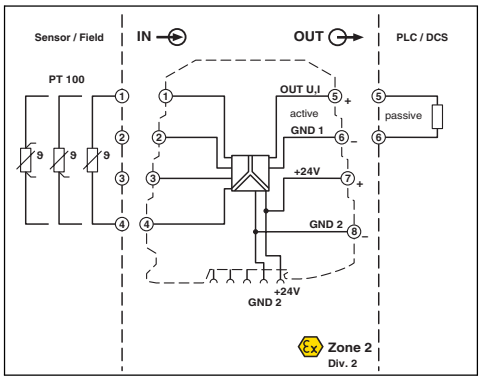
Failure information (depends on the output signal range):

	Overrange			Open circuit		
	0...20 mA	4...20 mA	0...10 V	0...20 mA	4...20 mA	0...10 V
A	20.5 mA	20.5 mA	10.25 V	21 mA	21 mA	10.5 V
B	20.5 mA	20.5 mA	10.25 V	21 mA	21 mA	10.5 V
C	20 mA	20 mA	10 V	21 mA	21 mA	10.5 V
D	20 mA	20 mA	10 V	0 mA	4 mA	0 V

	Underrange			Short circuit		
	0...20 mA	4...20 mA	0...10 V	0...20 mA	4...20 mA	0...10 V
A	0 mA	4 mA	0 V	0 mA	4 mA	0 V
B	0 mA	3.5 mA	0 V	0 mA	3 mA	0 V
C	0 mA	4 mA	0 V	21 mA	21 mA	10.5 V
D	0 mA	4 mA	0 V	0 mA	4 mA	0 V

Temperature, temperature transducer for PT 100





Ex n

Configurable, for a temperature measuring range of -150°C ... +850°C

Ex:

Housing width 6.2 mm

- Highly compact temperature transducer for electrical isolation, conversion, amplification, and filtering of PT 100 signals to create standard signals
- Temperature measuring range of -150°C to +850°C
- For 2-, 3- or 4-wire PT 100 sensors according to IEC 60751
- Input and output signals can be configured via DIP switches
- 3-way isolation
- Error signaling via diagnostic LED and analog signal
- Power supply possible through the foot element (T-connector)

Notes:

To order a product with an order configuration, please enter the desired configuration by referring to the order key; see below.

Information about power bridging, system cabling, and marking components can be found starting at page 369

Technical data

Input data		
Input signal (can be configured using DIP switches)	Pt 100 (IEC 60751/EN 60751) : 2-, 3-, 4-wire	
Temperature range	-150°C ... 850°C (configurable)	
Measuring range span	Min. 50 K	
Output data	U output	I output
Output signal (configurable using the DIP switch)	0 ... 5 V / 1 ... 5 V 0 ... 10 V / 10 ... 0 V	0 ... 20 mA / 4 ... 20 mA 20 ... 0 mA / 20 ... 4 mA
Maximum output signal	Approx. 12.5 V	23 mA
Load R_B	≥ 10 kΩ	< 500 Ω (at 20 mA)
Ripple	< 20 mV_{PP} (at 10 kΩ)	< 20 mV_{PP} (at 500 Ω)
General data		
Supply voltage U_B	19.2 V DC ... 30 V DC	
Current consumption	< 21 mA (at 24 V DC)	
Power consumption	< 500 mW	
Transmission error for the full/set measurement range	≤ 0.2%; ((100 K / set measurement range [K]) + 0.1)%	
Temperature coefficient	< 0.02%/K	
Step response (0–99%)	< 160 ms	
Electrical isolation	Basic insulation according to EN 61010	
Test voltage, input/output/supply	1.5 kV (50 Hz, 1 min.)	
Ambient temperature (operation)	-20°C ... 65°C	
Housing material	PBT	
Dimensions W / H / D	6.2 / 93.1 / 102.5 mm	
Screw connection solid / stranded / AWG	0.14 ... 2.5 mm^2 / 0.2 ... 2.5 mm^2 / 26 - 12	
Spring-cage connection solid / stranded / AWG	0.2 ... 2.5 mm^2 / 0.2 ... 2.5 mm^2 / 24 - 12	
Conformance/approvals		
Conformance	CE-compliant	
ATEX	II 3 G Ex nA II T4 X	
UL, USA/Canada	UL 508 recognized Class I, Div. 2, Groups A, B, C, D T5	
GL	GL EMC 2 D	

Ordering data

Description		Type	Order No.	Pcs. / Pkt.
MCR temperature measuring transducer, for Pt 100 temperature sensors				
Order configuration	Screw connection	**MINI MCR-SL-PT100-UI**	**2864435**	1
Order configuration	Spring-cage conn.	**MINI MCR-SL-PT100-UI-SP**	**2864736**	1
Unconfigured	Screw connection	**MINI MCR-SL-PT100-UI-NC**	**2864273**	1
Unconfigured	Spring-cage conn.	**MINI MCR-SL-PT100-UI-SP-NC**	**2864286**	1

Order key MINI MCR-SL-PT100-UI (standard configuration entered as an example)

Order No.	Connection method	Measuring range [°C] Start	End	Output	Failure information [1]	Factory calibration certificate FCC
2864435	**3**	**0**	**100**	**OUT01**	**A**	**NONE**
2864435 ≙ ...-PT100-UI	2 ≙ 2-wire 3 ≙ 3-wire 4 ≙ 4-wire	0 -10 -20 -30 -40 -50 -100 -150	**Range** (increment) 0...100 (5 K) 110...300 (10 K) 320...700 (20 K) 750...850 (50 K)	OUT01 ≙ 0...20 mA OUT02 ≙ 4...20 mA OUT03 ≙ 0...10 V OUT05 ≙ 0...5 V OUT06 ≙ 1...5 V OUT07 ≙ 20...0 mA OUT08 ≙ 20...4 mA OUT09 ≙ 10...0 V	A B C D	NONE ≙ without FCC YES ≙ with FCC (a fee is charged) YESPLUS ≙ Factory calibration certificate with 5 measuring points (a fee is charged)

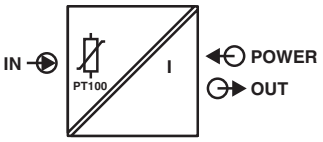
Failure information (depends on the output signal range):

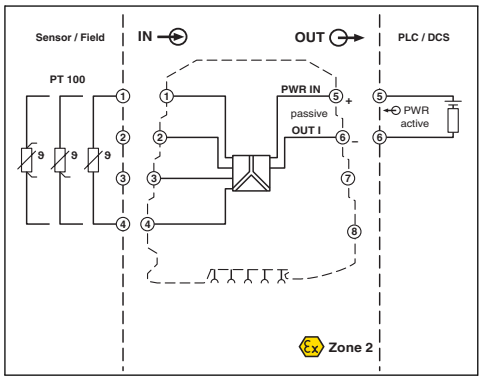
	Overrange			Open circuit		
	0...20 mA	4...20 mA	0...10 V	0...20 mA	4...20 mA	0...10 V
A	20.5 mA	20.5 mA	10.25 V	21 mA	21 mA	10.5 V
B	20.5 mA	20.5 mA	10.25 V	21 mA	21 mA	10.5 V
C	20 mA	20 mA	10 V	21 mA	21 mA	10.5 V
D	20 mA	20 mA	10 V	0 mA	4 mA	0 V

	Underrange			Short circuit		
	0...20 mA	4...20 mA	0...10 V	0...20 mA	4...20 mA	0...10 V
A	0 mA	4 mA	0 V	0 mA	4 mA	0 V
B	0 mA	3.5 mA	0 V	0 mA	3 mA	0 V
C	0 mA	4 mA	0 V	21 mA	21 mA	10.5 V
D	0 mA	4 mA	0 V	0 mA	4 mA	0 V

[1]) For explanations see adjacent text on the right, for further details see data sheet: www.phoenixcontact.com.

Temperature, temperature transducer for PT 100





Ex n

D W H

Configurable, for a temperature measuring range of -150°C ... +300°C, loop-powered

Ex:

Housing width 6.2 mm

- Highly compact loop-powered temperature transducer for electrical isolation, conversion, amplification, and filtering of PT 100 signals to create standard signals
- Supplied by an output loop
- Does not require any additional auxiliary voltage
- Temperature measuring range of -150°C to +300°C
- 2-, 3- or 4-wire Pt 100 sensors
- Input signals can be configured via DIP switches
- 2-way isolation
- Error signaling via diagnostic LED and analog signal

Notes:

To order a product with an order configuration, please enter the desired configuration by referring to the order key; see below.

Technical data

Input data	
Input signal (can be configured using DIP switches)	Pt 100 (IEC 60751/EN 60751) : 2-, 3-, 4-wire
Temperature range	-150°C ... 300°C (configurable)
Measuring range span	Min. 50 K
Output data	
Output signal	4 ... 20 mA / 20 ... 4 mA
Maximum output signal	23 mA
Load R_B	$((U_{supply} - 12\ V) / 22\ mA)$
Ripple	< 20 mV_{PP} (at 500 Ω)
General data	
Supply voltage U_B	12 V DC ... 30 V DC
Current consumption	< 3.5 mA (without signal current)
Power consumption	< 42 mW (without signal current)
Transmission error for the full/set measurement range	≤ 0.25%; ((90 K / set measuring range [K]) + 0.05)%
Temperature coefficient	< 0.02%/K
Step response (0–99%)	< 200 ms
Electrical isolation	Basic insulation according to EN 61010
Test voltage, input/output/supply	1.5 kV (50 Hz, 1 min.)
Degree of protection	IP20
Ambient temperature (operation)	-20°C ... 65°C
Mounting	Any
Housing material	PBT
Dimensions W / H / D	6.2 / 93.1 / 102.5 mm
Screw connection solid / stranded / AWG	0.14 ... 2.5 mm^2 / 0.2 ... 2.5 mm^2 / 26 - 12
Spring-cage connection solid / stranded / AWG	0.2 ... 2.5 mm^2 / 0.2 ... 2.5 mm^2 / 24 - 12
Conformance/approvals	
Conformance	CE-compliant
ATEX	II 3 G Ex nA II T4 X
UL, USA/Canada	UL 508 recognized Class I, Div. 2, Groups A, B, C, D T5 applied for

Ordering data

Description		Type	Order No.	Pcs. / Pkt.
MCR temperature measuring transducer, for Pt 100 temperature sensors, loop-powered				
Order configuration	Screw connection	**MINI MCR-SL-PT100-LP**	**2810298**	1
Order configuration	Spring-cage conn.	**MINI MCR-SL-PT100-LP-SP**	**2810382**	1
Unconfigured	Screw connection	**MINI MCR-SL-PT100-LP-NC**	**2810308**	1
Unconfigured	Spring-cage conn.	**MINI MCR-SL-PT100-LP-NC-SP**	**2810395**	1

Order key MINI MCR-SL-PT100-LP (standard configuration entered as an example)

Order No.	Connection method	Measuring range [°C] Start	End	Output	Failure information [1]	Factory calibration certificate FCC
2810298	**3**	**0**	**100**	**OUT02**	**1**	**NONE**
2810298 ≙ ...-PT100-LP 2810382 ≙ ...-PT100-LP-SP	2 ≙ 2-wire 3 ≙ 3-wire 4 ≙ 4-wire	0 -10 -20 -30 -40 -50 -100 -150	**Range** (increment) 0...300 (5 K)	OUT02 ≙ 4...20 mA OUT08 ≙ 20...4 mA	1 2 3 4	NONE ≙ without FCC YES ≙ with FCC (a fee is charged) YESPLUS ≙ FCC with 5 measuring points (a fee is charged)

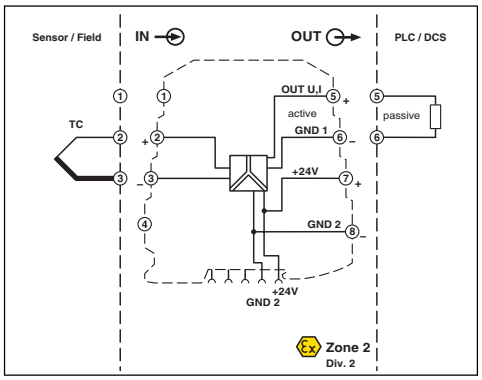
[1]) For explanations see adjacent text on the right, for further details see data sheet: www.phoenixcontact.com.

Failure information

	Overrange	Open circuit
1	-	Start of range
2	21.5 mA	21.5 mA
3	3.5 mA	3.5 mA
4	21.5 mA	21.5 mA

	Underrange	Short circuit
1	-	Start of range
2	21.5 mA	21.5 mA
3	3.5 mA	3.5 mA
4	3.5 mA	3.5 mA

Temperature, temperature transducer for J- and K-type thermocouples



Configurable, for a temperature measuring range of -150°C ... +1350°C

Ex:

Housing width 6.2 mm

- Highly compact temperature transducer for electrical isolation, conversion, amplification, and filtering of thermocouple signals to create standard signals
- Temperature measuring range of -150°C to +1350°C
- For J and K thermocouples according to IEC 60584
- Internal cold junction compensation
- Input and output signals can be configured via DIP switches
- 3-way isolation
- Error signaling via diagnostic LED and analog signal
- Power supply possible through the foot element (T-connector)

Notes:

To order a product with an order configuration, please enter the desired configuration by referring to the order key; see below.

Information about power bridging, system cabling, and marking components can be found starting at page 369

Technical data

Input data		
Input signal (can be configured using DIP switches)	Thermocouples type J, K (IEC 584-1)	
Temperature range	Type J : -150°C ... 1200°C (configurable) Type K : -150°C ... 1350°C	
Measuring range span	Min. 50 K	
Output data	U output	I output
Output signal (configurable using the DIP switch)	0 ... 5 V / 1 ... 5 V 0 ... 10 V / 10 ... 0 V	0 ... 20 mA / 4 ... 20 mA 20 ... 0 mA / 20 ... 4 mA
Maximum output signal	Approx. 12.5 V	23 mA
No-load voltage		Approx. 12.5 V
Short-circuit current	Approx. 10 mA	
Load R_B	≥ 10 kΩ	< 500 Ω (at 20 mA)
Ripple	< 20 mV_{PP} (at 10 kΩ)	< 20 mV_{PP} (at 500 Ω)
General data		
Supply voltage U_B	19.2 V DC ... 30 V DC	
Current consumption	< 25 mA (at 24 V DC)	
Power consumption	< 500 mW	
Transmission error for the full/set measurement range	≤ 0.2%; ((150 K / set measurement range [K]) + 0.1)%	
Cold junction errors	< 3 K (typ. < 2 K)	
Temperature coefficient	< 0.02%/K	
Step response (0–99%)	< 30 ms	
Electrical isolation	Basic insulation according to EN 61010	
Test voltage, input/output/supply	1.5 kV (50 Hz, 1 min.)	
Ambient temperature (operation)	-20°C ... 65°C	
Housing material	PBT	
Dimensions W / H / D	6.2 / 93.1 / 102.5 mm	
Screw connection solid / stranded / AWG	0.14 ... 2.5 mm^2 / 0.2 ... 2.5 mm^2 / 26 - 12	
Conformance/approvals		
Conformance	CE-compliant	
ATEX	II 3 G Ex nA II T4 X	
UL, USA/Canada	UL 508 recognized Class I, Div. 2, Groups A, B, C, D T5	
GL	GL EMC 2 D	

Ordering data

Description		Type	Order No.	Pcs. / Pkt.
MCR temperature measuring transducer, for thermocouples				
Order configuration	Screw connection	**MINI MCR-SL-TC-UI**	**2864448**	1
Unconfigured	Screw connection	**MINI MCR-SL-TC-UI-NC**	**2864299**	1

Order key for MINI MCR-SL-TC-UI (standard configuration entered as an example)

Order No.	Sensor type	Measuring range [°C] Start	Measuring range [°C] End	Output	Failure information [1]	Factory calibration certificate FCC
2864448	**J**	**0**	**1000**	**OUT01**	**A**	**NONE**
	J ≙ Type J	0	**Range**	OUT01 ≙ 0...20 mA	A	NONE ≙ without FCC
		-10	(increment)	OUT02 ≙ 4...20 mA	B	YES ≙ with FCC (a fee is charged)
	K ≙ Type K	-20		OUT03 ≙ 0...10 V	C	
		-30		OUT05 ≙ 0...5 V	D	
		-40	0 ... 300 (10 K)	OUT06 ≙ 1...5 V		YESPLUS ≙ Factory calibration certificate with 5 measuring points (a fee is charged)
		-50	320 ... 700 (20 K)	OUT07 ≙ 20...0 mA		
		-100	750...1350 (50 K)	OUT08 ≙ 20...4 mA		
		-150		OUT09 ≙ 10...0 V		

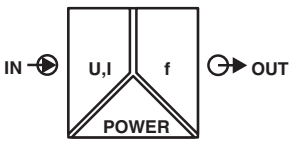
[1]) For explanations see adjacent text on the right, for further details see data sheet: www.phoenixcontact.com.

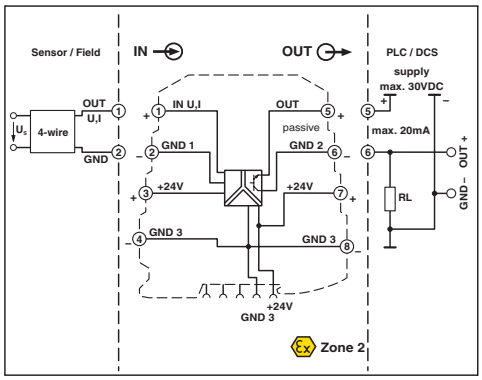
Failure information (depends on the output signal range):

	Overrange			Open circuit		
	0...20 mA	4...20 mA	0...10 V	0...20 mA	4...20 mA	0...10 V
A	20.5 mA	20.5 mA	10.25 V	21 mA	21 mA	10.5 V
B	20.5 mA	20.5 mA	10.25 V	21 mA	21 mA	10.5 V
C	20 mA	20 mA	10 V	21 mA	21 mA	10.5 V
D	20 mA	20 mA	10 V	0 mA	4 mA	0 V

	Underrange		
	0...20 mA	4...20 mA	0...10 V
A	0 mA	4 mA	0 V
B	0 mA	3.5 mA	0 V
C	0 mA	4 mA	0 V
D	0 mA	4 mA	0 V

Frequency, analog-frequency transducer





Ex n

Configurable, frequency and PWM output

Ex:
Housing width 6.2 mm

- Highly compact analog-to-frequency transducer for electrical isolation, amplification, conversion, and filtering of standard signals to create frequencies or PWM signals
- Configurable interference filter
- Input and output signals can be configured via DIP switches
- 3-way isolation
- Error signaling via diagnostic LED and analog signal
- Power supply possible through the foot element (T-connector)
- PWM output of 5 ... 95%

Notes:

Information about power bridging, system cabling, and marking components can be found starting at page 369

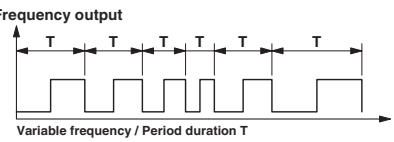
Technical data

Input data		
Input signal (configurable using the DIP switch)	U input	I input
	0 ... 5 V / 1 ... 5 V	0 ... 20 mA / 4 ... 20 mA
Maximum input signal	30 V DC	100 mA
Input resistance	Approx. 110 kΩ	Approx. 50 Ω
Output data		
Output signal (can be configured using DIP switches)	Frequency output	PWM output
	0 Hz ... 10 kHz / 0 Hz ... 5 kHz	7.8 kHz (10 bit) / 3.9 kHz (10 bit)
	0 Hz ... 2.5 kHz / 0 Hz ... 1 kHz	1.9 kHz (12 bit) / 977 Hz (12 bit)
	0 Hz ... 500 Hz / 0 Hz ... 250 Hz	488 Hz (14 bit) / 244 Hz (14 bit)
	0 Hz ... 100 Hz / 0 Hz ... 50 Hz	122 Hz (16 bit) / 61 Hz (16 bit)
Minimum load	4 mA ≤ (U_L / R_L) ≤ 20 mA	12 mA ≤ (U_L / R_L) ≤ 20 mA
Load current maximum	20 mA	
Maximum switching voltage	30 V	
Overrange/underrange	Can be set (via DIP switch)	
Protective circuit	Short-circuit protection, polarity reversal protection	
General data		
Supply voltage U_B	19.2 V DC ... 30 V DC	
Nominal supply voltage	24 V DC	
Current consumption	< 10 mA (at 24 V DC)	
Power consumption	< 200 mW	
Maximum transmission error	≤ 0.2%	
Temperature coefficient	< 0.02%/K	
Step response (0–99%)	< 15 ms (+ (1/f)) < 1 s (+ (1/f) largest filter)	
Electrical isolation	Basic insulation according to EN 61010	
Test voltage, input/output/supply	1.5 kV (50 Hz, 1 min.)	
Degree of protection	IP20	
Ambient temperature (operation)	-20°C ... 65°C	
Mounting	Any	
Housing material	PBT	
Dimensions W / H / D	6.2 / 93.1 / 102.5 mm	
Screw connection solid / stranded / AWG	0.14 ... 2.5 mm² / 0.2 ... 2.5 mm² / 26 - 12	
Spring-cage connection solid / stranded / AWG	0.2 ... 2.5 mm² / 0.2 ... 2.5 mm² / 24 - 12	
Conformance/approvals		
Conformance	CE-compliant	
ATEX	Ex II 3 G Ex nA II T4 X	
UL, USA/Canada	UL 508 recognized Class I, Div. 2, Groups A, B, C, D T5 applied for	
GL	GL EMC 2 D	

Ordering data

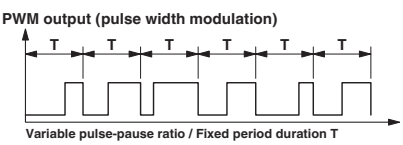
Description	Type	Order No.	Pcs. / Pkt.
MCR frequency transducer			
Screw connection	**MINI MCR-SL-UI-F**	**2864082**	1
Spring-cage conn.	**MINI MCR-SL-UI-F-SP**	**2810243**	1

Frequency output



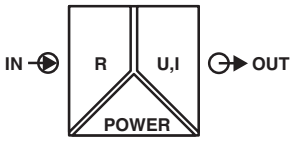
Variable frequency / Period duration T

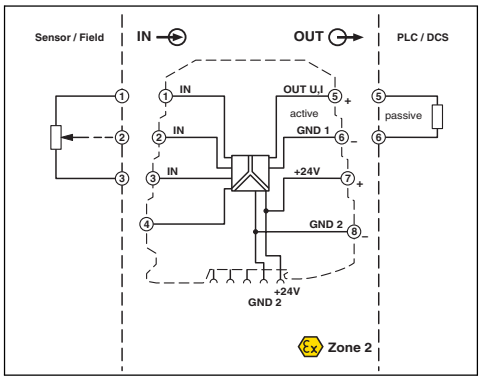
PWM output (pulse width modulation)

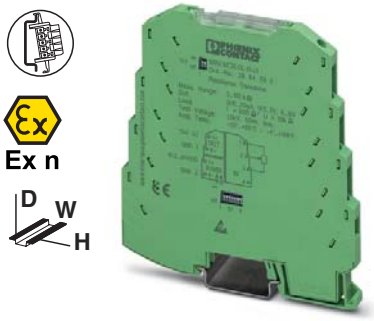


Variable pulse-pause ratio / Fixed period duration T

Potentiometer, potiposition transducer







Ex n

D W H

Configurable, automatic potentiometer detection

Housing width 6.2 mm

- Highly compact potiposition transducer for electrical isolation, conversion, amplification, and filtering of potentiometer signals to create standard signals
- Automatic potentiometer detection without manual adjustment
- For potentiometers from 100 Ω to 100 kΩ
- Configurable measuring range and output signals
- A potentiometer sub-range can be linearized via the "teach-in" switch on the device
- Input and output signals can be configured via DIP switches
- 3-way isolation
- Error signaling via diagnostic LED and analog signal
- Power supply possible through the foot element (T-connector)

Notes:

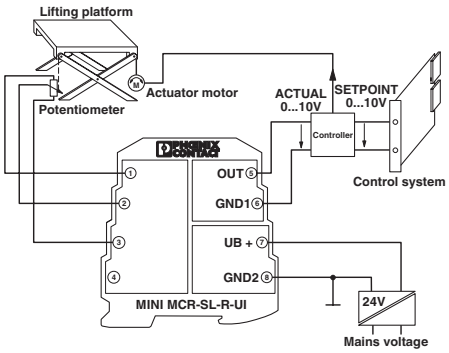
Information about power bridging, system cabling, and marking components can be found starting at page 369

Technical data

Input data		
Potentiometer	100 Ω ... 100 kΩ	
Reference voltage source	< 3.6 V	
Output data	U output	I output
Output signal	0 ... 5 V / 1 ... 5 V 0 ... 10 V / 10 ... 0 V	0 ... 20 mA / 4 ... 20 mA 20 ... 0 mA / 20 ... 4 mA
Maximum output signal	12.5 V	23 mA
No-load voltage		Approx. 12.5 V
Short-circuit current	Approx. 10 mA	
Load R_B	> 10 kΩ	< 500 Ω (20 mA)
Ripple	< 20 mV_{PP} (at 10 kΩ)	< 20 mV_{PP} (at 500 Ω)
Behavior in the event of a sensor error	Configurable 0% ... 105%	
General data		
Supply voltage U_B	19.2 V DC ... 30 V DC	
Nominal supply voltage	24 V DC	
Current consumption	< 25 mA (at 24 V DC)	
Power consumption	< 500 mW	
Maximum transmission error	< 0.2%	
Temperature coefficient	< 0.02%/K	
Step response (0–99%)	< 30 ms	
Electrical isolation	Basic insulation according to EN 61010	
Test voltage, input/output/supply	1.5 kV (50 Hz, 1 min.)	
Degree of protection	IP20	
Ambient temperature (operation)	-20°C ... 65°C	
Mounting	Any	
Housing material	PBT	
Dimensions W / H / D	6.2 / 93.1 / 102.5 mm	
Screw connection solid / stranded / AWG	0.14 ... 2.5 mm^2 / 0.2 ... 2.5 mm^2 / 26 - 12	
Spring-cage connection solid / stranded / AWG	0.2 ... 2.5 mm^2 / 0.2 ... 2.5 mm^2 / 24 - 12	
Conformance/approvals		
Conformance	CE-compliant	
ATEX	Ex II 3 G Ex nA II T4 X	
UL, USA/Canada	UL 508 recognized Class I, Div. 2, Groups A, B, C, D T5 applied for	
GL	GL EMC 2 D	

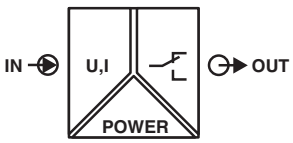
Ordering data

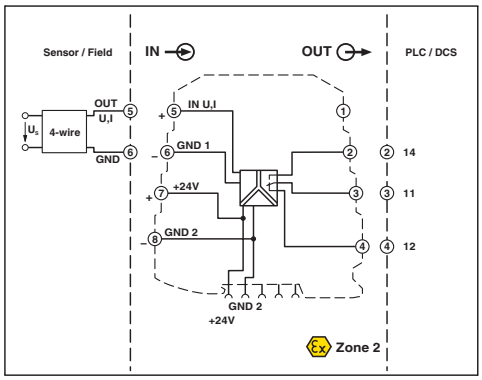
Description		Type	Order No.	Pcs. / Pkt.
MCR potiposition transducer				
	Screw connection	**MINI MCR-SL-R-UI**	**2864095**	1
	Spring-cage conn.	**MINI MCR-SL-R-UI-SP**	**2810256**	1



Height adjustment of a lifting platform with setpoint and actual value control

Limit values, threshold value switch





Configurable, with relay PDT output

Ex:
Housing width 6.2 mm

- Highly compact threshold value switch for switching analog limit values
- Input signal, hysteresis, and delay time can be configured via DIP switches
- Limit value can be freely adjusted via potentiometer on front
- 3-way isolation
- PDT relay at output
- Operating current / Quiescent current switch-over
- Status and error signaling via two diagnostic LEDs
- Power supply possible through the foot element (T-connector)

Notes:

Information about power bridging, system cabling, and marking components can be found starting at page 369

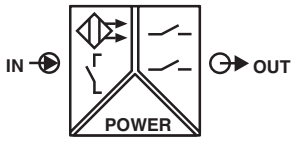
Technical data

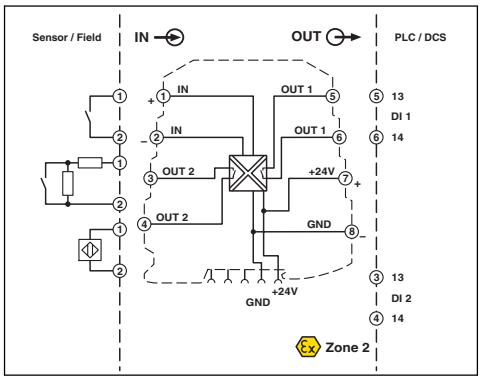
Input data	U input	I input
Input signal (configurable using the DIP switch)	0 ... 10 V	0 ... 20 mA
Maximum input signal	30 V	100 mA
Input resistance	> 100 kΩ	50 Ω
Specification of the switching point	With 25-speed potentiometer	
Switching output		
Relay output	1 PDT	
Contact material	$AgSnO_2$, hard gold-plated	
Max. switching voltage	250 V AC	
Limiting continuous current	2 A	
Hysteresis (configurable using the DIP switch)	(0.1%; 1%; 2.5%; 5%)	
Operating and closed circuit current behavior	Switchable using DIP switch	
Setting range of the response delay (configurable using the DIP switch)	0 s ... 10 s (0 s; 1 s; 2 s; 3 s; 4 s; 6 s; 8 s; 10 s)	
General data		
Supply voltage U_B	19.2 V DC ... 30 V DC	
Nominal supply voltage	24 V DC	
Current consumption	< 14 mA (at 24 V DC)	
Power consumption	< 330 mW (at 24 V DC)	
Linearity error	< 0.05% (of final value)	
Temperature coefficient	< 0.02%/K	
Step response (0–99%)	< 35 ms	
Electrical isolation	Basic insulation according to EN 61010	
Test voltage input/power supply	1.5 kV AC (50 Hz, 1 min.)	
Degree of protection	IP20	
Ambient temperature (operation)	-20°C ... 65°C	
Mounting	Any	
Housing material	PBT	
Dimensions W / H / D	6.2 / 93.1 / 102.5 mm	
Screw connection solid / stranded / AWG	0.14 ... 2.5 mm^2 / 0.2 ... 2.5 mm^2 / 26 - 12	
Spring-cage connection solid / stranded / AWG	0.2 ... 2.5 mm^2 / 0.2 ... 2.5 mm^2 / 24 - 12	
Conformance/approvals		
Conformance	CE-compliant	
ATEX	II 3 G Ex nAC IIC T4 X	
UL, USA/Canada	UL 508 recognized	
UL, USA	Class I, Zone 2, AEx nC IIC T6	
UL, Canada	Class I, Zone 2, Ex nC IIC T6	
GL	GL EMC 2 D	

Ordering data

Description	Type	Order No.	Pcs. / Pkt.
MCR threshold value switch			
Screw connection	**MINI MCR-SL-UI-REL**	**2864480**	1
Spring-cage conn.	**MINI MCR-SL-UI-REL-SP**	**2864493**	1

Digital IN
NAMUR isolation amplifiers





Ex n

D W H

Configurable,
for NAMUR sensors and floating contacts

Ex:
Housing width 6.2 mm

- Highly compact isolation amplifier for electrical isolation, amplification, and duplication of proximity sensor signals
- For proximity sensors in accordance with IEC 60947-5-6 and EN 50227
- Floating contacts and contacts with resistance circuit can be connected
- Input and output signals can be configured via DIP switches
- N/O contacts at output
- Second output can be used as a doubler or error signaling output
- 3-way isolation
- Switchover between operating current and quiescent current (inverted switching behavior)
- Error signaling via diagnostic LED and analog signal
- Power supply possible through the foot element (T-connector)

Notes:

Information about power bridging, system cabling, and marking components can be found starting at page 369

Technical data

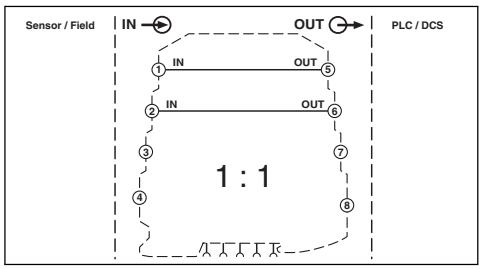
Input data	
Input signal	NAMUR proximity sensors Floating switch contacts Switch contacts with resistance circuit
Control circuit	
No-load voltage	8.2 V DC ±10%
Switching points (in acc. with IEC 60947-5-6)	< 1.2 mA (blocking) > 2.1 mA (conductive)
Line error detection	> 6 mA (in the event of a short circuit) < 0.1 mA (with wire break)
Switching output	
Relay output	2 N/O contacts
Contact material	$AgSnO_2$, hard gold-plated
Max. switching voltage	250 V AC
Max. switching current	2 A
Min. contact current	1 mA (for 5 V DC)
Switching frequency	10 Hz 0.5 Hz (240 V AC / 30 V DC / 2 A)
General data	
Supply voltage U_B	19.2 V DC ... 30 V DC
Nominal supply voltage	24 V DC
Current consumption	< 25 mA
Power consumption	< 600 mW
Electrical isolation	Basic insulation according to EN 61010
Test voltage, input/output/supply	1.5 kV (50 Hz, 1 min.)
Degree of protection	IP20
Ambient temperature (operation)	-20°C ... 60°C
Mounting	Any
Housing material	PBT
Dimensions W / H / D	6.2 / 93.1 / 102.5 mm
Screw connection solid / stranded / AWG	0.14 ... 2.5 mm^2 / 0.2 ... 2.5 mm^2 / 26 - 12
Spring-cage connection solid / stranded / AWG	0.2 ... 2.5 mm^2 / 0.2 ... 2.5 mm^2 / 24 - 12
Conformance/approvals	
Conformance	CE-compliant
ATEX	II 3 G Ex nAC IIC T4 X
UL, USA/Canada	UL 508 recognized Class I, Div. 2, Groups A, B, C, D T5 applied for
GL	GL EMC 2 D

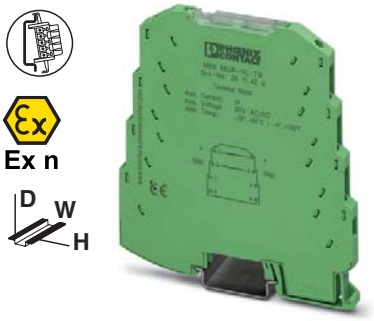
Ordering data

Description	Type	Order No.	Pcs. / Pkt.
MCR NAMUR switching amplifier			
Screw connection	**MINI MCR-SL-NAM-2RNO**	**2864105**	1
Spring-cage conn.	**MINI MCR-SL-NAM-2RNO-SP**	**2810269**	1

Accessories
Feed-through terminal blocks

- Feed-through terminal block for 1:1 forwarding of signals in the MINI Analog group
- For plugging gaps in system cabling with the V8 system adapter, e.g., when there are fewer than eight signals
- Used in conjunction with the MINI Analog multiplexer
- For direct mounting in the case of applications without signal conversion and without electrical isolation





1:1 connection

	Technical data
General data	
Degree of protection	IP20
Ambient temperature (operation)	-20°C ... 65°C
Mounting	Any
Housing material	PBT
Dimensions W / H / D	6.2 / 93.1 / 102.5 mm
Screw connection solid / stranded / AWG	0.14 ... 2.5 mm² / 0.2 ... 2.5 mm² / 24 - 12
Conformance/approvals	
ATEX	Ex II 3 G Ex nA II T4 X
GL	GL EMC 2 D

Description	Ordering data: Type	Order No.	Pcs. / Pkt.
MINI Analog feed-through terminal block Screw connection	**MINI MCR-SL-TB**	**2811420**	1

Accessories
marking material

- Flexible labeling system with pivoting transparent cover and matching insert strips
- Transparent cover that can be snapped onto the module instead of the standard cover
- Insert strips on pre-punched paper sheets
- Marking option for standard cover in the form of ZBF 6 zack marker strip marking labels

Transparent cover with insert strips

Description	Ordering data: Type	Order No.	Pcs. / Pkt.
Fold up transparent cover, for labeling MINI Analog modules with insert strips	**MINI MCR DKL**	**2308111**	10
	Accessories		
Insert strips, stamped, for transparent cover	**MINI MCR-DKL-LABEL**	**2810272**	10
Zack marker strip, flat	**ZBF 6 (CLIPLINE catalog part 2)**		
UniCard sheets, for marker groove	UC-TMF 6 (CLIPLINE catalog part 2)		

Accessories, ME 6,2 TBUS... T-connector

- For bridging the supply voltage
- Reduces wiring costs
- Module can be replaced without interrupting the supply to the remaining modules (hot swap)
- One T-connector for two MINI Analog modules
- 8 A current carrying capacitance in parallel with DIN rail and 2 A in parallel with MINI Analog modules

For bridging the supply voltage

Ordering data

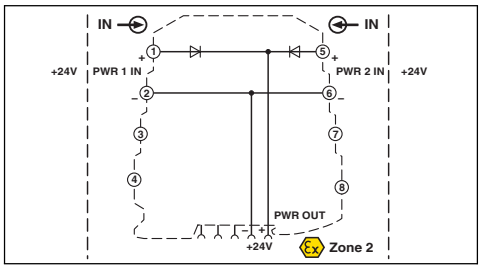
Description	Type	Order No.	Pcs. / Pkt.
DIN rail connector (TBUS), for bridging the supply voltage, can be snapped onto 35 mm DIN rails as per EN 60715, with UL approval	**ME 6,2 TBUS-2 1,5/5-ST-3,81 GN**	**2869728**	10

Accessories Power terminals

- For supplying the supply voltage via the foot element (T-connector) where DC voltages of up to 30 V are already available
- Option of redundant supply decoupled from diode
- For up to 80 MINI Analog modules
- For up to 2 A
- Status and error signaling via diagnostic LEDs

Notes:

Recommended fuse for power terminal block:
Fuse in acc. with IEC 60127-2/V
Nominal current: 2.5 A
Characteristics: Slow-blow
(e.g., Wickmann 5 x 20 mm/No. 195 - glass fuse)



Ex n

D W H

Redundant supply for existing 24 V

Technical data

Input data	
Input voltage range	0 V DC ... 30 V DC
Current consumption	Max. 2 A
Output data	
Output voltage	(Input voltage - 0.8 V)
Output current	Max. 2 A
General data	
Ambient temperature (operation)	-20°C ... 65°C
Housing material	PBT
Conformance/approvals	
Conformance	CE-compliant
ATEX	Ex II 3 G Ex nA II T4 X
UL, USA/Canada	UL 508 recognized Class I, Div. 2, Groups A, B, C, D T5
GL	GL EMC 2 D

Ordering data

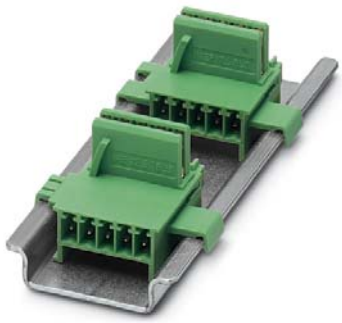
Description	Type	Order No.	Pcs. / Pkt.
MCR power terminal			
	MINI MCR-SL-PTB	**2864134**	1
	MINI MCR-SL-PTB-SP	**2864147**	1

Accessories
ME 17,5 TBUS-...T-connector

– For bridging the supply voltage when using a MINI POWER system power supply

Notes:

If the system power supply is used, you need two ME 17,5 TBUS T-connectors to establish the connection with the ME 6,2 TBUS T-connectors of the MINI Analog system and provide an effective power supply.



For system power supply

Description	Ordering data		
	Type	**Order No.**	Pcs. / Pkt.
DIN rail connector, for bridging the supply voltage, can be snapped onto 35 mm DIN rails as per EN 60715, with UL approval, two pieces are required per system power supply	**ME 17,5 TBUS 1,5/ 5-ST-3,81 GN**	**2709561**	10

Accessories
System power supply

– For supplying the supply voltage via the foot element (T-connector) where AC voltages are available
– 100 ... 240 V AC nominal input voltage range
– 24 V DC output voltage
– For up to 60 MINI Analog modules
– For up to 1.5 A, secondary
– Status and error signaling via diagnostic LEDs

Ex n

For applications with local voltages of over 100 V

Description	Ordering data		
	Type	**Order No.**	Pcs. / Pkt.
System power supply unit, primary-switched with Zone 2 approval. More information is given in the INTERFACE Power Supply catalog part.	**MINI-PS-100-240AC/24DC/1.5/EX**	**2866653**	1
System power supply unit, primary-switched (not for Zone 2) More information is given in the INTERFACE Power Supply catalog part.	**MINI-SYS-PS-100-240AC/24DC/1.5**	**2866983**	1

Accessories
System cabling

A high number of channels enables analog signal transmission across 6 mm within very confined spaces for many applications. In this kind of context, in particular, it is really important to have access to wiring solutions that avoid errors and are time-efficient, thereby cutting costs.

The MINI Analog system cabling solution allows you to wire up to eight channels quickly, easily, and without errors.

System cabling can take various forms.

System cabling with a front adapter

This involves:

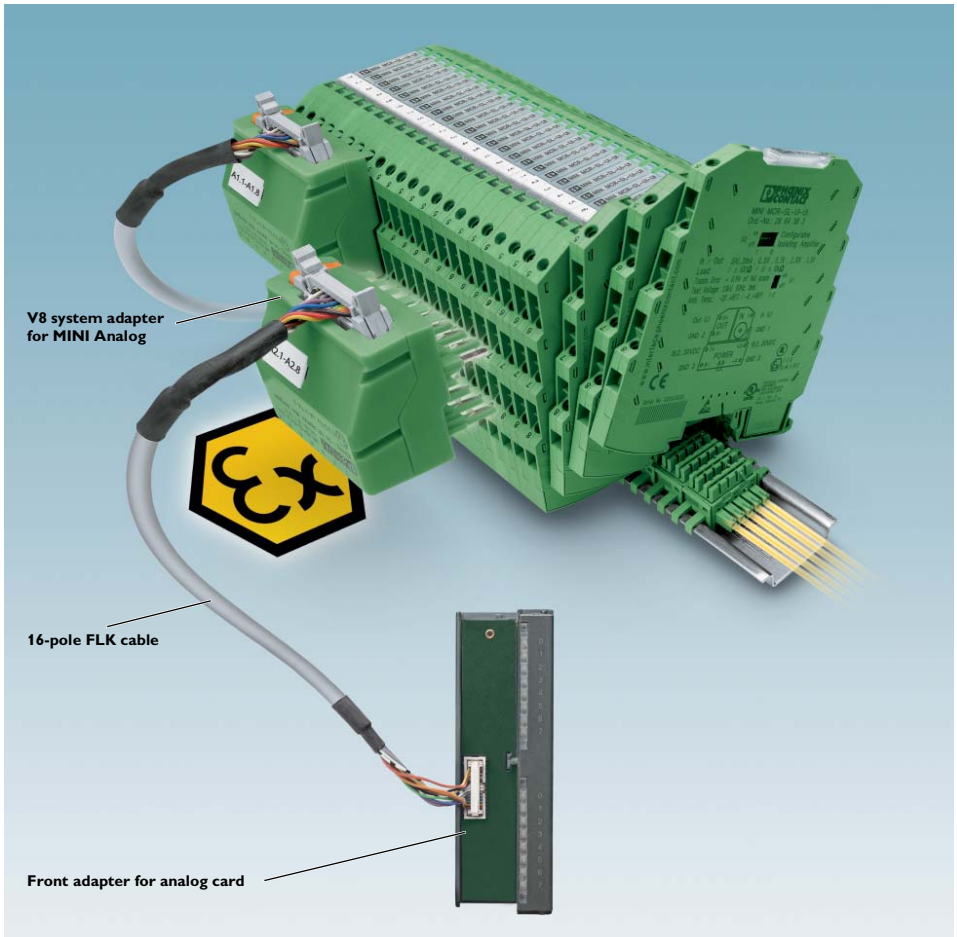
– A 16-pole FLK cable
– The V8 system adapter for MINI Analog modules
– A front adapter that needs to be specifically selected in accordance with the analog card of the controller

With this solution, all you have to do is interconnect the components. It all but eliminates wiring overheads. What's more, it completely rules out wiring errors, as the pre-assembled components ensure correct assignment by design.

System cabling without a front adapter

The version that does not require the use of a front adapter is the ideal addition.

This solution involves using a 16-pole FLK cable with open ends on one side. The open ends are equipped with ferrules and are numbered. This allows you to set up a system cabling connection to practically any module without having to fit a front adapter. The other advantage is that you can implement system cabling on the module side quickly, easily, and without errors.

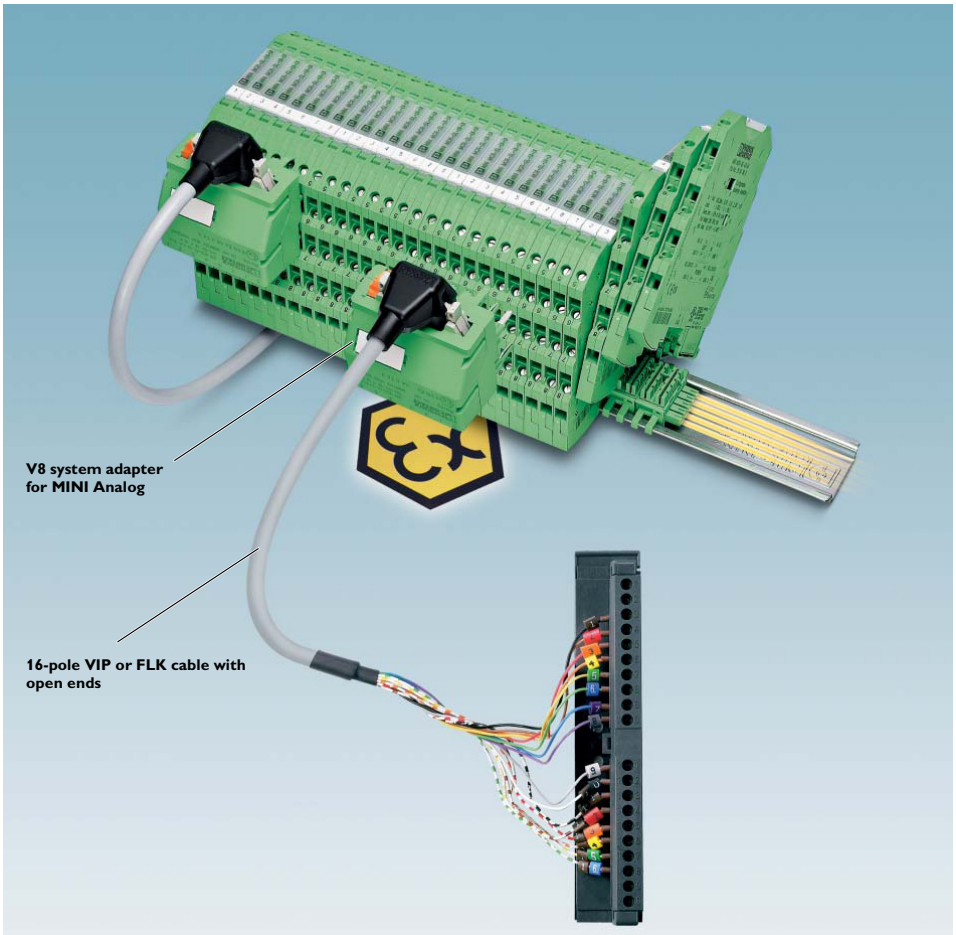


System cabling with a front adapter

The tables below are designed to serve as a configuration aid. Details of other solutions are available on the website or on request.

Configuration aid for MINI Analog system cabling

Controller	Analog card	Front adapter	FLK cable	V8 system adapter for MINI Analog
Siemens SIMATIC S7-300 / ET 200 M	6ES7-331-7KF02-0AB0 6ES7-331-7KB02-0AB0 6ES7-331-7KB81-0AB0 6ES7-331-7TF00-0AB0 6ES7-332-8TF01-0AB0	**FLKM 16-PA-S300/MINI-MCR** (in catalog on page 234)	**FLK 16/EZ-DR/.../KONFEK** (non-molded connectors, in catalog on page 284)	**MINI MCR-SL-V8-FLK 16-A** (in catalog on page 374)
	6ES7-331-1KF01-0AB0 (for current signals)	**FLKM 16-PA-331-1KF/I/MINI-MCR** (in catalog on page 235)		
	6ES7-331-5HF00-0AB0 (for current signals)	**FLKM 16-PA-332-5HF/I/MINI-MCR** (in catalog on page 235)		
Yokogawa Centum CS 3000 R3	AAI 141 AAI 143	Not required	**CABLE-40/2/FLK16/.../YUC** (non-molded connectors, in catalog on page 245)	**2 x MINI MCR-SL-V8-FLK 16-A** (in catalog on page 374)
Miscellaneous controllers / actuators / sensors	All cards	Not required	**CABLE-FLK16/OE/0,14/...M** (non-molded connectors, in catalog on page 280) or alternatively **VIP-CAB-FLK16/FR/OE/0,14/...M** (molded connectors, in catalog on page 280)	**MINI MCR-SL-V8-FLK 16-A** (in catalog on page 374)



System cabling without a front adapter

Innovative concept

Thanks to its innovative design concept, the MINI MCR-SL-V8-FLK 16 A MINI Analog system adapter can be used on both the input and output sides. Consequently, there is nothing at all to prevent you from using the same components for system cabling on both output and input modules.

Complete flexibility

The proven FLK cable series offers complete flexibility in terms of selection and is the ideal solution for system cabling with a front adapter. The flat and flexible connector connections mean that the products can be easily installed in any analog module.

Increased protection

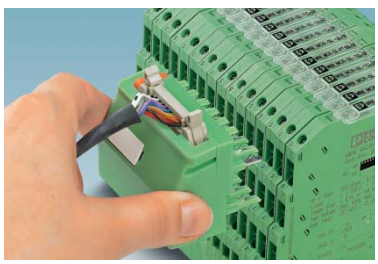
The new VIP cables with molded FLK connectors offer enhanced protection in the context of harsh industrial environments. If you opt for system cabling without a front adapter, you can enjoy all the advantages of the new VIP cables on the system adapter side.

Addition

If the application demands a form of system cabling with fewer than eight channels, the MINI MCR-SL-TB feed-through terminal block (page 369) represents the perfect addition.

Plug-in connection

Innovative concept



Complete flexibility

Increased protection

Addition

Accessories
MINI Analog system adapter

- Time-saving wiring solution thanks to unique plug-in concept
- System cabling on PLC side
- Plug and play
- For up to eight channels
- Reduces wiring costs and errors

Ex n

System adapter

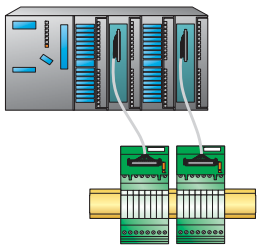
Ex:
Housing width 50.4 mm

Technical data

General data	
Contact resistance	< 10 mΩ
Current carrying capacitance	Max. 1 A
Test voltage	500 V (50 Hz, 1 min.; from channel to channel)
Vibration resistance	Max. 0.7 g
Surge voltage category / Pollution degree	III / 2
Ambient temperature (operation)	-20°C ... 60°C
Housing material	PBT
Dimensions W / H / D	50.4 / 46.2 / 45.5 mm
Connection to the signal level	Flat-ribbon cable plug connector in acc. with IEC 60603-13
Insertion/withdrawal cycles (System adapter / FLK 16)	10 / min. 200
Conformance/approvals	
ATEX	II 3 G Ex nA II T4 X
UL, USA/Canada	UL 508 recognized
GL	GL EMC 2 D

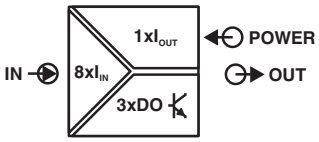
Ordering data

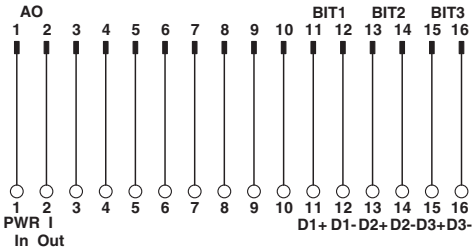
Description	Type	Order No.	Pcs. / Pkt.
System adapter, for MINI Analog modules with screw connection	**MINI MCR-SL-V8-FLK 16-A**	**2811268**	1



MINI Analog system cabling

Accessories, MINI Analog multiplexer





FLK pin strip assignment

Ex: Ⓔx
Housing width 50.4 mm

- Generates an analog output from up to eight analog input signals – parallel analog signals are transmitted serially via a cable
- The desired number of channels is selected via DIP switches (8, 6, 4 or 2 channels).
- The channel currently switched is indicated as a bit pattern via three digital outputs
- Two clock cycles for execution can be selected via DIP switches (one- or two-second clock)
- Supplied by an output loop
- For 4 ... 20 mA current signals
- Can be easily snapped onto MINI Analog modules with screw connection method
- Huge reduction in analog inputs at controllers
- System cabling on the output side using pre-assembled FLK cables with open ends

Notes:

For six, four or two channels you will also need the corresponding number of feed-through terminal blocks (i.e., two, four or six).

Technical data

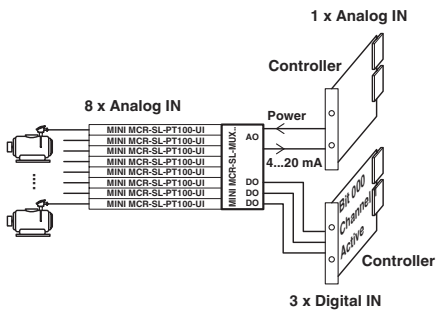
Input data	
Description	2-, 4-, 6- or 8-channel (can be switched over)
Can be configured/parameterized	Via DIP switches
Input signal	4 ... 20 mA
Maximum input signal	< 30 mA
Switching cycles	2 or 1 sec. (can be selected)
Output data	
Output signal	4 ... 20 mA
Maximum output signal	< 30 mA
Load R_B	$((U_{supply} - 7\ V) / I_{max})$
Active input status indication	1-, 2-, 3-bit digital output (can be selected)
Switching output	3 x PNP optocouplers
Maximum switching voltage	30 V DC
General data	
Supply voltage U_B	7 V DC ... 30 V DC (Loop-powered)
Current consumption	< 3.5 mA (without signal current)
Power consumption	< 24 mW (without signal current)
Maximum transmission error	0.3% (0.1%, typical)
Temperature coefficient	< 0.01%/K
Ambient temperature (operation)	-20°C ... 65°C
Housing material	PBT
Dimensions W / H / D	50.4 / 45.5 / 46.2 mm
Connection to control level	Flat-ribbon cable plug connector in acc. with IEC 60603-13
Insertion/withdrawal cycles (System adapter / FLK 16)	10 / min. 200
Conformance/approvals	
Conformance	CE-compliant
ATEX	Ⓔx II 3 G Ex nA II T4 X

Ordering data

Description	Type	Order No.	Pcs. / Pkt.
Multiplexer for MINI Analog modules with screw connection	**MINI MCR-SL-MUX-V8-FLK 16**	**2811815**	1

Accessories

MINI Analog feed-through terminal block	**MINI MCR-SL-TB**	**2811420**	1
Round cable with an open end (in catalog on page 280)	**VIP-CAB-FLK16/FR/OE/0,14/...**		
Round cable with an open end (in catalog on page 280)	**CABLE-FLK16/OE/0,14/...**		



Monitoring of eight motor temperatures with just one analog control input

Accessories
Surge protection
LINETRAB LIT

The perfect complement to MINI Analog - The innovative surge protection solution in a 6.2 mm housing.

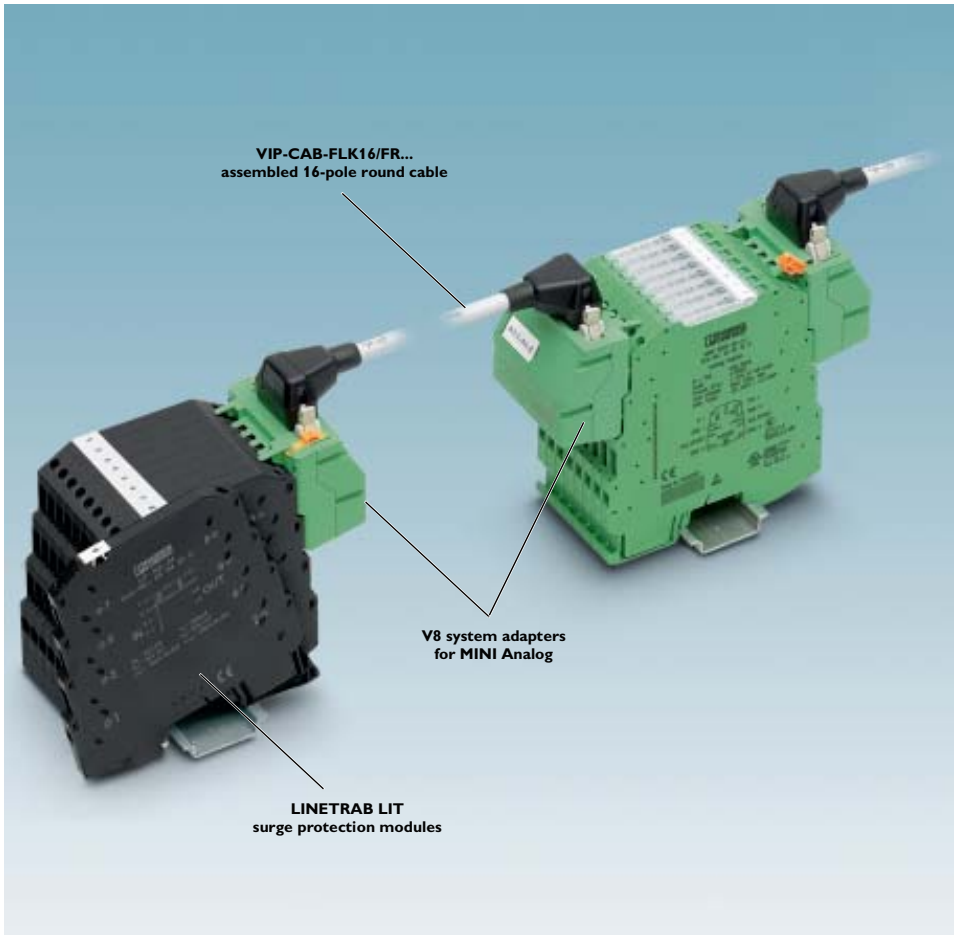
Because the contours of the LINETRAB LIT and MINI Analog housings are identical, you can enjoy the numerous benefits of system cabling. The advantage of combining MINI Analog and LINETRAB LIT products is that it enables you to set up a space-saving, protected, and perfectly coordinated signal chain from the sensor right through to the controller.

The tables below are designed to serve as configuration aids for combining MINI Analog and LINETRAB products.

On the left, you will find a list of the components and combination options for setting up system cabling between MINI Analog and LINETRAB.

For details of system cabling solutions that can be used between MINI Analog and the controller side, please refer to page 372.

For further information about LINETRAB LIT surge protection modules, please see the TRABTECH catalog.



Reliable and systematic measurements - LINETRAB LIT and MINI Analog

LINETRAB LIT - MINI Analog configuration aid

Cabling via MINI Analog system adapter (8 modules)

LINETRAB LIT (surge protection)		MINI Analog	
Type	Order No.	**Type**	Order No.
LIT 1X2-24	2804610	MINI MCR-SL-UI-UI	2864383
		MINI MCR-SL-UI-UI-NC	2864150
		MINI MCR-SL-U-UI-NC	2865007
		MINI MCR-SL-U-I-0	2813512
		MINI MCR-SL-U-I-4	2813525
		MINI MCR-SL-I-U-0	2813541
		MINI MCR-SL-I-U-4	2813538
		MINI MCR-SL-I-I	2864406
		MINI MCR-SL-U-U	2864684
		MINI MCR-SL-UI-2I	2864794
		MINI MCR-SL-UI-2I-NC	2864176
		MINI MCR-SL-RPS-I-I	2864422
		MINI MCR-SL-RPSS-I-I	2864079
		MINI MCR-SL-1CP-I-I	2864419
		MINI MCR-SL-UI-F	2864082
		MINI MCR-SL-NAM-2RNO	2864105
		MINI MCR-SL-UI-REL	2864480
		MINI MCR-SL-SHUNT-UI	2810858
		MINI MCR-SL-SHUNT-UI-NC	2810780

Components required for system cabling

Available VIP... 16-pole round cables			V8 system adapter for MINI Analog
Type	Length	Order No.	**Type**
VIP-CAB-FLK16/FR/FR/0,14/0,5M	0.5 m	2900154	2 x MINI MCR-SL-V8-FLK 16-A (in catalog on page 374)
VIP-CAB-FLK16/FR/FR/0,14/1,0M	1.0 m	2900155	
VIP-CAB-FLK16/FR/FR/0,14/2,0M	2.0 m	2900156	

VIP... round cables are available in special lengths on request.

VIP system cables

The new VIP cables provide a way of setting up secure and rugged connections, even in harsh industrial environments.

Innovative concept

Not only does the MINI Analog system adapter support system cabling on the input and output sides; it also allows cabling to be installed with LINETRAB surge protection modules quickly, easily, and without errors.

Increased protection

In addition to all the advantages associated with electrical isolation, filtering, amplification, and the conversion of standard analog signals using MINI Analog, there is now also the option of effective surge protection.

Surge protection

Surge protection is a reliable means of actively preventing and protecting against system damage and downtimes. LINETRAB is able to limit transient surge voltages safely and without affecting the signal - all in a compact device with a design width of just 6.2 mm.

VIP system cable

Innovative concept

Increased protection

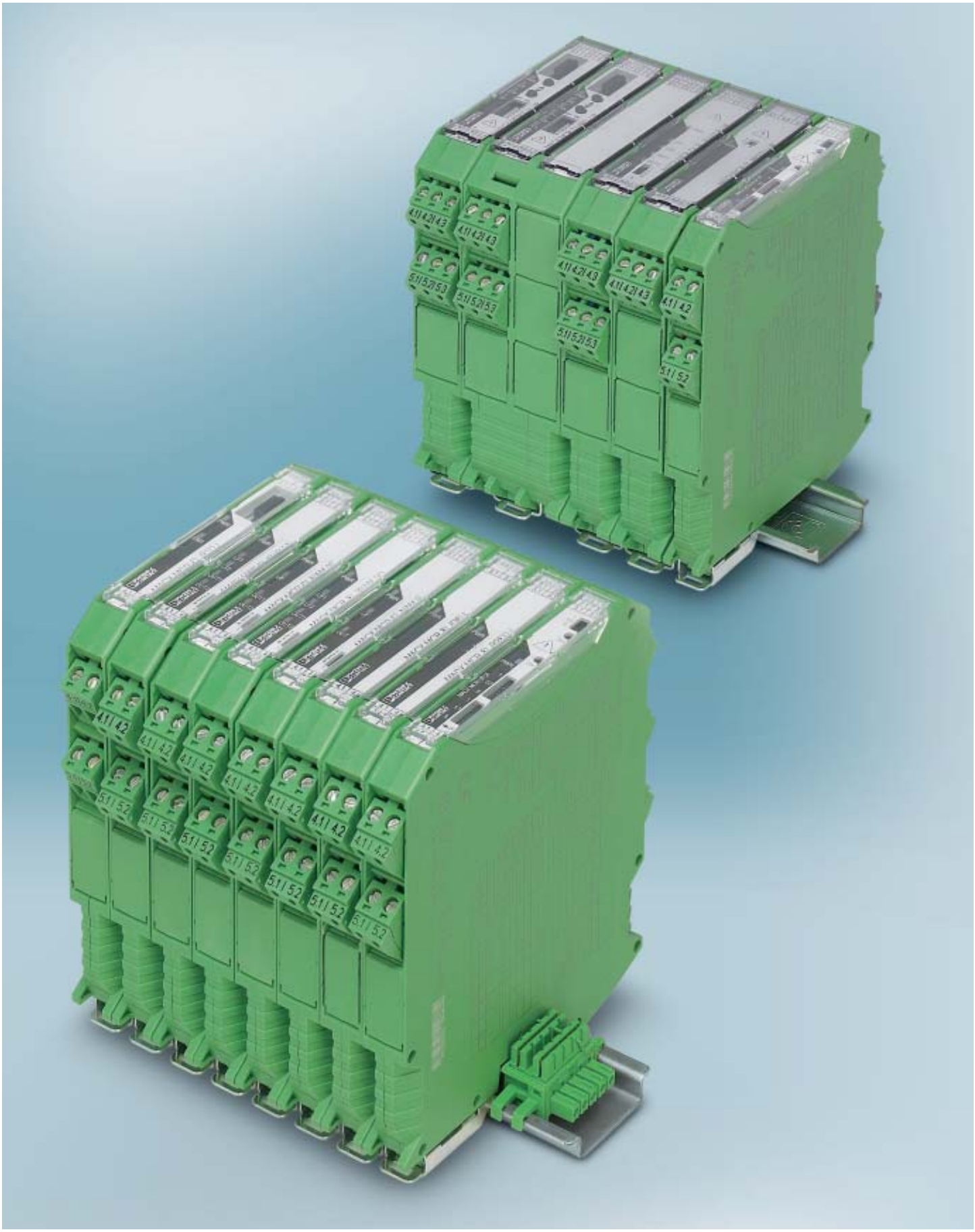
Surge protection

LINETRAB LIT - MINI Analog configuration aid

Manual cabling

LINETRAB LIT (surge protection)		MINI Analog	
Type	Order No.	**Type**	Order No.
LIT 1X2-24	2804610	**MINI MCR-SL-UI-UI**	2864383
		MINI MCR-SL-UI-UI-NC	2864150
		MINI MCR-SL-UI-UI-SP	2864710
		MINI MCR-SL-UI-UI-SP-NC	2864163
		MINI MCR-SL-SHUNT-UI-SP	2810874
		MINI MCR-SL-SHUNT-UI-SP-NC	2810793
		MINI MCR-SL-U-UI-SP	2811213
		MINI MCR-SL-U-UI-SP-NC	2810078
		MINI MCR-SL-U-I-0-SP	2813570
		MINI MCR-SL-U-I-4-SP	2813583
		MINI MCR-SL-I-U-0-SP	2813554
		MINI MCR-SL-I-U-4-SP	2813567
		MINI MCR-SL-I-I-SP	2864723
		MINI MCR-SL-U-U-SP	2864697
		MINI MCR-SL-UI-2I-SP	2864804
		MINI MCR-SL-UI-2I-SP-NC	2864189
		MINI MCR-SL-RPS-I-I-SP	2864752
		MINI MCR-SL-RPSS-I-I-SP	2810230
		MINI MCR-SL-1CP-I-I-SP	2864749
LIT 2X2-24	2804623	**MINI MCR-SL-2CP-I-I**	2864655
		MINI MCR-SL-2CP-I-I-SP	2864781
LIT 2-12 (for 2-wire connection method)	2804665	**MINI MCR-SL-PT100-UI-200**	2864309
		MINI MCR-SL-PT100-UI-200-NC	2864370
		MINI MCR-SL-PT100-UI-200-SP	2864192
		MINI MCR-SL-PT100-UI-200-SP-NC	2864202
LIT 4-12 (for 3- and 4-wire connection method)	2804678	**MINI MCR-SL-PT100-UI**	2864435
		MINI MCR-SL-PT100-UI-NC	2864273
		MINI MCR-SL-PT100-UI-SP	2864736
		MINI MCR-SL-PT100-UI-SP-NC	2864286
		MINI MCR-SL-PT100-UI-LP	2810298
		MINI MCR-SL-PT100-UI-LP-NC	2810308
		MINI MCR-SL-PT100-UI-LP-SP	2810382
		MINI MCR-SL-PT100-UI-LP-SP-NC	2810395
LIT 1X2-24	2804610	**MINI MCR-SL-UI-F-SP**	2810243
		MINI MCR-SL-NAM-2RNO-SP	2810269
		MINI MCR-SL-UI-REL-SP	2864493
LIT 4-24	2804678	**MINI MCR-SL-R-UI**	2864095
		MINI MCR-SL-R-UI-SP	2810256

Modular converters for MCR technology



Universal and standard isolating amplifiers - With safety built in

As this is a universal product range, you are bound to be able to find a solution for any analog signal transmission application (temperature, AI/AO, Namur, etc.).

You are free to choose between either multifunctional high-end devices or reasonably-priced standard modules with exactly the right functions.

The MACX Analog range from Phoenix Contact offers all this and many more functions besides.

Analog IN/Analog OUT

– Configurable 3-way isolating amplifiers with electrical isolation between input, output, and supply
– Repeater power supplies for supplying 2-wire transmitters, with HART signal transmission
– Output isolating amplifiers with HART signal transmission

Temperature

– Universal temperature transducers, optionally available with safe limit value relays
– Operating and display unit for local display and configuration
– Configurable temperature transducer for resistance thermometers and resistance-type sensors
– Configurable temperature measuring transducer for thermocouples and mV sources

Limit values

– Universal temperature transducers, with safe limit value relays
– Operating and display unit for local display and configuration

Digital IN

Isolation amplifier with input for NAMUR proximity sensor or switch

– Single-channel with PDT contact or passive transistor output
– Single-channel with double N/O contact output
– Two-channel with one N/O contact output per channel
– Two-channel with one PDT contact or passive transistor output per channel

Accessories

– Power and error message module
– DIN rail connector for bridging the supply voltage
– Marking material

Features

Signal isolators are used for the electrical isolation, amplification, filtering, and conditioning of analog signals.

Developed and produced in accordance with functional safety requirements. The resulting SIL approval means that you get to enjoy maximum reliability and safety throughout the device's entire life cycle.

Power bridging

In addition to the intelligent supply concept for compatible 24 V DC modules, which relies on DIN rail connectors, the range also includes modules with a universal supply voltage range.

Operational reliability

Safe 3-way isolation increases the operational reliability when faced with disturbances in your system.

Configuration

You can order many of the modules pre-configured or you can easily carry out the configuration process yourself using DIP switches, an operator interface or software.

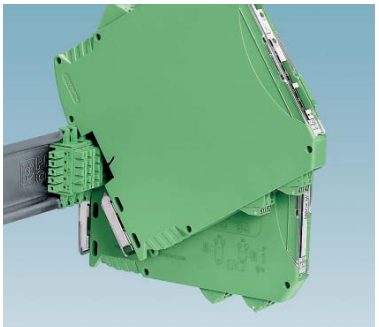
Connection method

You are free to choose between screw or spring-cage connection methods.

The spring-cage terminal block features the PIT push-in connection method, which enables it to be operated without the need for tools.

Low current consumption

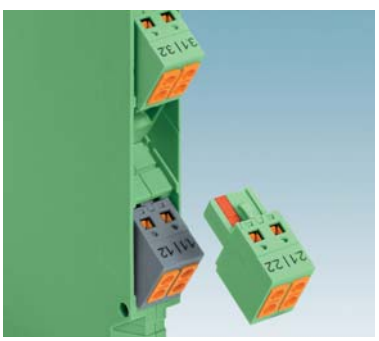
This patented circuit design results in minimum self-heating, which in turn ensures the longest possible service life.



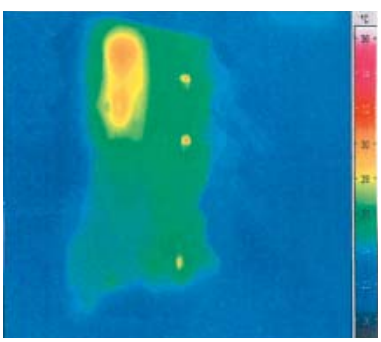
Power bridging

Operational reliability

FDT/DTM configuration

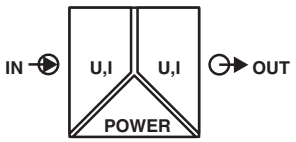


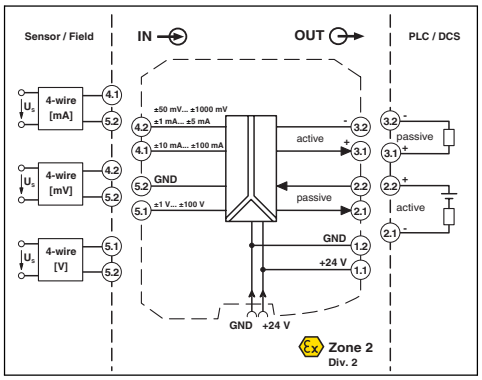
Connection method



Low current consumption

Analog IN / Analog OUT
3-way isolating amplifier





Ex n

Universal,
more than 1600 signal combinations

Ex:
Applied for: UL listed / CUL listed / UL-EX LIS / CUL-EX LIS
Housing width 12.5 mm

Universal isolating amplifier for operating 4-wire measuring transducers

- Analog isolating amplifier for isolating, filtering, amplifying, and converting standard analog signals
- Configurable input and output signals, including bipolar current and voltage signals
- 3-way electrical isolation
- Over 1600 signal conversions can be set via DIP switches on the front
- 10 kHz limit frequency for time-critical applications
- Output active or passive
- Plug-in screw or spring-cage connection method (PIT)
- Power supply via DIN rail connector possible
- Status indicator for supply voltage
- Up to SIL 2 according to EN 61508
- Installation in Zone 2 permissible

Notes:

To order a product with an order configuration, enter the required configuration by referring to the adjacent order key.

Information about the supply and error evaluation module as well as about the DIN rail connectors and marking material can be found from page 402

Technical data

Input data		
Input signal (configurable using the DIP switch)	0 ... 10 V, please indicate if different setting when ordering	
Maximum input signal	±100 V	±100 mA
Input resistance	Approx. 1 MΩ (±1 V DC ... ±100 V DC)	Approx. 10 Ω (±10 mA DC ... ±100 mA DC)
Output data	U output	I output
Output signal (configurable using the DIP switch)	0 ... 20 mA, please indicate if different setting when ordering	
Load R_B	≥ 1 kΩ (10 V)	active: ≤ 600 Ω (20 mA) (passive: ≤ (UB-2 V) / I_{outmax})
General data		
Supply voltage U_B	12 V DC ... 24 V DC (-20% / +25%)	
Power dissipation	< 0.7 W (at 24 V DC / 20 mA)	
Maximum transmission error	≤ 0.1% (Compared to the final value)	
Temperature coefficient	0.0075%/K	
ZERO / SPAN adjustment	±4% / ±4%	
Limit frequency (3 dB)	10 kHz (Can be switched to 30 Hz)	
Step response (10 - 90%)	35 µs (at 10 kHz) 11 ms (at 30 Hz)	
Electrical isolation		
Input/output/power supply	2.5 kV (50 Hz, 1 min., test voltage) 300 V_{rms} (Rated insulation voltage, surge voltage category II, pollution degree 2, safe isolation as per EN 61010, EN 50178)	
Degree of protection	IP20	
Ambient temperature (operation)	-20°C ... 70°C	
Mounting	Any	
Housing material	PA 66-FR	
Dimensions W / H / D	12.5 / 99 / 114.5 mm	
Screw connection solid / stranded / AWG	0.2 ... 2.5 mm² / 0.2 ... 2.5 mm² / 24 - 14	
Spring-cage connection solid / stranded / AWG	0.2 ... 1.5 mm² / 0.2 ... 1.5 mm² / 24 - 16	
Conformance/approvals		
Conformance	CE-compliant	
ATEX	II 3 G Ex nA nL IIC T4	
IECEx	Ex nA nL IIC T4	
UL, USA/Canada	UL applied for	
Functional safety (SIL)	SIL 2	
GL	GL applied for	

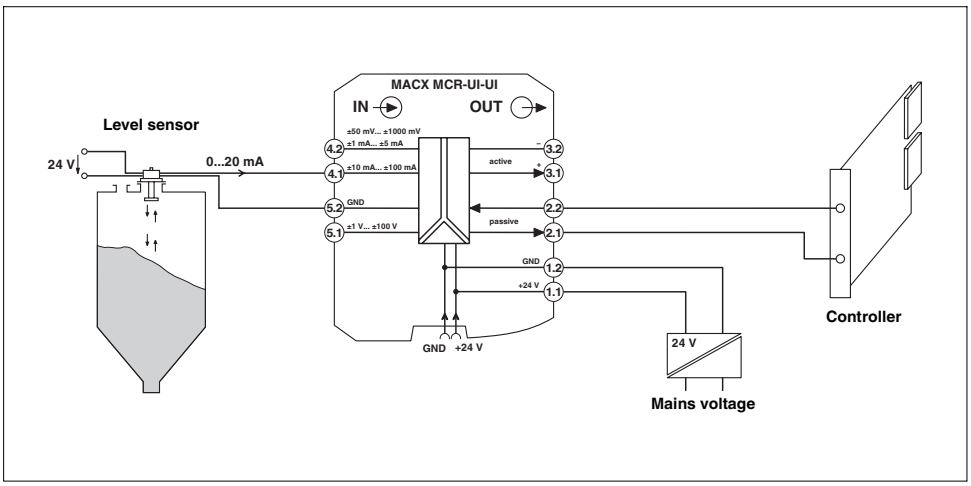
Ordering data

Description		Type	Order No.	Pcs. / Pkt.
3-way isolating amplifier, for electrical isolation of analog signals				
Order configuration	Screw connection	**MACX MCR-UI-UI**	**2811284**	1
Order configuration	Spring-cage connection	**MACX MCR-UI-UI-SP**	**2811572**	1
Standard configuration	Screw connection	**MACX MCR-UI-UI-NC**	**2811446**	1
Standard configuration	Spring-cage connection	**MACX MCR-UI-UI-SP-NC**	**2811556**	1

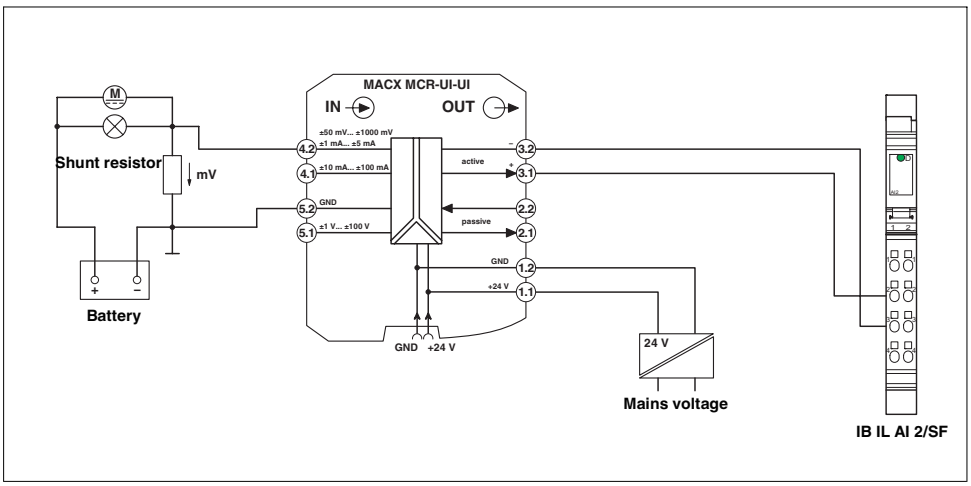
Order key MACX MCR-UI-UI-... (standard configuration entered as an example)

Order No.	Input			Output		Limit frequency	Factory calibration certificate FCC
2811284 /	IN03			OUT01		10K /	NONE
2811284 ≙ ...-UI-UI	IN40 ≙ 0...50 mV IN24 ≙ 0...60 mV IN41 ≙ 0...75 mV IN25 ≙ 0...100 mV IN43 ≙ 0...120 mV	IN53 ≙ -50...+50 mV IN13 ≙ -60...+60 mV IN54 ≙ -75...+75 mV IN14 ≙ -100...+100 mV IN56 ≙ -120...+120 mV	IN70 ≙ 0...1.0 mA IN71 ≙ 0...1.5 mA IN72 ≙ 0...2.0 mA IN73 ≙ 0...3.0 mA IN36 ≙ 0...5 mA	OUT19 ≙ 0...2.5 V OUT05 ≙ 0...5 V OUT03 ≙ 0...10 V	OUT15 ≙ 0...5 mA OUT16 ≙ 0...10 mA OUT01 ≙ 0...20 mA	30 ≙ 30 Hz 10K ≙ 10 kHz	NONE ≙ without FCC YES ≙ with FCC (a fee is charged)
2811572 ≙ ...-UI-UI-SP	IN44 ≙ 0...150 mV IN26 ≙ 0...200 mV IN27 ≙ 0...300 mV IN28 ≙ 0...500 mV IN66 ≙ 0...1000 mV IN29 ≙ 0...1.0 V IN50 ≙ 0...1.5 V IN30 ≙ 0...2.0 V IN52 ≙ 0...3.0 V IN05 ≙ 0...5 V IN03 ≙ 0...10 V IN67 ≙ 0...15 V IN32 ≙ 0...20 V IN39 ≙ 0...30 V IN68 ≙ 0...50 V IN69 ≙ 0...100 V IN06 ≙ 1...5 V IN04 ≙ 2...10 V	IN57 ≙ -150...+150 mV IN15 ≙ -200...+200 mV IN16 ≙ -300...+300 mV IN17 ≙ -500...+500 mV IN78 ≙ -1000...+1000 mV IN18 ≙ -1.0...+1.0 V IN63 ≙ -1.5...+1.5 V IN19 ≙ -2.0...+2.0 V IN65 ≙ -3.0...+3.0 V IN21 ≙ -5...+5 V IN22 ≙ -10...+10 V IN79 ≙ -15...+15 V IN23 ≙ -20...+20 V IN80 ≙ -30...+30 V IN81 ≙ -50...+50 V IN82 ≙ -100...+100 V	IN74 ≙ 0...15 mA IN01 ≙ 0...20 mA IN75 ≙ 0...30 mA IN76 ≙ 0...50 mA IN77 ≙ 0...100 mA IN83 ≙ -1.0...+1.0 mA IN84 ≙ -1.5...+1.5 mA IN85 ≙ -2.0...+2.0 mA IN86 ≙ -3.0...+3.0 mA IN33 ≙ -5...+5 mA IN34 ≙ -10...+10 mA IN87 ≙ -15...+15 mA IN35 ≙ -20...+20 mA IN88 ≙ -30...+30 mA IN89 ≙ -50...+50 mA IN90 ≙ -100...+100 mA IN91 ≙ 1...5 mA IN92 ≙ 2...10 mA IN02 ≙ 4...20 mA	OUT20 ≙ -2.5...+2.5 V OUT13 ≙ -5...+5 V OUT14 ≙ -10...+10 V OUT24 ≙ 0.5...+2.5 V OUT06 ≙ 1...5 V OUT04 ≙ 2...10 V OUT27 ≙ 2.5...0 V OUT11 ≙ 5...0 V OUT09 ≙ 10...0 V	OUT21 ≙ -5...+5 mA OUT22 ≙ -10...+10 mA OUT23 ≙ -20...+20 mA OUT25 ≙ 1...5 mA OUT26 ≙ 2...10 mA OUT02 ≙ 4...20 mA OUT28 ≙ 5...0 mA OUT29 ≙ 10...0 mA OUT07 ≙ 20...0 mA		YESPLUS ≙ Factory calibration certificate with 5 measuring points (a fee is charged)

Application example: Level measurement and active analog input card



Application example: Shunt measurement and Inline terminal with passive analog input channels within an Inline station



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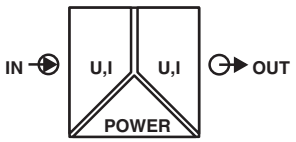
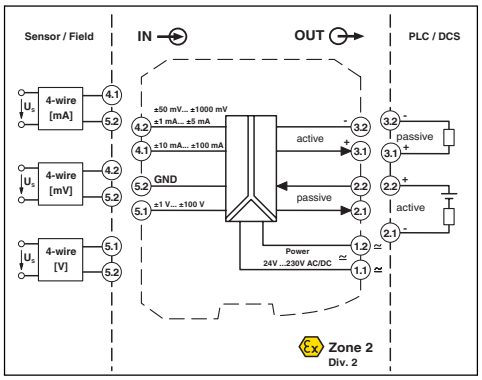
Analog IN / Analog OUT
3-way isolating amplifier





Ex n

SIL IEC 61508

Universal,
more than 1600 signal combinations,
wide-range power supply

Ex: // Applied for: UL listed / CUL listed / UL-EX LIS / CUL-EX LIS
Housing width 12.5 mm

- Analog isolating amplifier for isolating, filtering, amplifying, and converting standard analog signals
- Configurable input and output signals, including bipolar current and voltage signals
- 3-way electrical isolation
- Over 1600 signal conversions can be set via DIP switches on the front
- Output active or passive
- Plug-in screw or spring-cage connection method (PIT)
- Wide-range power supply: 19.2 ... 253 V AC/DC
- Status indicator for supply voltage
- Up to SIL 2 according to EN 61508
- Installation in Zone 2 permissible

Notes:

To order a product with an order configuration, enter the required configuration by referring to the adjacent order key.

Technical data

Input data		
Input signal (configurable using the DIP switch)	0 ... 10 V, please indicate if different setting when ordering	
Maximum input signal	±100 V	±100 mA
Input resistance	Approx. 1 MΩ (±1 V DC ... ±100 V DC)	Approx. 10 Ω (±10 mA DC ... ±100 mA DC)
Output data	U output	I output
Output signal (configurable using the DIP switch)	0 ... 20 mA, configurable via DIP switches	
Maximum output signal	15 V	35 mA
Load R_B	≥ 1 kΩ (10 V)	active: ≤ 600 Ω (20 mA) (passive: ≤ (UB-2 V) / I_{outmax})
General data		
Supply voltage U_B	24 V ... 230 V AC/DC (-20%/+10%, 50/60 Hz)	
Power dissipation	< 0.8 W (at 24 V DC / 20 mA) < 0.9 W (at 230 V AC / 20 mA)	
Maximum transmission error	≤ 0.1% (Compared to the final value)	
Temperature coefficient	0.0075%/K	
ZERO / SPAN adjustment	±4% / ±4%	
Electrical isolation		
Input/output/power supply	2.5 kV (50 Hz, 1 min., test voltage) 300 V_{rms} (Rated insulation voltage, surge voltage category II, pollution degree 2, safe isolation as per EN 61010, EN 50178)	
Degree of protection	IP20	
Ambient temperature (operation)	-20°C ... 70°C	
Housing material	PA 66-FR	
Dimensions W / H / D	12.5 / 99 / 114.5 mm	
Screw connection solid / stranded / AWG	0.2 ... 2.5 mm² / 0.2 ... 2.5 mm² / 24 - 14	
Spring-cage connection solid / stranded / AWG	0.2 ... 1.5 mm² / 0.2 ... 1.5 mm² / 24 - 16	
Conformance/approvals		
Conformance	CE-compliant	
ATEX	II 3 G Ex nA nL II T4	
IECEx	Ex nA nL II T4	
UL, USA/Canada	UL applied for	
Functional safety (SIL)	SIL 2	
GL	GL applied for	

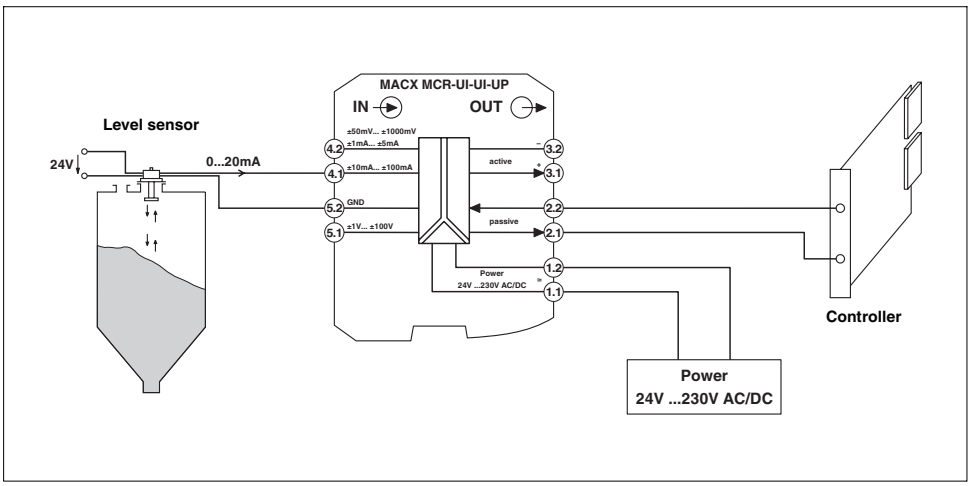
Ordering data

Description		Type	Order No.	Pcs. / Pkt.
3-way isolating amplifier, for electrical isolation of analog signals with long-range power supply				
Order configuration	Screw connection	**MACX MCR-UI-UI-UP**	**2811459**	1
Order configuration	Spring-cage connection	**MACX MCR-UI-UI-UP-SP**	**2811585**	1
Standard configuration	Screw connection	**MACX MCR-UI-UI-UP-NC**	**2811297**	1
Standard configuration	Spring-cage connection	**MACX MCR-UI-UI-UP-SP-NC**	**2811569**	1

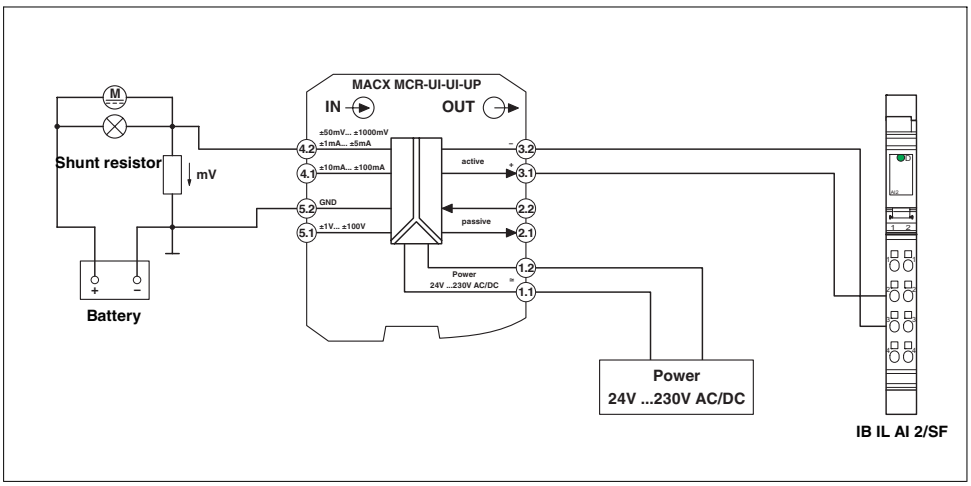
Order key MACX MCR-UI-UI-... (standard configuration entered as an example)

Order No.	Input			Output		Limit frequency	Factory calibration certificate FCC
2811459 /	IN03			OUT01		10K /	NONE
2811459 ≙ ...-UI-UI-UP 2811585 ≙ ...-UI-UI-UP-SP	IN40 ≙ 0...50 mV IN24 ≙ 0...60 mV IN41 ≙ 0...75 mV IN25 ≙ 0...100 mV IN43 ≙ 0...120 mV IN44 ≙ 0...150 mV IN26 ≙ 0...200 mV IN27 ≙ 0...300 mV IN28 ≙ 0...500 mV IN66 ≙ 0...1000 mV IN29 ≙ 0...1.0 V IN50 ≙ 0...1.5 V IN30 ≙ 0...2.0 V IN52 ≙ 0...3.0 V IN05 ≙ 0...5 V IN03 ≙ 0...10 V IN67 ≙ 0...15 V IN32 ≙ 0...20 V IN39 ≙ 0...30 V IN68 ≙ 0...50 V IN69 ≙ 0...100 V IN06 ≙ 1...5 V IN04 ≙ 2...10 V	IN53 ≙ -50...+50 mV IN13 ≙ -60...+60 mV IN54 ≙ -75...+75 mV IN14 ≙ -100...+100 mV IN56 ≙ -120...+120 mV IN57 ≙ -150...+150 mV IN15 ≙ -200...+200 mV IN16 ≙ -300...+300 mV IN17 ≙ -500...+500 mV IN78 ≙ -1000...+1000 mV IN18 ≙ -1.0...+1.0 V IN63 ≙ -1.5...+1.5 V IN19 ≙ -2.0...+2.0 V IN65 ≙ -3.0...+3.0 V IN21 ≙ -5...+5 V IN22 ≙ -10...+10 V IN79 ≙ -15...+15 V IN23 ≙ -20...+20 V IN80 ≙ -30...+30 V IN81 ≙ -50...+50 V IN82 ≙ -100...+100 V	IN70 ≙ 0...1.0 mA IN71 ≙ 0...1.5 mA IN72 ≙ 0...2.0 mA IN73 ≙ 0...3.0 mA IN36 ≙ 0...5 mA IN37 ≙ 0...10 mA IN74 ≙ 0...15 mA IN01 ≙ 0...20 mA IN75 ≙ 0...30 mA IN76 ≙ 0...50 mA IN77 ≙ 0...100 mA IN83 ≙ -1.0...+1.0 mA IN84 ≙ -1.5...+1.5 mA IN85 ≙ -2.0...+2.0 mA IN86 ≙ -3.0...+3.0 mA IN33 ≙ -5...+5 mA IN34 ≙ -10...+10 mA IN87 ≙ -15...+15 mA IN35 ≙ -20...+20 mA IN88 ≙ -30...+30 mA IN89 ≙ -50...+50 mA IN90 ≙ -100...+100 mA IN91 ≙ 1...5 mA IN92 ≙ 2...10 mA IN02 ≙ 4...20 mA	OUT19 ≙ 0...2.5 V OUT05 ≙ 0...5 V OUT03 ≙ 0...10 V OUT20 ≙ -2.5...+2.5 V OUT13 ≙ -5...+5 V OUT14 ≙ -10...+10 V OUT24 ≙ 0.5...+2.5 V OUT06 ≙ 1...5 V OUT04 ≙ 2...10 V OUT27 ≙ 2.5...0 V OUT11 ≙ 5...0 V OUT09 ≙ 10...0 V	OUT15 ≙ 0...5 mA OUT16 ≙ 0...10 mA OUT01 ≙ 0...20 mA OUT21 ≙ -5...+5 mA OUT22 ≙ -10...+10 mA OUT23 ≙ -20...+20 mA OUT25 ≙ 1...5 mA OUT26 ≙ 2...10 mA OUT02 ≙ 4...20 mA OUT28 ≙ 5...0 mA OUT29 ≙ 10...0 mA OUT07 ≙ 20...0 mA	30 ≙ 30 Hz 10K ≙ 10 kHz	NONE ≙ without FCC YES ≙ with FCC (a fee is charged) YESPLUS ≙ Factory calibration certificate with 5 measuring points (a fee is charged)

Application example: Level measurement and active analog input card



Application example: Shunt measurement and Inline terminal with analog input channels within an Inline station



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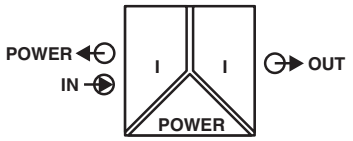
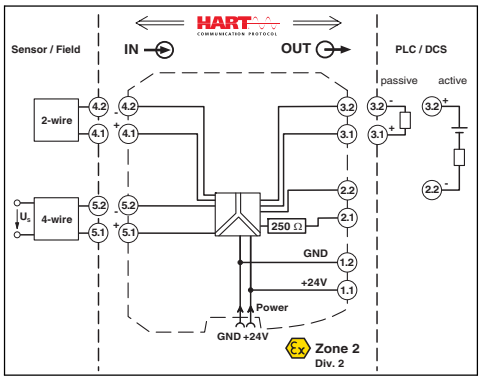
Analog IN / Analog OUT repeater power supplies





Ex n

Repeater power supply and input isolating amplifier

Ex:
Applied for: UL listed / CUL listed
Housing width 12.5 mm

Repeater power supply and input isolating amplifier for the operation of 2-wire measuring transducers, 4-wire measuring transducers, and mA current sources

- Input 0/4...20 mA (feeding or non-feeding)
- 0/4...20 mA output (active or passive)
- Bidirectional transmission of digital HART communication signals
- Plug-in screw or spring-cage connection method (PIT), with integrated sockets for HART communicators
- Terminal point with 250 Ω resistor to increase the HART impedance in the case of low-impedance systems
- 3-way electrical isolation
- Power supply via DIN rail connector possible
- Up to SIL 2 according to EN 61508
- Installation in Zone 2, protection type "n" (EN 60079-15) permitted

Notes:

Information about the supply and error evaluation module as well as about the DIN rail connectors and marking material can be found from page 402

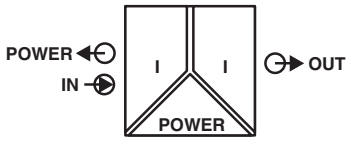
Technical data

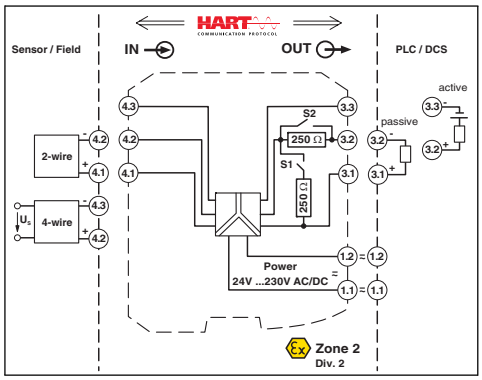
Input data	
Input signal	0 mA ... 20 mA / 4 mA ... 20 mA
Transmitter supply voltage	> 16 V (at 20 mA)
Voltage drop	< 3.5 V (in input isolating amplifier operation)
Output data	
Output signal	0 mA ... 20 mA (active) 4 mA ... 20 mA (active) 0 mA ... 20 mA (14 ... 26 V ext. source voltage) 4 mA ... 20 mA (14 ... 26 V ext. source voltage)
Load	< 600 Ω
Output ripple	< 20 mV_{rms}
General data	
Supply voltage range	19.2 V DC ... 30 V DC
Current consumption	< 60 mA (at 24 V DC)
Power dissipation	< 1.1 W (at 24 V DC / 20 mA)
Temperature coefficient	< 0.01%/K
Step response (10 - 90%)	< 600 µs (for 4 mA ... 20 mA step)
Transmission error, typical	< 0.05% (of final value)
Maximum transmission error	< 0.1% (of final value)
Under-/overload range	as per NE 43
Electrical isolation	
Input/output/power supply	2.5 kV (50 Hz, 1 min., test voltage) 300 V_{rms} (Rated insulation voltage, surge voltage category II, pollution degree 2, safe isolation as per EN 61010, EN 50178)
Input/output	375 V (Peak value in accordance with EN 60079-11)
Input/power supply	375 V (Peak value in accordance with EN 60079-11)
Ambient temperature range	-20°C ... 60°C (Any mounting position)
Status indication	Green LED (supply voltage)
SMART communication	Yes
Signal bandwidth	as per HART specifications
Protocols supported	HART
Housing material	PA 66-FR
Dimensions W / H / D	12.5 / 99 / 114.5 mm
Screw connection solid / stranded / AWG	0.2 ... 2.5 mm^2 / 0.2 ... 2.5 mm^2 / 24 - 14
Spring-cage connection solid / stranded / AWG	0.2 ... 1.5 mm^2 / 0.2 ... 1.5 mm^2 / 24 - 16
Conformance/approvals	
Conformance	CE-compliant, additionally EN 61326
ATEX	II 3 G Ex nA II T4 X
UL, USA/Canada	UL applied for
Functional safety (SIL)	SIL 2 according to EN 61508

Ordering data

Description	Type	Order No.	Pcs. / Pkt.
Repeater power supply, with HART® protocol			
Screw connection	**MACX MCR-SL-RPSSI-I**	**2865955**	1
Spring-cage conn.	**MACX MCR-SL-RPSSI-I-SP**	**2924207**	1

Analog IN / Analog OUT repeater power supplies





Repeater power supply and input isolating amplifier, wide-range power supply

Ex: Ex
Applied for: UL listed / CUL listed
Housing width 17.5 mm

Repeater power supply and input isolating amplifier for the operation of 2-wire measuring transducers, 4-wire measuring transducers, and mA current sources

- Input 0/4...20 mA (feeding or non-feeding)
- Output 0/4...20 mA (active or passive), 0/1...5 V, can be switched via the DIP switch
- Bidirectional transmission of digital HART communication signals
- Plug-in screw or spring-cage connection method (PIT), with integrated sockets for HART communicators
- 250 Ω resistor that can be activated via DIP switches to increase the HART impedance in the case of low-impedance systems
- 3-way electrical isolation
- Wide-range power supply: 19.2 ... 253 V AC/DC
- Up to SIL 2 according to EN 61508
- Installation in Zone 2, protection type "n" (EN 60079-15) permitted

Technical data

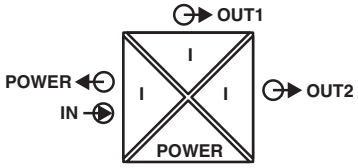
Input data	
Input signal	0 mA ... 20 mA / 4 mA ... 20 mA
Transmitter supply voltage	> 16 V (at 20 mA)
Voltage drop	< 3.5 V (in input isolating amplifier operation)
Output data	
Output signal	0 mA ... 20 mA (active) 4 mA ... 20 mA (active) 0 mA ... 20 mA (14 ... 26 V ext. source voltage) 4 mA ... 20 mA (14 ... 26 V ext. source voltage) 0 V ... 5 V (internal resistance, 250 Ω, 0.1%) 1 V ... 5 V (internal resistance, 250 Ω, 0.1%)
Load	< 600 Ω (I output)
Output ripple	< 20 mV_{rms}
General data	
Supply voltage range	24 V AC/DC ... 230 V AC/DC (-20%/+10%, 50/60 Hz)
Current consumption	< 75 mA (at 24 V DC)
Power dissipation	< 1.8 W
Temperature coefficient	< 0.01%/K
Step response (10 - 90%)	< 600 µs (for 4 mA ... 20 mA step)
Transmission error, typical	< 0.05% (of final value)
Maximum transmission error	< 0.1% (of final value)
Under-/overload range	as per NE 43
Electrical isolation	
Input/output/power supply	2.5 kV (50 Hz, 1 min., test voltage) 300 V_{rms} (Rated insulation voltage, surge voltage category II, pollution degree 2, safe isolation as per EN 61010, EN 50178)
Input/output	375 V (Peak value in accordance with EN 60079-11)
Input/power supply	375 V (Peak value in accordance with EN 60079-11)
Ambient temperature range	-20°C ... 60°C (Any mounting position)
Status indication	Green LED (supply voltage)
SMART communication	Yes
Signal bandwidth	as per HART specifications
Protocols supported	HART
Housing material	PA 66-FR
Dimensions W / H / D	17.5 / 99 / 114.5 mm
Screw connection solid / stranded / AWG	0.2 ... 2.5 mm^2 / 0.2 ... 2.5 mm^2 / 24 - 14
Spring-cage connection solid / stranded / AWG	0.2 ... 1.5 mm^2 / 0.2 ... 1.5 mm^2 / 24 - 16
Conformance/approvals	
Conformance	CE-compliant, additionally EN 61326
ATEX	Ex II 3 G Ex nA II T4 X
UL, USA/Canada	UL applied for
Functional safety (SIL)	SIL 2 according to EN 61508

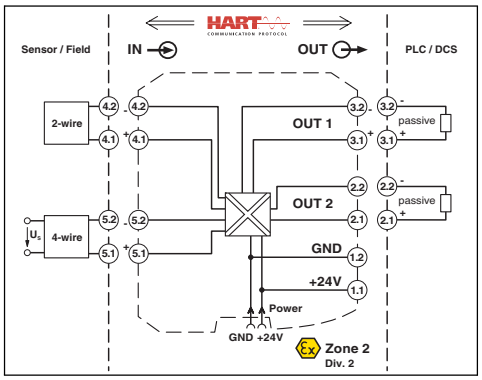
Ordering data

Description	Type	Order No.	Pcs. / Pkt.
Repeater power supply, with HART® protocol			
Screw connection	**MACX MCR-SL-RPSSI-I-UP**	**2865968**	1
Spring-cage conn.	**MACX MCR-SL-RPSSI-I-UP-SP**	**2924210**	1

N

Analog IN / Analog OUT repeater power supplies





Ex n

SIL
IEC 61508

Repeater power supply and input isolating amplifier, with two electrically isolated outputs

Repeater power supply and input isolating amplifier for the operation of 2-wire measuring transducers, 4-wire measuring transducers, and mA current sources

- Input 0/4...20 mA (feeding or non-feeding)
- Two electrically isolated 0/4 ... 20 mA (active) outputs
- Bidirectional transmission of digital HART communication signals (both outputs)
- Plug-in screw or spring-cage connection method (PIT), with integrated sockets for HART communicators
- 4-way electrical isolation
- Power supply via DIN rail connector possible
- Up to SIL 2 according to EN 61508
- Installation in Zone 2, protection type "n" (EN 60079-15) permitted

Notes:

Information about the supply and error evaluation module as well as about the DIN rail connectors and marking material can be found from page 402

Housing width 12.5 mm

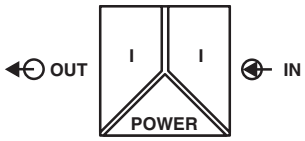
Technical data

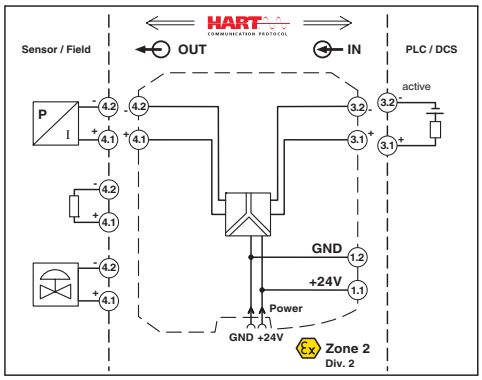
Input data	
Input signal	4 mA ... 20 mA / 0 mA ... 20 mA
Transmitter supply voltage	> 16 V (at 20 mA)
Voltage drop	< 3.9 V (in input isolating amplifier operation)
Output data	
Output signal (Per output)	0 mA ... 20 mA (active) 4 mA ... 20 mA (active)
Load	< 450 Ω (at 20 mA)
Output ripple	< 20 mV_{rms}
General data	
Supply voltage range	19.2 V DC ... 30 V DC (24 V DC (-20% ... +25%))
Current consumption	< 75 mA (at 24 V DC)
Power dissipation	< 1.45 W (at 24 V DC / 20 mA)
Temperature coefficient	< 0.01%/K
Step response (10 - 90%)	< 1.3 ms (for 4 mA ... 20 mA step)
Transmission error, typical	< 0.05% (of final value)
Maximum transmission error	< 0.1% (of final value)
Under-/overload range	as per NE 43
Electrical isolation	
Input/output/power supply	2.5 kV (50 Hz, 1 min., test voltage) 300 V_{rms} (Rated insulation voltage, surge voltage category II, pollution degree 2, safe isolation as per EN 61010, EN 50178)
Input/output	375 V (Peak value in accordance with EN 60079-11)
Input/power supply	375 V (Peak value in accordance with EN 60079-11)
Output 1/output 2	1.5 kV AC (50 Hz, 1 min., test voltage)
Ambient temperature range	-20°C ... 60°C (Any mounting position)
Status indication	Green LED (PWR supply voltage)
SMART communication (Per output)	Yes
Protocols supported	HART
Housing material	PA 66-FR
Dimensions W / H / D	12.5 / 99 / 114.5 mm
Screw connection solid / stranded / AWG	0.2 ... 2.5 mm^2 / 0.2 ... 2.5 mm^2 / 24 - 14
Spring-cage connection solid / stranded / AWG	0.2 ... 1.5 mm^2 / 0.2 ... 1.5 mm^2 / 24 - 16
Conformance/approvals	
Conformance	CE-compliant, additionally EN 61326
ATEX	Ex II 3 G Ex nA II T4 X
Functional safety (SIL)	SIL 2 according to EN 61508

Ordering data

Description	Type	Order No.	Pcs. / Pkt.
Repeater power supply, with HART® protocol			
Screw connection	**MACX MCR-SL-RPSSI-2I**	**2924825**	1
Spring-cage conn.	**MACX MCR-SL-RPSSI-2I-SP**	**2924838**	1

Analog OUT
Output isolating amplifier





Ex n

Ex:
Applied for: UL listed / CUL listed
Housing width 12.5 mm

Output isolating amplifier for controlling I/P transducers, control valves, and displays

- 0/4...20 mA input
- 0/4 ... 20 mA output
- Bidirectional transmission of digital HART communication signals
- Plug-in screw or spring-cage connection method (PIT), with integrated sockets for HART communicators
- Line fault detection (LFD)
- 3-way electrical isolation
- Power supply via DIN rail connector possible
- Up to SIL 2 according to EN 61508
- Installation in Zone 2, protection type "n" (EN 60079-15) permitted

Notes:

Information about the supply and error evaluation module as well as about the DIN rail connectors and marking material can be found from page 402

Technical data

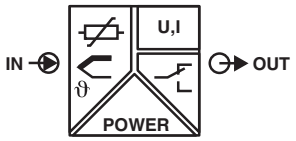
Input data	
Input signal	0 mA ... 20 mA / 4 mA ... 20 mA
Input voltage	5.4 V (at 20 mA)
Input impedance in the event of a cable break at the output	> 100 kΩ (If there is a line fault)
Output data	
Output signal	0 mA ... 20 mA / 4 mA ... 20 mA
Load	< 800 Ω (at 20 mA)
Output ripple	< 20 mV_{rms}
General data	
Supply voltage range	19.2 V DC ... 30 V DC
Current consumption	< 46 mA (at 24 V DC / 20 mA)
Power dissipation	< 1.1 W (at 24 V DC / 20 mA)
Temperature coefficient	< 0.01%/K
Step response (10 - 90%)	< 140 µs
Maximum transmission error	< 0.1% (of final value)
Electrical isolation	
Input/output/power supply	1.5 kV (50 Hz, 1 min., test voltage) 300 V_{rms} (Rated insulation voltage, surge voltage category II, pollution degree 2, safe isolation as per EN 61010, EN 50178)
Ambient temperature range	-20°C ... 60°C (Any mounting position)
Humidity	10% ... 95% (no condensation)
SMART communication	Yes
Signal bandwidth	as per HART specifications
Protocols supported	HART
Housing material	PA 66-FR
Inflammability class according to UL 94	V0
Dimensions W / H / D	12.5 / 99 / 114.5 mm
Screw connection solid / stranded / AWG	0.2 ... 2.5 mm^2 / 0.2 ... 2.5 mm^2 / 24 - 14
Spring-cage connection solid / stranded / AWG	0.2 ... 1.5 mm^2 / 0.2 ... 1.5 mm^2 / 24 - 16
Conformance/approvals	
Conformance	CE-compliant, additionally EN 61326
ATEX	Ex II 3 G Ex nA II T4 X
Functional safety (SIL)	SIL 2 according to EN 61508

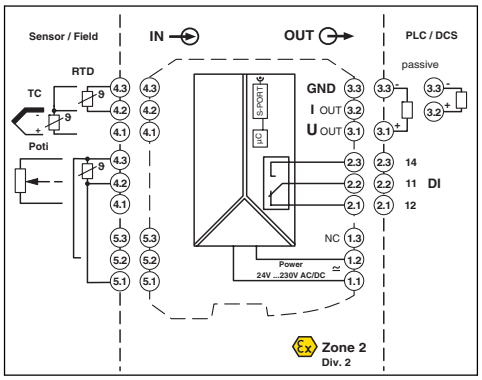
Ordering data

Description	Type	Order No.	Pcs. / Pkt.
Output isolating amplifier			
Screw connection	**MACX MCR-SL-IDSI-I**	**2865971**	1
Spring-cage conn.	**MACX MCR-SL-IDSI-I-SP**	**2924223**	1

N

Temperature, temperature transducer





Ex n

SIL
IEC 61508

Universal, with switching output, wide-range power supply

Universal temperature transducer with freely configurable properties

- Input for resistance thermometers, thermocouples, resistance-type sensors, potentiometers, and mV sources
- Measure differential temperatures
- Freely programmable input and output
- Option of inverse output signal ranges
- Relay switching output
- Configuration via software (FDT-DTM) or IFS-OP-UNIT operating and display unit
- Programming during operation and also voltage-free using IFS-USB-PROG-ADAPTER programming adapter
- Plug-in screw or spring-cage connection method (PIT)
- Cold junction compensation with separate connector
- Wide-range power supply: 19.2 ... 253 V AC/DC
- Status indicator for supply voltage, cable, sensor, and module errors
- Up to SIL 2 according to EN 61508
- Installation in Zone 2, protection type "n" (EN 60079-15) permitted

Notes:
To order a product with an order configuration, enter the required configuration by referring to the adjacent order key.
The IFS-CONF configuration software can be downloaded from the Internet (www.phoenixcontact.com).
Information on the IFS-OP-UNIT operating and display unit and the associated IFS-OP-CRADLE DIN rail cradle can be found on page 392

Housing width 17.5 mm

Technical data

Input data		
Resistance thermometers	Pt, Ni, Cu sensors: 2-, 3-, 4-wire	
Thermocouple sensors	B, E, J, K, N, R, S, T, L, U, CA, DA, A1G, A2G, A3G, MG, LG	
Resistor	0 Ω ... 50 kΩ	
Potentiometer	0 Ω ... 50 kΩ	
Voltage	-1000 mV ... 1000 mV	
Output data	U output	I output
Output signal	4 mA ... 20 mA (with SIL, others can be configured using software)	
Maximum output signal	±11 V	22 mA
Load R_B	≥ 10 kΩ	≤ 600 Ω (at 20 mA)
Behavior in the event of a sensor error	According to NE 43 or freely configurable	
Switching output	Relay output	
Contact type	1 PDT	
Contact material	$AgSnO_2$, hard gold-plated	
Max. switching voltage	30 V AC (30 V DC)	
Max. switching current	0.5 A (30 V AC) / 1 A (30 V DC)	
General data		
Supply voltage range	24 V ... 230 V AC/DC (-20%/+10%, 50/60 Hz)	
Power consumption	< 1.5 W	
Temperature coefficient	0.01%/K	
Transmission error, total	0.1% (PT100, 20 K min. span)	
Electrical isolation		
Input/output	375 V (Peak value in accordance with EN 60079-11)	
Input/power supply	375 V (Peak value in accordance with EN 60079-11)	
Input/switching output	375 V (Peak value in accordance with EN 60079-11)	
Output/power supply	300 V_{rms} (Rated insulation voltage, surge voltage category II, pollution degree 2, safe isolation as per EN 61010, EN 50178)	
Ambient temperature range	-20°C ... 65°C	
Humidity	Typ. 5% ... 95% (no condensation)	
Housing material	PA 66-FR	
Inflammability class according to UL 94	V0	
Dimensions W / H / D	17.5 / 99 / 114.5 mm	
Screw connection solid / stranded / AWG	0.2 ... 2.5 mm^2 / 0.2 ... 2.5 mm^2 / 24 - 14	
Spring-cage connection solid / stranded / AWG	0.2 ... 1.5 mm^2 / 0.2 ... 1.5 mm^2 / 24 - 16	
Conformance/approvals		
Conformance	CE-compliant	
ATEX	Ex II 3 G Ex nAC ic IIC / IIB / IIA T4 X	
IECEx	Ex nAC ic IIC T4 X	
Functional safety (SIL)	SIL 2	

Ordering data

Description		Type	Order No.	Pcs. / Pkt.
Temperature transducer				
Standard configuration	Screw connection	**MACX MCR-T-UI-UP**	**2811394**	1
Standard configuration	Spring-cage conn.	**MACX MCR-T-UI-UP-SP**	**2811860**	1
Order configuration	Screw connection	**MACX MCR-T-UI-UP-C**	**2811873**	1
Order configuration	Spring-cage conn.	**MACX MCR-T-UI-UP-SP-C**	**2811970**	1

Accessories

Programming adapter with USB interface, for programming with the IFS-CONF software		**IFS-USB-PROG-ADAPTER**	**2811271**	1

Order key for temperature transducer MACX-MCR-T-UI-UP(-SP)-C (standard configuration entered as an example)

Order No.	Safety Integrity Level (SIL)	Sensor type	Connection method	Cold junction compensation	Measuring range: Start	Measuring range: End	Measuring unit	Output range	Factory calibration certificate = FCC
2811873 /	ON /	PT100 /	4 /	0 /	-50 /	150 /	C /	OUT02 /	NONE
2811873 ≙ MACX MCR-T-UI-UP-C 2811970 ≙ MACX MCR-T-UI-UP-SP-C	ON ≙ active NONE ≙ not active ON only with output range = OUT02	See below	2 ≙ 2-wire 3 ≙ 3-wire 4 ≙ 4-wire	0 ≙ off, e.g., with RTD, R, potentiometer, mV 1 ≙ on, e.g., with TC	See below	See below	C ≙ °C F ≙ °F O ≙ Ω P ≙ % V ≙ mV	OUT15 ≙ 0...5 mA OUT16 ≙ 0...10 mA OUT01 ≙ 0...20 mA OUT15 ≙ 0...5 mA OUT25 ≙ 1...5 mA OUT26 ≙ 2...10 mA OUT02 ≙ 4...20 mA OUT05 ≙ 0...5 V OUT03 ≙ 0...10 V OUT06 ≙ 1...5 V OUT04 ≙ 2...10 V OUT13 ≙ -5...+5 V OUT14 ≙ -10...+10 V others freely configurable in the software	NONE ≙ without FCC YES ≙ with FCC (a fee is charged) YESPLUS ≙ Factory calibration certificate with 5 measuring points (a fee is charged)

						Smallest measuring range
Resistance thermometers RTD Others can be selected or are freely configured in the software.	PT100	≙ Pt 100 acc. to IEC/EN 60751	-200	850	°C	20 K
	PT200	≙ Pt 200 acc. to IEC/EN 60751	-200	850	°C	20 K
	PT500	≙ Pt 500 acc. to IEC/EN 60751	-200	850	°C	20 K
	PT1000	≙ Pt 1000 acc. to IEC/EN 60751	-200	850	°C	20 K
	PT100S	≙ Pt 100 acc. to Sama RC21-4-1966	-200	850	°C	20 K
	PT1000S	≙ Pt 1000 acc. to Sama RC21-4-1966	-200	850	°C	20 K
	PT100G	≙ Pt 100 acc. to GOST 6651	-200	850	°C	20 K
	PT1000G	≙ Pt 1000 acc. to GOST 6651	-200	850	°C	20 K
	PT100J	≙ Pt 100 acc. to JIS C1604/1997	-200	850	°C	20 K
	PT1000J	≙ Pt 1000 acc. to JIS C1604/1997	-200	850	°C	20 K
	NI100	≙ Ni 100 acc. to DIN 43760/DIN IEC 60751	-60	250	°C	20 K
	NI1000	≙ Ni 1000 acc. to DIN 43760/DIN IEC 60751	-60	250	°C	20 K
	NI100S	≙ Ni 100 acc. to Sama RC21-4-1966	-60	180	°C	20 K
	NI1000S	≙ Ni 1000 acc. to Sama RC21-4-1966	-60	180	°C	20 K
	NI1000L	≙ Ni 1000 (Landis & Gyr)	-50	160	°C	20 K
	CU10	≙ Cu 10 acc. to Sama RC21-4-1966	-70	500	°C	100 K
	CU50	≙ Cu 50/Cu 100 acc. to GOST 6651 (α = 1.428)	-50	200	°C	100 K
	CU53	≙ Cu 53 acc. to GOST 6651 (α = 1.428)	-50	180	°C	100 K
	KTY81	≙ KTY81-110 (Philips)	-55	150	°C	20 K
	KTY84	≙ KTY84-130 (Philips)	-40	300	°C	20 K
Thermocouples TC Others can be selected in the software.	B	≙ acc. to IEC/EN 60584 (Pt30Rh-Pt6Rh)	500	1820	°C	50 K
	E	≙ acc. to IEC/EN 60584 (NiCr-CuNi)	-230	1000	°C	50 K
	J	≙ acc. to IEC/EN 60584 (Fe-CuNi)	-210	1200	°C	50 K
	K	≙ acc. to IEC/EN 60584 (NiCr-Ni)	-250	1372	°C	50 K
	N	≙ acc. to IEC/EN 60584 (NiCrSi-NiSi)	-250	1300	°C	50 K
	R	≙ acc. to IEC/EN 60584 (Pt13Rh-Pt)	-50	1768	°C	50 K
	S	≙ acc. to IEC/EN 60584 (Pt10Rh-Pt)	-50	1768	°C	50 K
	T	≙ acc. to IEC/EN 60584 (Cu-CuNi)	-200	400	°C	50 K
	L	≙ acc. to DIN 43760 (Fe-CuNi)	-200	900	°C	50 K
	U	≙ acc. to DIN 43760 (Cu-CuNi)	-200	600	°C	50 K
	CA	≙ C ASTM JE988 (2002)	0	2315	°C	50 K
	DA	≙ D ASTM JE988 (2002)	0	2315	°C	50 K
	A1G	≙ A-1 GOST 8.585-2001	0	2500	°C	50 K
	A2G	≙ A-2 GOST 8.585-2001	0	1800	°C	50 K
	A3G	≙ A-3 GOST 8.585-2001	0	1800	°C	50 K
	MG	≙ M GOST 8.585-2001	-200	100	°C	50 K
	LG	≙ L GOST 8.585-2001	-200	800	°C	50 K
Remote resistance-type sensors R (2-, 3-, 4-wire) Others can be selected in the software.	RES03	≙ Resistance 0...150 Ω	0	150	Ω	10% of the selected measuring range
	RES05	≙ Resistance 0...600 Ω	0	600	Ω	
	RES06	≙ Resistance 0...1200 Ω	0	1200	Ω	
	RES09	≙ Resistance 0...6250 Ω	0	6250	Ω	
	RES10	≙ Resistance 0...12500 Ω	0	12500	Ω	
	RES12	≙ Resistance 0...50000 Ω	0	50000	Ω	
Potentiometers 3-wire Others can be selected in the software.	POT03	≙ Potentiometer 0...150 Ω	0	100	%	10% of the selected measuring range
	POT05	≙ Potentiometer 0...600 Ω	0	100	%	
	POT06	≙ Potentiometer 0...1200 Ω	0	100	%	
	POT09	≙ Potentiometer 0...6250 Ω	0	100	%	
	POT10	≙ Potentiometer 0...12500 Ω	0	100	%	
	POT12	≙ Potentiometer 0...50000 Ω	0	100	%	
Voltage signals mV Others can be selected in the software.	V04	≙ Voltage (mV)	-1000	+1000	mV	10% of nominal span

Other setting options can be configured with the IFS-CONF software.

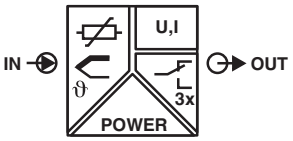
- Freely configurable user characteristic with 30 interpolation points
- Output behavior in the event of a short circuit, sensor break or overrange/underrange is freely configurable or can be set according to NE43 (standard configuration: NE43 upscale)
- Filter setting (standard configuration: 1)
- Restart after failsafe (standard configuration: ON)
- Switching behavior: Switching output (limit values, times, etc.) (standard configuration: OFF)

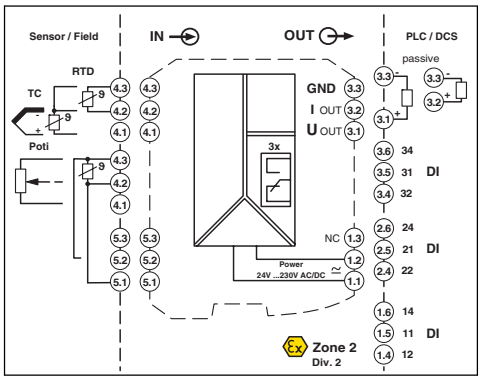
Temperature conversion guide for °C to °F:

$$T\,[°F] = \frac{9}{5}\,T\,[°C] + 32$$

N

Temperature, temperature transducer





Ex n

SIL
IEC 61508

Universal, with three limit value relays, wide-range power supply

Universal temperature transducer with freely configurable properties

- Input for resistance thermometers, thermocouples, resistance-type sensors, potentiometers, and mV sources
- Measure differential temperatures
- Freely programmable input and output
- Option of inverse output signal ranges
- Three limit value relays, can be used in combination as a safe limit value relay
- Configuration via software (FDT-DTM) or IFS-OP-UNIT operating and display unit
- Programming during operation and also voltage-free using IFS-USB-PROG-ADAPTER programming adapter
- Plug-in screw or spring-cage connection method (PIT)
- Cold junction compensation with separate connector
- Wide-range power supply: 19.2 ... 253 V AC/DC
- Status indicator for supply voltage, cable, sensor, and module errors
- Up to SIL 2 according to EN 61508
- Installation in Zone 2, protection type "n" (EN 60079-15) permitted

Notes:
To order a product with an order configuration, enter the required configuration by referring to the adjacent order key.
The IFS-CONF configuration software can be downloaded from the Internet (www.phoenixcontact.com).
Information on the IFS-OP-UNIT operating and display unit and the associated IFS-OP-CRADLE DIN rail cradle can be found on page 392

Housing width 35 mm

Technical data

Input data		
Resistance thermometers	Pt, Ni, Cu sensors: 2-, 3-, 4-wire	
Thermocouple sensors	B, E, J, K, N, R, S, T, L, U, CA, DA, A1G, A2G, A3G, MG, LG	
Resistor	0 Ω ... 50 kΩ	
Potentiometer	0 Ω ... 50 kΩ	
Voltage	-1000 mV ... 1000 mV	
Output data	U output	I output
Output signal	4 mA ... 20 mA (with SIL, others can be configured using software)	
Maximum output signal	±11 V	22 mA
Load R_B	≥ 10 kΩ	≤ 600 Ω (at 20 mA)
Behavior in the event of a sensor error	According to NE 43 or freely configurable	
Switching output	**Relay output**	
Contact type	3 PDTs	
Contact material	$AgSnO_2$, hard gold-plated	
Max. switching voltage	250 V AC (250 V DC)	
Max. switching current	2 A (250 V AC) / 2 A (28 V DC)	
General data		
Supply voltage range	24 V ... 230 V AC/DC (-20%/+10%, 50/60 Hz)	
Power consumption	< 2.4 W	
Temperature coefficient	0.01%/K	
Transmission error, total	0.1% (PT100, 20 K min. span)	
Electrical isolation		
Input/output	375 V (Peak value in accordance with EN 60079-11)	
Input/power supply	375 V (Peak value in accordance with EN 60079-11)	
Input/switching output	375 V (Peak value in accordance with EN 60079-11)	
Output/supply/switching output	300 V_{rms} (Rated insulation voltage, surge voltage category II, pollution degree 2, safe isolation as per EN 61010, EN 50178)	
Ambient temperature range	-20°C ... 65°C	
Humidity	Typ. 5% ... 95% (no condensation)	
Housing material	PA 66-FR	
Inflammability class according to UL 94	V0	
Dimensions W / H / D	35 / 99 / 114.5 mm	
Screw connection solid / stranded / AWG	0.2 ... 2.5 mm^2 / 0.2 ... 2.5 mm^2 / 24 - 14	
Spring-cage connection solid / stranded / AWG	0.2 ... 1.5 mm^2 / 0.2 ... 1.5 mm^2 / 24 - 16	
Conformance/approvals		
Conformance	CE-compliant	
ATEX	Ex II 3 G Ex nAC ic IIC / IIB / IIA T4 X	
IECEx	Ex nAC ic IIC T4 X	
Functional safety (SIL)	SIL 2	

Ordering data

Description		Type	Order No.	Pcs. / Pkt.
Temperature transducer				
Standard configuration	Screw connection	**MACX MCR-T-UIREL-UP**	**2811378**	1
Standard configuration	Spring-cage conn.	**MACX MCR-T-UIREL-UP-SP**	**2811828**	1
Order configuration	Screw connection	**MACX MCR-T-UIREL-UP-C**	**2811514**	1
Order configuration	Spring-cage conn.	**MACX MCR-T-UIREL-UP-SP-C**	**2811831**	1

Accessories

Programming adapter with USB interface, for programming with the IFS-CONF software	**IFS-USB-PROG-ADAPTER**	**2811271**	1

Order key for temperature transducer MACX-MCR-T-UIREL-UP(-SP)-C (standard configuration entered as an example)

Order No.	Safety Integrity Level (SIL)	Sensor type	Connection method	Cold junction compensation	Measuring range: Start	Measuring range: End	Measuring unit	Output range	Factory calibration certificate = FCC
2811514 /	ON /	PT100 /	4 /	0 /	-50 /	150 /	C /	OUT02 /	NONE
2811514 ≙ MACX MCR-T-UIREL-UP-C 2811831 ≙ MACX MCR-T-UIREL-UP-SP-C	ON ≙ active NONE ≙ not active ON only with output range = OUT02	See below	2 ≙ 2-wire 3 ≙ 3-wire 4 ≙ 4-wire	0 ≙ off, e.g., with RTD, R, potentiometer, mV 1 ≙ on, e.g., with TC	See below	See below	C ≙ °C F ≙ °F O ≙ Ω P ≙ % V ≙ mV	OUT15 ≙ 0...5 mA OUT16 ≙ 0...10 mA OUT01 ≙ 0...20 mA OUT15 ≙ 0...5 mA OUT25 ≙ 1...5 mA OUT26 ≙ 2...10 mA OUT02 ≙ 4...20 mA OUT05 ≙ 0...5 V OUT03 ≙ 0...10 V OUT06 ≙ 1...5 V OUT04 ≙ 2...10 V OUT13 ≙ -5...+5 V OUT14 ≙ -10...+10 V others freely configurable in the software	NONE ≙ without FCC YES ≙ with FCC (a fee is charged) YESPLUS ≙ Factory calibration certificate with 5 measuring points (a fee is charged)

						Smallest measuring range
Resistance thermometers RTD Others can be selected or are freely configured in the software.	PT100	≙ Pt 100 acc. to IEC/EN 60751	-200	850	°C	20 K
	PT200	≙ Pt 200 acc. to IEC/EN 60751	-200	850	°C	20 K
	PT500	≙ Pt 500 acc. to IEC/EN 60751	-200	850	°C	20 K
	PT1000	≙ Pt 1000 acc. to IEC/EN 60751	-200	850	°C	20 K
	PT100S	≙ Pt 100 acc. to Sama RC21-4-1966	-200	850	°C	20 K
	PT1000S	≙ Pt 1000 acc. to Sama RC21-4-1966	-200	850	°C	20 K
	PT100G	≙ Pt 100 acc. to GOST 6651	-200	850	°C	20 K
	PT1000G	≙ Pt 1000 acc. to GOST 6651	-200	850	°C	20 K
	PT100J	≙ Pt 100 acc. to JIS C1604/1997	-200	850	°C	20 K
	PT1000J	≙ Pt 1000 acc. to JIS C1604/1997	-200	850	°C	20 K
	NI100	≙ Ni 100 acc. to DIN 43760/DIN IEC 60751	-60	250	°C	20 K
	NI1000	≙ Ni 1000 acc. to DIN 43760/DIN IEC 60751	-60	250	°C	20 K
	NI100S	≙ Ni 100 acc. to Sama RC21-4-1966	-60	180	°C	20 K
	NI1000S	≙ Ni 1000 acc. to Sama RC21-4-1966	-60	180	°C	20 K
	NI1000L	≙ Ni 1000 (Landis & Gyr)	-50	160	°C	20 K
	CU10	≙ Cu 10 acc. to Sama RC21-4-1966	-70	500	°C	100 K
	CU50	≙ Cu 50/Cu 100 acc. to GOST 6651 (α = 1.428)	-50	200	°C	100 K
	CU50	≙ Cu 53 acc. to GOST 6651 (α = 1.428)	-50	180	°C	100 K
	KTY81	≙ KTY81-110 (Philips)	-55	150	°C	20 K
	KTY84	≙ KTY84-130 (Philips)	-40	300	°C	20 K
Thermocouples TC Others can be selected in the software.	B	≙ acc. to IEC/EN 60584 (Pt30Rh-Pt6Rh)	500	1820	°C	50 K
	E	≙ acc. to IEC/EN 60584 (NiCr-CuNi)	-230	1000	°C	50 K
	J	≙ acc. to IEC/EN 60584 (Fe-CuNi)	-210	1200	°C	50 K
	K	≙ acc. to IEC/EN 60584 (NiCr-Ni)	-250	1372	°C	50 K
	N	≙ acc. to IEC/EN 60584 (NiCrSi-NiSi)	-250	1300	°C	50 K
	R	≙ acc. to IEC/EN 60584 (Pt13Rh-Pt)	-50	1768	°C	50 K
	S	≙ acc. to IEC/EN 60584 (Pt10Rh-Pt)	-50	1768	°C	50 K
	T	≙ acc. to IEC/EN 60584 (Cu-CuNi)	-200	400	°C	50 K
	L	≙ acc. to DIN 43760 (Fe-CuNi)	-200	900	°C	50 K
	U	≙ acc. to DIN 43760 (Cu-CuNi)	-200	600	°C	50 K
	CA	≙ C ASTM JE988 (2002)	0	2315	°C	50 K
	DA	≙ D ASTM JE988 (2002)	0	2315	°C	50 K
	A1G	≙ A-1 GOST 8.585-2001	0	2500	°C	50 K
	A2G	≙ A-2 GOST 8.585-2001	0	1800	°C	50 K
	A3G	≙ A-3 GOST 8.585-2001	0	1800	°C	50 K
	MG	≙ M GOST 8.585-2001	-200	100	°C	50 K
	LG	≙ L GOST 8.585-2001	-200	800	°C	50 K
Remote resistance-type sensors R (2-, 3-, 4-wire) Others can be selected in the software.	RES03	≙ Resistance 0...150 Ω	0	150	Ω	10% of the selected measuring range
	RES05	≙ Resistance 0...600 Ω	0	600	Ω	
	RES06	≙ Resistance 0...1200 Ω	0	1200	Ω	
	RES09	≙ Resistance 0...6250 Ω	0	6250	Ω	
	RES10	≙ Resistance 0...12,500 Ω	0	12500	Ω	
	RES12	≙ Resistance 0...50,000 Ω	0	50000	Ω	
Potentiometers 3-wire Others can be selected in the software.	POT03	≙ Potentiometer 0...150 Ω	0	100	%	10% of the selected measuring range
	POT05	≙ Potentiometer 0...600 Ω	0	100	%	
	POT06	≙ Potentiometer 0...1200 Ω	0	100	%	
	POT09	≙ Potentiometer 0...6250 Ω	0	100	%	
	POT10	≙ Potentiometer 0...12,500 Ω	0	100	%	
	POT12	≙ Potentiometer 0...50,000 Ω	0	100	%	
Voltage signals mV Others can be selected in the software.	V04	≙ Voltage (mV)	-1000	+1000	mV	10% of nominal span

Other setting options can be configured with the IFS-CONF software.

- Freely configurable user characteristic with 30 interpolation points
- Output behavior in the event of a short circuit, sensor break or overrange/underrange is freely configurable or can be set according to NE43 (standard configuration: NE43 upscale)
- Filter setting (standard configuration: 1)
- Restart after failsafe (standard configuration: ON)
- Switching behavior: Switching output (limit values, times, etc.) (standard configuration: OFF)

Temperature conversion guide for °C to °F:

$$T\,[°F] = \frac{9}{5}\,T\,[°C] + 32$$

Accessories, operating and display unit

N

Ex n

- Local display of actual values
- Copy function
- Easy guided operation
- Easy configuration without PC software
- Operating and display unit can be snapped directly onto compatible devices with a housing width of 35 mm
- DIN rail mounting possible for thinner devices in conjunction with cradle unit
- Backlighting
- Installation in Zone 2 permissible

Can be snapped directly onto compatible 35 mm devices

Technical data

General data		
Ambient temperature range		-20°C ... 65°C (-4°F ... 149°F)
Humidity		90% (at 25°C, no condensation)
Housing material		PA 6.6
Dimensions W / H / D		35 / 99 / 20 mm
Connection method	PC side	S port (female connector)
	Measuring transducer side	S port (male connector)
Conformance/approvals		
Conformance		CE-compliant
ATEX		Ⓔx II 3G Ex nA ic IIC T4 X
IECEx		Ex nA ic IIC T4 X

Ordering data

Description	Type	Order No.	Pcs. / Pkt.
Operating and display unit	**IFS-OP-UNIT**	**2811899**	1

Accessories, cradle unit

N

Ex n

- For snapping onto the DIN rail
- For control cabinet mounting of the operating and display unit

Cradle for operating and display unit

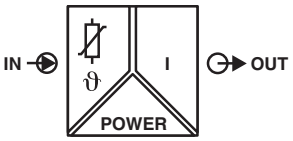
Technical data

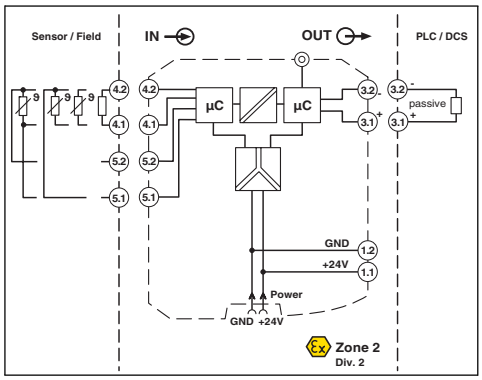
General data		
Ambient temperature range		-20°C ... 65°C (-4°F ... 149°F)
Humidity		90% (at 25°C, no condensation)
Housing material		PA 6.6
Dimensions W / H / D		35.2 / 29 / 99 mm
Connection method	IFS-OP-UNIT operator interface	S port (female connector)
	Measuring transducer side	S port (male connector)
Conformance/approvals		
Conformance		CE-compliant
ATEX		Ⓔx II 3G Ex nA ic IIC T4 X
IECEx		Ex nA ic IIC T4 X

Ordering data

Description	Type	Order No.	Pcs. / Pkt.
Cradle unit, for snapping the operating and display unit onto the DIN rail	**IFS-OP-CRADLE**	**2811886**	1

Temperature, temperature transducer





Ex n

For resistance thermometers and resistance-type sensors

Ex:
Applied for: UL listed / CUL listed
Housing width 12.5 mm

Programmable temperature transducer for operating resistance thermometers and resistance-type sensors. The measured values are converted into a linear 0 ... 20 mA or 4 ... 20 mA signal.

- Input for resistance thermometers and resistance-type sensors
- 0 ... 20 mA or 4 ... 20 mA output
- Configuration via software (FDT/DTM): Sensor type, connection method, measuring range, measuring unit, filter, alarm signal, and output range
- Programming during operation and also voltage-free using IFS-USB-PROG-ADAPTER programming adapter
- Status indicator for supply voltage, cable, sensor, and module errors
- 3-way electrical isolation
- Power supply via DIN rail connector possible
- Up to SIL 2 according to EN 61508
- Installation in Zone 2, protection type "n" (EN 60079-15) permitted

Notes:

To order a product with an order configuration, please enter the desired configuration by referring to the order key, see page 395

The IFS-CONF configuration software can be downloaded from the Internet (www.phoenixcontact.com).

Information about the supply and error evaluation module as well as about the DIN rail connectors and marking material can be found from page 402

Technical data

Input data	
Resistance thermometers	Pt, Ni, Cu sensors: 2-, 3-, 4-wire
Resistor	0 Ω ... 2000 Ω
Cable resistance	50 Ω per line
Sensor input current	(200 µA ... 1 mA)
Measuring range span	Min. 50 K
Output data	
Output signal	0 mA ... 20 mA / 4 mA ... 20 mA
Load	≤ 500 Ω
Behavior in the event of a sensor error	As per NE 43 or can be freely defined
Output ripple	< 50 μA_{PP}
General data	
Supply voltage range	19.2 V DC ... 30 V DC
Current consumption	< 40 mA (24 V DC)
Power dissipation	< 1 W
Temperature coefficient	0.01%/K
Step response (0–99%)	Typ. 800 ms (with SIL) Max. 1200 ms (with SIL) Typ. 700 ms (without SIL) Max. 1100 ms (without SIL)
Transmission error, total	0.05% x 100 [K] / measuring range span [K] + 0.05%
ZERO / SPAN adjustment	±5% / ±5%
Electrical isolation	
Input/output/power supply	2.5 kV (50 Hz, 1 min., test voltage) 300 V_{rms} (Rated insulation voltage, surge voltage category II, pollution degree 2, safe isolation as per EN 61010, EN 50178)
Ambient temperature range	-20°C ... 60°C (Any mounting position)
Humidity	5% ... 95% (no condensation)
Housing material	PA 66-FR
Inflammability class according to UL 94	V0
Dimensions W / H / D	12.5 / 99 / 114.5 mm
Screw connection solid / stranded / AWG	0.2 ... 2.5 mm² / 0.2 ... 2.5 mm² / 24 - 14
Spring-cage connection solid / stranded / AWG	0.2 ... 1.5 mm² / 0.2 ... 1.5 mm² / 24 - 16
Conformance/approvals	
Conformance	CE-compliant, additionally EN 61326
ATEX	Ex II 3G Ex nA ic IIC T4 X
Functional safety (SIL)	SIL 2 according to EN 61508

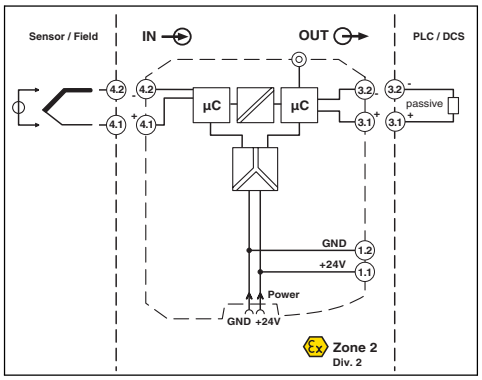
Ordering data

Description		Type	Order No.	Pcs. / Pkt.
Temperature transducer				
Order configuration	Screw connection	**MACX MCR-SL-RTD-I**	**2865065**	1
Order configuration	Spring-cage conn.	**MACX MCR-SL-RTD-I-SP**	**2924317**	1
Standard configuration	Screw connection	**MACX MCR-SL-RTD-I-NC**	**2865078**	1
Standard configuration	Spring-cage conn.	**MACX MCR-SL-RTD-I-SP-NC**	**2924320**	1

Accessories

Programming adapter with USB interface, for programming with the IFS-CONF software		**IFS-USB-PROG-ADAPTER**	**2811271**	1

Temperature, temperature transducer



Ex n

SIL IEC 61508

For thermocouples and mV sources

Ex:
Applied for: UL listed / CUL listed
Housing width 12.5 mm

Programmable temperature transducer for operating thermocouples and mV sources. The measured values are converted into a linear 0 ... 20 or 4 ... 20 mA signal.

- Input for thermocouples and mV sources
- 0 ... 20 mA or 4 ... 20 mA output
- Configuration via software (FDT/DTM): Sensor type, connection method, measuring range, measuring unit, filter, alarm signal, and output range
- Programming during operation and also voltage-free using IFS-USB-PROG-ADAPTER programming adapter
- Status indicator for supply voltage, cable, sensor, and module errors
- 3-way electrical isolation
- Power supply via DIN rail connector possible
- Up to SIL 2 according to EN 61508
- Installation in Zone 2, protection type "n" (EN 60079-15) permitted

Notes:
To order a product with an order configuration, enter the required configuration by referring to the adjacent order key.
The IFS-CONF configuration software can be downloaded from the Internet (www.phoenixcontact.com).
Information about the supply and error evaluation module as well as about the DIN rail connectors and marking material can be found from page 402

Technical data

Input data	
Thermocouple sensors	E, J, K, N as per IEC / EN 60584, L as per DIN 43760
Voltage	-20 mV ... 70 mV
Measuring range span	(Min. 50 K for thermocouples, 3 mV for mV sources)
Output data	
Output signal	0 mA ... 20 mA / 4 mA ... 20 mA
Load	Max. 500 Ω
Behavior in the event of a sensor error	As per NE 43 or can be freely defined
Output ripple	< 50 μA_{PP}
General data	
Supply voltage range	19.2 V DC ... 30 V DC
Current consumption	< 40 mA (24 V DC)
Power dissipation	< 1 W
Temperature coefficient	0.01%/K
Step response (0–99%)	Typ. 800 ms (with SIL) Max. 1200 ms (with SIL) Typ. 700 ms (without SIL) Max. 1100 ms (without SIL)
Transmission error, total	0.05% x 200 [K]/Measuring range span [K] + 0.05%
Cold junction errors	±1 K
ZERO / SPAN adjustment	±5% / ±5%
Electrical isolation	
Input/output/power supply	2.5 kV (50 Hz, 1 min., test voltage) 300 V_{rms} (Rated insulation voltage, surge voltage category II, pollution degree 2, safe isolation as per EN 61010, EN 50178)
Ambient temperature range	-20°C ... 60°C (Any mounting position)
Humidity	5% ... 95% (no condensation)
Housing material	PA 66-FR
Inflammability class according to UL 94	V0
Dimensions W / H / D	12.5 / 99 / 114.5 mm
Screw connection solid / stranded / AWG	0.2 ... 2.5 mm^2 / 0.2 ... 2.5 mm^2 / 24 - 14
Conformance/approvals	
Conformance	CE-compliant, additionally EN 61326
ATEX	II 3G Ex nA ic IIC T4 X
Functional safety (SIL)	SIL 2 according to EN 61508

Ordering data

Description		Type	Order No.	Pcs. / Pkt.
Temperature transducer				
Order configuration	Screw connection	**MACX MCR-SL-TC-I**	**2924333**	1
Standard configuration	Screw connection	**MACX MCR-SL-TC-I-NC**	**2924346**	1

Accessories

Programming adapter with USB interface, for programming with the IFS-CONF software	**IFS-USB-PROG-ADAPTER**	**2811271**	1

Order key and temperature ranges for temperature transducer MACX-MCR-SL-RTD-I(-SP)

Order key for temperature transducer MACX-MCR-SL-RTD-I(-SP) (standard configuration entered as an example)

Order No.	Sensor type	Safety Integrity Level (SIL)	Connection method	Measuring range: Start	Measuring range: End	Measuring unit	Output range	Filter Oversampling	Filter Moving average value
2865065 /	PT100 /	ON /	3 /	0 /	100 /	C /	OUT02 /	10 /	1 / ...
2865065 ≙ MACX MCR-SL-RTD-I 2924317 ≙ MACX MCR-SL-RTD-I-SP	see below	ON ≙ active NONE ≙ not active ON only with output range = OUT02	2 ≙ 2-wire 3 ≙ 3-wire 4 ≙ 4-wire	see below	see below	C ≙ °C F ≙ °F O ≙ Ω	OUT01 ≙ 0...20 mA OUT02 ≙ 4...20 mA	1 ≙ 1 value 3 ≙ 3 values 5 ≙ 5 values 7 ≙ 7 values 10 ≙ 10 values 20 ≙ 20 values	1 ≙ 1 value 2 ≙ 2 values 3 ≙ 3 values 4 ≙ 4 values

					Smallest measuring range
RES01	≙ resistance	0	2000	Ω	25 Ω
PT50	≙ Pt 50 according to IEC/EN 60751	-200	850	°C	50 K
PT100	≙ Pt 100 according to IEC/EN 60751	-200	850	°C	50 K
PT200	≙ Pt 200 according to IEC/EN 60751	-200	850	°C	50 K
PT500	≙ Pt 500 according to IEC/EN 60751	-200	850	°C	50 K
PT100S	≙ Pt 100 according to Sama RC21-4-1966	-200	600	°C	50 K
PT500S	≙ Pt 500 according to Sama RC21-4-1966	-200	600	°C	50 K
NI100DIN	≙ Ni 100 according to DIN 43760	-60	250	°C	50 K
NI500DIN	≙ Ni 500 according to DIN 43760	-60	250	°C	50 K
CU50	≙ Cu 50	-50	200	°C	50 K
CU53	≙ Cu 53	-50	180	°C	50 K

... /	Alarm signal Short circuit/ Overrange	Alarm signal Sensor break/ Underrange	Factory calibration certificate = FCC
	I035 /	I215 /	NONE
	I000 ≙ 0 mA I035 ≙ 3.5 mA I215 ≙ 21.5 mA	I000 ≙ 0 mA I035 ≙ 3.5 mA I215 ≙ 21.5 mA	NONE ≙ without FCC YES ≙ with FCC (a fee is charged) YESPLUS ≙ factory calibration certificate with 5 measuring points (a fee is charged)

I035 only with output range = OUT02

Alarm signals can also be configured individually using software.

Temperature conversion guide for°C to°F:

$$T\,[°F] = \frac{9}{5}\,T\,[°C] + 32$$

Order key and temperature ranges for temperature transducer MACX-MCR-SL-TC-I

Order key for temperature transducer MACX-MCR-SL-TC-I (standard configuration entered as an example)

Order No.	Sensor type	Safety Integrity Level (SIL)	Cold junction compensation	Measuring range: Start	Measuring range: End	Measuring unit	Output range	Filter Oversampling	Filter Moving average value
2924333 /	J /	ON /	1 /	0 /	1000 /	C /	OUT02 /	10 /	1 / ...
MACX MCR-SL-TC-I	see below	ON ≙ active NONE ≙ not active ON only with output range = OUT02	1 ≙ switched on 0 ≙ switched off (e.g., for mV voltage measurement)	see below	see below	C ≙ °C F ≙ °F V ≙ mV	OUT01 ≙ 0...20 mA OUT02 ≙ 4...20 mA	1 ≙ 1 value 3 ≙ 3 values 5 ≙ 5 values 7 ≙ 7 values 10 ≙ 10 values 20 ≙ 20 values	1 ≙ 1 value 2 ≙ 2 values 3 ≙ 3 values 4 ≙ 4 values

					Smallest measuring range
V03	≙ Voltage (mV)	-20	+70	mV	3 mV
E	≙ according to IEC/EN 60584 (NiCr-CuNi)	-250	1000	°C	50 K
J	≙ according to IEC/EN 60584 (Fe-CuNi)	-210	1200	°C	50 K
K	≙ according to IEC/EN 60584 (NiCr-Ni)	-250	1372	°C	50 K
N	≙ according to IEC/EN 60584 (NiCrSi-NiSi)	-250	1300	°C	50 K
L	≙ according to DIN 43760 (Fe-CuNi)	-200	900	°C	50 K

... /	Alarm signal Overrange	Alarm signal Sensor break/ Underrange	Factory calibration certificate = FCC
	I035 /	I215 /	NONE
	I000 ≙ 0 mA I035 ≙ 3.5 mA I215 ≙ 21.5 mA	I000 ≙ 0 mA I035 ≙ 3.5 mA I215 ≙ 21.5 mA	NONE ≙ without FCC YES ≙ with FCC (a fee is charged) YESPLUS ≙ factory calibration certificate with 5 measuring points (a fee is charged)

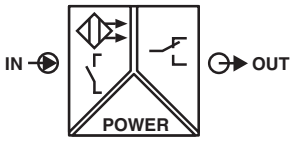
I035 only with output range = OUT02

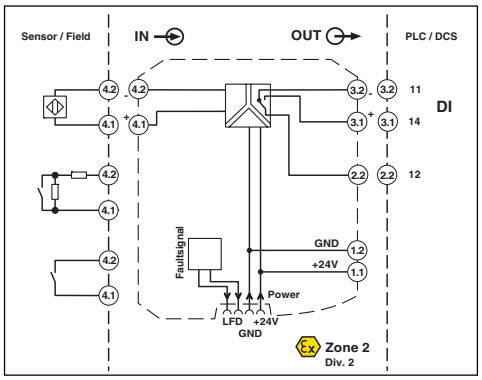
Alarm signals can also be configured individually using software.

Temperature conversion guide for°C to°F:

$$T\,[°F] = \frac{9}{5}\,T\,[°C] + 32$$

Digital IN
NAMUR isolation amplifiers





Signal output: PDT relay

Ex: Ex
Applied for: UL listed / CUL listed
Housing width 12.5 mm

NAMUR isolation amplifier for operating proximity sensors and mechanical contacts

- Input for NAMUR proximity sensors (EN 60947-5-6), floating contacts or contacts with resistance circuit
- Relay signal output (PDT)
- Reversible direction of action (operating current or closed-circuit current behavior)
- Line fault detection (LFD), can be activated/deactivated, error message signaled by red flashing LED with de-excitation of output relay
- Power supply and error indication possible via the DIN rail connector
- LED displays for indicating supply voltage, circuit state, and malfunctions to NAMUR NE 44
- 3-way electrical isolation
- Up to SIL 2 according to EN 61508
- Installation in Zone 2, protection type "n" (EN 60079-15) permitted

Notes:

Information about the supply and error evaluation module as well as about the DIN rail connectors and marking material can be found from page 402

Information about resistance circuits is provided on page 461

Technical data

Input data	
Input signal	NAMUR proximity sensors (EN 60947-5-6) Floating switch contacts Switch contacts with resistance circuit
No-load voltage	8 V DC ±10%
Switching points	> 2.1 mA (conductive) / < 1.2 mA (blocking)
Switching hysteresis	< 0.2 mA
Line error detection	Break 0.05 mA < I_{IN} < 0.35 mA Short circuit 100 Ω < R_{Sensor} < 360 Ω
Switching output	**Relay output**
Contact type	1 PDT
Contact material	$AgSnO_2$, hard gold-plated
Max. switching voltage	250 V AC (2 A) / 120 V DC (0.2 A) / 30 V DC (2 A)
Max. switching capacity	500 VA
Recommended minimum load	5 V / 10 mA
Mechanical service life	10^7 cycles
Switching behavior	Can be inverted via slide switch
Max. switching frequency	20 Hz (without load)
General data	
Supply voltage range	19.2 V DC ... 30 V DC
Current consumption	21 mA (24 V DC)
Power dissipation	< 650 mW
Electrical isolation	
Input/supply, T-connector	1.5 kV (50 Hz, 1 min., test voltage) 300 V_{rms} (Rated insulation voltage, surge voltage category II, pollution degree 2, basic insulation as EN 61010, EN 50178)
Output/input, supply, T-connector	2.5 kV (50 Hz, 1 min., test voltage) 300 V_{rms} (Rated insulation voltage, surge voltage category III, pollution degree 2, safe isolation as per EN 61010, EN 50178)
Ambient temperature range	-20°C ... 60°C (Any mounting position)
Humidity	10% ... 95% (no condensation)
Housing material	PA 66-FR
Inflammability class according to UL 94	V0
Dimensions W / H / D	12.5 / 99 / 114.5 mm
Screw connection solid / stranded / AWG	0.2 ... 2.5 mm^2 / 0.2 ... 2.5 mm^2 / 24 - 14
Spring-cage connection solid / stranded / AWG	0.2 ... 1.5 mm^2 / 0.2 ... 1.5 mm^2 / 24 - 16
Conformance/approvals	
Conformance	CE-compliant, additionally EN 61326
ATEX	Ex II 3 G Ex nAC IIC T4 X
Functional safety (SIL)	SIL 2 according to EN 61508

Ordering data

Description	Type	Order No.	Pcs. / Pkt.
NAMUR isolation amplifier			
Screw connection	**MACX MCR-SL-NAM-R**	**2865997**	1
Spring-cage conn.	**MACX MCR-SL-NAM-R-SP**	**2924252**	1

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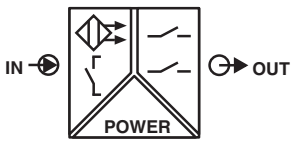
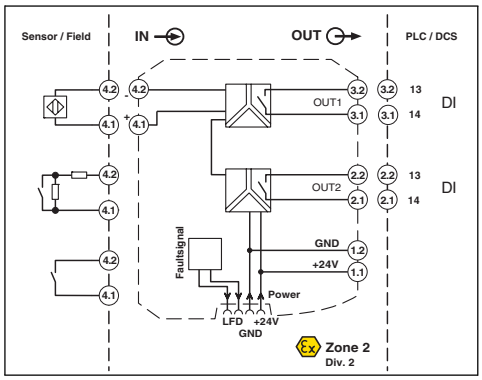
NAMUR isolation amplifiers





2 signal outputs: N/O contact relay

Ex: Ex
Applied for: UL listed / CUL listed
Housing width 12.5 mm

NAMUR isolation amplifier for operating proximity sensors and mechanical contacts

- Input for NAMUR proximity sensors (EN 60947-5-6), floating contacts or contacts with resistance circuit
- Two relay signal outputs (N/O contact); output 2 can be used as an error message output
- Reversible direction of action (operating current or closed-circuit current behavior)
- Line fault detection (LFD), can be activated/deactivated, error message signaled by red flashing LED with de-excitation of output relay
- Power supply and error indication possible via the DIN rail connector
- LED displays for indicating supply voltage, circuit state, and malfunctions to NAMUR NE 44
- 4-way electrical isolation
- Up to SIL 2 according to EN 61508
- Installation in Zone 2, protection type "n" (EN 60079-15) permitted

Notes:

Information about the supply and error evaluation module as well as about the DIN rail connectors and marking material can be found from page 402

Information about resistance circuits is provided on page 461

Technical data

Input data	
Input signal	NAMUR proximity sensors (EN 60947-5-6) Floating switch contacts Switch contacts with resistance circuit
No-load voltage	8 V DC ±10%
Switching points	> 2.1 mA (conductive) / < 1.2 mA (blocking)
Switching hysteresis	< 0.2 mA
Line error detection	Break 0.05 mA < I_{IN} < 0.35 mA Short circuit 100 Ω < R_{Sensor} < 360 Ω
Switching output	**Relay output**
Contact type	2 N/O contacts
Contact material	$AgSnO_2$, hard gold-plated
Max. switching voltage	250 V AC (2 A) / 120 V DC (0.2 A) / 30 V DC (2 A)
Max. switching capacity	500 VA
Recommended minimum load	5 V / 10 mA
Mechanical service life	10^7 cycles
Switching behavior	Can be inverted via slide switch
Max. switching frequency	20 Hz (without load)
General data	
Supply voltage range	19.2 V DC ... 30 V DC
Current consumption	30 mA (24 V DC)
Power dissipation	< 950 mW
Electrical isolation	
Input/supply, T-connector	1.5 kV (50 Hz, 1 min., test voltage) 300 V_{rms} (Rated insulation voltage, surge voltage category II, pollution degree 2, basic insulation as per EN 61010, EN 50178)
Output 1/output 2/input, power supply, T-connector	2.5 kV (50 Hz, 1 min., test voltage) 300 V_{rms} (Rated insulation voltage, surge voltage category III, pollution degree 2, safe isolation as per EN 61010, EN 50178)
Ambient temperature range	-20°C ... 60°C (Any mounting position)
Humidity	10% ... 95% (no condensation)
Housing material	PA 66-FR
Inflammability class according to UL 94	V0
Dimensions W / H / D	12.5 / 99 / 114.5 mm
Screw connection solid / stranded / AWG	0.2 ... 2.5 mm^2 / 0.2 ... 2.5 mm^2 / 24 - 14
Spring-cage connection solid / stranded / AWG	0.2 ... 1.5 mm^2 / 0.2 ... 1.5 mm^2 / 24 - 16
Conformance/approvals	
Conformance	CE-compliant, additionally EN 61326
ATEX	Ex II 3 G Ex nAC IIC T4 X
Functional safety (SIL)	SIL 2 according to EN 61508

Ordering data

Description	Type	Order No.	Pcs. / Pkt.
NAMUR isolation amplifier			
Screw connection	**MACX MCR-SL-NAM-2RO**	**2865010**	1
Spring-cage conn.	**MACX MCR-SL-NAM-2RO-SP**	**2924265**	1

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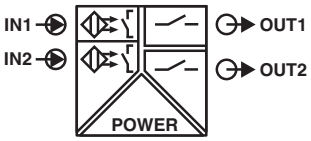
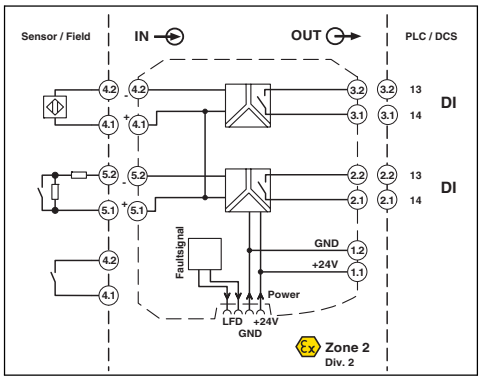
NAMUR isolation amplifiers





2-channel, signal output: N/O contact relay

Ex:
Applied for: UL listed / CUL listed
Housing width 12.5 mm

NAMUR isolating amplifier for intrinsically safe operation of proximity sensors and mechanical contacts installed in Ex areas.

- 2-channel
- Input for NAMUR proximity sensors (EN 60947-5-6), floating contacts or contacts with resistance circuit
- Relay signal output (N/O contact)
- Reversible direction of action (operating current or closed-circuit current behavior)
- Line fault detection (LFD), can be activated/deactivated, error message signaled by red flashing LED with de-excitation of output relay
- Power supply and error indication possible via the DIN rail connector
- LED displays for indicating supply voltage, circuit state, and malfunctions to NAMUR NE 44
- 3-way electrical isolation
- Up to SIL 2 according to EN 61508
- Installation in Zone 2, protection type "n" (EN 60079-15) permitted

Notes:

Information about the supply and error evaluation module as well as about the DIN rail connectors and marking material can be found from page 402

Information about resistance circuits is provided on page 461

Technical data

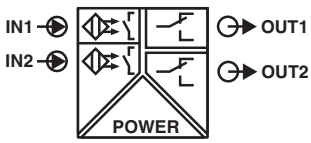
Input data	
Input signal	NAMUR proximity sensors (EN 60947-5-6) Floating switch contacts Switch contacts with resistance circuit
No-load voltage	8 V DC ±10%
Switching points	> 2.1 mA (conductive) / < 1.2 mA (blocking)
Switching hysteresis	< 0.2 mA
Line error detection	Break 0.05 mA < I_{IN} < 0.35 mA Short circuit 100 Ω < R_{Sensor} < 360 Ω
Switching output	**Relay output**
Contact type	2 N/O contacts
Contact material	$AgSnO_2$, hard gold-plated
Max. switching voltage	250 V AC (2 A) / 120 V DC (0.2 A) / 30 V DC (2 A)
Max. switching capacity	500 VA
Recommended minimum load	5 V / 10 mA
Mechanical service life	10^7 cycles
Switching behavior	Can be inverted via slide switch
Max. switching frequency	20 Hz (without load)
General data	
Supply voltage range	19.2 V DC ... 30 V DC
Current consumption	35 mA (24 V DC)
Power dissipation	< 1 W
Electrical isolation	
Input/supply, T-connector	1.5 kV (50 Hz, 1 min., test voltage) 300 V_{rms} (Rated insulation voltage, surge voltage category II, pollution degree 2, basic insulation as per EN 61010, EN 50178)
Output 1/output 2/input, power supply, T-connector	2.5 kV (50 Hz, 1 min., test voltage) 300 V_{rms} (Rated insulation voltage, surge voltage category III, pollution degree 2, safe isolation as per EN 61010, EN 50178)
Ambient temperature range	-20°C ... 60°C (Any mounting position)
Humidity	5% ... 95% (no condensation)
Housing material	PA 66-FR
Inflammability class according to UL 94	V0
Dimensions W / H / D	12.5 / 99 / 114.5 mm
Screw connection solid / stranded / AWG	0.2 ... 2.5 mm^2 / 0.2 ... 2.5 mm^2 / 24 - 14
Spring-cage connection solid / stranded / AWG	0.2 ... 1.5 mm^2 / 0.2 ... 1.5 mm^2 / 24 - 16
Conformance/approvals	
Conformance	CE-compliant, additionally EN 61326
ATEX	II 3 G Ex nAC IIC T4 X
Functional safety (SIL)	SIL 2 according to EN 61508

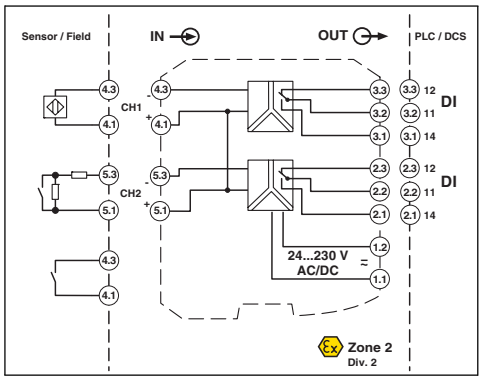
Ordering data

Description	Type	Order No.	Pcs. / Pkt.
NAMUR isolation amplifier			
Screw connection	**MACX MCR-SL-2NAM-RO**	**2865049**	1
Spring-cage conn.	**MACX MCR-SL-2NAM-RO-SP**	**2924294**	1

N

Digital IN
NAMUR isolation amplifiers





Ex n

SIL
IEC 61508

2-channel, signal output: PDT relay, wide-range power supply

NAMUR isolation amplifier for operating proximity sensors and mechanical contacts

- 2-channel
- Input for NAMUR proximity sensors (EN 60947-5-6), floating contacts or contacts with resistance circuit
- Relay signal output (PDT)
- Reversible direction of action (operating current or closed-circuit current behavior)
- Line fault detection (LFD), can be activated/deactivated, error message signaled by red flashing LED with de-excitation of output relay
- Wide-range power supply: 19.2 ... 253 V AC/DC
- LED displays for indicating supply voltage, circuit state, and malfunctions to NAMUR NE 44
- 3-way electrical isolation
- Up to SIL 2 according to EN 61508
- Installation in Zone 2, protection type "n" (EN 60079-15) permitted

Notes:

Information about resistance circuits is provided on page 461

Housing width 17.5 mm

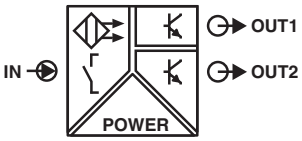
Technical data

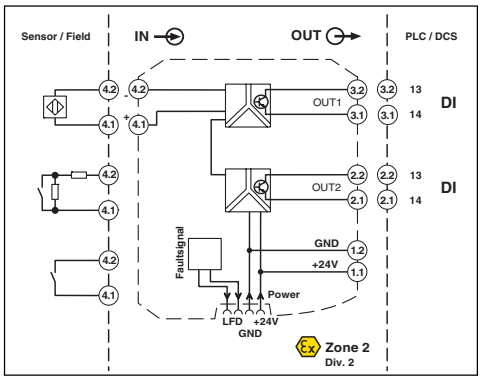
Input data	
Input signal	NAMUR proximity sensors (EN 60947-5-6) Switch contacts with open circuit Switch contacts with resistance circuit
No-load voltage	8 V DC ±10%
Switching points	> 2.1 mA (conductive) / < 1.2 mA (blocking)
Switching hysteresis	Approx. 0.2 mA
Line error detection	Break 0.05 mA < I_{IN} < 0.35 mA Short circuit 100 Ω < R_{Sensor} < 360 Ω
Switching output	**Relay output**
Contact type	2 PDT
Contact material	$AgSnO_2$, hard gold-plated
Max. switching voltage	250 V AC (2 A, 60 Hz) / 120 V DC (0.2 A) / 30 V DC (2 A)
Max. switching capacity	500 VA
Recommended minimum load	5 V / 10 mA
Mechanical service life	10^7 cycles
Switching behavior	can be inverted using DIP switch
Max. switching frequency	20 Hz (Load-dependent)
General data	
Supply voltage range	24 V DC ... 230 V AC/DC (-20% ... +10%, 50 ... 60 Hz)
Current consumption	< 80 mA; < 42 mA (24 V DC)
Power dissipation	Max. 1.3 W
Electrical isolation	
Input/supply, T-connector	300 V_{rms} (Rated insulation voltage, surge voltage category II, pollution degree 2, safe isolation as per EN 61010, EN 50178) 2.5 kV AC (50 Hz, 1 min., test voltage)
Output 1/output 2/input, power supply, T-connector	300 V_{rms} (Rated insulation voltage, surge voltage category III, pollution degree 2, safe isolation as per EN 61010, EN 50178) 2.5 kV (50 Hz, 1 min., test voltage)
Ambient temperature range	-20°C ... 60°C
Humidity	10% ... 95% (no condensation)
Housing material	PA 66-FR
Inflammability class according to UL 94	V0
Dimensions W / H / D	17.5 / 99 / 114.5 mm
Screw connection solid / stranded / AWG	0.2 ... 2.5 mm^2 / 0.2 ... 2.5 mm^2 / 24 - 14
Spring-cage connection solid / stranded / AWG	0.2 ... 1.5 mm^2 / 0.2 ... 1.5 mm^2 / 24 - 16
Conformance/approvals	
Conformance	CE-compliant, additionally EN 61326
ATEX	Ex II 3 G Ex nAC IIC T4 X
Functional safety (SIL)	SIL 2 according to EN 61508

Ordering data

Description		Type	Order No.	Pcs. / Pkt.
NAMUR isolation amplifier				
	Screw connection	**MACX MCR-SL-2NAM-R-UP**	**2865052**	1
Spring-cage connection	Spring-cage conn.	**MACX MCR-SL-2NAM-R-UP-SP**	**2924304**	1

Digital IN
NAMUR isolation amplifiers





Ex n

SIL IEC 61508

2 signal outputs: transistor (passive)

NAMUR isolation amplifier for operating proximity sensors and mechanical contacts

- Input for NAMUR proximity sensors (EN 60947-5-6), floating contacts or contacts with resistance circuit
- 2 signal outputs: transistor (passive); up to 5 kHz
- Signal output 2 can also be used as a fault signaling output
- Reversible direction of action (operating current or closed-circuit current behavior)
- Line fault detection (LFD), can be activated/deactivated, error message signaled by red flashing LED with inhibiting of transistor output
- Power supply and error indication possible via the DIN rail connector
- LED displays for indicating supply voltage, circuit state, and malfunctions to NAMUR NE 44
- 4-way electrical isolation
- Up to SIL 2 according to EN 61508
- Installation in Zone 2, protection type "n" (EN 60079-15) permitted

Notes:

Information about the supply and error evaluation module as well as about the DIN rail connectors and marking material can be found from page 402

Information about resistance circuits is provided on page 461

Ex: Ex
Applied for: UL listed / CUL listed
Housing width 12.5 mm

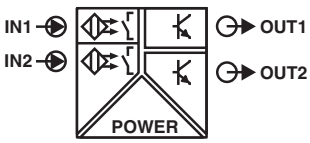
Technical data

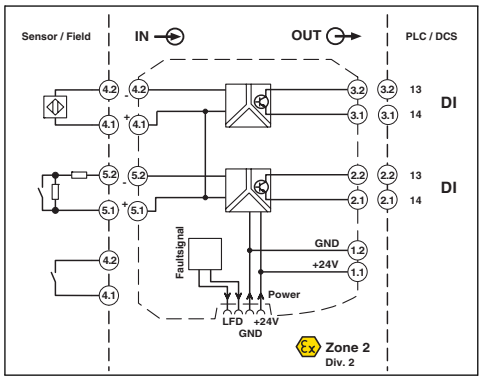
Input data	
Input signal	NAMUR proximity sensors (EN 60947-5-6) Floating switch contacts Switch contacts with resistance circuit
No-load voltage	8 V DC ±10%
Switching points	> 2.1 mA (conductive) / < 1.2 mA (blocking)
Line error detection	Break 0.05 mA < I_{IN} < 0.35 mA Short circuit 100 Ω < R_{Sensor} < 360 Ω
Switching output	2 transistor outputs, passive
Max. switching voltage	30 V DC (per output)
Max. switching current	50 mA (short-circuit-proof)
Drop (ΔU)	< 1.4 V
Switching behavior	can be inverted using DIP switch
Max. switching frequency	5 kHz
General data	
Supply voltage range	19.2 V DC ... 30 V DC
Current consumption	< 28 mA (24 V DC)
Power dissipation	800 mW
Electrical isolation	
Input/output, supply, T-connector	2.5 kV (50 Hz, 1 min., test voltage) 300 V_{rms} (Rated insulation voltage, surge voltage category II, pollution degree 2, safe isolation as per EN 61010, EN 50178)
Output/supply, T-connector	1.5 kV (50 Hz, 1 min., test voltage) 300 V_{rms} (Rated insulation voltage, surge voltage category II, pollution degree 2, safe isolation as per EN 61010, EN 50178)
Output 1/output 2	1 kV (50 Hz, 1 min., test voltage) 50 V_{rms} (Rated insulation voltage, surge voltage category II, pollution degree 2, safe isolation as per EN 61010, EN 50178)
Ambient temperature range	-20°C ... 60°C (Any mounting position)
Humidity	10% ... 95% (no condensation)
Housing material	PA 66-FR
Inflammability class according to UL 94	V0
Dimensions W / H / D	12.5 / 99 / 114.5 mm
Screw connection solid / stranded / AWG	0.2 ... 2.5 mm^2 / 0.2 ... 2.5 mm^2 / 24 - 14
Spring-cage connection solid / stranded / AWG	0.2 ... 1.5 mm^2 / 0.2 ... 1.5 mm^2 / 24 - 16
Conformance/approvals	
Conformance	CE-compliant, additionally EN 61326
ATEX	Ex II 3 G Ex nA II T4 X
Functional safety (SIL)	SIL 2 according to EN 61508

Ordering data

Description	Type	Order No.	Pcs. / Pkt.
NAMUR isolation amplifier			
Screw connection	**MACX MCR-SL-NAM-2T**	**2865023**	1
Spring-cage conn.	**MACX MCR-SL-NAM-2T-SP**	**2924278**	1

Digital IN
NAMUR isolation amplifiers





Ex n

2-channel, signal output transistor (passive)

Ex:
Applied for: UL listed / CUL listed
Housing width 12.5 mm

NAMUR isolation amplifier for operating proximity sensors and mechanical contacts

- 2-channel
- Input for NAMUR proximity sensors (EN 60947-5-6), floating contacts or contacts with resistance circuit
- Signal output transistor (passive); up to 5 kHz
- Reversible direction of action (operating current or closed-circuit current behavior)
- Line fault detection (LFD), can be activated/deactivated, error message signaled by red flashing LED with inhibiting of transistor output
- Power supply and error indication possible via the DIN rail connector
- LED displays for indicating supply voltage, circuit state, and malfunctions to NAMUR NE 44
- 3-way electrical isolation
- Up to SIL 2 according to EN 61508
- Installation in Zone 2, protection type "n" (EN 60079-15) permitted

Notes:

Information about the supply and error evaluation module as well as about the DIN rail connectors and marking material can be found from page 402

Information about resistance circuits is provided on page 461

Technical data

Input data	
Input signal	NAMUR proximity sensors (EN 60947-5-6) Floating switch contacts Switch contacts with resistance circuit
No-load voltage	8 V DC ±10%
Switching points	> 2.1 mA (conductive) / < 1.2 mA (blocking)
Line error detection	Break 0.05 mA < I_{IN} < 0.35 mA Short circuit 100 Ω < R_{Sensor} < 360 Ω
Switching output	Transistor output, passive
Max. switching voltage	30 V DC (per output)
Max. switching current	50 mA (short-circuit-proof)
Drop (ΔU)	< 1.4 V
Switching behavior	can be inverted using DIP switch
Max. switching frequency	5 kHz
General data	
Supply voltage range	19.2 V DC ... 30 V DC
Current consumption	< 34 mA (24 V DC)
Power dissipation	1000 mW
Electrical isolation	
Input/output, supply, T-connector	2.5 kV (50 Hz, 1 min., test voltage) 300 V_{rms} (Rated insulation voltage, surge voltage category II, pollution degree 2, safe isolation as per EN 61010, EN 50178)
Output/supply, T-connector	1.5 kV (50 Hz, 1 min., test voltage) 300 V_{rms} (Rated insulation voltage, surge voltage category II, pollution degree 2, safe isolation as per EN 61010, EN 50178)
Output 1/output 2	1 kV (50 Hz, 1 min., test voltage) 50 V_{rms} (Rated insulation voltage, surge voltage category II, pollution degree 2, safe isolation as per EN 61010, EN 50178)
Ambient temperature range	-20°C ... 60°C (Any mounting position)
Humidity	10% ... 95% (no condensation)
Housing material	PA 66-FR
Inflammability class according to UL 94	V0
Dimensions W / H / D	12.5 / 99 / 114.5 mm
Screw connection solid / stranded / AWG	0.2 ... 2.5 mm^2 / 0.2 ... 2.5 mm^2 / 24 - 14
Spring-cage connection solid / stranded / AWG	0.2 ... 1.5 mm^2 / 0.2 ... 1.5 mm^2 / 24 - 16
Conformance/approvals	
Conformance	CE-compliant, additionally EN 61326
ATEX	Ex II 3 G Ex nA II T4 X
Functional safety (SIL)	SIL 2 according to EN 61508

Ordering data

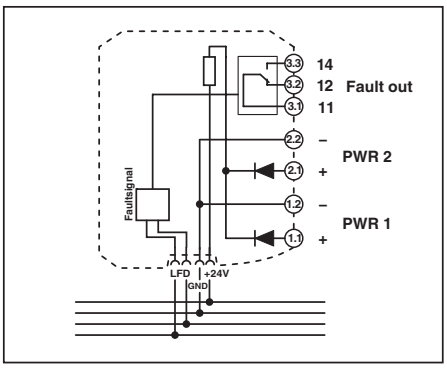
Description	Type	Order No.	Pcs. / Pkt.
NAMUR isolation amplifier			
Screw connection	**MACX MCR-SL-2NAM-T**	**2865036**	1
Spring-cage conn.	**MACX MCR-SL-2NAM-T-SP**	**2924281**	1

Accessories

Power and error message module

Power and fault signaling module for feeding the 24 V supply voltage to the DIN rail connectors and signaling line faults and power supply failures.

- One-time or redundant supply, decoupled from diode, protected against polarization
- Supply current up to 3.75 A
- Relay output (PDT) and flashing LED for error messages
- Error message in the event of a power supply failure or fuse fault
- Bus cable fault message for MACX MCR-...(2)NAM... devices connected via DIN rail connectors
- Replaceable fuse
- Installation in Zone 2 permissible



Ex: // Applied for: UL-EX LIS / CUL-EX LIS
Housing width 17.5 mm

Technical data

Input data	
Input signal	19.2 V DC ... 30 V DC
Redundant supply	yes, decoupled from diodes
Polarization and surge protection	Yes
Output data	
Maximum output signal	3.75 A
Output voltage	(Input voltage - max 0.8 V at 3.75 A)
Switching output	Relay
Contact type	1 PDT
Contact material	Gold (Au)
Max. switching voltage	50 V AC (2 A)
General data	
Current consumption	
Ambient temperature range	-20°C ... 60°C (Any mounting position)
Humidity	5% ... 95% (no condensation)
Fuse	5 A (replaceable), slow-blow 250 V AC
Status indication	1 x red LED (error) 2 x green LEDs (PWR1 and PWR2)
Housing material	Polyamide (PA 6.6)
Inflammability class according to UL 94	V0
Dimensions W / H / D	17.5 / 99 / 114.5 mm
Screw connection solid / stranded / AWG	0.2 ... 2.5 mm² / 0.2 ... 2.5 mm² / 24 - 14
Spring-cage connection solid / stranded / AWG	0.2 ... 1.5 mm² / 0.2 ... 1.5 mm² / 24 - 16
Conformance/approvals	
Conformance	CE-compliant
ATEX	II 3 G Ex nAC IIC T4 X
IECEx	Ex nAC IIC T4 X
UL, USA/Canada	UL 61010

Ordering data

Description	Type	Order No.	Pcs. / Pkt.
Supply and error message module, including the relevant DIN rail connector ME 17,5 TBUS 1,5/5-ST-3,81 GN			
Screw connection	**MACX MCR-PTB**	**2865625**	1
Spring-cage conn.	**MACX MCR-PTB-SP**	**2924184**	1

Accessories

ME 6,2 TBUS... T-connector

DIN rail connector (5-pole) for bridging the supply voltage of 12.5 mm wide MACX Analog modules

– Reduces wiring costs
– System can be extended or module replaced even while process is active
– Inter-extendable

Description	Ordering data		
	Type	Order No.	Pcs. / Pkt.
DIN rail connector (TBUS), for bridging the supply voltage, can be snapped onto 35 mm DIN rails as per EN 60715, with UL approval			
	ME 6,2 TBUS-2 1,5/5-ST-3,81 GN	**2869728**	10

Accessories

Marking material for device marking

– For device marking inside the control cabinet and in the field
– Self-adhesive with high adhesive strengths
– Large temperature range

Description	Color	Ordering data		
		Type	Order No.	Pcs. / Pkt.
UniCard, with self-adhesive plastic labels, can be labeled with BLUEMARK and CMS-P1-PLOTTER				
10-part, lettering field size: 11 x 9 mm	white	**UC-EMLP (11X9)**	**0819291**	10
UniCard, with self-adhesive plastic labels, **labeled according to customer specifications** For ordering details, see CLIPLINE catalog part 2 or www.phoenixcontact.net/catalog.				
10-part, lettering field size: 11 x 9 mm	white	**UC-EMLP (11X9) CUS**	**0824547**	1

Modular converters for MCR technology

Analog IN/Analog OUT
– Configurable signal multipliers to double standard analog signals
– Configurable loop-powered isolators and standard passive isolators

Temperature
– Programmable temperature transducers
– Configurable temperature transducers for Pt 100
– Temperature relays for Pt 100
– Programmable loop-powered temperature transducers

Frequency
– Programmable frequency transducers for frequencies of up to 120 kHz

Threshold value switch
– Threshold value switches for standard analog signals

Digital displays
– Programmable digital displays for standard signals
– Setpoint adjusters

Features

Operational reliability
Electrical isolation increases the operational reliability when faced with disturbances in your system.

Connection method
Convenient wiring thanks to plug-in connection method.

Configuration
You can either order the modules pre-configured or you can easily carry out the configuration process yourself using DIP switches.
Highly functional devices, such as temperature transducers, can be parameterized using software if required.

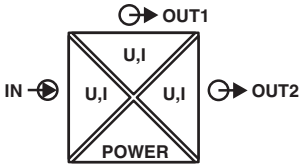
Analog IN/Analog OUT

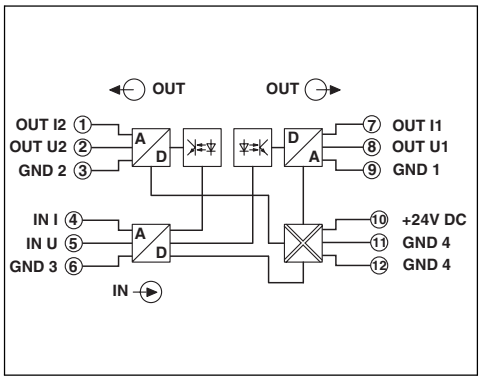
Temperature

Frequency

Digital displays

Analog IN / Analog OUT, signal multiplier





With freely configurable input and two outputs

Ex:

Housing width 17.5 mm

- 4-way isolation
- Calibrated reversible input and output signals

Notes:

To order a product with an order configuration, enter the required configuration by referring to the adjacent order key.

Technical data

Input data	U input	I input
Input signal	0 V ... 12 V (freely selectable in 0.1 V steps)	0 mA ... 24 mA (freely selectable in 0.1 mA steps)
Measuring range span	Min. 4 V	Min. 8 mA
Maximum input signal	30 V	50 mA
Input resistance	200 kΩ	50 Ω
Output data	U output	I output
Output signal (configurable using the DIP switch)	See order key	See order key
Maximum output signal	15 V	35 mA
Load R_B	≥ 10 kΩ	≤ 600 Ω
General data		
Supply voltage U_B	20 V DC ... 30 V DC	
Current consumption	< 25 mA	
Maximum transmission error	≤ 0.15% (of final value), typ. 0.05% (of final value)	
Temperature coefficient	< 0.015%/K, typ. 0.0075%/K	
Test voltage, input/output/supply	1.5 kV (50 Hz, 1 min.)	
Degree of protection	IP20	
Ambient temperature (operation)	-25°C ... 55°C	
Housing material	Polyamide PA non-reinforced	
Dimensions W / H / D	17.5 / 99 / 114.5 mm	
Screw connection solid / stranded / AWG	0.2 ... 2.5 mm^2 / 0.2 ... 2.5 mm^2 / 24 - 14	
Conformance/approvals		
Conformance	CE-compliant	
UL, USA/Canada	Class I, Div. 2, Groups A, B, C, D or non-hazardous locations	

Ordering data

Description	Type	Order No.	Pcs. / Pkt.
MCR signal multiplier, for multiplying and electrical isolation of analog signals			
Order configuration	**MCR-FL-C-UI-2UI-DCI**	**2814854**	1
Standard configuration	**MCR-FL-C-UI-2UI-DCI-NC**	**2814867**	1

Order key MCR-FL-C-UI-2UI-DCI (Standard configuration entered as example)

Order No.	Input signal	Input signal range (standard and special signals) Initial value	Final value	Output signal (standard signals) Output 1	Output 2	Factory calibration certificate FCC
2814854	I	0.0	20.0	OUT01	OUT01	NONE
	I ≙ Current U ≙ Voltage	0.0 ≙ 0.0 mA I : Freely selectable between 0.0...24.0 mA U : Freely selectable between 0.0...12.0 mA	20.0 ≙ 20.0 mA I : Freely selectable between 0.0...24.0 mA U : Freely selectable between 0.0...12.0 mA	OUT01 ≙ 0...20 mA OUT02 ≙ 4...20 mA OUT03 ≙ 0...10 V OUT04 ≙ 2...10 V OUT05 ≙ 0...5 V OUT06 ≙ 1...5 V OUT16 ≙ 0...10 mA	OUT01 ≙ 0...20 mA OUT02 ≙ 4...20 mA OUT03 ≙ 0...10 V OUT04 ≙ 2...10 V OUT05 ≙ 0...5 V OUT06 ≙ 1...5 V OUT16 ≙ 0...10 mA	NONE ≙ without FCC YES ≙ with FCC (a fee is charged) YESPLUS ≙ FCC with 5 measuring points (a fee is charged)

Measuring range span min. 8.0 mA/4.0 V
Increment 0.1 mA /0.1 V

Ordering examples:

		Input signal range (standard and special signals) Initial value	Final value	Output signal (standard signals) Output 1	Output 2	Factory calibration certificate FCC
2814854	I	5.3	13.3	OUT01	OUT01	NONE
	I ≙ Current	I ≙ 5.3 mA	I ≙ 13.3 mA	OUT01 ≙ 0...20 mA	OUT01 ≙ 0...20 mA	NONE ≙ without FCC

Measuring range span 8.0 mA, i.e., order is possible.

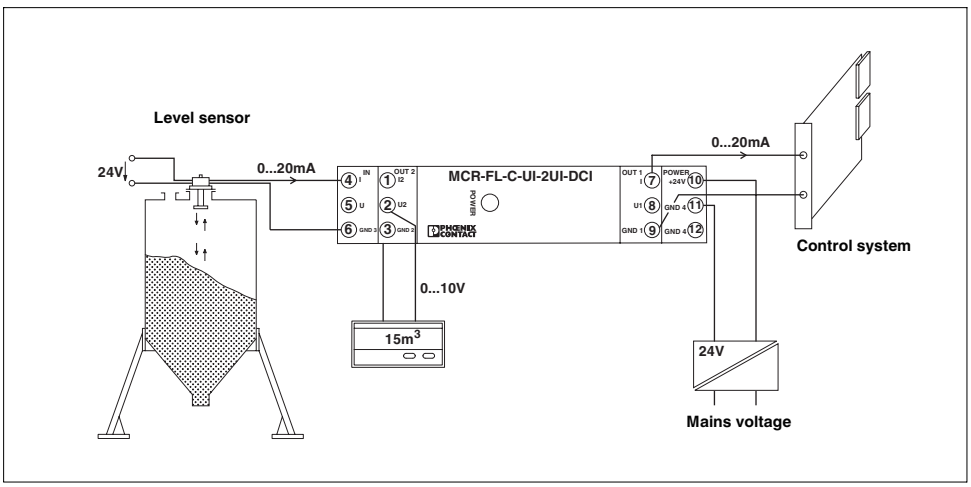
2814854	U	7.8	11.8	OUT01	OUT03	NONE
	U ≙ Voltage	U ≙ 7.8 V	U ≙ 11.8 V	OUT01 ≙ 0...20 mA	OUT03 ≙ 0...10 V	NONE ≙ without FCC

Measuring range span 4.0 V, i.e., order is possible.

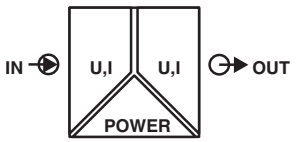
Combination table for input and output signals set with DIP switches

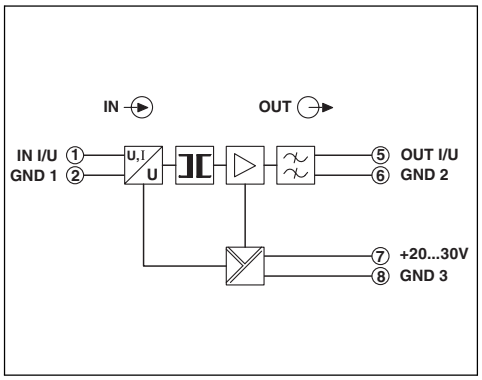
	Output 1							Output 2						
Input	0...20 mA	4...20 mA	0...10 mA	0...10 V	0...5 V	1...5 V	2...10 V	0...20 mA	4...20 mA	0...10 mA	0...10 V	0...5 V	1...5 V	2...10 V
0...20 mA	x	x	x	x	x	x	x	x	x	x	x	x	x	x
4...20 mA	x	x	x	x	x	x	x	x	x	x	x	x	x	x
0...10 mA	x	x	x	x	x	x	x	x	x	x	x	x	x	x
2...10 mA	x	x	x	x	x	x	x	x	x	x	x	x	x	x
0...10 V	x	x	x	x	x	x	x	x	x	x	x	x	x	x
2...10 V	x	x	x	x	x	x	x	x	x	x	x	x	x	x
0...5 V	x	x	x	x	x	x	x	x	x	x	x	x	x	x
1...5 V	x	x	x	x	x	x	x	x	x	x	x	x	x	x

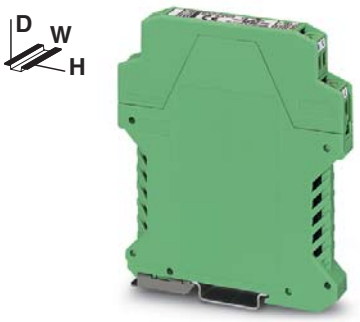
Application example: Level measurement with subsequent signal multiplication



Analog IN / Analog OUT
3-way isolating amplifier







With fixed signal combinations

Housing width 12.5 mm

- Processing standard signals
- Fixed setting of input and output signals
- 3-way isolation

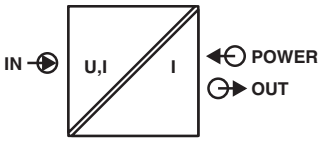
Technical data

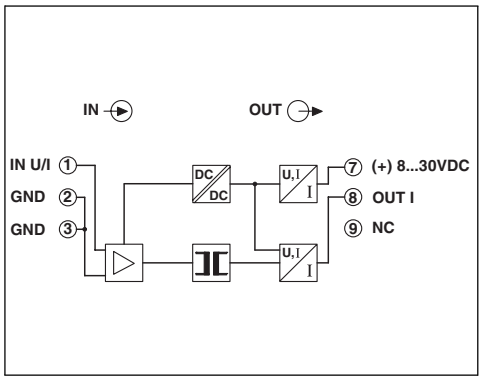
Input data		
Input signal	U input	I input
	0 ... 10 V / -10 ... 10 V	0 ... 20 mA / 4 ... 20 mA -20 ... 20 mA
Maximum input signal	30 V	50 mA
Input resistance	200 kΩ	50 Ω
Output data		
Output signal	U output	I output
	0 ... 10 V / -10 ... 10 V	0 ... 20 mA / 4 ... 20 mA
Maximum output signal	15 V	30 mA
Load R_B	> 10 kΩ	≤ 500 Ω
Linear transmission range (in reference to the output range end value)	-10% ... 110% -110% ... 110% (Bipolar signals)	-5% ... 105%
General data		
Supply voltage U_B	20 V DC ... 30 V DC	
Current consumption	< 15 mA (without load)	
Maximum transmission error	≤ 0.3% (of final value), typ. < 0.2% (of final value)	
Temperature coefficient	< 0.015%/K	
Limit frequency (3 dB)	30 Hz	
Step response (10 - 90%)	11 ms	
Test voltage, input/output/supply	1.5 kV (50 Hz, 1 min.)	
Ambient temperature (operation)	-25°C ... 60°C	
Mounting	Any	
Housing material	Polyamide PA non-reinforced	
Dimensions W / H / D	12.5 / 99 / 114.5 mm	
Screw connection solid / stranded / AWG	0.2 ... 2.5 mm² / 0.2 ... 2.5 mm² / 24 - 14	
Conformance/approvals		
Conformance	CE-compliant	

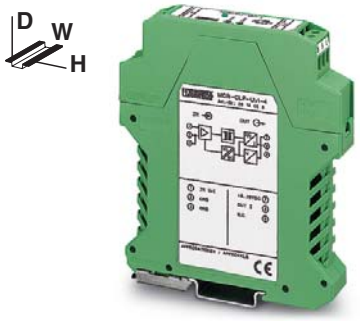
Ordering data

Description	Input signal	Output signal	Type	Order No.	Pcs. / Pkt.
MCR 3-way isolating amplifier, for electrical isolation of analog signals					
	0 ... 10 V	0 ... 20 mA	**MCR-C-U-I- 0-DC**	**2814472**	5
	0 ... 10 V	4 ... 20 mA	**MCR-C-U-I- 4-DC**	**2814537**	5
	0 ... 20 mA	4 ... 20 mA	**MCR-C-I-I-04-DC**	**2814540**	5
	4 ... 20 mA	0 ... 20 mA	**MCR-C-I-I-40-DC**	**2814524**	5
	4 ... 20 mA	0 ... 10 V	**MCR-C-I-U- 4-DC**	**2814511**	5
	0 ... 20 mA, 4 ... 20 mA	0 ... 20 mA, 4 ... 20 mA	**MCR-C-I-I-00-DC**	**2814508**	5
	0 ... 20 mA, -20 ... 20 mA	0 ... 10 V, -10 ... 10 V	**MCR-C-I-U- 0-DC**	**2814498**	5
	0 ... 10 V, -10 ... 10 V	0 ... 10 V, -10 ... 10 V	**MCR-C-U-U-DC**	**2814469**	5

Analog IN / Analog OUT, loop-powered isolator







Loop-powered, with a configurable input

Ex:
Housing width 17.5 mm

- No separate voltage supply
- Electrically isolated input
- Configurable input
- 4 ... 20 mA output
- Zero/span adjustment (±2%)

Notes:

To order a product with an order configuration, please enter the desired configuration by referring to the order key; see below.

Technical data

Input data	U input	I input
Input signal (configurable using the DIP switch)	4 ... 20 mA, please indicate if different setting when ordering	
Maximum input signal	30 V	50 mA
Input resistance	1 MΩ	50 Ω
Output data		
Output signal	4 ... 20 mA	
Maximum output signal	35 mA	
Load R_B	≤ 800 Ω (at U_B = 24 V; otherwise: (U_B - 8 V) / 20 mA)	
General data		
Supply voltage U_B	8 V DC ... 30 V DC	
Maximum transmission error	≤ 0.1% (of final value), typ. 0.05%	
Temperature coefficient	≤ 0.01%/K, typ. 0.005%/K	
ZERO / SPAN adjustment	±2% (of final value) / ±2% (of final value)	
Test voltage input/output	1.5 kV (50 Hz, 1 min.)	
Ambient temperature (operation)	-25°C ... 65°C	
Housing material	Polyamide PA non-reinforced	
Dimensions W / H / D	17.5 / 99 / 114.5 mm	
Screw connection solid / stranded / AWG	0.2 ... 2.5 mm^2 / 0.2 ... 2.5 mm^2 / 24 - 14	
Conformance/approvals		
Conformance	CE-compliant	
UL, USA/Canada	Class I, Div. 2, Groups A, B, C, D or non-hazardous locations	

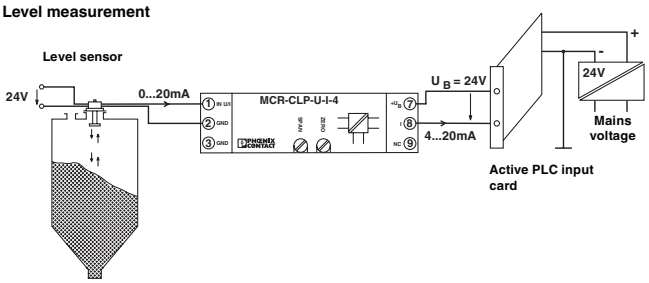
Ordering data

Description	Type	Order No.	Pcs. / Pkt.
MCR loop-powered isolator, for electrical isolation of analog signals			
Order configuration	**MCR-CLP-UI-I-4**	**2814058**	1
Standard configuration	**MCR-CLP-UI-I-4-NC**	**2814252**	1

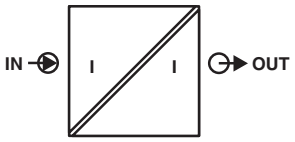
Order key MCR-CLP-UI-I-4 (Standard configuration entered as example)

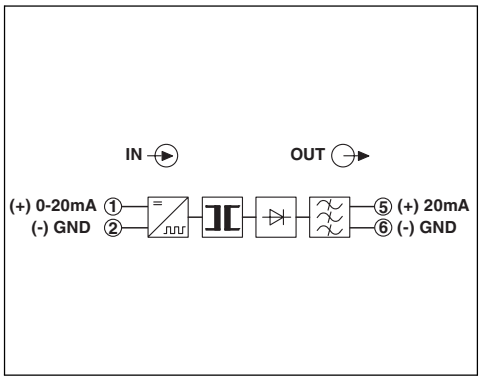
Order No.	Input			Factory calibration certificate FCC
2814058 /	IN02			/ NONE
	IN01 ≙0...20 mA IN02 ≙4...20 mA IN03 ≙0...10 V IN05 ≙0...5 V IN06 ≙1...5 V IN13 ≙-60...+60 mV IN14 ≙-100..+100 mV IN15 ≙-200...+200 mV IN16 ≙-300...+300 mV IN17 ≙-500...+500 mV	IN18 ≙-1...+1 V IN19 ≙-2...+2 V IN21 ≙-5...+5 V IN22 ≙-10...+10 V IN23 ≙-20...+20 V IN24 ≙0...60 mV IN25 ≙0...100 mV IN26 ≙0...200 mV IN27 ≙0...300 mV IN28 ≙0...500 mV	IN29 ≙0...1 V IN30 ≙0...2 V IN32 ≙0...20 V IN33 ≙-5...+5 mA IN34 ≙-10...+10 mA IN35 ≙-20...+20 mA IN36 ≙0...5 mA IN37 ≙0...10 mA	NONE ≙without FCC YES ≙with FCC (a fee is charged) YESPLUS ≙FCC with 5 measuring points (a fee is charged)

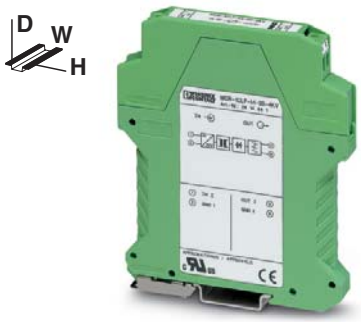
Level measurement



Analog IN / Analog OUT passive isolators







Single-channel, with safe isolation

Housing width 12.5 mm

- Electrical isolation without additional auxiliary power supply
- Current signals 0(4) ... 20 mA
- Safe isolation

Notes:

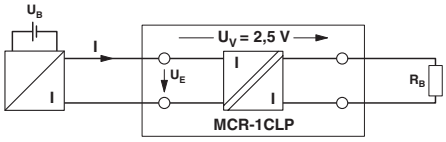
When using passive isolators, make sure that the current sourcing voltage of the measuring transducer U_B is sufficient to drive the maximum current of 20 mA via the passive isolator with the voltage drop U_V = 2.5 V and the load R_B.
This means:
$U_B \geq U_E$ = 2.5 V + 20 mA x R_B

Technical data

Input data	
Input signal	0 ... 20 mA / 4 ... 20 mA
Voltage drop	2.5 V (at I = 20 mA)
Response current	< 50 µA
Maximum input current	50 mA (100 mA overload)
Maximum input voltage	30 V (30 V overload)
Input voltage limitation	33 V 5% (with Zener diode)
Output data	
Output signal	0 ... 20 mA / 4 ... 20 mA
Maximum output signal	< 50 mA
Load R_B	≤ 1375 Ω (at I = 20 mA output signal)
Ripple	< 5 mV (rms)
General data	
Maximum transmission error	≤ 0.1% (of final value)
Additional error per 100 Ω load	0.02% (of measured value / 100 Ω load)
Temperature coefficient	≤ 0.002%/K (of measured value / 100 Ω load)
Test voltage input/output	4 kV (50 Hz, 1 min.)
Protection against electric shock	Increased insulation according to DIN EN 61 010 part 1 and safe isolation according to VDE 0100 part 410 along the lines of VDE 0106 part 101 up to 300 V AC/DC for surge voltage category II and pollution degree 2 between all isolated distances.
Ambient temperature (operation)	-10°C ... 70°C
Housing material	Polyamide PA non-reinforced
Dimensions W / H / D	12.5 / 99 / 114.5 mm
Screw connection solid / stranded / AWG	0.2 ... 2.5 mm² / 0.2 ... 2.5 mm² / 24 - 14
Conformance/approvals	
Conformance	CE-compliant

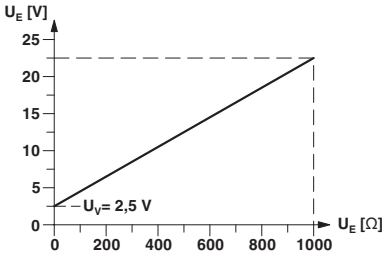
Ordering data

Description	Type	Order No.	Pcs. / Pkt.
MCR passive isolator, for electrical isolation of current signals without auxiliary power	**MCR-SL-1CLP-I-I-00-4KV**	**2814841**	1

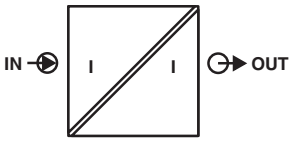


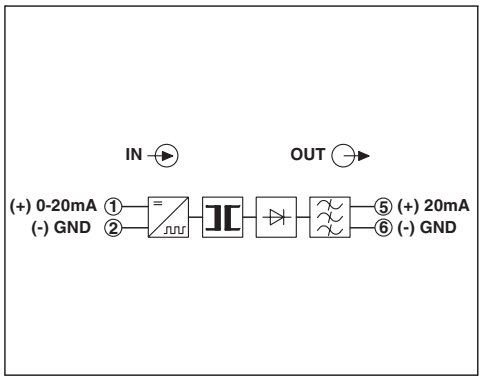
Input voltage depending on the load at I_A = 20 mA

The diagram shows input voltage U_E in relation to load R_B taking into account voltage failure U_V.
If you know the load, the minimum voltage the sensor must supply in order to drive the maximum current of 20 mA via the loop-powered isolator and the load can be read off on the Y-axis.



Analog IN / Analog OUT passive isolators





1-, 2- or 4-channel options

- Electrical isolation without additional auxiliary power supply
- Current signals 0(4) ... 20 mA
- Alternatively 1-, 2- or 4-channel version

Notes:

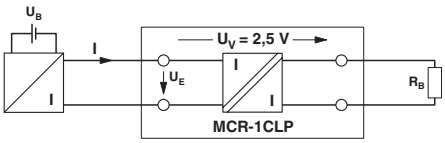
When using passive isolators, make sure that the current sourcing voltage of the measuring transducer U_B is sufficient to drive the maximum current of 20 mA via the passive isolator with the voltage drop U_V = 2.5 V and the load R_B.
This means:
$U_B \geq U_E$ = 2.5 V + 20 mA x R_B

Technical data

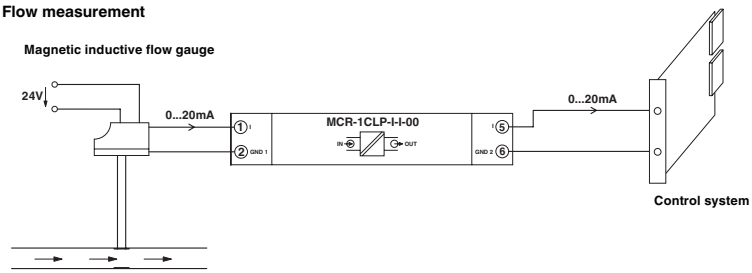
Input data	
Input signal	0 ... 20 mA / 4 ... 20 mA
Voltage drop	2.5 V (at I = 20 mA)
Response current	< 50 µA
Maximum input current	50 mA (100 mA overload)
Maximum input voltage	30 V (30 V overload)
Input voltage limitation	33 V (with Zener diode)
Output data	
Output signal	0 ... 20 mA / 4 ... 20 mA
Maximum output signal	< 50 mA
Load R_B	≤ 1375 Ω (at I = 20 mA output signal)
Ripple	< 5 mV (rms)
General data	
Additional error per 100 Ω load	0.02% (of measured value)
Temperature coefficient	≤ 0.002%/K (of measured value / 100 Ω load)
Test voltage input/output	510 V (50 Hz, 1 min.)
Ambient temperature (operation)	-10°C ... 70°C
Housing material	Polyamide PA non-reinforced
Dimensions H / D	99 / 114.5 mm
Screw connection solid / stranded / AWG	0.2 ... 2.5 mm² / 0.2 ... 2.5 mm² / 24 - 14
Conformance/approvals	
Conformance	CE-compliant

Ordering data

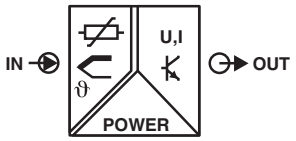
Description		Type	Order No.	Pcs. / Pkt.
MCR passive isolator, for electrical isolation of current signals without auxiliary power				
Single-channel	12.5 mm wide	**MCR-1CLP-I-I-00**	**2814016**	1
2-channel	12.5 mm wide	**MCR-2CLP-I-I-00**	**2814029**	1
4-channel	22.5 mm wide	**MCR-4CLP-I-I-00**	**2814045**	1

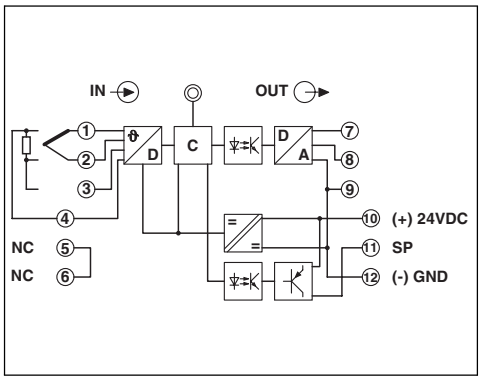


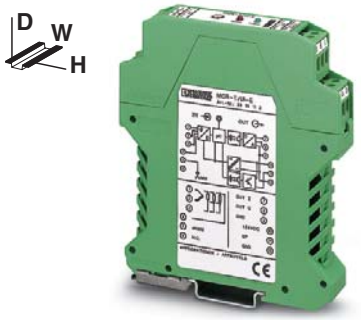
Flow measurement



Temperature, temperature transducer







For resistance thermometers, thermocouples, resistance-type sensors, and mV sources

Ex:
Housing width 17.5 mm

- For resistance thermometers and thermocouples
- Measure differential temperatures
- With transistor switching output
- Freely programmable via MCR/PI-CONF-WIN
- Option of inverse output signal ranges

Notes:

To order a product with an order configuration, enter the required configuration by referring to the adjacent order key.

Further information about the configuration software can be found on page 424

Technical data

Input data		
Resistance thermometers	Pt, Ni, Cu sensors : 2-, 3-, 4-wire	
Thermocouple sensors	U, T, L, J, E, K, N, S, R, B, C, W, HK	
Resistor	0 Ω ... 8000 Ω (freely adjustable, min. measuring range 100 Ω)	
Voltage	-20 mV ... 2400 mV (freely adjustable, minimum measuring range span of 10 mV)	
Temperature range	(Depending on sensor type used)	
Sensor input current	250 µA (resistance thermometer)	
Output data	U output	I output
Output signal	0 ... 5 V / 0 ... 10 V -5 ... 5 V / -10 ... 10 V	0 ... 20 mA / 4 ... 20 mA -
Maximum output signal	±12 V	24 mA
D/A resolution	±12 Bit	±12 Bit
Load R_B	≥ 10 kΩ	≤ 500 Ω
Ripple	< 20 mV_{PP}	
Output signal with open circuit	-12 V ... 12 V	0 A ... 24 mA
Measuring range overrange/underrange	-12 V ... 12 V	0 A ... 24 mA
Switching output	Transistor output, pnp Can carry a load of 100 mA, switches supply voltage (not protected against short circuit); locked in case of order-specific configuration, otherwise freely programmable through MCR/PI-CONF-WIN	
General data		
Supply voltage U_B	18 V DC ... 30 V DC	
Current consumption	≤ 60 mA, typ. 40 mA	
Maximum transmission error	≤ 0.1% (Of final value, ±6 mV or ±12 µA at output)	
Cold junction errors	≤ 3 K, typ. 1.5 K	
Temperature coefficient	≤ 0.01%/K, typ. 0.005%/K	
Test voltage input/output	1 kV (50 Hz, 1 min.)	
Test voltage input/power supply	1 kV (50 Hz, 1 min.)	
Ambient temperature (operation)	-20°C ... 65°C	
Mounting	Any	
Housing material	Polyamide PA non-reinforced	
Dimensions W / H / D	17.5 / 99 / 114.5 mm	
Screw connection solid / stranded / AWG	0.2 ... 2.5 mm^2 / 0.2 ... 2.5 mm^2 / 24 - 14	
Conformance/approvals		
Conformance	CE-compliant	
UL, USA/Canada	Class I, Div. 2, Groups A, B, C, D or non-hazardous locations	
GL	Germanischer Lloyd	

Ordering data

Description	Type	Order No.	Pcs. / Pkt.
MCR temperature measuring transducers, for resistance thermometers and thermocouple sensors, with electrical isolation of input/output and input/supply voltage			
Order configuration	**MCR-T-UI-E**	**2814113**	1
Standard configuration	**MCR-T-UI-E-NC**	**2814126**	1
Order configuration, without electrical isolation	**MCR-T-UI**	**2814090**	1
Standard configuration, without electrical isolation	**MCR-T-UI-NC**	**2814100**	1

Order key MCR-T-UI(-E)/... (Standard configuration entered as example)

Order No.	Sensor type	Input characteristic curve	Connection method	Measuring range: Start	Measuring range: End	Unit of measurement	Output	Output characteristic curve	Factory calibration certificate FCC
2814113 /	PT100 /	D /	3 /	-200.0 /	+850.0 /	C /	OUT02 /	N /	NONE
2814113 ≙ MCR-T-UI-E 2814090 ≙ MCR-T-UI	Refer to tables under "Sensor type"	D ≙ DIN S ≙ SAMA (see table) 0 ≙ At Ni1000 (Landis&Gyr), Cu10, Cu50, Cu53, KTY81-110, Thermocouple, Resistor, Potentiometer, Voltage	2 ≙ 2-wire 3 ≙ 3-wire 4 ≙ 4-wire 0 ≙ For Thermocouple, Resistor, Potentiometer, Voltage	At 0 mA (e.g. -200.0°C)	At 20 mA (e.g.: +850.0°C)	C ≙ °C F ≙ °F V ≙ mV O ≙ W P ≙ %	OUT01 ≙ 0...20 mA OUT02 ≙ 4...20 mA OUT03 ≙ 0...10 V OUT05 ≙ 0...5 V OUT13 ≙ -5...+5 V OUT14 ≙ -10...+10 V	N ≙ Normal I ≙ Inverse	NONE ≙ without FCC YES ≙ with FCC (a fee is charged) YESPLUS ≙ Factory calibration certificate with 5 measuring points (a fee is charged)

Resistance thermometers

Sensor type [1]	Standard (Input characteristic curve)	Measuring range	Smallest measuring range span
PT...	DIN/SAMA	-200°C ... 850°C	0.4 K
NI...	DIN/SAMA	-60°C ... 180°C	0.4 K
Ni1000	Landis & Gyr	-50°C ... 160°C	0.4 K
CU10	SAMA	-70°C ... 500°C	0.4 K
CU50	–	-50°C ... 200°C	0.4 K
CU53	–	-50°C ... 180°C	0.4 K
KTY81	Philips	-55°C ... 150°C	0.4 K
KTY84	–	-40°C ... 300°C	0.4 K

Temperature ranges in accordance with IEC 60751/EN 60751 or DIN 43760 SAMA RC 21-4-1966 in 2-, 3- or 4-wire technology.

[1]) Note: Pt sensors in increments of 10, 20, ...100 and 100, 200, ...1000, 2000.
KTY81 ≙ KTY81-110; KTY84 ≙ KTY84-130.

Further types and characteristic curves on request.

Thermocouples

Sensor type	Thermocouple	Measuring range	Smallest measuring range span
U	Cu-CuNi	-200°C ... 600°C	> 1 K
T [2])	Cu-CuNi	-200°C ... 400°C	> 1 K
L	Fe-CuNi	-200°C ... 900°C	> 1 K
J [2])	Fe-CuNi	-210°C ... 1200°C	> 1 K
E [2])	NiCr-CuNi	-226°C ... 1000°C	> 1 K
K [2])	NiCr-Ni	-200°C ... 1372°C	> 1 K
N [2])	NiCrSi-NiSi	-200°C ... 1300°C	> 1 K
S [2])	Pt10Rh-Pt	-50°C ... 1768°C	> 4 K
R [2])	Pt13Rh-Pt	-50°C ... 1768°C	> 4 K
B [2])	Pt30Rh-Pt6Rh	500°C ... 1820°C	> 10 K
C		-18°C ... 2316°C	> 4 K
W		-18°C ... 2316°C	> 4 K
HK		-200°C ... 800°C	> 1 K

[2]) Thermocouples as per IEC 60584/EN 60584.

Further types and characteristic curves on request.

Resistors, potentiometers, mV-voltages

Sensor type	Input	Measuring range	Smallest measuring range span
RES	Resistance	0 Ω ... 8000 Ω (2-wire)	2 Ω
POT	Potentiometers (max. 8 kΩ)	0 ... 100% (3-wire)	0.2%
V01	Voltage	-20 mV ...+2400 mV	2 mV

Conversion aid for temperature from °C to °F:

$$T\,[°F] = \frac{9}{5}\,T\,[°C] + 32$$

Order examples with various input versions:

Resistance thermometers

2814113 / PT100 / D / 3 / -200.0 / +850.0 / C / OUT02 / N / NONE

(Configuration for 3-wire PT 100 sensor; according to DIN from -200.0°C to +850.0°C with a 4...20 mA output characteristic curve)

Thermocouple

2814113 / J / 0 / 0 / -346 / +2192 / F / OUT02 / I / NONE

(Configuration for thermocouple type J from -346F to +2192F with 20...4 mA output characteristic curve)

Voltage

2814113 / V01 / 0 / 0 / -10 / 1200 / V / OUT03 / I / NONE

(Configuration for voltage input from -10 mV to +1200 mV with 10...0 V output characteristic curve)

Resistance
(2-wire connection)

2814113 / RES / 0 / 0 / 0 / 7500 / O / OUT05 / N / NONE

(Configuration for connecting a resistor varying between 0 Ω and 7500 Ω. The output signal is 0...5 V.)

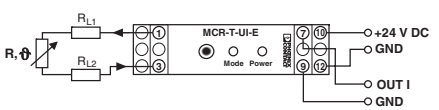
Potentiometers
(3-wire connection)

2814113 / POT / 0 / 0 / 10 / 90 / P / OUT02 / N / NONE

(Configuration for connecting a 3-wire potentiometer, whereby 10… 90% of the range is used. The output signal is 4…20 mA.)

Application examples:

Resistance thermometer: 2-wire connection method

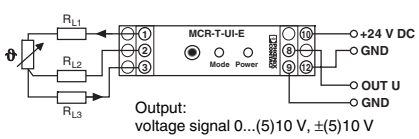


Output: Current signals 0(4)...20 mA

Application:
- For short distances (< 10 m)

The following should be paid attention to:
- Cable resistances R_{L1} and R_{L2} are incorporated in the measurement result directly and falsify the result accordingly (example Pt 100. 0.385 Ω ≙ 1 K).
  A compensation of ± 5% is possible.

Resistance thermometer: 3-wire connection method

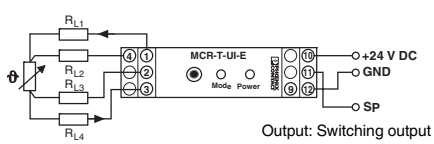


Output:
voltage signal 0...(5)10 V, ±(5)10 V

Application:
- For large distances between the PT 100 sensor and the MCR module (R_{L1}, R_{L2}, R_{L3} ≤ 25 Ω).

The following should be paid attention to:
- The value of all cable resistances must be exactly the same in order to balance out the sensor cable resistances ($R_{L1} = R_{L2} = R_{L3}$)

Resistance thermometer: 4-wire connection method

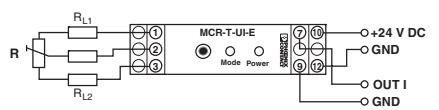


Output: Switching output

Application;
- For long distances between a PT 100 sensor and the MCR module and different cable resistances ($R_{L1} \neq R_{L2} \neq R_{L3} \neq R_{L4}$)

The following should be paid attention to:
- The cable resistance ($R_{L2} + R_{L4}$) must not exceed a value of 50 Ω .

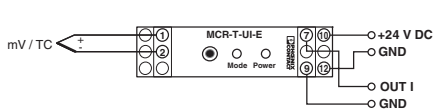
Potentiometer



Application:
- For short distances and slow changes!

The following should be paid attention to:
- Cable resistances R_{L1} and R_{L2} are incorporated in the measurement result directly and falsify the result accordingly. A compensation of ± 5% is possible.

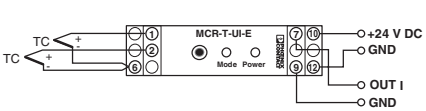
Thermocouple: Absolute temperature measurement



Application:
- Connecting a thermocouple or an mV signal.

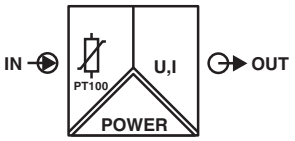
Note:
- Activate cold junction compensation for the device with thermocouple measurements.

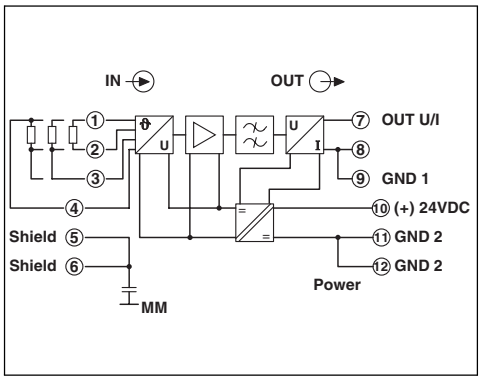
Thermocouple: Differential temperature measurement

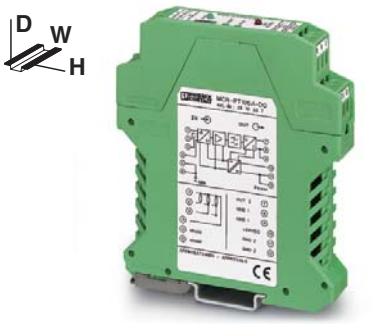


Application:
- Differential temperature measurement using thermocouples.
- Switch off the cold junction compensation of the device.

Temperature, temperature transducer







For PT 100, either voltage or current output

Housing width 17.5 mm

- Temperature range adjustable via DIP switch
- ZERO/SPAN adjustment
- Open circuit detection
- Alternatively with galvanically isolated supply voltage

Notes:

When ordering, you must use the order key to specify the desired configuration.

Technical data

Input data				
Resistance thermometers	Pt 100 (IEC 60751/EN 60751) : 2-, 3-, 4-wire			
Temperature range	0°C ... 300°C (0 ... 100/150/200/300) / -50°C ... 250°C (-50 ... 50/100/150/250)			
Sensor input current	Approx. 1 mA			
Output data	U output		I output	
Output signal	0 ... 10 V		0 ... 10 V	
Maximum output signal	15 V		15 V	
Load R_B	≥ 10 kΩ		≥ 10 kΩ	
Output signal with open circuit	> 11 V		> 11 V	
General data	...-U-DC	...-U	...-I-DC	...-I
Supply voltage U_B	20 ... 30 V DC	20 ... 30 V DC	20 ... 30 V DC	20 ... 30 V DC
Current consumption	35 mA	20 mA	60 mA	45 mA
Maximum transmission error	≤ 0.4% (of final value)			
Temperature coefficient	≤ 0.02%/K			
ZERO / SPAN adjustment	±5% / ±5%			
Step response (10 - 90%)	11 ms			
Test voltage power supply/signal	750 V AC (50 Hz, 1 min.)			
Ambient temperature (operation)	-20°C ... 65°C			
Housing material	Polyamide PA non-reinforced			
Dimensions W / H / D	17.5 / 99 / 114.5 mm			
Screw connection solid / stranded / AWG	0.2 ... 2.5 mm^2 / 0.2 ... 2.5 mm^2 / 24 - 14			
Conformance/approvals				
Conformance	CE-compliant			
UL, USA/Canada	UL 508 recognized			

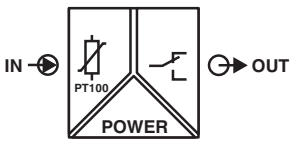
Ordering data

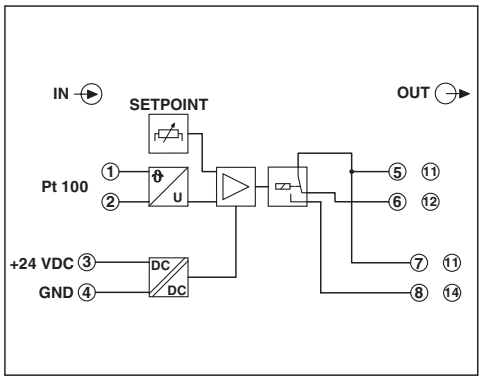
Description	Type	Order No.	Pcs. / Pkt.
MCR temperature measuring transducer, for Pt 100 temperature sensors with 2-, 3-, 4-wire technology with electrically isolated supply voltage			
Output: 0 ... 0.10 V	**MCR-PT100-U-DC**	**2810311**	1
Output: 0 ... (4)20 mA	**MCR-PT100-I-DC**	**2810337**	1
Output: 0 ... 10 V, without electrical isolation	**MCR-PT100-U**	**2810340**	1
Output: 0 ... (4)20 mA, without electrical isolation	**MCR-PT100-I**	**2810353**	1

Order key MCR-PT100-...(-DC) (Standard configuration entered as example)

Order No.		Connection method		Temperature range		Output		Factory calibration certificate
2810337	/	**3**	/	**TR05**	/	**OUT02**	/	**NONE**
2810311 ≙ MCR-PT100-U-DC 2810337 ≙ MCR-PT100-I-DC 2810340 ≙ MCR-PT100-U 2810353 ≙ MCR-PT100-I		2 ≙ 2-wire 3 ≙ 3-wire 4 ≙ 4-wire		TR01 ≙ -50...+50°C TR02 ≙ -50...+100°C TR03 ≙ -50...+150°C TR04 ≙ -50...+250°C TR05 ≙ 0...100°C TR06 ≙ 0...150°C TR07 ≙ 0...200°C TR08 ≙ 0...300°C		OUT01 ≙ 0...20 mA OUT02 ≙ 4...20 mA With the devices: 2810311 MCR-PT100-U-DC 2810340 MCR-PT100-U The output signal is 0...10 V. No details are necessary.		NONE ≙ Without certificate YES ≙ With factory calibration certificate (fee) YESPLUS ≙ Factory calibration certificate with 5 measuring points (fee)

Temperature, temperature relay





For PT 100

Housing width 12.5 mm

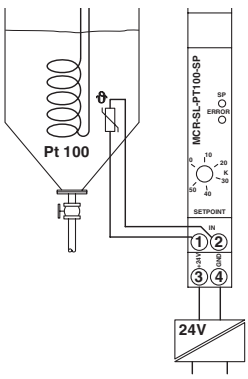
- Switching point in the temperature range from -100°C ... +700°C freely selectable
- Changeover relay output
- Electrical isolation
- Adjustable switch hysteresis

Technical data

Input data	
Resistance thermometers	Pt 100 (IEC 60751/EN 60751) : 2-wire
Temperature range	-100°C ... 700°C
Sensor input current	Approx. 1 mA
Switching output	Relay output
Contact type	1 PDT
Contact material	AgSnO, hard gold-plated
Max. switching current	50 mA (with gold layer, 30 V AC/ 36 V DC) 2 A (with damaged gold layer, 250 V AC)
Operate delay time	Approx. 6 ms
Off delay time	Approx. 200 ms
Switching hysteresis	Adjustable using DIP switches (0.5 K, 2 K, 3 K, 5 K)
Error/status indicator	Red LED (short circuit/wire break) / Yellow LED (relay active)
General data	
Supply voltage U_B	20 V DC ... 30 V DC
Current consumption	< 30 mA
Linearity error	< 0.1%
Setting accuracy	< 1%, typ. < 0.5%
Temperature coefficient	< 0.01%/K, typ. 0.005%/K
Test voltage, input/output/supply	1.5 kV (50 Hz, 1 min.)
Ambient temperature (operation)	-20°C ... 65°C
Mounting	Any
Housing material	Polyamide PA non-reinforced
Dimensions W / H / D	12.5 / 99 / 114.5 mm
Screw connection solid / stranded / AWG	0.2 ... 2.5 mm² / 0.2 ... 2.5 mm² / 24 - 14
Conformance/approvals	
Conformance	CE-compliant
UL, USA/Canada	UL 508 recognized

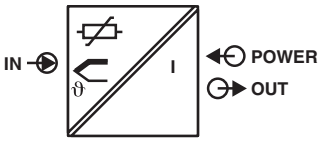
Ordering data

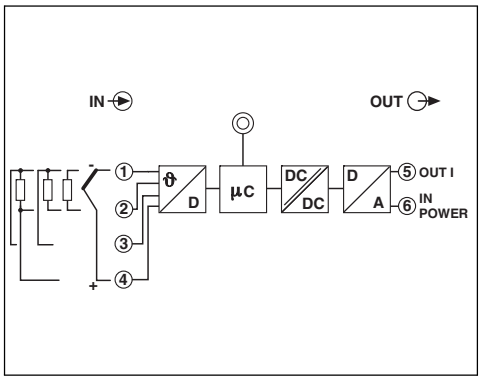
Description	Type	Order No.	Pcs. / Pkt.
MCR temperature relay, for Pt 100 in 2-wire system	**MCR-SL-PT100-SP**	**2814948**	1

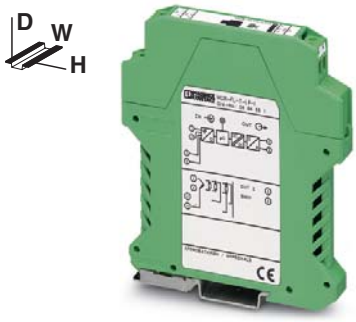


Application example -
Temperature control of a heated medium 1 = mains voltage

Temperature, temperature transducer







Loop-powered, programmable

Ex:
Housing width 12.5 mm

- Two-wire transmitter for resistance thermometers, thermocouples, resistance-type and voltage sensors
- Freely programmable via MCR/PI-CONF-WIN

Notes:

The devices are supplied with the standard configuration: Pt 100 sensor, measuring range 0 ... 100°C, 3-wire connection.

You can implement your own measuring range settings, linearization, and characteristic curve adjustments. For this purpose, you need the MCR-PAC-T-USB programming adapter and the MCR/PI-CONF-WIN configuration software, see page 424

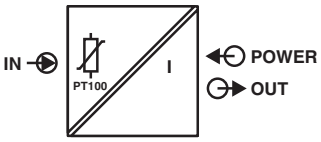
Technical data

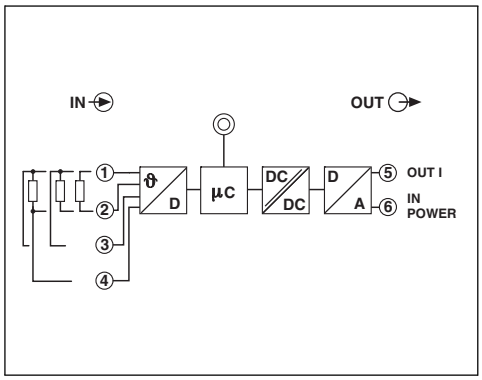
Input data		
Resistance thermometers		Pt, Ni (100, 500, 1000); minimum measurement range 10 K : 2-, 3-, 4-wire
Thermocouple sensors		B, C, D, E, J, K, L, N, R, S, T, U; minimum measurement range 50 K/500 K
Resistor		Resistance-type sensor from 10 Ω to 400 Ω and from 10 Ω to 2000 Ω; minimum measurement range 10 Ω/100 Ω
Voltage		-10 mV ... 100 mV (min. measurement range 5 mV)
Output data		
Output signal		4 ... 20 mA / 20 ... 4 mA
Load R_B		(Max (V_{supply} -12 V) / 0.023 A (current output))
Output signal with short circuit		≤ 3.6 mA or ≥ 21 mA (adjustable, not for thermocouples)
Output signal with open circuit		≤ 3.6 mA or ≥ 21 mA (adjustable)
Measuring range overrange/underrange		≤ 20.5 mA / ≥ 3.8 mA (linear increase/decrease)
General data		
Supply voltage U_B		12 V DC ... 35 V DC
Current consumption		< 3.5 mA
Transmission error	Resistance thermometers	0.2 K (Pt 100, Ni 100), 0.5 K (Pt 500, Ni 500), 0.3 K (Pt 1000, Ni 1000)
	Thermocouple sensors	Type 0.5 K (K, J, T, E, L, U), 1.0 K (N, C, D), 2.0 K (S, B, R)
	Resistance-type sensors	±0.1 Ω (10 ... 400 Ω), ±1.5 Ω (10 ... 2000 Ω)
	Voltage sensor	±20 µV (-10 ... 100 mV)
Step response (10 - 90%)		< 2 s
Pickup delay		4 s
Test voltage input/output		2 kV (50 Hz, 1 min.)
Degree of protection		IP20
Ambient temperature (operation)		-40°C ... 85°C
Mounting		Any
Housing material		Polyamide PA non-reinforced
Dimensions W / H / D		12.5 / 99 / 114.5 mm
Screw connection solid / stranded / AWG		0.2 ... 2.5 mm^2 / 0.2 ... 2.5 mm^2 / 24 - 14
Conformance/approvals		
Conformance		CE-compliant
UL, USA/Canada		Class I, Div. 2, Groups A, B, C, D

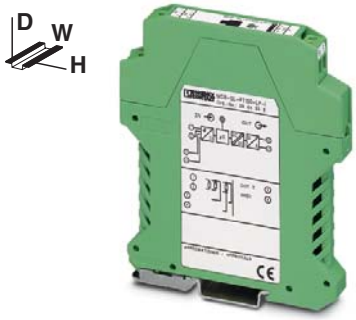
Ordering data

Description	Type	Order No.	Pcs. / Pkt.
MCR temperature measuring transducer, loop-powered for resistance thermometers, thermocouples, resistance-type and voltage sensors	**MCR-FL-T-LP-I**	**2864561**	1

Temperature, temperature transducer







Loop-powered, programmable

Ex:
Housing width 12.5 mm

- Two-wire transmitter for PT 100 resistance thermometers
- Freely programmable via MCR/PI-CONF-WIN

Notes:

The devices are supplied with the standard configuration: Pt 100 sensor, measuring range 0 ... 100°C, 3-wire connection.

You can implement your own measuring range settings, linearization, and characteristic curve adjustments. For this purpose, you need the MCR-PAC-T-USB programming adapter and the MCR/PI-CONF-WIN configuration software, see page 424

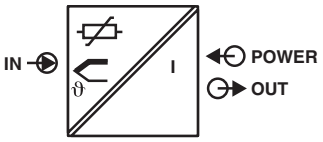
Technical data

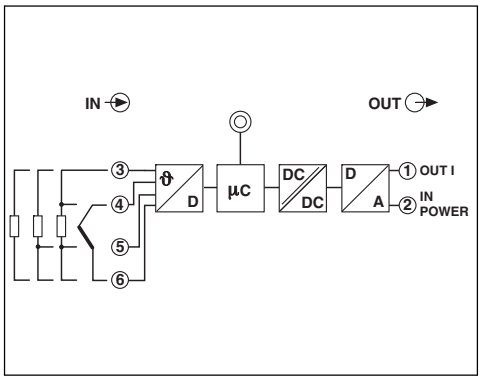
Input data		
Resistance thermometers		Pt 100; minimum measurement range 10 K: 2-, 3-, 4-wire
Output data		
Output signal		4 ... 20 mA / 20 ... 4 mA
Load R_B		(Max (V_{supply} -12 V) / 0.023 A (current output))
Output signal with short circuit		≤ 3.6 mA or ≥ 21 mA (adjustable)
Output signal with open circuit		≤ 3.6 mA or ≥ 21 mA (adjustable)
Measuring range overrange/underrange		≤ 20.5 mA / ≥ 3.8 mA (linear increase/decrease)
General data		
Supply voltage U_B		12 V DC ... 35 V DC
Current consumption		< 3.5 mA
Transmission error	Resistance thermometers	0.2 K
Step response (10 - 90%)		< 2 s
Pickup delay		4 s
Test voltage input/output		2 kV (50 Hz, 1 min.)
Degree of protection		IP20
Ambient temperature (operation)		-40°C ... 85°C
Mounting		Any
Housing material		Polyamide PA non-reinforced
Dimensions W / H / D		12.5 / 99 / 114.5 mm
Screw connection solid / stranded / AWG		0.2 ... 2.5 mm^2 / 0.2 ... 2.5 mm^2 / 24 - 24
Conformance/approvals		
Conformance		CE-compliant
UL, USA/Canada		Class I, Div. 2, Groups A, B, C, D

Ordering data

Description	Type	Order No.	Pcs. / Pkt.
MCR temperature measuring transducer, loop-powered for Pt 100 resistance thermometer	**MCR-SL-PT100-LP-I**	**2864558**	1

Temperature, temperature head transmitter





Loop-powered, programmable

Ex:

- Two-wire transmitter for resistance thermometers, thermocouples, resistance-type and voltage sensors
- For mounting in the connecting head, form B
- Freely programmable via MCR/PI-CONF-WIN

Notes:

The devices are supplied with the standard configuration: Pt 100 sensor, measuring range 0 ... 100°C, 3-wire connection.

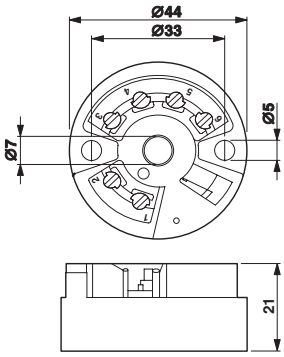
You can implement your own measuring range settings, linearization, and characteristic curve adjustments. For this purpose, you need the MCR-PAC-T-USB programming adapter and the MCR/PI-CONF-WIN configuration software, see page 424

Technical data

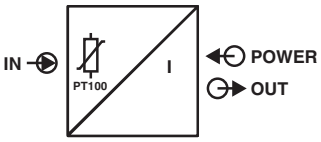
Input data		
Resistance thermometers		Pt, Ni (100, 500, 1000); minimum measurement range 10 K : 2-, 3-, 4-wire
Thermocouple sensors		B, C, D, E, J, K, L, N, R, S, T, U; minimum measurement range 50 K/500 K
Resistor		(Resistance-type sensor from 10 Ω to 400 Ω and from 10 Ω to 2000 Ω; minimum measurement range 10 Ω/100 Ω)
Voltage		-10 mV ... 75 mV (min. measurement range 5 mV)
Output data		
Output signal		4 ... 20 mA / 20 ... 4 mA
Load R_B		(Max (V_{supply} - 8 V) / 0.025 A (current output))
Output signal with short circuit		≤ 3.6 mA or ≥ 21 mA (adjustable, not for thermocouples)
Output signal with open circuit		≤ 3.6 mA or ≥ 21 mA (adjustable)
Measuring range overrange/underrange		≤ 20.5 mA / ≥ 3.8 mA (linear increase/decrease)
General data		
Supply voltage U_B		8 V DC ... 35 V DC
Current consumption		< 3.5 mA
Transmission error	Resistance thermometers	0.2 K (Pt 100, Ni 100), 0.5 K (Pt 500, Ni 500), 0.3 K (Pt 1000, Ni 1000)
	Thermocouple sensors	Type 0.5 K (K, J, T, E, L, U), 1.0 K (N, C, D), 2.0 K (S, B, R)
	Resistance-type sensors	±0.1 Ω (10 ... 400 Ω), ±1.5 Ω (10 ... 2000 Ω)
	Voltage sensor	±20 µV (-10 ... 100 mV)
Step response (10 - 90%)		< 2 s
Pickup delay		6 s
Test voltage input/output		2 kV (50 Hz, 1 min.)
Degree of protection		IP00, IP66 (integrated in the connecting head)
Ambient temperature (operation)		-40°C ... 85°C
Mounting		Any
Housing material		Polycarbonate, PC
Screw connection solid / stranded / AWG		0.2 ... 1.75 mm² / 0.2 ... 1.75 mm² / 24 - 15
Conformance/approvals		
Conformance		CE-compliant
UL, USA/Canada		Class I, Div. 2, Groups A, B, C, D

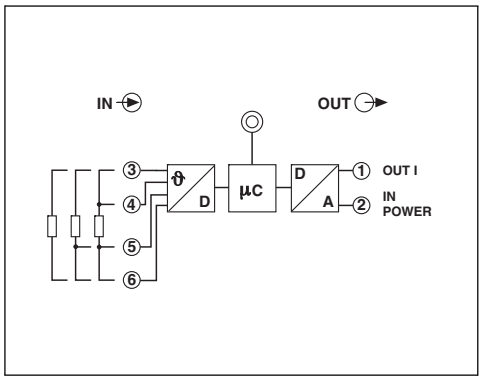
Ordering data

Description	Type	Order No.	Pcs. / Pkt.
MCR temperature measuring transducer, loop-powered			
for resistance thermometers, thermocouples, resistance-type and voltage sensors	**MCR-FL-HT-T-I**	**2864529**	1



Temperature, temperature head transmitter





Loop-powered, programmable

Ex:

- Two-wire transmitter for PT 100 resistance thermometers
- For mounting in the connecting head, form B
- Freely programmable via MCR/PI-CONF-WIN

Notes:

The devices are supplied with the standard configuration: Pt 100 sensor, measuring range 0 ... 100°C, 3-wire connection.

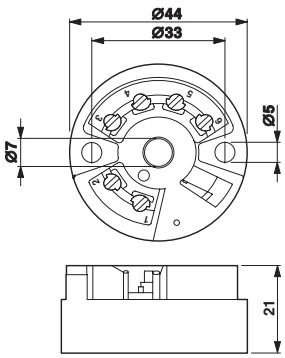
You can implement your own measuring range settings, linearization, and characteristic curve adjustments. For this purpose, you need the MCR-PAC-T-USB programming adapter and the MCR/PI-CONF-WIN configuration software, see page 424

Technical data

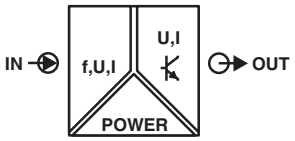
Input data		
Resistance thermometers		Pt 100; minimum measurement range 10 K: 2-, 3-, 4-wire
Output data		
Output signal		4 ... 20 mA / 20 ... 4 mA
Load R_B		(Max (V_{supply} - 10 V) / 0.023 A (current output))
Output signal with short circuit		≤ 3.6 mA or ≥ 21 mA (adjustable)
Output signal with open circuit		≤ 3.6 mA or ≥ 21 mA (adjustable)
Measuring range overrange/underrange		≤ 20.5 mA / ≥ 3.8 mA (linear increase/decrease)
General data		
Supply voltage U_B		10 V DC ... 35 V DC
Current consumption		< 3.5 mA
Transmission error	Resistance thermometers	0.2 K
Step response (10 - 90%)		< 2 s
Pickup delay		4 s
Degree of protection		IP00, IP54 (integrated in the connecting head)
Ambient temperature (operation)		-40°C ... 85°C
Mounting		Any
Housing material		Polycarbonate, PC
Conformance/approvals		
Conformance		CE-compliant
UL, USA/Canada		Class I, Div. 2, Groups A, B, C, D

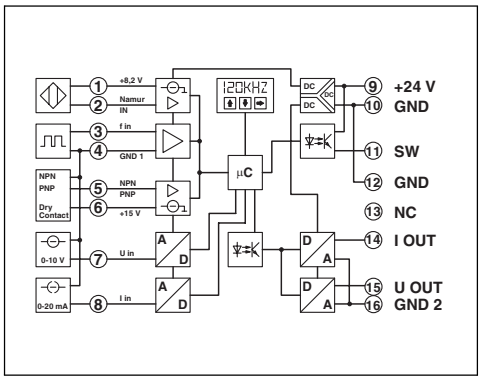
Ordering data

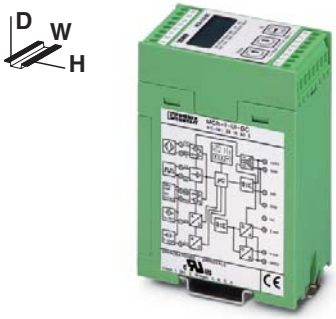
Description	Type	Order No.	Pcs. / Pkt.
MCR temperature measuring transducer, loop-powered			
for Pt 100 resistance thermometer	**MCR-SL-HT-PT 100-I**	**2864516**	1



Frequency, frequency transducer







Programmable, for frequencies of up to 120 kHz

Ex:

Housing width 45 mm

- Frequencies up to 120 kHz
- For NAMUR sensors, floating contacts, frequency generators, and NPN/PNP transistor outputs
- Analog and switching output
- 3-way isolation
- Programmable using membrane keypad or software
- Display of input or output signal

Notes:

Further information about the configuration software can be found on page 424

Technical data

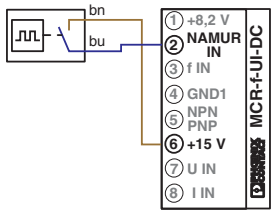
Input data	Frequency input	
Frequency range	0.1 Hz ... 120 kHz	
Input sources	NPN/PNP transistor outputs NAMUR initiators Floating relay contact (dry contact) Frequency generator	
Transducer supply	Approx. 15 V DC / max. 25 mA (constant)	
Signal level	2 V_{PP} (In case of rectangle 0.1 Hz ... 120 kHz) 2 V_{PP} (In case of sine 8 Hz ... 120 kHz) 13 V_{PP} (In case of sine 1 Hz ... 120 kHz)	
Maximum input signal	30 V (incl. DC voltage)	
Signal form	Any	
Pulse length	≥ 1 µs	
Resolution	> 12 bit	
Signal conversion time	≤ 32 ms	
Input data	Isolating amplifier function	
Input signal	0 V ... 10 V (freely adjustable)	0 mA ... 20 mA (freely adjustable)
Maximum input signal	12 V	24 mA
Input resistance	95 kΩ	200 Ω
Resolution	14 bit (full-scale)	14 bit (full-scale)
Output data	U output	I output
Output signal	0 ... 5 V / 0 ... 10 V	0 ... 20 mA
Maximum output signal	12.5 V	25 mA
Load R_B	≥ 500 Ω	≤ 500 Ω
Ripple	< 20 mV_{PP}	
Switching output	Transistor output, pnp	
	Switches supply voltage to terminal block SW, can carry a load of 100 mA, not protected against short circuit	
General data		
Supply voltage U_B	20 V DC ... 30 V DC	
Current consumption	< 60 mA (without load, without switching output)	
Maximum transmission error	≤ 0.15% (of measured value), typ. 0.1%	
Temperature coefficient	0.015%/K, typ. 0.01%/K	
ZERO / SPAN adjustment	±25% / ±25%	
Step response (10 - 90%)	< 25 ms	
Test voltage, input/output/supply	1.5 kV (50 Hz, 1 min.)	
Ambient temperature (operation)	-20°C ... 65°C (for specified data)	
Status indication	LC display	
Operating elements	Membrane keypad with 3 keys and LCD display	
Housing material	ASA-PC (V0)	
Dimensions W / H / D	45 / 75 / 110 mm	
Screw connection solid / stranded / AWG	0.2 ... 2.5 mm^2 / 0.2 ... 2.5 mm^2 / 24 - 14	
Conformance/approvals		
Conformance	CE-compliant	
UL, USA/Canada	Class I, Div. 2, Groups A, B, C, D or non-hazardous locations	
GL	Germanischer Lloyd	

Ordering data

Description	Type	Order No.	Pcs. / Pkt.
MCR frequency measuring transducer, for conversion of frequencies into analog signals 0(4) ... 20 mA, 0 ... (5)10 V and their inverse signals	**MCR-F-UI-DC**	**2814605**	1

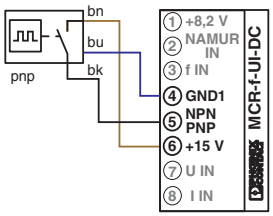
Connection examples for common frequency transmitters

2-wire DC (mechanical contact)

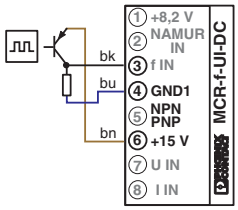


Terminal block ① also possible instead of terminal block ⑥.

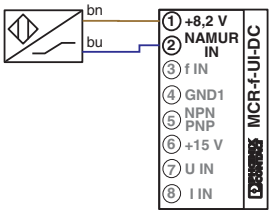
3-wire DC
• With PNP transistor output



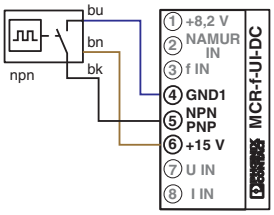
3-wire DC
• PNP transistor with pull-down resistance



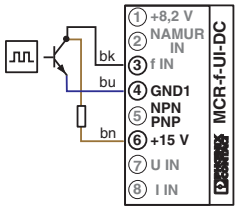
2-wire DC NAMUR sensor



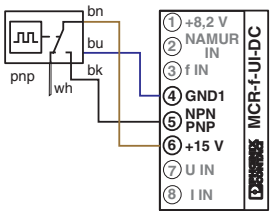
• With NPN transistor output



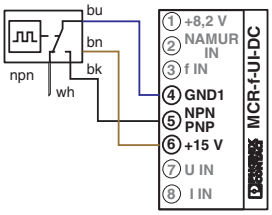
• NPN transistor with pull-up resistance



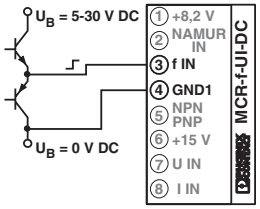
4-wire DC
• With PNP transistor output



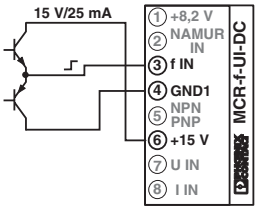
• With NPN transistor output



Incremental rotary transducer with push-pull:
• Supply of the external signaling encoder

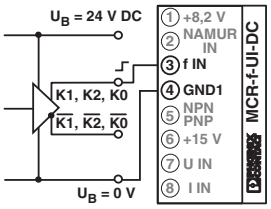


• Supply of the signaling encoder from the module

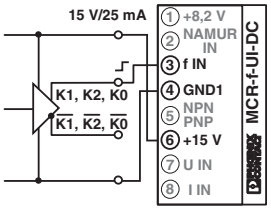


The external supply can be picked off by terminal blocks ⑨ +24 V DC and ⑩ GND as well. Any 3-way isolation then no longer applies.

Incremental rotary transducer with HTL logic:
• Supply of the external signaling encoder



• Supply of the signaling encoder from the module



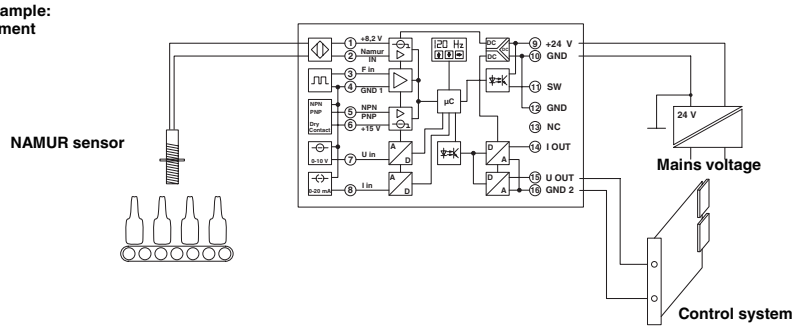
Application examples:

The frequency transducer **MCR-F-UI-DC** converts the pulse signal into an analog standard signal that provides information about the numbers of bottles in filling systems recorded in a defined time unit.

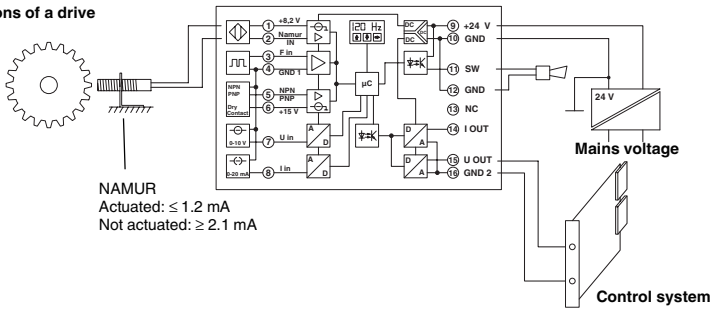
For speed measurements, it is possible to enter the measuring range in revolutions per minute (rpm) and to display the current measured value on the device.

The frequency measuring transducer has an automatic measuring range selection function (autorange) to ensure the best possible resolution. This permits response times to be reduced to a minimum and the measured value is optimally adapted to the input value.

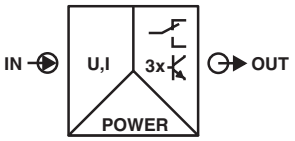
Application example:
Flow measurement

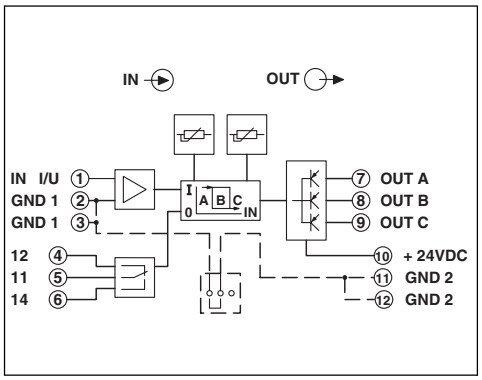


Application example:
Measurement of revolutions of a drive



Limit values, threshold value switch





For either standard voltage or standard current signals

Housing width 17.5 mm

- 0 ... 10 V or 0 ... 20 mA input
- Relay/transistor output
- Limit indicator
- Adjustable hysteresis
- Monitoring of three signal statuses

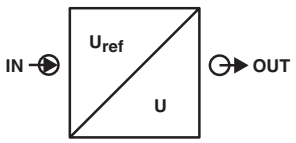
Technical data

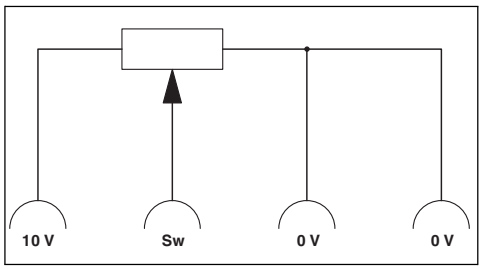
Input data	MCR-SWS-U	MCR-SWS-I
Input signal	0 ... 10 V	0 ... 20 mA / 4 ... 20 mA
Maximum input signal	11 V	22 mA
Input resistance	≥ 100 kΩ	≤ 120 Ω
Limit value setting	Setting potentiometer, scaled 270° potentiometer	
Setting range of the limit value	0 V ... 10 V	0 A ... 20 mA
Setting range for the hysteresis	0.1 V ... 10 V (setting accuracy: ±30 mV)	0.2 mA ... 20 mA (setting accuracy: ±60 µA)
Internal hysteresis	±30 mV (around the lower/upper switching point)	±60 µA (around the lower/upper switching point)
Switching output	Transistor output, pnp	
Number of outputs	3	
Output voltage	20 V DC ... 30 V DC	
Continuous load current	100 mA	
Switching output	Relay output	
Contact type	1 PDT	
Contact material	AgNi 0.15 + HTV (hard gold-plated)	
Max. switching voltage	250 V AC (30 V DC)	
Max. switching current	2 A	
Mechanical service life	10^7 cycles	
Error/status indicator		
General data		
Supply voltage U_B	20 V DC ... 30 V DC	
Current consumption	60 mA, typ. 60 mA	
Temperature coefficient	≤ 0.02%/K	
Step response (10 - 90%)	< 25 ms	
Ambient temperature (operation)	-20°C ... 65°C	
Mounting	Any	
Housing material	Polyamide PA non-reinforced	
Dimensions W / H / D	17.5 / 99 / 114.5 mm	
Screw connection solid / stranded / AWG	0.2 ... 2.5 mm² / 0.2 ... 2.5 mm² / 24 - 14	
Conformance/approvals		
Conformance	CE-compliant	
UL, USA/Canada	UL 508 recognized	

Ordering data

Description	Type	Order No.	Pcs. / Pkt.
MCR threshold value switch, with adjustable hysteresis and relay/transistor output			
Input: 0 ... 0.10 V	**MCR-SWS-U**	**2766465**	1
Input: 0(4) - 20 mA	**MCR-SWS-I**	**2766478**	1

Setpoint value potentiometer





– For direct setpoint definition in combination with a constant voltage source

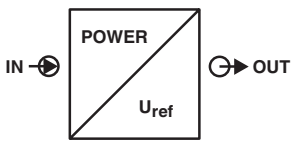
Technical data

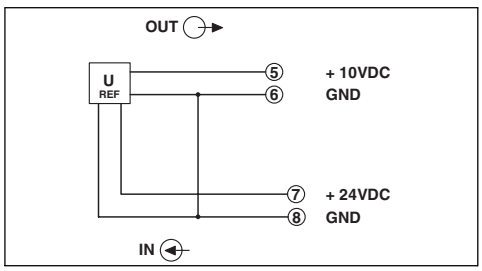
Input data	EMG 30-SP- 4K7LIN	EMG 30-SP/10K LIN
Resistance value	4.7 kΩ ±20%	10 kΩ ±20%
Linearity	5% (of final value)	5% (of final value)
Load capacitance	1 W	0.5 W
General data		
Ambient temperature (operation)	0°C ... 40°C	
Mounting	Any	
Housing material	Polycarbonate fiber reinforced PC-F	
Dimensions W / H / D	30 / 75 / 68 mm	
Screw connection solid / stranded / AWG	0.2 ... 4 mm² / 0.2 ... 2.5 mm² / 24 - 14	

Ordering data

Description	Type	Order No.	Pcs. / Pkt.
Setpoint potentiometer, to set setpoints individually			
Resistance value 4.7 kΩ	**EMG 30-SP- 4K7LIN**	**2940252**	10
Resistance value 10 kΩ	**EMG 30-SP/10K LIN**	**2942124**	10

Accessories, constant voltage source





Constant 10 V DC output voltage, with short-circuit-proof output

– Voltage reference for setpoint definition in conjunction with potentiometers

Technical data

Input data	
Nominal input voltage range	18 V DC ... 30 V DC
Current consumption	Approx. 10 mA (with no load on the output)
Output data	
Nominal output voltage	+10 V DC ±0.1%
Short-circuit current	Approx. 65 mA
Ripple	≤ 50 mV_{PP}
General data	
Temperature coefficient	≤ 0.015%/K
Ambient temperature (operation)	-20°C ... 65°C
Dimensions W / H / D	12.5 / 99 / 114.5 mm
Screw connection solid / stranded / AWG	0.2 ... 2.5 mm² / 0.2 ... 2.5 mm² / 24 - 14
Conformance/approvals	
Conformance	CE-compliant

Ordering data

Description	Type	Order No.	Pcs. / Pkt.
MCR constant voltage source			
Output voltage +10 V DC	**MCR-PS- 24DC-10DC**	**2766685**	1

Accessories
Configuration software package

The **MCR/PI-CONF-WIN configuration software package** is used to configure and visualize all parameters for the programmable MCR measuring transducers.
– Straightforward menu interface
– Rapid programming

Notes:
The software runs under the following operating systems: Windows NT™, 2000™, and XP™.

Description	Ordering data: Type	Order No.	Pcs. / Pkt.
MCR configuration software, for programming the MCR-T-..., MCR-...-LP-..., MCR-...-HT-..., MCR-S-..., MCR-f-..., and MCR-PSP-... modules, CD-ROM	**MCR/PI-CONF-WIN**	**2814799**	1
	Accessories		
Labels, for labeling MCR-T and MCR-S modules, four sheets DIN A4 marking labels (112 pieces)	**MCR-ET 38X35 WH**	**2814317**	1

USB adapter cable
Software adapter cable

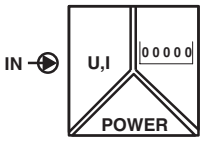
The following adapter cables are available for programming:
– USB adapter cable
– Interface converter

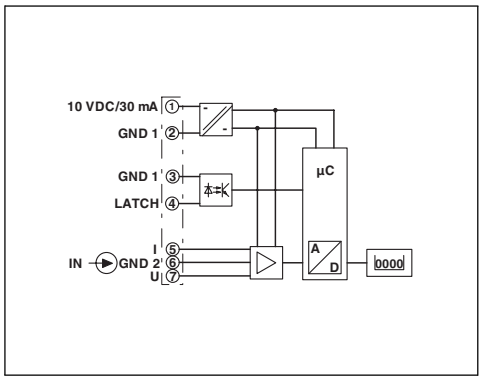
The following modules are supported:
– MCR-T-UI(-E)...
– MCR-f-UI-DC
– MCR-FL-T-LP-I
– MCR-SL-PT100-LP-I
– MCR-FL-HT-T-I
– MCR-SL-HT-PT100-I

Data cable

Description	Ordering data: Type	Order No.	Pcs. / Pkt.
USB adapter cable, D-9-SUB to USB, with D-9-SUB to D-25-SUB adapter	**CM-KBL-RS232/USB**	**2881078**	1
Software adapter cable (stereo jack connector/D-SUB 25-pole), 1.2 m length, for programming MCR-T..., MCR-S..., and MCR-f... modules	**MCR-TTL-RS232-E**	**2814388**	1
Software adapter cable, 2.4 m length, with USB connection, for programming MCR-...-LP-... and MCR-...-HT-... modules	**MCR-PAC-T-USB**	**2309000**	1
	Accessories		
Adapter cable, stranded, 9-pole D-SUB socket on 25-pole D-SUB pin	**PSM-KAD 9 SUB 25/BS**	**2761295**	1

Analog IN
standard signals





For standard analog signals, programmable

Housing width 48 mm

- For 0 ... 10 V and 0(4) ... 20 mA standard analog signals
- Programmable
- 5 positions displayed
- 8 mm LED, 7-segment
- Electrical isolation
- Min./max. value saving
- Freely programmable decimal point display
- Latch/hold function for storing the display value
- Display 48 x 24 mm

Technical data

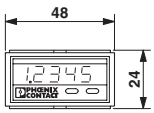
Input data		U input	I input
Input signal		0 ... 10 V	0 ... 20 mA / 4 ... 20 mA
Maximum input signal		30 V DC	50 mA
Input resistance		> 1 MΩ	Approx. 100 Ω with 5 mA / Approx. 70 Ω with 20 mA
Resolution		1 mV	2 µA
Measuring rate		0.5 to 2 measurements/second	
Input latch signal		Display stop	
Switching level	1 signal ("H")	4 V DC ... 30 V DC	
	0 signal ("L")	0 V DC ... 2 V DC	
Output data			
Display		7-segment LED; 8 mm; red	
Number of the displayed positions		5	
Accuracy		< 0.1% ±1 digit (at an ambient temperature of 20°C)	
General data			
Supply voltage U_B		10 V DC ... 30 V DC	
Current consumption		50 mA	
Data memory		EEPROM 1 mil. memory cycles or 10 years	
Resolution A/D		14 bit	
System hum suppression		Digital filtering 50/60 Hz	
Test voltage input/power supply		500 V_{rms} (50/60 Hz, 1 min.)	
Degree of protection		IP65 from the front	
Ambient temperature (operation)		-10°C ... 50°C	
Housing material		Macrolon 2405	
Dimensions W / H / D		48 / 24 / 68 mm	
Control panel cutout		22(+0.6) x 45(+0.8) mm	
Screw connection solid / stranded / AWG		0.14 ... 1.5 mm² / 0.14 ... 1.5 mm² / 26 - 16	
Conformance/approvals			
Conformance		CE-compliant	
UL, USA/Canada		UL 508 recognized	

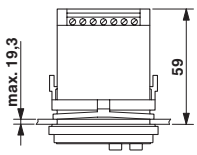
Ordering data

Description	Type	Order No.	Pcs. / Pkt.
MCR digital display, for measurement and display of standard signals	**MCR-SL-D-U-I**	**2864011**	1

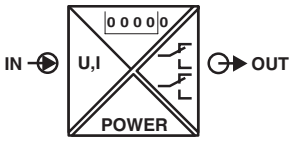
Accessories

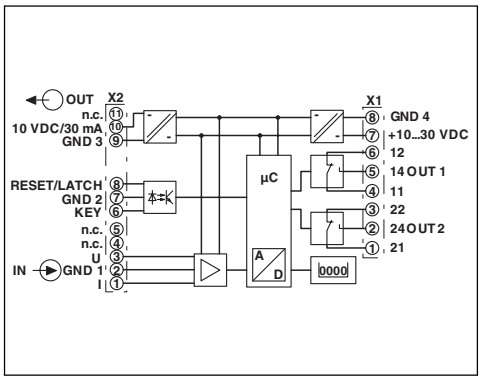
MCR DIN rail adapter, for digital displays in a 24 x 48 mm housing	**MCR-SL-D-RA**	**2810081**	1





Analog IN standard signals





For standard analog signals, programmable, with threshold value monitoring

Housing width 96 mm

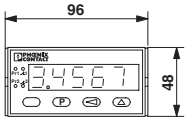
- For standard analog signals
- Programmable
- 5 positions displayed
- Electrical isolation
- 2 relay outputs with freely selectable limit values
- Totalisator
- Display 96 x 48 mm

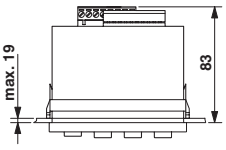
Technical data

Input data		
Input signal	U input	I input
Maximum input signal	0 ... 10 V / -10 ... 10 V	0 ... 20 mA / 4 ... 20 mA
Input resistance	±30 V	50 mA
Resolution	> 1 MΩ	< 50 Ω
Measuring rate	1 mV	2 µA
Input latch signal	Approximately 2 measurements/second	
Input reset impulse	Display stop	
	> 5 ms to reset the totalizer / the relay outputs	
Switching level	1 signal ("H")	4 V DC ... 30 V DC
	0 signal ("L")	0 V DC ... 2 V DC
Output data		
Display	7-segment LED; 14.2 mm; red	
Number of the displayed positions	5	
Accuracy	< 0.1% ±1 digit (at an ambient temperature of 20°C)	
Switching output	2 x relay output + digital display	
Contact type	2 PDT	
Contact material	AgCdO	
Max. switching voltage	300 V DC / 250 V AC	
Max. switching current	3 A	
Min. switching current	30 mA DC	
Switching capacity	50 W / 2000 VA	
Switching hysteresis	Programmable	
Error/status indicator	Red LEDs	
Supply voltage for measuring transducer/sensor	10 V DC ±2%, 30 mA	
General data		
Supply voltage U_B	10 V DC ... 30 V DC	
Power consumption	Max. 2 W	
Data memory	EEPROM 1 mil. memory cycles or 10 years	
Resolution A/D	14 bit	
System hum suppression	Digital filtering 50/60 Hz	
Test voltage, input/output/supply	(500 V_{rms} / 2.3 kV_{rms}, 50/60 Hz, 1 min.)	
Degree of protection	IP65 from the front	
Ambient temperature (operation)	-20°C ... 65°C	
Housing material	Macrolon 2405	
Dimensions W / H / D	96 / 48 / 93.1 mm	
Control panel cutout	92 (+0.8) x 45(+0.6) mm	
Screw connection solid / stranded / AWG	0.14 ... 1 mm^2 / 0.14 ... 1.5 mm^2 / 26 - 16	
Conformance/approvals		
Conformance	CE-compliant	
UL, USA/Canada	UL 508 recognized	

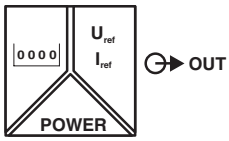
Ordering data

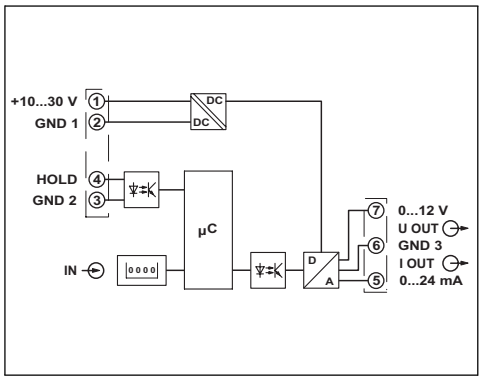
Description	Type	Order No.	Pcs. / Pkt.
MCR digital display, for measurement and display of standard signals Supply voltage 24 V DC	**MCR-FL-D-U-I-2SP- 24**	**2864215**	1





Analog OUT, setpoint adjuster





With manual and automatic ramp function

- Manual setpoint definition with step width setting
- Manual setpoint definition via direct input
- Automatic setpoint definition with hold function and 20 support points
- Highly adjustable 0 ... 12 V or 0 ... 24 mA signal ranges
- Data backup in case of a power failure
- Display value parameterization
- Electrical isolation between output and supply

Housing width 48 mm

Technical data

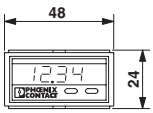
Input data		
Display	7-segment, 8 mm, red	
Number of the displayed positions	4	
Switching level	1 signal ("H") 4 V DC ... 30 V DC 0 signal ("L") 0 V DC ... 2 V DC	
Output data	U output	I output
Output signal	0 ... 12 V	0 ... 24 mA
Length of step	10 mV	10 µA
Load R_B	≥ 2 kΩ	≤ 500 Ω (up to 20 mA) ≤ 400 Ω (> 20 mA)
Ripple	≤ 10 mV_{PP}	
General data		
Supply voltage U_B	10 V DC ... 30 V DC	
Power consumption	1 W (with 24 mA/12 V)	
Maximum transmission error	< 0.2% ((full-scale) at rated voltage)	
Test voltage output/power supply	500 V AC (50 Hz, 1 min.)	
Degree of protection	IP65 from the front	
Ambient temperature (operation)	-20°C ... 65°C	
Housing material	Macrolon 2405	
Dimensions W / H / D	48 / 24 / 68 mm	
Control panel cutout	45(+0.6) x 22.2(+0.3) mm	
Screw connection solid / stranded / AWG	0.14 ... 1.5 mm^2 / 0.14 ... 1.5 mm^2 / 26 - 16	
Conformance/approvals		
Conformance	CE-compliant	
UL, USA/Canada	UL 508 recognized	

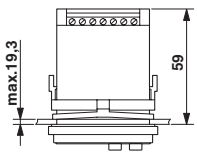
Ordering data

Description	Type	Order No.	Pcs. / Pkt.
MCR digital setpoint encoder, for presetting current and voltage signals	**MCR-SL-D-SPA-UI**	**2710314**	1

Accessories

MCR DIN rail adapter, for digital displays in a 24 x 48 mm housing	**MCR-SL-D-RA**	**2810081**	1





MCR-FL-TS-LP-I-Ex
Ord.-No.: 28 64 56 7
IN
OUT
OUT I
GND1
APPROBATIONEN / APPROVALS
CE
MCR-FL-T-LP-I-Ex
Ord.-No.: 28 64 57 4
IN
OUT
OUT I
GND1
APPROBATIONEN / APPROVALS
CE

INTERFACE Ex

Signal conditioners for the Ex area

In order to automate process engineering operations, a great deal of information is required about the momentary value of various process parameters. The main measuring tasks associated with this consist of recording the pressure, temperature, flow rate, and level variables. In addition to these analog closed-loop signals (4 ... 20 mA), there are a large number of digital alarm and control signals.

Another feature of many process technology systems is the presence of areas in which explosive atmospheres can occur.

As far as measurement and control technology is concerned, "intrinsic safety" (Ex i) has become the protection type of choice worldwide thanks to the cost-effective operating equipment and the relative ease of installation with which it is associated.

Irrespective of the measurement and control application, whether it involves system technology (process technology systems with a large number of measuring junctions) or individual applications (mechanical and plant engineering), the INTERFACE Ex product range from Phoenix Contact offers tailor-made, economical solutions for practical execution of your automation task, and contributes to high levels of system availability. With INTERFACE Ex, intrinsically safe signal circuits are electrically isolated from the system level, and the measured values are transmitted to the PLCs or process control systems with a high degree of accuracy.

The products that make up the INTERFACE Ex product group are certified in accordance with Directive 94/9/EC (ATEX) and other international standards (IECEx, cUL, etc.).

MACX Analog Ex

- Highly compact single-channel and two-channel devices with a 24 V supply voltage that support power bridging and monitoring by means of modular T-connectors in the DIN rail
- Highly functional devices with wide-range power supply for use in all power supply networks the world over

2-wire field devices

- Intrinsically safe temperature transmitters

HART multiplexer

- For integrating HART information into separate management systems

Product range overview

Product overview		**430**
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Analog OUT	Output isolating amplifiers	**443**
Digital IN	NAMUR isolation amplifiers	**444**
Digital OUT	Solenoid drivers	**450**
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Multiplexer	HART multiplexer	**460**
2-wire field devices		
Temperature	Temperature transducers	**462**
	Temperature head transmitter	**463**

MACX Analog Ex:

DIN-rail-connector-compatible
The DIN rail connector can be used for modular bridging of the 24 V supply voltage.

Wide-range power supply
The modules featuring a wide-range power supply (...-UP) can be used in all power supply networks the world over without the need for additional power supply units.

MACX Analog Ex

	Analog IN				Analog OUT
Type	**MACX MCR-EX-SL-RPSSI-I**	**MACX MCR-EX-SL-RPSSI-I-UP**	**MACX MCR-EX-SL-RPSSI-2I**		**MACX MCR-EX-SL-IDSI-I**
Description	**Repeater power supply,** with intrinsically safe input, supplying and non-supplying, for 0/4 ... 20 mA signals, active and passive output, HART, SIL 2	**Repeater power supply,** with intrinsically safe input, supplying and non-supplying, for 0/4 ... 20 mA signals, active and passive output, HART, SIL 2, with wide-range power supply	**Repeater power supply,** with intrinsically safe input, supplying and non-supplying, for 0/4 ... 20 mA signals, two active outputs, HART, SIL 2		**Output isolating amplifier,** with intrinsically safe output, for 0/4 ... 20 mA signals, load up to 800 Ω, with transmission of the HART protocol, SIL 2
Page	440	441	442		443

MACX Analog Ex

	Digital IN				
Type	**MACX MCR-EX-SL-NAM-R** **MACX MCR-EX-SL-NAM-2RO**	**MACX MCR-EX-SL-2NAM-RO**	**MACX MCR-EX-SL-2NAM-R-UP**	**MACX MCR-EX-SL-NAM-2T**	**MACX MCR-EX-SL-2NAM-T**
Description	**NAMUR isolation amplifier,** single-channel, with intrinsically safe input, with one relay output (PDT contact) or two relay outputs (N/O contact), SIL 2	**NAMUR isolation amplifier,** two-channel, with intrinsically safe input, with one relay output per channel (N/O contact), SIL 2	**NAMUR isolation amplifier,** two-channel, with intrinsically safe input, with one relay output per channel (PDT contact), SIL 2, with wide-range power supply	**NAMUR isolation amplifier,** single-channel, with intrinsically safe input, with two passive transistor outputs, SIL 2	**NAMUR isolation amplifier,** two-channel, with intrinsically safe input, with one passive transistor output per channel, SIL 2
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MACX Analog Ex

	Digital OUT				
Type	**MACX MCR-EX-SL-SD-21-25-LP**	**MACX MCR-EX-SL-SD-21-40-LP**	**MACX MCR-EX-SL-SD-24-48-LP**	**MACX MCR-EX-SL-SD-21-60-LP**	
Description	**Solenoid driver,** with intrinsically safe output, loop-powered, 25 mA current limitation, for group IIC/IIB/IIA gases, SIL 3	**Solenoid driver,** with intrinsically safe output, loop-powered, 40 mA current limitation, for group IIC/IIB/IIA gases, SIL 3	**Solenoid driver,** with intrinsically safe output, loop-powered, 48 mA current limitation, for group IIC/IIB/IIA gases, SIL 3	**Solenoid driver,** with intrinsically safe output, loop-powered, 58 mA current limitation, for group IIB/IIA gases, SIL 3	
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MACX Analog Ex

Temperature

MACX MCR-EX-T-UI-UP

Temperature transducer
for resistance thermometers, thermocouples, resistance-type sensors, potentiometers, and mV sources, with intrinsically safe input and limit value relay, SIL 2, with wide-range power supply

452

MACX MCR-EX-T-UIREL-UP

Temperature transducer
for resistance thermometers, thermocouples, resistance-type sensors, potentiometers, and mV sources, with intrinsically safe input and three limit value relays, SIL 2, with wide-range power supply

454

MACX MCR-EX-SL-RTD-I...

Temperature transducer
for resistance thermometers and resistance-type sensors, with intrinsically safe input, programmable, SIL 2

456

MACX MCR-EX-SL-TC-I...

Temperature transducer
for thermocouples and mV sources, with intrinsically safe input, programmable, SIL 2

457

MACX Analog Ex

Accessories

MACX MCR-PTB

Power and error message module

459

ME 6,2 TBUS-2 1,5/5-ST-3,81 GN

DIN rail connector

459

MACX MCR-S-MUX

Multiplexer
for HART signals

460

UC-EMLP...

Marking material

461

UKK 5-2R/NAMUR

Resistance circuit
Double-level terminal block with pre-assembled resistors

461

2-wire field devices

Programmable loop-powered temperature transducers, Ex i

MCR-FL-TS-LP-I-EX

Temperature transducer,
loop-powered, with intrinsically safe input and output, with transmission of the HART protocol

462

MCR-FL-T-LP-I-EX

Temperature transducer,
loop-powered, with intrinsically safe input and output

462

MCR-FL-HT-TS-I-EX

Temperature head transmitter,
loop-powered, with intrinsically safe input and output, with transmission of the HART protocol

463

MCR-FL-HT-T-I-EX

Temperature head transmitter,
loop-powered, with intrinsically safe input and output

464

Accessories

MCR/PI-CONF-WIN
MCR-PAC-T-USB

Configuration software package, software adapter cable

465

Facts about explosion protection

The chemical and petrochemical industries involve industrial processes which produce explosive atmospheres. They are caused, for example, by gases, fumes or vapors. Explosive atmospheres are also likely to occur in mills, silos, sugar, and fodder factories due to the dust present there.

Therefore, electrical devices in potentially explosive areas are subject to special directives.

Devices and protective systems in potentially explosive areas

Directive 94/9/EC of March 23, 1994 (ATEX manufacturer directive) of the European Parliament is of particular importance within CENELEC (European Community and Western European EFTA states). It is designed to facilitate the harmonization of legal provisions in the member states of the European Union for devices and protective systems in terms of ensuring correct use in potentially explosive areas. Directive 94/9/EC must be applied to all explosion-protected devices and protective systems placed on the market in the European Union!

The scope of this directive also includes safety, monitoring, and control devices which are used outside potentially explosive areas, but which are necessary for, or contribute towards, safe operation of devices and protective systems with respect to explosion hazards.

The term **device** includes machines, operating equipment, stationary or mobile devices, control components, and system accessories. The standard also covers alarm and protection systems which are meant to be used, either individually or in combination, for the generation, transmission, storage, measurement, control, and conversion of energy as well as for processing materials and which have the potential to ignite and cause an explosion.

Protective systems are devices designed to stop an incipient explosion immediately and/or restrict the area affected by the explosion, and which are placed on the market separately as autonomous systems.

Components are defined as those parts that are necessary for ensuring the safe operation of devices and protective systems, but do not perform an autonomous function in themselves.

European directives are implemented in ordinances or laws at a national level.

Systems in potentially explosive areas

Directive 1999/92/EC (ATEX Operator Directive) was passed in Europe to regulate the operation of systems in potentially explosive areas.

Terminology associated with the Ex area
Explosive atmosphere A mixture of combustible gases, steam, vapors or dust, and air in atmospheric conditions that allow the entire mixture to combust once ignited. **Potentially explosive area** An area where the atmosphere has the potential to explode due to local or operational conditions ("Ex area"). **Electrical equipment** The entire set of components, electric circuits or parts of electric circuits that are usually located within a single housing. **Intrinsically safe electrical equipment** An electrical device in which all circuits are intrinsically safe. Note: These devices may be used directly in the Ex area. **Associated equipment** Electrical devices that contain both intrinsically safe and non-intrinsically safe circuits and that are designed in such a way that the non-intrinsically safe circuits cannot influence the intrinsically safe ones. Note: Associated electrical equipment must not be used directly in potentially explosive areas without additional protection defined by a further protection type.

Classification into groups

The general stipulations of EN 60079-0 divide electrical devices for potentially explosive areas into three groups.

Group I:

Electrical devices for firedamp areas (mines) which are susceptible to pit gases (methane) and/or combustible dusts (coal dust).

Group II:

Electrical devices for operation in areas where explosive gas atmospheres are likely to occur, excluding mines susceptible to firedamp.

This also includes devices for the chemical, petrochemical, and pharmaceutical industries as well as for waste water treatment.

Electrical devices are further divided into subcategories according to the properties of the explosive atmosphere.

In the case of the intrinsic safety protection type, classification is based on the minimum ignition energy of the gas or vapor.

Designation	Typical gas	Ignition energy/µJ Intrinsic safety
II A	Propane	> 180
II B	Ethylene	60 ... 180
II C	Hydrogen	< 60

Group III:

Electrical devices for operation in areas where explosive dust atmospheres are likely to occur, excluding mines susceptible to firedamp.

This includes devices for areas associated with the food industry (mills, silos), for example.

Electrical devices are further divided into subcategories according to the properties of the explosive atmosphere.

Designation	Dusts
III A	Combustible flyings
III B	Non-conductive dust
III C	Conductive dust

Classification into temperature classes

Simply dividing the various gases into explosion or gas groups according to their minimum ignition energy is not sufficient to describe the gases adequately with respect to their explosive properties.

A gas may explode either when the ignition energy is exceeded or where there is an excessively high temperature caused by a hot surface. This ignition temperature is, however, not usually linked to the ignition energy, i.e., a gas with a low ignition energy does not necessarily explode at a low temperature. Consequently, devices that are used directly in potentially explosive atmospheres are divided into temperature classes. Temperature classes define the maximum surface temperature even in the case of errors. Parallel to this, the gases are classified according to their different ignition temperatures.

Temperature class	Maximum permissible surface temperature of operating equipment °C	Ignition temperatures of combustible substances °C
T 1	450	> 450
T 2	300	> 300 ≤ 450
T 3	200	> 200 ≤ 300
T 4	135	> 135 ≤ 200
T 5	100	> 100 ≤ 135
T 6	85	> 85 ≤ 100

The following table provides an overview of the ignition energies and ignition temperatures for certain gases:

Substance	T_{ign}	Temperature class	E_{min}	Group
Ethoxyethane	170	T 4	190	II B
Ethylene	425	T 1	82	II B
Ammonia	630	T 1	14,000	II A
Butane	365	T 2	250	II A
Methane	595	T 1	280	I
Propane	470	T 1	250	II A
Carbon disulfide	95	T 6	9	II C
Hydrogen	560	T 1	16	II C

Zone classification

Potentially explosive areas are divided into zones according to the probability of their occurrence. The EN 60079-10-1 standard defines the zones containing **explosive atmospheres** as follows:

Zone 0:

Area in which an explosive atmosphere is always present or present for a prolonged period.

These conditions are usually present inside containers, pipelines, apparatus, and tanks.

Zone 1:

Area in which an explosive atmosphere is to be expected only occasionally during normal operation.

This includes the immediate surroundings of Zone 0, as well as the areas close to filling and discharge plants.

Zone 2:

Area in which an explosive atmosphere is not expected during normal operation; however, if it does occur, then it does so only rarely and for a short time.

Zone 2 includes areas that are used exclusively for storage, areas around pipe connections that can be disconnected, and generally, areas in close proximity to Zone 1.

Areas that are potentially explosive as a result of **combustible dusts** are divided into the following zones in accordance with 60079-10-2 (formerly: EN 61241-10):

Zone 20:

Area in which an explosive atmosphere is always present, present for a prolonged period or frequently present in the form of an airborne cloud of combustible dust.

Zone 21:

Area in which an explosive atmosphere in the form of an airborne cloud of combustible dust is to be expected only occasionally during normal operation.

Zone 22:

Area in which an explosive atmosphere in the form of an airborne cloud of combustible dust is not expected during normal operation. However, if it does occur, then it does so only for a short time.

Categories

The ATEX directive assigns devices for use in potentially explosive areas to categories. In IEC 60079-0, "Equipment Protection Level (EPL)" is the term used instead of "category".

In the same way that there are different zones, there are also various device categories. These consist of categories M1 and M2 for Group I and categories 1, 2, and 3 for Group II. The categories for **equipment group II** are described in more detail below:

Category 1:

Devices constructed to guarantee a very high degree of safety.

Devices in this category must guarantee the required degree of safety even in the unlikely event of a device failure and therefore be provided with measures to protect against explosion, so that

- in the event of one integrated protection measure failing, a second, independent protection measure is able to guarantee the necessary safety, or
- the necessary safety is guaranteed when two independent errors occur.

Category 2:

Devices constructed to guarantee a very high degree of safety.

The explosion protection measures associated with this category guarantee the necessary degree of safety, even in the case of frequent device failures or common errors.

Category 3:

Devices constructed to guarantee a standard degree of safety.

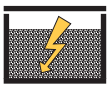
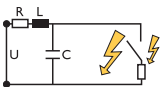
Devices in this category guarantee an adequate degree of safety in normal operation.

The table below shows which categories are assigned to which zones:

Category	For Zone	Also possible
1	0 20	1 and 2 21 and 22
2	1 21	2 22
3	2 22	

Facts about explosion protection

Protection types

Protection principle		Protection type		Area of application (selection)	Standard
	Isolation	Oil encapsulation	o	Transformers, relays, startup controllers, switching devices	EN 60079-6
		Sand encapsulation	q	Transformers, relays, capacitors	EN 60079-5
		Molded encapsulation	m*	Coils of relays and motors, electronics, solenoid valves, connection systems	EN 60079-18
	Exclusion	Pressurization	p	Control cabinets, motors, measuring and analysis devices, computers	EN 60079-2
	Special mechanical design	Flameproof enclosure	d	Motors, switching devices, power electronics	EN 60079-1
	Clearance from electrically conductive parts	Increased safety	e	Terminal blocks, housing, lights, motors	EN 60079-7
	Energy limitation	Intrinsic safety	i*	Electronics, MCR	EN 60079-11
		Intrinsically safe systems		Electronic systems	EN 60079-25
		Intrinsically safe fieldbus systems		Fieldbus systems	EN 60079-27
Improved industrial quality nA: non-sparking nC: sparking items of equipment nR: restricted breathing housing nL: energy-limited nP: simplified pressurized enclosures		"n" protection type	n**	Motors, housing, lights, electronics	EN 60079-15

* **ia, ma:** Application in Zone 0, 1, 2 / **ib, mb:** Application in Zone 1, 2 / **ic, mc:** Application in Zone 2 only ** Application in Zone 2 only

Designation according to ATEX

CE 10 Ex II (1) G

- Current year of manufacture
- Conformity assessment according to ATEX Directive 94/9/EC
- Associated electrical equipment

CE 0344 10 Ex II 2 G

- Atmosphere (G = Gas, D = Dust)
- Equipment category (1, 2, 3)
- Equipment group (I, II)
- Notified body, production monitoring (e.g., KEMA)

CE mark does not apply to components.

Designation according to EN 60079-0

[Ex ia Ga] IIC

- Associated electrical equipment
- Intrinsic safety

Ex e IIC T6 Gb

- Equipment protection level, EPL (Ga, Gb, Gc, Da, Db, Dc)
- Temperature class, for items of equipment used directly in the Ex area (T1 ... T6)
- Gas group (IIA, IIB, IIC) or Dust group (IIIA, IIIB, IIIC)
- Protection type (ia, ib, ic, e, d, ...)
- Explosion-protected
- Increased safety

EC-type examination certificate

IBExU 08 ATEX 1069

- Certificate number
- Type-tested according to 94/9/EC
- Year of EC-type examination certificate
- Notified body (Notified Body)

Solenoid drivers for controlling solenoid valves

In order to control intrinsically safe Ex i solenoid valves, you have to have an intrinsically safe control circuit. This is provided by the solenoid drivers that are available from Phoenix Contact.

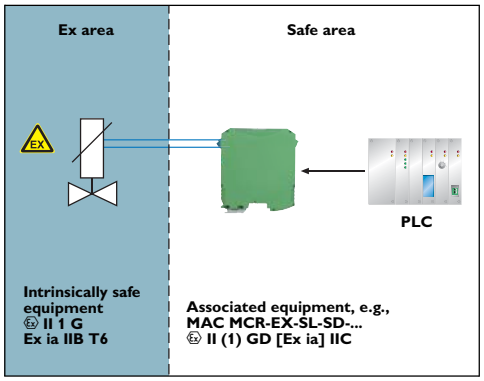
The following must be taken into account when dimensioning your intrinsically safe control circuit:
– Valve
– Cable with corresponding resistance
– Solenoid driver

As a result, it may be the case that not all valves are compatible with the solenoid drivers.

Below is an extract from a table showing possible combinations of valves and solenoid drivers.

A complete and updated list (along with details of the technical data of suitable valves, the maximum cable lengths, and the maximum cable resistances of the individual combinations) can be found on the Internet at:
www.phoenixcontact.com

Example circuit



Valves overview

Manufacturer	Type designation		Ex certificate	Condition	INTERFACE Ex solenoid driver: MACX MCR-EX-SL-SD-21-25-LP	MACX MCR-EX-SL-SD-21-40-LP	MACX MCR-EX-SL-SD-24-48-LP	MACX MCR-EX-SL-SD-21-60-LP
ASCO	Coil	195	LCIE 08 ATEX 6083			✓	✓	
	Coil	302 (12 V)	INERIS 03 ATEX 0249X				✓	✓
	Coil	302 (24 V)	INERIS 03 ATEX 0249X					✓
Bürkert	Coil	AC 10, standard	PTB 01 ATEX 2101			✓	✓	
	Coil	AC 10, high-resistance	PTB 01 ATEX 2101			✓	✓	
	Coil	AC 21, standard	PTB 01 ATEX 2175	700 mW / 65°C		✓	✓	
	Coil	AC 21, high-resistance	PTB 01 ATEX 2175	700 mW / 65°C		✓	✓	
	Coil	AC 21, standard	PTB 01 ATEX 2175	900 mW / 45°C		✓	✓	
	Coil	AC 21, high-resistance	PTB 01 ATEX 2175	900 mW / 45°C		✓	✓	
	Coil	AC 21, standard	PTB 01 ATEX 2175	900 mW / 60°C		✓	✓	
	Coil	AC 21, high-resistance	PTB 01 ATEX 2175	900 mW / 60°C		✓	✓	
	Coil	G1 642735, standard		600 mW / 50°C		✓		
	Coil	G1 642735, high-resistance		600 mW / 50°C		✓		
	Coil	G1 642735, standard	PTB 01 ATEX 2173	800 mW / 40°C		✓	✓	
	Coil	G1 642735, high-resistance	PTB 01 ATEX 2173	800 mW / 40°C		✓	✓	
	Coil	G1 642735, standard	PTB 01 ATEX 2173	1000 mW / 40°C		✓	✓	
	Coil	G1 642735, high-resistance	PTB 01 ATEX 2173	1000 mW / 40°C		✓	✓	
FESTO	Coil	MFH-...IA-SA-EX GBXE022AIAD03	PTB 03 ATEX 2097				✓	✓
	Coil	(J)MFH-...BIA-SA-EX GBXE022AIAD03	PTB 03 ATEX 2097				✓	✓
Norgren Herion	Coil	2050	PTB 07 ATEX 2019			✓	✓	✓
	Coil	2051	PTB 07 ATEX 2019			✓	✓	✓
	Coil	2052	PTB 07 ATEX 2019			✓	✓	✓
	Coil	2053	PTB 07 ATEX 2019				✓	✓
	Coil	2085	PTB 06 ATEX 2001 U		✓			
	Coil	2086	PTB 06 ATEX 2001 U		✓	✓	✓	✓
	Coil	3039	PTB 03 ATEX 2134				✓	
Hörbiger	Piezo	P8 38x RF-Nx-SPN65	DMT 01 ATEX E026X	30 V type	✓	✓		
	Piezo	P20 381RF-NG-CPN61	DMT 01 ATEX E025X	30 V type	✓	✓		
Nass	Coil	1259 30.1-00	PTB 02 ATEX 2154				✓	
	Coil	1259 50.1-00	PTB 02 ATEX 2154				✓	
Parker	Coil VZ07	488650.01	LCIE 02 ATEX 6024X			✓	✓	
	Coil VZ33	494035.10	LCIE 02 ATEX 6024X			✓	✓	
	Coil VZ08	488660.01	LCIE 02 ATEX 6024X			✓	✓	
	Coil VZ09	488670.01	LCIE 02 ATEX 6024X			✓	✓	
	Coil VZ95	482160.01	LCIE 02 ATEX 6024X	EEx ia IIB T6		✓	✓	✓
	Coil VZ23	482870.01	LCIE 02 ATEX 6024X			✓	✓	
Samson	Coil	3701-11 (6 V)	PTB 02 ATEX 2178		✓			
	Coil	3701-12 (12 V)	PTB 02 ATEX 2178		✓	✓	✓	
	Coil	3701-13 (24 V)	PTB 02 ATEX 2178		✓	✓	✓	
	Coil	3963-11 (6 V)	PTB 01 ATEX 2085		✓			
	Coil	3963-12 (12 V)	PTB 01 ATEX 2085		✓	✓	✓	
	Coil	3963-13 (24 V)	PTB 01 ATEX 2085		✓	✓	✓	
	Coil	3964-11 (6 V)	PTB 02 ATEX 2047		✓			
	Coil	3964-12 (12 V)	PTB 02 ATEX 2047		✓	✓	✓	
	Coil	3964-13 (24 V)	PTB 02 ATEX 2047		✓	✓	✓	
Seitz	Pilot valve	PV 12F73 Ci oH	PTB 99 ATEX 2146		✓	✓	✓	
	Pilot valve	PV 12F73 Xi oH	PTB 00 ATEX 2030		✓	✓	✓	
	Pilot valve	PV 12F73 Xi oH-2	PTB 00 ATEX 2030		✓	✓	✓	
	Solenoid	11 G 52	PTB 01 ATEX 2020				✓	

SIL principles (functional safety)

Safety-related function for the Ex area

The term SIL (Safety Integrity Level) is becoming more and more significant in the field of process engineering. It defines the requirements that a device or a system is expected to fulfill so that the failure probability can be specified. The aim is to achieve maximum possible operational reliability. If a device or system fails, a defined state is attained. Standard-based inspections are carried out to determine statistical probability.

Application of SIL on the basis of EN 61508 and EN 61511

The SIL standard is used for a wide range of industries within the process industry, including the chemical industry, refineries, oil and gas production, paper manufacturing, and conventional power generation. In addition to functional safety requirements, systems in potentially explosive areas are also subject to the Ex standards EN 60079-0 ff.

EN 61508 standard: "Functional safety of electrical/electronic/programmable electronic safety-related systems"

This standard describes the requirements that the manufacturer has to bear in mind when producing devices or systems.

EN 61511 standard: "Functional safety - Safety instrumented systems for the process industry sector"

The EN 61511 standard describes the requirements for achieving systems with functional safety.

Compliance with the standard is determined by operators, owners, and planners on the basis of safety plans and national regulations. In addition, the standard also describes the requirements for using a device in an application on the basis of its proven effectiveness (proven in use).

SIL designation on devices

The products in the MACX range from Phoenix Contact, which have been developed in accordance with EN 61508, are labeled with the designation SIL2 or SIL3. This indicates clearly that the devices are potentially suitable for safety instrumented functions (SIF).

To determine whether they can actually be used, you need to calculate the sum of the probability failure values for all the devices in the signal circuit. The values required for this can be found in the safety manual accompanying any SIL product.

Overview of terms from SIL standards EN 61508 and EN 61511

SIL — **Safety Integrity Level**
One of four discrete levels for the specification of requirements for the safety integrity of safety instrumented functions, which are assigned to the E/E/PE safety instrumented systems, where SIL 4 is the highest and SIL 1 the lowest level.

EUC — **Equipment Under Control**
Equipment, machines, devices or systems used in production, processing of materials, and transport.

MTBF — **Mean Time Between Failures**
The expected mean time between failures.

PFD — **Probability of Failure on Demand**
The probability of a failure on demand.
This describes the probability of a safety instrumented system failing to perform its function when required.

PFDavg — **Average Probability of Failure on Demand**
The average probability of the function failing on demand.

E/E/PES — **Electrical/Electronic/Programmable Electronic Systems**
This term is used for all electrical devices or systems which can be used to execute a safety instrumented function. It includes straightforward electrical devices and all types of programmable logic controllers (PLC).

PFH — **Probability of dangerous Failure per Hour**
Describes the probability of a dangerous failure occurring per hour.

SFF — **Safe Failure Fraction**
Describes the proportion of harmless failures. This is the ratio of the rate of safe failures plus the rate of diagnosed or detected faults to the total rate of failures of the system.

SIF — **Safety Instrumented Function**
Describes the safety instrumented functions of a system.

SIS — **Safety Instrumented System**
An SIS (safety instrumented system) is made up of one or more safety instrumented functions. An SIL requirement is applicable for each of these safety instrumented functions.

SIL inspection

The complete signal path must be taken into account during the SIL inspection. The example shows how estimates are made using average failure probabilities of individual devices in a typical safety-related application.

Table 2 of the EN 61508-1 standard describes the relationship between the average failure probability and the attainable SIL. Here, the level required determines the overall budget for the sum of all PFD values.

A system with a single-channel structure with a low demand rate has been taken as an example; the average PFD value lies between 10^{-3} and $< 10^{-2}$.

Safety Integrity Level SIL	Operating mode with a low demand rate (average probability of the specified function failing on demand)
4	$\geq 10^{-5}$ to $< 10^{-4}$
3	$\geq 10^{-4}$ to $< 10^{-3}$
2	$\geq 10^{-3}$ to $< 10^{-2}$
1	$\geq 10^{-2}$ to $< 10^{-1}$

Safety Integrity Level: Limit values for failures for a safety function which is operated in a mode with a low demand rate.

The INTERFACE Analog and INTERFACE Ex product ranges include products that meet the requirements for explosion protection as well as functional safety.

Example:

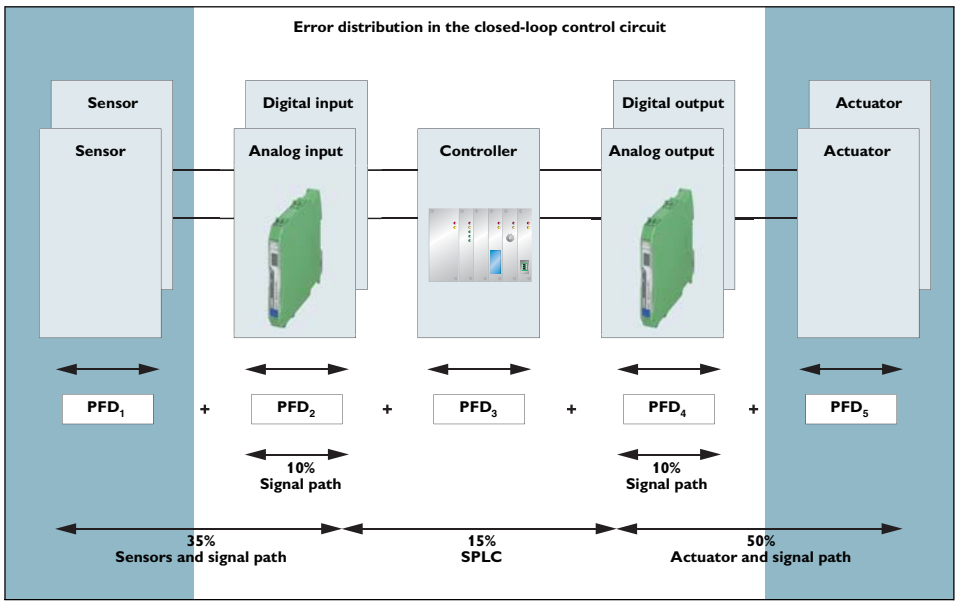
A sensor and actuator are assembled in the field and are exposed to chemical and physical loads (process medium, pressure, temperature, vibration, etc.). Accordingly, these components have a high risk of failure:

- The sensor accounts for 25% of the overall PFD
- The actuator accounts for 40% of the overall PFD

Neither the failsafe controller nor the interface modules come into contact with the process medium and they are usually located in a protected control cabinet:

- The failsafe controller accounts for 15% of the overall PFD
- Each of the interface modules accounts for 10% of the overall PFD

Typically, the values form the basis for a calculation.



MACX Analog Ex - The widest range in the narrowest of housings

Super compact with excellent technology -

That is the best way to sum up the MACX Analog Ex single-channel and two-channel signal isolators for intrinsically safe circuits in the Ex area. They ensure maximum system safety and explosion protection combined with minimum space requirements and installation effort.

The MACX Analog Ex series offers an extensive range of functions but boasts the narrowest of designs. When it comes to process control applications on systems that are subject to explosive atmospheres, all key signal forms and directions can be accommodated thanks to the following:

– Analog IN:
  HART-capable repeater power supplies/ input isolating amplifiers
– Analog OUT:
  HART-capable output isolating amplifiers
– Digital IN:
  NAMUR isolation amplifiers
– Digital OUT:
  Solenoid drivers
– Temperature:
  FDT/DTM-programmable temperature transducers
– Highly functional versions with wide-range power supply, for example

12.5 mm design width

The T-connector-compatible devices are bound to impress with their highly compact design width of just 12.5 mm. This saves up to 45% of the space available on the DIN rail compared to the conventional design widths of 16 to 22.5 mm previously associated with single- or two-channel modules.

Innovative circuit design

New patented circuit designs ensure precise transmission behavior and low current consumption. The minimal self-heating results in the longest possible service life.

Operational reliability

Consistent and safe electrical isolation between the input, output, and supply increases the operational reliability when faced with disturbances in the system.

Power bridging and diagnostics

Modular T-connectors, which are snapped into standard DIN rails as foot elements, are a convenient solution for bridging the power supply. Power can either be supplied directly using any compatible MACX Analog Ex device or can be supplied via the MACX MCR-PTB power module.

In addition, the power module can be used to set up a redundant supply voltage and indicates line faults affecting the connected devices. Integrated protection against polarity reversal prevents the devices being snapped on incorrectly and a stable metal foot catch holds them securely in place.

Plug-in connection method

For service-friendly installation.

– Choice of screw or spring-cage connection (PIT)
– Keying with clear identification
– Integrated sockets for connection to HART communicators, for example

Configuration

All DIP switches and configuration interfaces are accessible from the front and are located behind a pivoting transparent cover for protection. The programmable temperature transducers can be configured using FTD/DTM-based software both during actual operation and when they are de-energized.

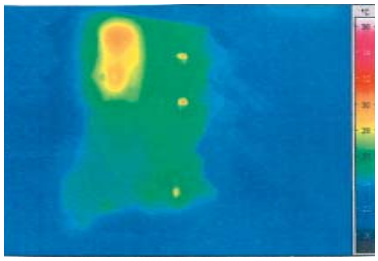
Labeling

Various labeling options are available by using a MARKING system, e.g., self-adhesive UniCard markers.

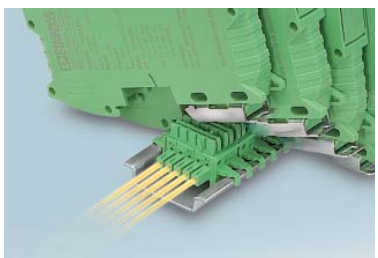
Approvals

The devices have been approved in accordance with the latest ATEX and IECEx standards for installation in Ex Zone 2 and for Ex i circuits up to Ex Zone 0 (gas) and 20 (dust).

SIL2/3 approvals according to IEC 61508 mean the products can be used in safety-related applications.


Innovative circuit design

Operational reliability

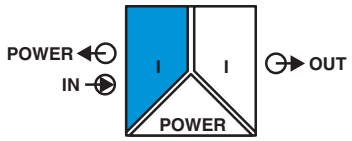

Power bridging and diagnostics

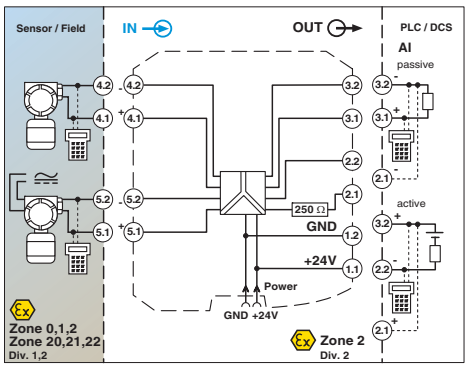
Connection method

Configuration

Approvals

Analog IN
Repeater power supply, Ex i





Repeater power supply and input isolating amplifier

Repeater power supply and input isolating amplifier for the operation of intrinsically safe (Ex i) 2-wire measuring transducers, 4-wire measuring transducers, and mA current sources installed in Ex areas.

- Input 0/4 ... 20 mA, [Ex ia] IIC (feeding or non-feeding)
- 0/4 ... 20 mA output (active or passive)
- Bidirectional transmission of digital HART communication signals
- Plug-in screw or spring-cage connection method (PIT), with integrated sockets for HART communicators
- Terminal point with 250 Ω resistor to increase the HART impedance in the case of low-impedance systems
- 3-way electrical isolation
- Power supply via DIN rail connector possible
- Up to SIL 2 according to EN 61508
- Installation in Zone 2, protection type "n" (EN 60079-15) permitted

Notes:

Information about the supply and error evaluation module as well as about the DIN rail connectors and marking material can be found from page 459

cULus / Applied for: GL
Ex: Ex cULus
Housing width 12.5 mm

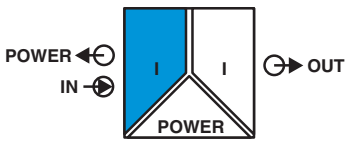
Technical data

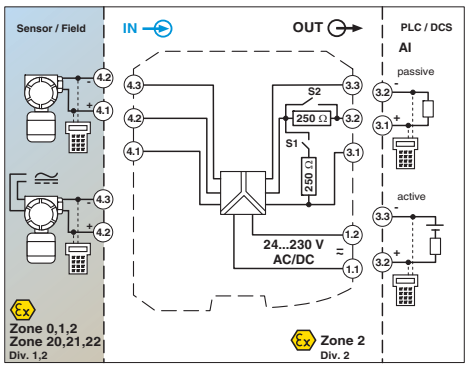
Input data	
Input signal	0 mA ... 20 mA / 4 mA ... 20 mA
Transmitter supply voltage	> 16 V (at 20 mA)
Voltage drop	< 3.5 V (in input isolating amplifier operation)
Output data	
Output signal	0 mA ... 20 mA (active) 4 mA ... 20 mA (active) 0 mA ... 20 mA (14 ... 26 V ext. source voltage) 4 mA ... 20 mA (14 ... 26 V ext. source voltage)
Load	< 600 Ω
Output ripple	< 20 mV_{rms}
General data	
Supply voltage range	19.2 V DC ... 30 V DC
Current consumption	< 60 mA (at 24 V DC)
Power dissipation	< 1.1 W (at 24 V DC / 20 mA)
Temperature coefficient	< 0.01%/K
Step response (10 - 90%)	< 600 µs (for 4 mA ... 20 mA step)
Transmission error, typical	< 0.05% (of final value)
Maximum transmission error	< 0.1% (of final value)
Under-/overload range	as per NE 43
Electrical isolation	
Input/output/power supply	2.5 kV (50 Hz, 1 min., test voltage) 300 V_{rms} (Rated insulation voltage, surge voltage category II, pollution degree 2, safe isolation as per EN 61010, EN 50178)
Input/output	375 V (Peak value in accordance with EN 60079-11)
Input/power supply	375 V (Peak value in accordance with EN 60079-11)
Ambient temperature range	-20°C ... 60°C (Any mounting position)
Humidity	10% ... 95% (no condensation)
Status indication	Green LED (supply voltage)
SMART communication	Yes
Signal bandwidth	as per HART specifications
Protocols supported	HART
Housing material	PA 66-FR
Inflammability class according to UL 94	V0
Dimensions W / H / D	12.5 / 99 / 114.5 mm
Screw connection solid / stranded / AWG	0.2 ... 2.5 mm^2 / 0.2 ... 2.5 mm^2 / 24 - 14
Spring-cage connection solid / stranded / AWG	0.2 ... 1.5 mm^2 / 0.2 ... 1.5 mm^2 / 24 - 16
Safety data as per ATEX	
Max. voltage U_o	25.2 V
Max. current I_o	93 mA
Max. power P_o	587 mW
Maximum voltage U_m	253 V AC (125 V DC)
Conformance/approvals	
Conformance	CE-compliant, additionally EN 61326
ATEX	Ex II (1)G [Ex ia] IIC/IIB Ex II (1) D [Ex iaD] Ex II 3 (1)G Ex nA [ia] IIC/IIB T4
IECEx	[Ex ia] IIC/IIB; [Ex iaD]; Ex nA [ia] IIC/IIB T4
UL, USA/Canada	Class I Div 2; IS for Class I, II, III Div 1
Functional safety (SIL)	SIL 2 according to EN 61508

Ordering data

Description	Type	Order No.	Pcs. / Pkt.
Repeater power supply, smart, intrinsically safe input			
Screw connection	**MACX MCR-EX-SL-RPSSI-I**	**2865340**	1
Spring-cage conn.	**MACX MCR-EX-SL-RPSSI-I-SP**	**2924016**	1

Analog IN
Repeater power supply with wide range power supply, Ex i





Repeater power supply and input isolating amplifier, wide-range power supply

/ Applied for: GL
Ex:
Housing width 17.5 mm

Repeater power supply and input isolating amplifier for the operation of intrinsically safe (Ex i) 2-wire measuring transducers, 4-wire measuring transducers, and mA current sources installed in Ex areas.

- Input 0/4...20 mA, [Ex ia] IIC (feeding or non-feeding)
- Output 0/4...20 mA (active or passive), 0/1...5 V, can be switched via the DIP switch
- Bidirectional transmission of digital HART communication signals
- Plug-in screw or spring-cage connection method (PIT), with integrated sockets for HART communicators
- 250 Ω resistor that can be activated via DIP switches to increase the HART impedance in the case of low-impedance systems
- 3-way electrical isolation
- Wide-range power supply: 19.2 ... 253 V AC/DC
- Up to SIL 2 according to EN 61508
- Installation in Zone 2, protection type "n" (EN 60079-15) permitted

Technical data

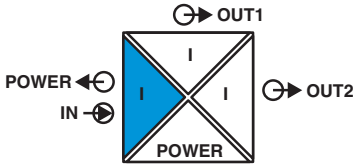
Input data	
Input signal	0 mA ... 20 mA / 4 mA ... 20 mA
Transmitter supply voltage	> 16 V (at 20 mA)
Voltage drop	< 3.5 V (in input isolating amplifier operation)
Output data	
Output signal (configurable using the DIP switch)	0 mA ... 20 mA (active) 4 mA ... 20 mA (active) 0 mA ... 20 mA (14 ... 26 V ext. source voltage) 4 mA ... 20 mA (14 ... 26 V ext. source voltage) 0 V ... 5 V (internal resistance, 250 Ω, 0.1%) 1 V ... 5 V (internal resistance, 250 Ω, 0.1%)
Load	< 600 Ω (I output)
Output ripple	< 20 mV_{rms}
General data	
Supply voltage range	24 V AC/DC ... 230 V AC/DC (-20%/+10%, 50/60 Hz)
Current consumption	< 80 mA (at 24 V DC)
Power dissipation	< 1.6 W
Temperature coefficient	< 0.01%/K
Step response (10 - 90%)	< 600 µs (for 4 mA ... 20 mA step)
Transmission error, typical	< 0.05% (of final value)
Maximum transmission error	< 0.1% (of final value)
Under-/overload range	as per NE 43
Electrical isolation	
Input/output/power supply	2.5 kV (50 Hz, 1 min., test voltage) 300 V_{rms} (Rated insulation voltage, surge voltage category II, pollution degree 2, safe isolation as per EN 61010, EN 50178)
Input/output	375 V (Peak value in accordance with EN 60079-11)
Input/power supply	375 V (Peak value in accordance with EN 60079-11)
Ambient temperature range	-20°C ... 60°C (Any mounting position)
Humidity	10% ... 95% (no condensation)
Status indication	Green LED (supply voltage)
SMART communication	Yes
Signal bandwidth	as per HART specifications
Protocols supported	HART
Housing material	PA 66-FR
Inflammability class according to UL 94	V0
Dimensions W / H / D	17.5 / 99 / 114.5 mm
Screw connection solid / stranded / AWG	0.2 ... 2.5 mm^2 / 0.2 ... 2.5 mm^2 / 24 - 14
Spring-cage connection solid / stranded / AWG	0.2 ... 1.5 mm^2 / 0.2 ... 1.5 mm^2 / 24 - 16
Safety data as per ATEX	
Max. voltage U_o	25.2 V
Max. current I_o	93 mA
Max. power P_o	587 mW
Maximum voltage U_m	253 V AC (125 V DC)
Conformance/approvals	
Conformance	CE-compliant, additionally EN 61326
ATEX	II (1)G [Ex ia] IIC/IIB II (1) D [Ex iaD] II 3 (1)G Ex nA [ia] IIC/IIB T4
IECEx	[Ex ia] IIC/IIB; [Ex iaD]; Ex nA [ia] IIC/IIB T4
UL, USA/Canada	Class I Div 2; IS for Class I, II, III Div 1
Functional safety (SIL)	SIL 2 according to EN 61508

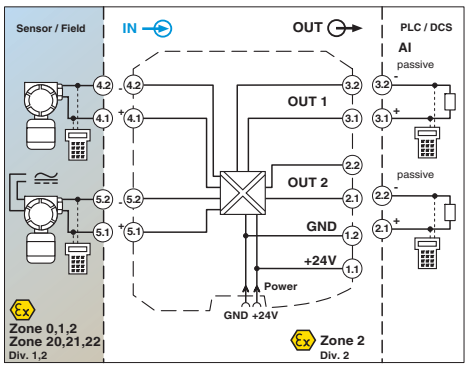
Ordering data

Description	Type	Order No.	Pcs. / Pkt.
Repeater power supply, smart, intrinsically safe input			
Screw connection	**MACX MCR-EX-SL-RPSSI-I-UP**	**2865793**	1
Spring-cage conn.	**MACX MCR-EX-SL-RPSSI-I-UP-SP**	**2924029**	1

N

Analog IN
Repeater power supply, Ex i





Repeater power supply and input isolating amplifier, with two electrically isolated outputs

Repeater power supply and input isolating amplifier for the operation of intrinsically safe (Ex i) 2-wire measuring transducers, 4-wire measuring transducers, and mA current sources installed in Ex areas.

- Input 0/4...20 mA, [Ex ia] IIC (feeding or non-feeding)
- Two electrically isolated 0/4 ... 20 mA (active) outputs
- Bidirectional transmission of digital HART communication signals (both outputs)
- Plug-in screw or spring-cage connection method (PIT), with integrated sockets for HART communicators
- 4-way electrical isolation
- Power supply via DIN rail connector possible
- Up to SIL 2 according to EN 61508
- Installation in Zone 2, protection type "n" (EN 60079-15) permitted

Notes:

Information about the supply and error evaluation module as well as about the DIN rail connectors and marking material can be found from page 459

Housing width 12.5 mm

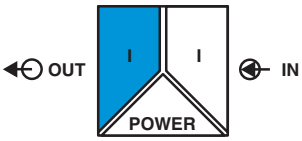
Technical data

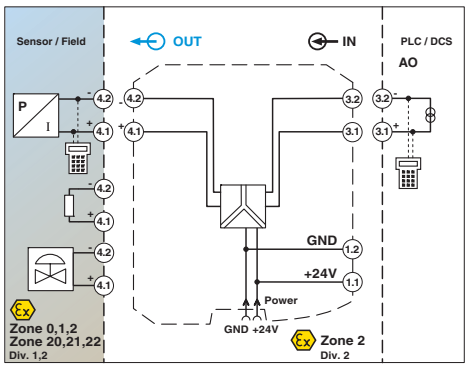
Input data	
Input signal	4 mA ... 20 mA / 0 mA ... 20 mA
Transmitter supply voltage	> 16 V (at 20 mA)
Voltage drop	< 3.9 V (in input isolating amplifier operation)
Output data	
Output signal (Per output)	0 mA ... 20 mA (active) 4 mA ... 20 mA (active)
Load	< 450 Ω (at 20 mA)
Output ripple	< 20 mV_{rms}
General data	
Supply voltage range	19.2 V DC ... 30 V DC (24 V DC (-20% ... +25%))
Current consumption	< 75 mA (24 V DC/ 20 mA)
Power dissipation	< 1.45 W (24 V DC/ 20 mA)
Temperature coefficient	< 0.01%/K
Step response (10 - 90%)	< 1.3 ms (for 4 mA ... 20 mA step)
Transmission error, typical	< 0.05% (of final value)
Maximum transmission error	< 0.1% (of final value)
Under-/overload range	as per NE 43
Electrical isolation	
Input/output/power supply	2.5 kV (50 Hz, 1 min., test voltage) 300 V_{rms} (Rated insulation voltage, surge voltage category II, pollution degree 2, safe isolation as per EN 61010, EN 50178)
Input/output	375 V (Peak value in accordance with EN 60079-11)
Input/power supply	375 V (Peak value in accordance with EN 60079-11)
Output 1/output 2	1.5 kV AC (50 Hz, 1 min., test voltage)
Ambient temperature range	-20°C ... 60°C (Any mounting position)
Status indication	Green LED (PWR supply voltage)
SMART communication (Per output)	Yes
Protocols supported	HART
Housing material	PA 66-FR
Dimensions W / H / D	12.5 / 99 / 114.5 mm
Screw connection solid / stranded / AWG	0.2 ... 2.5 mm^2 / 0.2 ... 2.5 mm^2 / 24 - 14
Spring-cage connection solid / stranded / AWG	0.2 ... 1.5 mm^2 / 0.2 ... 1.5 mm^2 / 24 - 16
Safety data as per ATEX	
Max. voltage U_o	25.2 V
Max. current I_o	93 mA
Max. power P_o	587 mW
Maximum voltage U_m	253 V AC (125 V DC)
Conformance/approvals	
Conformance	CE-compliant, additionally EN 61326
ATEX	Ex II (1)G [Ex ia] IIC/IIB Ex II (1) D [Ex iaD] Ex II 3 (1)G Ex nA [ia] IIC/IIB T4
IECEx	[Ex ia] IIC/IIB; [Ex iaD]; Ex nA [ia] IIC/IIB T4
Functional safety (SIL)	SIL 2 according to EN 61508

Ordering data

Description	Type	Order No.	Pcs. / Pkt.
Repeater power supply, smart, intrinsically safe input			
Screw connection	**MACX MCR-EX-SL-RPSSI-2I**	**2865366**	1
Spring-cage conn.	**MACX MCR-EX-SL-RPSSI-2I-SP**	**2924236**	1

Analog OUT
Output isolating amplifier, Ex i





Ex:
Housing width 12.5 mm

Output isolating amplifier for controlling intrinsically safe (Ex i) I/P converters, control valves, and indicators installed in Ex areas.

- 0/4...20 mA input
- 0/4...20 mA output, [Ex ia] IIC
- Bidirectional transmission of digital HART communication signals
- Plug-in screw or spring-cage connection method (PIT), with integrated sockets for HART communicators
- Line fault detection (LFD)
- 3-way electrical isolation
- Power supply via DIN rail connector possible
- Up to SIL 2 according to EN 61508
- Installation in Zone 2, protection type "n" (EN 60079-15) permitted

Notes:

Information about the supply and error evaluation module as well as about the DIN rail connectors and marking material can be found from page 459

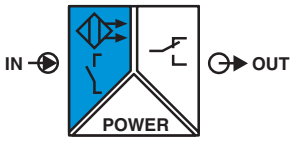
Technical data

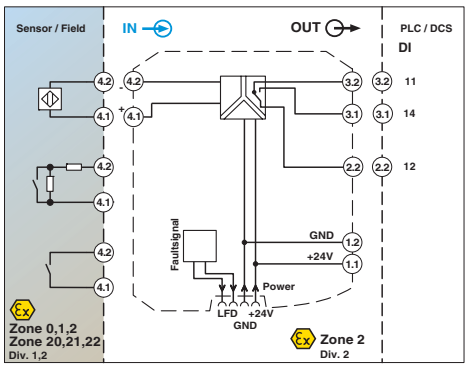
Input data	
Input signal	0 mA ... 20 mA / 4 mA ... 20 mA
Input voltage	5.4 V (at 20 mA)
Input impedance in the event of a cable break at the output	> 100 kΩ (If there is a line fault)
Output data	
Output signal	0 mA ... 20 mA / 4 mA ... 20 mA
Load	< 800 Ω (at 20 mA)
Output ripple	< 20 mV_{rms}
General data	
Supply voltage range	19.2 V DC ... 30 V DC
Current consumption	< 46 mA (at 24 V DC / 20 mA)
Power dissipation	< 1.1 W (at 24 V DC / 20 mA)
Temperature coefficient	< 0.01%/K
Step response (10 - 90%)	< 140 µs
Maximum transmission error	< 0.1% (of final value)
Electrical isolation	
Input/output/power supply	1.5 kV (50 Hz, 1 min., test voltage) 300 V_{rms} (Rated insulation voltage, surge voltage category II, pollution degree 2, safe isolation as per EN 61010, EN 50178)
Input/output	375 V (Peak value in accordance with EN 60079-11)
Output/power supply	375 V (Peak value in accordance with EN 60079-11)
Ambient temperature range	-20°C ... 60°C (Any mounting position)
Humidity	10% ... 95% (no condensation)
Status indication	Green LED (supply voltage)
SMART communication	Yes
Signal bandwidth	as per HART specifications
Protocols supported	HART
Housing material	PA 66-FR
Inflammability class according to UL 94	V0
Dimensions W / H / D	12.5 / 99 / 114.5 mm
Screw connection solid / stranded / AWG	0.2 ... 2.5 mm^2 / 0.2 ... 2.5 mm^2 / 24 - 14
Spring-cage connection solid / stranded / AWG	0.2 ... 1.5 mm^2 / 0.2 ... 1.5 mm^2 / 24 - 16
Safety data as per ATEX	
Max. voltage U_o	27.7 V
Max. current I_o	92 mA
Max. power P_o	633 mW
Maximum voltage U_m	253 V AC (125 V DC)
Conformance/approvals	
Conformance	CE-compliant, additionally EN 61326
ATEX	II (1) GD [Ex ia] IIC Ex II 3 (1GD) G Ex nA [ia] IIC T4
IECEx	[Ex ia] IIC; Ex nA[ia] IIC T4
UL, USA/Canada	Class I Div 2; IS for Class I, II, III Div 1
Functional safety (SIL)	SIL 2 according to EN 61508

Ordering data

Description	Type	Order No.	Pcs. / Pkt.
Output isolating amplifier, smart, output intrinsically safe			
Screw connection	**MACX MCR-EX-SL-IDSI-I**	**2865405**	1
Spring-cage conn.	**MACX MCR-EX-SL-IDSI-I-SP**	**2924032**	1

Digital IN
NAMUR isolating amplifier, Ex i





Signal output: PDT relay

Ex:
Housing width 12.5 mm

NAMUR isolating amplifier for intrinsically safe operation of proximity sensors and mechanical contacts installed in Ex areas.

- Input for NAMUR proximity sensors (EN 60947-5-6), floating contacts or contacts with resistance circuit, [Ex ia] IIC
- Relay signal output (PDT)
- Reversible direction of action (operating current or closed-circuit current behavior)
- Line fault detection (LFD), can be activated/deactivated, error message signaled by red flashing LED with de-excitation of output relay
- Power supply and error indication possible via the DIN rail connector
- LED displays for indicating supply voltage, circuit state, and malfunctions to NAMUR NE 44
- 3-way electrical isolation
- Up to SIL 2 according to EN 61508
- Installation in Zone 2, protection type "n" (EN 60079-15) permitted

Notes:

Information about the supply and error evaluation module as well as about the DIN rail connectors and marking material can be found from page 459

Information about resistance circuits is provided on page 461

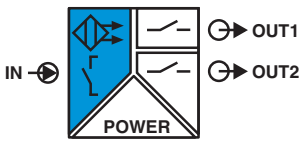
Technical data

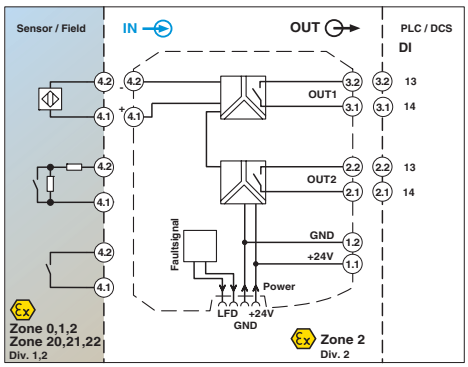
Input data	
Input signal	NAMUR proximity sensors (EN 60947-5-6) Floating switch contacts Switch contacts with resistance circuit
No-load voltage	8 V DC ±10%
Switching points	> 2.1 mA (conductive) / < 1.2 mA (blocking)
Switching hysteresis	< 0.2 mA
Line error detection	Break 0.05 mA < I_{IN} < 0.35 mA Short circuit 100 Ω < R_{Sensor} < 360 Ω
Switching output	**Relay output**
Contact type	1 PDT
Contact material	$AgSnO_2$, hard gold-plated
Max. switching voltage	250 V AC (2 A) / 120 V DC (0.2 A) / 30 V DC (2 A)
Max. switching capacity	500 VA
Recommended minimum load	5 V / 10 mA
Mechanical service life	10^7 cycles
Switching behavior	Can be inverted via slide switch
Max. switching frequency	20 Hz (without load)
General data	
Supply voltage range	19.2 V DC ... 30 V DC
Current consumption	21 mA (24 V DC)
Power dissipation	< 650 mW
Number of channels	1
Electrical isolation	
Input/output	375 V (Peak value in accordance with EN 60079-11)
Input/power supply	375 V (Peak value in accordance with EN 60079-11)
Input/supply, T-connector	300 V_{rms} (Rated insulation voltage, surge voltage category II, pollution degree 2, basic insulation as per EN 61010, EN 50178) 1.5 kV (50 Hz, 1 min., test voltage)
Output/input, supply, T-connector	300 V_{rms} (Rated insulation voltage, surge voltage category III, pollution degree 2, safe isolation as per EN 61010, EN 50178) 2.5 kV (50 Hz, 1 min., test voltage)
Ambient temperature range	-20°C ... 60°C (Any mounting position)
Humidity	10% ... 95% (no condensation)
Status indication	Green LED (supply voltage) Yellow LED (switching state) Red LED (line errors)
Housing material	PA 66-FR
Inflammability class according to UL 94	V0
Dimensions W / H / D	12.5 / 99 / 114.5 mm
Screw connection solid / stranded / AWG	0.2 ... 2.5 mm^2 / 0.2 ... 2.5 mm^2 / 24 - 14
Spring-cage connection solid / stranded / AWG	0.2 ... 1.5 mm^2 / 0.2 ... 1.5 mm^2 / 24 - 16
Safety data as per ATEX	
Max. voltage U_o	9.6 V
Max. current I_o	10 mA
Max. power P_o	25 mW
Maximum voltage U_m	253 V AC (125 V DC)
Conformance/approvals	
Conformance	CE-compliant, additionally EN 61326
ATEX	II (1) GD [Ex ia] IIC II 3 G Ex nAC IIC T4 X
IECEx	[Ex ia] IIC; [Ex iaD]; Ex nAC IIC T4 X
UL, USA/Canada	Class I Div 2; IS for Class I, II, III Div 1
Functional safety (SIL)	SIL 2 according to EN 61508

Ordering data

Description	Type	Order No.	Pcs. / Pkt.
NAMUR isolating amplifier, Single-channel, input intrinsically safe, output: PDT contact			
Screw connection	**MACX MCR-EX-SL-NAM-R**	**2865434**	1
Spring-cage conn.	**MACX MCR-EX-SL-NAM-R-SP**	**2924045**	1

Digital IN
NAMUR isolating amplifier, Ex i





2 signal outputs: N/O contact relay

Ex:
Housing width 12.5 mm

NAMUR isolating amplifier for intrinsically safe operation of proximity sensors and mechanical contacts installed in Ex areas.

- Input for NAMUR proximity sensors (EN 60947-5-6), floating contacts or contacts with resistance circuit, [Ex ia] IIC
- Two relay signal outputs (N/O contact); output 2 can be used as an error message output
- Reversible direction of action (operating current or closed-circuit current behavior)
- Line fault detection (LFD), can be activated/deactivated, error message signaled by red flashing LED with de-excitation of output relay
- Power supply and error indication possible via the DIN rail connector
- LED displays for indicating supply voltage, circuit state, and malfunctions to NAMUR NE 44
- 4-way electrical isolation
- Up to SIL 2 according to EN 61508
- Installation in Zone 2, protection type "n" (EN 60079-15) permitted

Notes:

Information about the supply and error evaluation module as well as about the DIN rail connectors and marking material can be found from page 459

Information about resistance circuits is provided on page 461

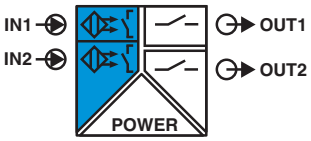
Technical data

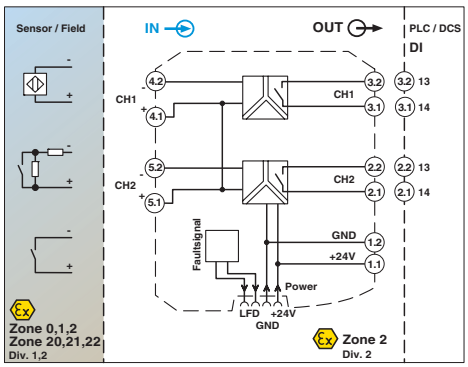
Input data	
Input signal	NAMUR proximity sensors (EN 60947-5-6) Floating switch contacts Switch contacts with resistance circuit
No-load voltage	8 V DC ±10%
Switching points	> 2.1 mA (conductive) / < 1.2 mA (blocking)
Switching hysteresis	< 0.2 mA
Line error detection	Break 0.05 mA < I_{IN} < 0.35 mA Short circuit 100 Ω < R_{Sensor} < 360 Ω
Switching output	**Relay output**
Contact type	2 N/O contacts
Contact material	$AgSnO_2$, hard gold-plated
Max. switching voltage	250 V AC (2 A) / 120 V DC (0.2 A) / 30 V DC (2 A)
Max. switching capacity	500 VA
Recommended minimum load	5 V / 10 mA
Mechanical service life	10^7 cycles
Switching behavior	Can be inverted via slide switch
Max. switching frequency	20 Hz (without load)
General data	
Supply voltage range	19.2 V DC ... 30 V DC
Current consumption	30 mA (24 V DC)
Power dissipation	< 950 mW
Number of channels	1
Electrical isolation	
Input/output	375 V (Peak value in accordance with EN 60079-11)
Input/power supply	375 V (Peak value in accordance with EN 60079-11)
Input/supply, T-connector	300 V_{rms} (Rated insulation voltage, surge voltage category II, pollution degree 2, basic insulation as per EN 61010, EN 50178) 1.5 kV (50 Hz, 1 min., test voltage)
Output 1/output 2/input, power supply, T-connector	300 V_{rms} (Rated insulation voltage, surge voltage category III, pollution degree 2, safe isolation as per EN 61010, EN 50178) 2.5 kV (50 Hz, 1 min., test voltage)
Ambient temperature range	-20°C ... 60°C (Any mounting position)
Humidity	10% ... 95% (no condensation)
Status indication	Green LED (supply voltage) Yellow LED (switching state) Red LED (line errors)
Housing material	PA 66-FR
Inflammability class according to UL 94	V0
Dimensions W / H / D	12.5 / 99 / 114.5 mm
Screw connection solid / stranded / AWG	0.2 ... 2.5 mm^2 / 0.2 ... 2.5 mm^2 / 24 - 14
Spring-cage connection solid / stranded / AWG	0.2 ... 1.5 mm^2 / 0.2 ... 1.5 mm^2 / 24 - 16
Safety data as per ATEX	
Max. voltage U_o	9.6 V
Max. current I_o	10 mA
Max. power P_o	25 mW
Maximum voltage U_m	253 V AC (125 V DC)
Conformance/approvals	
Conformance	CE-compliant, additionally EN 61326
ATEX	II (1) GD [Ex ia] IIC II 3 G Ex nAC IIC T4 X
IECEx	[Ex ia] IIC; [Ex iaD]; Ex nAC IIC T4 X
UL, USA/Canada	Class I Div 2; IS for Class I, II, III Div 1
Functional safety (SIL)	SIL 2 according to EN 61508

Ordering data

Description	Type	Order No.	Pcs. / Pkt.
NAMUR isolating amplifier, Single-channel, input intrinsically safe, output: 2 N/O contacts			
Screw connection	**MACX MCR-EX-SL-NAM-2RO**	**2865450**	1
Spring-cage conn.	**MACX MCR-EX-SL-NAM-2RO-SP**	**2924061**	1

Digital IN
NAMUR isolating amplifier, Ex i





2-channel, signal output: N/O contact relay

Ex:
Housing width 12.5 mm

NAMUR isolating amplifier for intrinsically safe operation of proximity sensors and mechanical contacts installed in Ex areas.

- 2-channel
- Input for NAMUR proximity sensors (EN 60947-5-6), floating contacts or contacts with resistance circuit, [Ex ia] IIC
- Relay signal output (N/O contact)
- Reversible direction of action (operating current or closed-circuit current behavior)
- Line fault detection (LFD), can be activated/deactivated, error message signaled by red flashing LED with de-excitation of output relay
- Power supply and error indication possible via the DIN rail connector
- LED displays for indicating supply voltage, circuit state, and malfunctions to NAMUR NE 44
- 3-way electrical isolation
- Up to SIL 2 according to EN 61508
- Installation in Zone 2, protection type "n" (EN 60079-15) permitted

Notes:

Information about the supply and error evaluation module as well as about the DIN rail connectors and marking material can be found from page 459

Information about resistance circuits is provided on page 461

Technical data

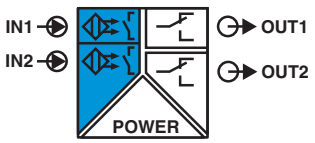
Input data	
Input signal	NAMUR proximity sensors (EN 60947-5-6) Floating switch contacts Switch contacts with resistance circuit
No-load voltage	8 V DC ±10%
Switching points	> 2.1 mA (conductive) / < 1.2 mA (blocking)
Switching hysteresis	< 0.2 mA
Line error detection	Break 0.05 mA < I_{IN} < 0.35 mA Short circuit 100 Ω < R_{Sensor} < 360 Ω
Switching output	**Relay output**
Contact type	2 N/O contacts
Contact material	$AgSnO_2$, hard gold-plated
Max. switching voltage	250 V AC (2 A) / 120 V DC (0.2 A) / 30 V DC (2 A)
Max. switching capacity	500 VA
Recommended minimum load	5 V / 10 mA
Mechanical service life	10^7 cycles
Switching behavior	Can be inverted via slide switch
Max. switching frequency	20 Hz (without load)
General data	
Supply voltage range	19.2 V DC ... 30 V DC
Current consumption	35 mA (24 V DC)
Power dissipation	< 1 W
Number of channels	2
Electrical isolation	
Input/output	375 V (Peak value in accordance with EN 60079-11)
Input/power supply	375 V (Peak value in accordance with EN 60079-11)
Input/supply, T-connector	300 V_{rms} (Rated insulation voltage, surge voltage category II, pollution degree 2, basic insulation as per EN 61010, EN 50178) 1.5 kV (50 Hz, 1 min., test voltage)
Output 1/output 2/input, power supply, T-connector	300 V_{rms} (Rated insulation voltage, surge voltage category III, pollution degree 2, safe isolation as per EN 61010, EN 50178) 2.5 kV (50 Hz, 1 min., test voltage)
Ambient temperature range	-20°C ... 60°C (Any mounting position)
Humidity	5% ... 95% (no condensation)
Status indication	Green LED (supply voltage) Yellow LED (switching state) Red LED (line errors)
Housing material	PA 66-FR
Inflammability class according to UL 94	V0
Dimensions W / H / D	12.5 / 99 / 114.5 mm
Screw connection solid / stranded / AWG	0.2 ... 2.5 mm^2 / 0.2 ... 2.5 mm^2 / 24 - 14
Spring-cage connection solid / stranded / AWG	0.2 ... 1.5 mm^2 / 0.2 ... 1.5 mm^2 / 24 - 16
Safety data as per ATEX	
Max. voltage U_o	9.6 V
Max. current I_o	10.3 mA
Max. power P_o	25 mW
Maximum voltage U_m	253 V AC (125 V DC)
Conformance/approvals	
Conformance	CE-compliant, additionally EN 61326
ATEX	II (1) GD [Ex ia] IIC II 3 G Ex nAC IIC T4 X
IECEx	[Ex ia] IIC; [Ex iaD]; Ex nAC IIC T4 X
UL, USA/Canada	Class I Div 2; IS for Class I, II, III Div 1
Functional safety (SIL)	SIL 2 according to EN 61508

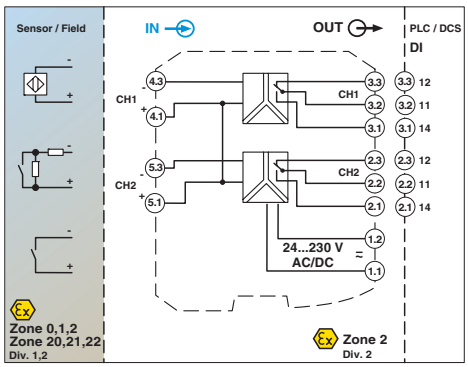
Ordering data

Description	Type	Order No.	Pcs. / Pkt.
NAMUR isolating amplifier, 2-channel, input intrinsically safe, output: N/O contact			
Screw connection	**MACX MCR-EX-SL-2NAM-RO**	**2865476**	1
Spring-cage conn.	**MACX MCR-EX-SL-2NAM-RO-SP**	**2924087**	1

N

Digital IN
NAMUR isolating amplifier, Ex i





2-channel, signal output: PDT relay, wide-range power supply

Ex: Ex
Applied for: UL listed / CUL listed / UL-EX LIS / CUL-EX LIS
Housing width 17.5 mm

NAMUR isolating amplifier for intrinsically safe operation of proximity sensors and mechanical contacts installed in Ex areas.

- 2-channel
- Input for NAMUR proximity sensors (EN 60947-5-6), floating contacts or contacts with resistance circuit, [Ex ia] IIC
- Relay signal output (PDT)
- Reversible direction of action (operating current or closed-circuit current behavior)
- Line fault detection (LFD), can be activated/deactivated, error message signaled by red flashing LED with de-excitation of output relay
- Wide-range power supply: 19.2 ... 253 V AC/DC
- LED displays for indicating supply voltage, circuit state, and malfunctions to NAMUR NE 44
- 3-way electrical isolation
- Up to SIL 2 according to EN 61508
- Installation in Zone 2, protection type "n" (EN 60079-15) permitted

Notes:

Information about resistance circuits is provided on page 461

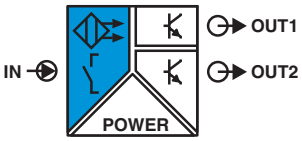
Technical data

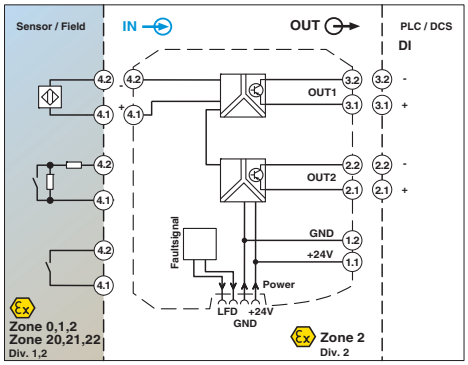
Input data	
Input signal	NAMUR proximity sensors (EN 60947-5-6) Switch contacts with open circuit Switch contacts with resistance circuit
No-load voltage	8 V DC ±10%
Switching points	> 2.1 mA (conductive) / < 1.2 mA (blocking)
Switching hysteresis	Approx. 0.2 mA
Line error detection	Break 0.05 mA < I_{IN} < 0.35 mA Short circuit 100 Ω < R_{Sensor} < 360 Ω
Switching output	**Relay output**
Contact type	1 PDT
Contact material	$AgSnO_2$, hard gold-plated
Max. switching voltage	250 V AC (2 A, 60 Hz) / 120 V DC (0.2 A) / 30 V DC (2 A)
Max. switching capacity	500 VA
Recommended minimum load	5 V / 10 mA
Mechanical service life	10^7 cycles
Switching behavior	can be inverted using DIP switch
Max. switching frequency	20 Hz (Load-dependent)
General data	
Supply voltage range	24 V DC ... 230 V AC/DC (-20% ... +10%, 50 ... 60 Hz)
Current consumption	< 80 mA; < 42 mA (24 V DC)
Power dissipation	Max. 1.3 W
Electrical isolation	
Input/output	375 V (Peak value in accordance with EN 60079-11)
Input/power supply	375 V (Peak value in accordance with EN 60079-11)
Input/supply, T-connector	300 V_{rms} (Rated insulation voltage, surge voltage category II, pollution degree 2, safe isolation as per EN 61010, EN 50178) 2.5 kV AC (50 Hz, 1 min., test voltage)
Output 1/output 2/input, power supply, T-connector	300 V_{rms} (Rated insulation voltage, surge voltage category III, pollution degree 2, safe isolation as per EN 61010, EN 50178) 2.5 kV (50 Hz, 1 min., test voltage)
Ambient temperature range	-20°C ... 60°C
Humidity	10% ... 95% (no condensation)
Housing material	PA 66-FR
Inflammability class according to UL 94	V0
Dimensions W / H / D	17.5 / 99 / 114.5 mm
Screw connection solid / stranded / AWG	0.2 ... 2.5 mm^2 / 0.2 ... 2.5 mm^2 / 24 - 14
Spring-cage connection solid / stranded / AWG	0.2 ... 1.5 mm^2 / 0.2 ... 1.5 mm^2 / 24 - 16
Safety data as per ATEX	
Max. voltage U_o	9.6 V
Max. current I_o	10.3 mA
Max. power P_o	25 mW
Maximum voltage U_m	253 V AC/DC (Supply terminals) 250 V AC (Output terminals) 120 V DC (Output terminals)
Conformance/approvals	
Conformance	CE-compliant, additionally EN 61326
ATEX	Ex II (1) G [Ex ia] IIC Ex II (1) D [Ex iaD] Ex II 3(1)G Ex nAC [ia] IIC T4 X
IECEx	[Ex ia] IIC; [Ex iaD]; Ex nAC [ia] IIC T4 X
Functional safety (SIL)	SIL 2 according to EN 61508

Ordering data

Description	Type	Order No.	Pcs. / Pkt.
NAMUR isolating amplifier, 2-channel, input intrinsically safe, output: Changeover contact			
Screw connection	**MACX MCR-EX-SL-2NAM-R-UP**	**2865984**	1
Spring-cage conn.	**MACX MCR-EX-SL-2NAM-R-UP-SP**	**2924249**	1

Digital IN
NAMUR isolating amplifier, Ex i





2 signal outputs: transistor (passive)

Ex:
Housing width 12.5 mm

NAMUR isolating amplifier for intrinsically safe operation of proximity sensors and mechanical contacts installed in Ex areas.

- Input for NAMUR proximity sensors (EN 60947-5-6), floating contacts or contacts with resistance circuit, [Ex ia] IIC
- 2 signal outputs: transistor (passive); up to 5 kHz
- Signal output 2 can also be used as a fault signaling output
- Reversible direction of action (operating current or closed-circuit current behavior)
- Line fault detection (LFD), can be activated/deactivated, error message signaled by red flashing LED with inhibiting of transistor output
- Power supply and error indication possible via the DIN rail connector
- LED displays for indicating supply voltage, circuit state, and malfunctions to NAMUR NE 44
- 4-way electrical isolation
- Up to SIL 2 according to EN 61508
- Installation in Zone 2, protection type "n" (EN 60079-15) permitted

Notes:

Information about the supply and error evaluation module as well as about the DIN rail connectors and marking material can be found from page 459

Information about resistance circuits is provided on page 461

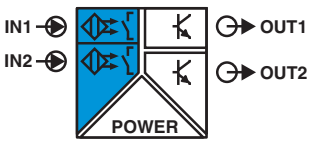
Technical data

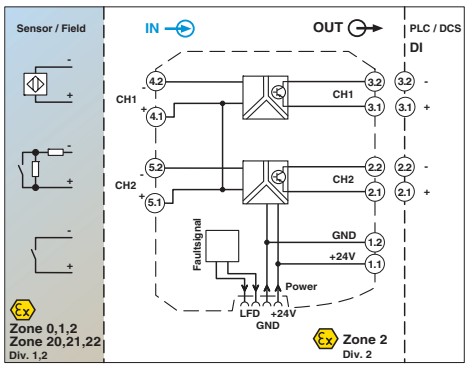
Input data	
Input signal	NAMUR proximity sensors (EN 60947-5-6) Floating switch contacts Switch contacts with resistance circuit
No-load voltage	8 V DC ±10%
Switching points	> 2.1 mA (conductive) / < 1.2 mA (blocking)
Line error detection	Break 0.05 mA < I_{IN} < 0.35 mA Short circuit 100 Ω < R_{Sensor} < 360 Ω
Switching output	2 transistor outputs, passive
Max. switching voltage	30 V DC (per output)
Max. switching current	50 mA (short-circuit-proof)
Drop (ΔU)	< 1.4 V
Switching behavior	can be inverted using DIP switch
Max. switching frequency	5 kHz
General data	
Supply voltage range	19.2 V DC ... 30 V DC
Current consumption	< 28 mA (24 V DC)
Power dissipation	800 mW
Number of channels	1
Electrical isolation	
Input/output	375 V (Peak value in accordance with EN 60079-11)
Input/supply, T-connector	375 V (Peak value in accordance with EN 60079-11)
Input/output, supply, T-connector	300 V_{rms} (Rated insulation voltage, surge voltage category II, pollution degree 2, safe isolation as per EN 61010, EN 50178) 2.5 kV (50 Hz, 1 min., test voltage)
Output/supply, T-connector	300 V_{rms} (Rated insulation voltage, surge voltage category II, pollution degree 2, safe isolation as per EN 61010, EN 50178) 1.5 kV (50 Hz, 1 min., test voltage)
Output 1/output 2	50 V_{rms} (Rated insulation voltage, surge voltage category II, pollution degree 2, safe isolation as per EN 61010, EN 50178) 1 kV (50 Hz, 1 min., test voltage)
Ambient temperature range	-20°C ... 60°C (Any mounting position)
Humidity	10% ... 95% (no condensation)
Status indication	Green LED (supply voltage) Yellow LED (switching state) Red LED (line errors)
Housing material	PA 66-FR
Inflammability class according to UL 94	V0
Dimensions W / H / D	12.5 / 99 / 114.5 mm
Screw connection solid / stranded / AWG	0.2 ... 2.5 mm^2 / 0.2 ... 2.5 mm^2 / 24 - 14
Spring-cage connection solid / stranded / AWG	0.2 ... 1.5 mm^2 / 0.2 ... 1.5 mm^2 / 24 - 16
Safety data as per ATEX	
Max. voltage U_o	9.6 V
Max. current I_o	10 mA
Max. power P_o	25 mW
Maximum voltage U_m	253 V AC (125 V DC)
Conformance/approvals	
Conformance	CE-compliant, additionally EN 61326
ATEX	II (1) GD [Ex ia] IIC II 3 G Ex nA II T4 X
IECEx	[Ex ia] IIC; [Ex iaD]; Ex nA II T4 X
UL, USA/Canada	Class I Div 2; IS for Class I, II, III Div 1
Functional safety (SIL)	SIL 2 according to EN 61508

Ordering data

Description	Type	Order No.	Pcs. / Pkt.
NAMUR isolating amplifier, input intrinsically safe, output: Transistor, passive			
Screw connection	**MACX MCR-EX-SL-NAM-2T**	**2865463**	1
Spring-cage conn.	**MACX MCR-EX-SL-NAM-2T-SP**	**2924074**	1

Digital IN
NAMUR isolating amplifier, Ex i





2-channel, signal output transistor (passive)

Ex:
Housing width 12.5 mm

NAMUR isolating amplifier for intrinsically safe operation of proximity sensors and mechanical contacts installed in Ex areas.

- 2-channel
- Input for NAMUR proximity sensors (EN 60947-5-6), floating contacts or contacts with resistance circuit, [Ex ia] IIC
- Signal output transistor (passive); up to 5 kHz
- Reversible direction of action (operating current or closed-circuit current behavior)
- Line fault detection (LFD), can be activated/deactivated, error message signaled by red flashing LED with inhibiting of transistor output
- Power supply and error indication possible via the DIN rail connector
- LED displays for indicating supply voltage, circuit state, and malfunctions to NAMUR NE 44
- 3-way electrical isolation
- Up to SIL 2 according to EN 61508
- Installation in Zone 2, protection type "n" (EN 60079-15) permitted

Notes:

Information about the supply and error evaluation module as well as about the DIN rail connectors and marking material can be found from page 459

Information about resistance circuits is provided on page 461

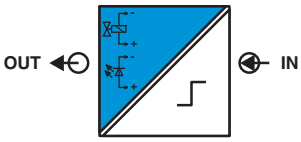
Technical data

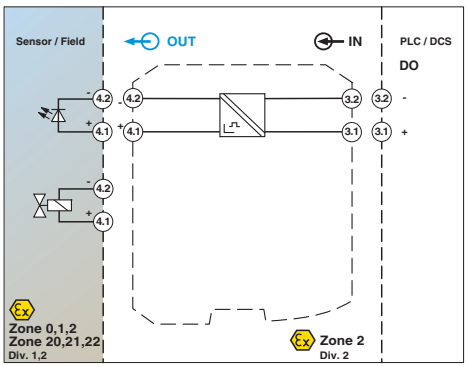
Input data	
Input signal	NAMUR proximity sensors (EN 60947-5-6) Floating switch contacts Switch contacts with resistance circuit
No-load voltage	8 V DC ±10%
Switching points	> 2.1 mA (conductive) / < 1.2 mA (blocking)
Line error detection	Break 0.05 mA < I_{IN} < 0.35 mA Short circuit 100 Ω < R_{Sensor} < 360 Ω
Switching output	Transistor output, passive
Max. switching voltage	30 V DC (per output)
Max. switching current	50 mA (short-circuit-proof)
Drop (ΔU)	< 1.4 V
Switching behavior	can be inverted using DIP switch
Max. switching frequency	5 kHz
General data	
Supply voltage range	19.2 V DC ... 30 V DC
Current consumption	< 34 mA (24 V DC)
Power dissipation	1000 mW
Number of channels	2
Electrical isolation	
Input/output	375 V (Peak value in accordance with EN 60079-11)
Input/supply, T-connector	375 V (Peak value in accordance with EN 60079-11)
Input/output, supply, T-connector	300 V_{rms} (Rated insulation voltage, surge voltage category II, pollution degree 2, safe isolation as per EN 61010, EN 50178) 2.5 kV (50 Hz, 1 min., test voltage)
Output/supply, T-connector	300 V_{rms} (Rated insulation voltage, surge voltage category II, pollution degree 2, safe isolation as per EN 61010, EN 50178) 1.5 kV (50 Hz, 1 min., test voltage)
Output 1/output 2	50 V_{rms} (Rated insulation voltage, surge voltage category II, pollution degree 2, safe isolation as per EN 61010, EN 50178) 1 kV (50 Hz, 1 min., test voltage)
Ambient temperature range	-20°C ... 60°C (Any mounting position)
Humidity	10% ... 95% (no condensation)
Status indication	Green LED (supply voltage) Yellow LED (switching state) Red LED (line errors)
Housing material	PA 66-FR
Inflammability class according to UL 94	V0
Dimensions W / H / D	12.5 / 99 / 114.5 mm
Screw connection solid / stranded / AWG	0.2 ... 2.5 mm^2 / 0.2 ... 2.5 mm^2 / 24 - 14
Spring-cage connection solid / stranded / AWG	0.2 ... 1.5 mm^2 / 0.2 ... 1.5 mm^2 / 24 - 16
Safety data as per ATEX	
Max. voltage U_o	9.6 V
Max. current I_o	10.3 mA
Max. power P_o	25 mW
Maximum voltage U_m	253 V AC (125 V DC)
Conformance/approvals	
Conformance	CE-compliant, additionally EN 61326
ATEX	II (1) GD [Ex ia] IIC II 3 G Ex nA II T4 X
IECEx	[Ex ia] IIC; [Ex iaD]; Ex nA II T4 X
UL, USA/Canada	Class I Div 2; IS for Class I, II, III Div 1
Functional safety (SIL)	SIL 2 according to EN 61508

Ordering data

Description	Type	Order No.	Pcs. / Pkt.
NAMUR isolating amplifier, 2-channel, input intrinsically safe, output: Transistor, passive			
Screw connection	**MACX MCR-EX-SL-2NAM-T**	**2865489**	1
Spring-cage conn.	**MACX MCR-EX-SL-2NAM-T-SP**	**2924090**	1

Digital OUT
Solenoid driver, Ex i





Current limitation 25 mA

Ex:
Housing width 12.5 mm

Solenoid drivers for controlling intrinsically safe solenoid valves, alarm transmitters, and indicators installed in Ex areas.

- 20 ... 30 V DC input
- Output [Ex ia] IIC / [Ex ia] IIB
- Various output characteristic curves compatible with the commercial solenoid valves
- Loop-powered: The required power is supplied via the control signal on the input side
- Mechanically compatible with DIN rail connector
- Galvanic 2-way isolation
- Up to SIL 3 as per EN 61508
- Installation in Zone 2, protection type "n" (EN 60079-15) permitted

Notes:

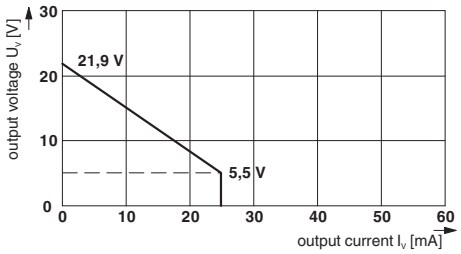
A list of suitable valves and notes for calculating a valve circuit are available from the download center at www.phoenixcontact.net/catalog.

Technical data

Input data	
Input signal	20 V DC ... 30 V DC
Input current	10 mA DC ... 70 mA DC (45 mA for U_e = 24 V DC)
Output data	
Output voltage	5.5 V DC (at 25 mA)
Current limitation	25 mA
No-load voltage	21.9 V DC
Internal resistance	641 Ω (Internal resistance R_i)
Immunity to short-circuiting	Yes
Response time t_A	20 ms
General data	
Power dissipation	< 1 W
Temperature coefficient	0.01%/K
Electrical isolation	
Input/output	2.5 kV (50 Hz, 1 min., test voltage) 375 V (Peak value in accordance with EN 60079-11) 300 V_{rms} (Rated insulation voltage, surge voltage category II, pollution degree 2, safe isolation as per EN 61010, EN 50178)
Ambient temperature range	-20°C ... 60°C (Any mounting position)
Humidity	10% ... 95% (no condensation)
Status indication	Yellow LED (switching state / status, lights up when output circuit is active)
Degree of protection	IP20
Housing material	PA 66-FR
Inflammability class according to UL 94	V0
Dimensions W / H / D	12.5 / 99 / 114.5 mm
Screw connection solid / stranded / AWG	0.2 ... 2.5 mm² / 0.2 ... 2.5 mm² / 24 - 14
Spring-cage connection solid / stranded / AWG	0.2 ... 1.5 mm² / 0.2 ... 1.5 mm² / 24 - 16
Safety data as per ATEX	
Max. voltage U_o	25.1 V
Max. current I_o	39 mA
Max. power P_o	245 mW
Maximum voltage U_m	253 V AC (125 V DC)
Conformance/approvals	
Conformance	CE-compliant, additionally EN 61326
ATEX	II (1) GD [Ex ia] IIC / IIB / IIA II 3 G Ex nA II T4 X
IECEx	[Ex ia] IIC/IIB/IIA; [Ex iaD]; Ex nA IIC T4 X
UL, USA/Canada	Class I Div 2; IS for Class I, II, III Div 1
Functional safety (SIL)	SIL 3

Ordering data

Description	Type	Order No.	Pcs. / Pkt.
Solenoid driver, loop-powered, output intrinsically safe			
Screw connection	**MACX MCR-EX-SL-SD-21-25-LP**	**2865492**	1
Spring-cage conn.	**MACX MCR-EX-SL-SD-21-25-LP-SP**	**2924113**	1



Current limitation 40 mA

Ex:
Housing width 12.5 mm

Technical data

20 V DC ... 30 V DC
10 mA ... 95 mA (65 mA for U_e = 24 V DC)

10 V DC (at 40 mA)
40 mA
21.9 V DC
287 Ω (Internal resistance R_i)
Yes
20 ms

< 1.2 W
0.01%/K

2.5 kV (50 Hz, 1 min., test voltage)
375 V (Peak value in accordance with EN 60079-11)
300 V_{rms} (Rated insulation voltage, surge voltage category II, pollution degree 2, safe isolation as per EN 61010, EN 50178)

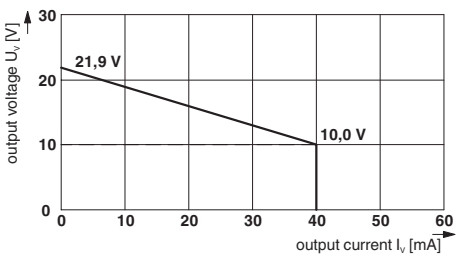
-20°C ... 60°C (Any mounting position)
10% ... 95% (no condensation)
Yellow LED (switching state / status, lights up when output circuit is active)
IP20
PA 66-FR
V0
12.5 / 99 / 114.5 mm
0.2 ... 2.5 mm^2 / 0.2 ... 2.5 mm^2 / 24 - 14
0.2 ... 1.5 mm^2 / 0.2 ... 1.5 mm^2 / 24 - 16

25.1 V
87 mA
550 mW
253 V AC (125 V DC)

CE-compliant, additionally EN 61326
II (1) GD [Ex ia] IIC / IIB / IIA
II 3 G Ex nA II T4 X
[Ex ia] IIC/IIB/IIA; [Ex iaD]; Ex nA IIC T4 X
Class I Div 2; IS for Class I, II, III Div 1
SIL 3

Ordering data

Type	Order No.	Pcs. / Pkt.
MACX MCR-EX-SL-SD-21-40-LP	**2865764**	1
MACX MCR-EX-SL-SD-21-40-LP-SP	**2924139**	1



Current limitation 48 mA

Ex:
Housing width 12.5 mm

Technical data

20 V DC ... 30 V DC
10 mA ... 95 mA (75 mA for U_e = 24 V DC)

10.5 V DC (at 48 mA)
48 mA
24 V DC
276 Ω (Internal resistance R_i)
Yes
30 ms

< 1.4 W
0.01%/K

2.5 kV (50 Hz, 1 min., test voltage)
375 V (Peak value in accordance with EN 60079-11)
300 V_{rms} (Rated insulation voltage, surge voltage category II, pollution degree 2, safe isolation as per EN 61010, EN 50178)

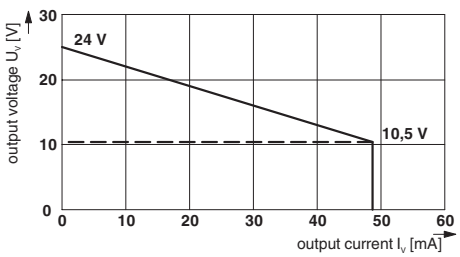
-20°C ... 60°C (Any mounting position)
10% ... 95% (no condensation)
Yellow LED (switching state / status, lights up when output circuit is active)
IP20
PA 66-FR
V0
12.5 / 99 / 114.5 mm
0.2 ... 2.5 mm^2 / 0.2 ... 2.5 mm^2 / 24 - 14
0.2 ... 1.5 mm^2 / 0.2 ... 1.5 mm^2 / 24 - 16

27.7 V
101 mA
697 mW
253 V AC (125 V DC)

CE-compliant, additionally EN 61326
II (1) GD [Ex ia] IIC / IIB / IIA
II 3 G Ex nA II T4 X
[Ex ia] IIC/IIB/IIA; [Ex iaD]; Ex nA IIC T4 X
Class I Div 2; IS for Class I, II, III Div 1
SIL 3

Ordering data

Type	Order No.	Pcs. / Pkt.
MACX MCR-EX-SL-SD-24-48-LP	**2865609**	1
MACX MCR-EX-SL-SD-24-48-LP-SP	**2924126**	1



Current limitation 58 mA, [Ex ia] IIB

Ex:
Housing width 12.5 mm

Technical data

20 V DC ... 30 V DC
10 mA ... 105 mA (95 mA for U_e = 24 V DC)

12.9 V DC (at 58 mA)
58 mA
21.9 V DC
133 Ω (Internal resistance R_i)
Yes
30 ms

< 1.4 W
0.01%/K

2.5 kV (50 Hz, 1 min., test voltage)
375 V (Peak value in accordance with EN 60079-11)
300 V_{rms} (Rated insulation voltage, surge voltage category II, pollution degree 2, safe isolation as per EN 61010, EN 50178)

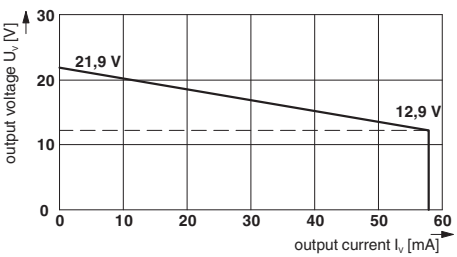
-20°C ... 60°C (Any mounting position)
10% ... 95% (no condensation)
Yellow LED (switching state / status, lights up when output circuit is active)
IP20
PA 66-FR
V0
12.5 / 99 / 114.5 mm
0.2 ... 2.5 mm^2 / 0.2 ... 2.5 mm^2 / 24 - 14
0.2 ... 1.5 mm^2 / 0.2 ... 1.5 mm^2 / 24 - 16

25.1 V
188 mA
1.18 W
253 V AC (125 V DC)

CE-compliant, additionally EN 61326
II (1) GD [Ex ia] IIB / IIA
II 3 G Ex nA II T4 X
[Ex ia] IIB/IIA; [Ex iaD]; Ex nA IIC T4 X
Class I Div 2; IS for Class I, II, III Div 1
SIL 3

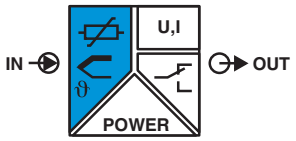
Ordering data

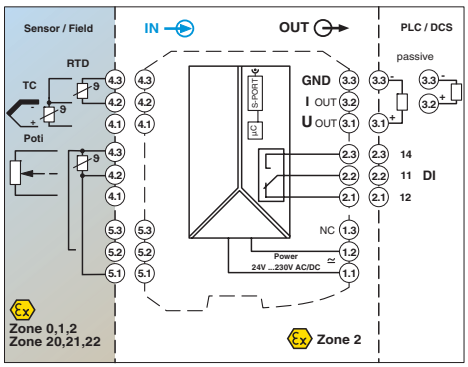
Type	Order No.	Pcs. / Pkt.
MACX MCR-EX-SL-SD-21-60-LP	**2865515**	1
MACX MCR-EX-SL-SD-21-60-LP-SP	**2924100**	1



Temperature transducer, Ex i

N





Universal, with switching output, wide-range power supply

Universal temperature transducer with freely configurable properties for intrinsically safe operation of resistance thermometers, thermocouples, resistance-type sensors, and potentiometers installed in Ex areas

- Input for resistance thermometers, thermocouples, resistance-type sensors, potentiometers, and mV sources, [Ex ia] IIC
- Measure differential temperatures
- Freely programmable input and output
- Option of inverse output signal ranges
- Relay switching output
- Configuration via software (FDT-DTM) or IFS-OP-UNIT operating and display unit
- Programming during operation with Ex measuring circuit connected and also voltage-free using IFS-USB-PROG-ADAPTER programming adapter
- Plug-in screw or spring-cage connection method (PIT)
- Cold junction compensation with separate connector
- Wide-range power supply: 19.2 ... 253 V AC/DC
- Status indicator for supply voltage, cable, sensor, and module errors
- Up to SIL 2 according to EN 61508
- Installation in Zone 2, protection type "n" (EN 60079-15) permitted

Notes:
To order a product with an order configuration, enter the required configuration by referring to the adjacent order key.
The IFS-CONF configuration software can be downloaded from the Internet (www.phoenixcontact.com).
Information on the IFS-OP-UNIT operating and display unit and the associated IFS-OP-CRADLE DIN rail cradle can be found on page 392

Housing width 17.5 mm

Technical data

Input data		
Resistance thermometers	Pt, Ni, Cu sensors: 2-, 3-, 4-wire	
Thermocouple sensors	B, E, J, K, N, R, S, T, L, U, CA, DA, A1G, A2G, A3G, MG, LG	
Resistor	0 Ω ... 50 kΩ	
Potentiometer	0 Ω ... 50 kΩ	
Voltage	-1000 mV ... 1000 mV	
Output data	U output	I output
Output signal	4 mA ... 20 mA (with SIL, others can be configured using software)	
Maximum output signal	±11 V	22 mA
Load R_B	≥ 10 kΩ	≤ 600 Ω (at 20 mA)
Behavior in the event of a sensor error	According to NE 43 or freely configurable	
Switching output	Switching output	
Contact type	1 PDT	
Contact material	$AgSnO_2$, hard gold-plated	
Max. switching voltage	30 V AC (30 V DC)	
Max. switching current	0.5 A (30 V AC) / 1 A (30 V DC)	
General data		
Supply voltage range	24 V ... 230 V AC/DC (-20%/+10%, 50/60 Hz)	
Power consumption	< 1.5 W	
Temperature coefficient	0.01%/K	
Transmission error, total	0.1% (PT100, 20 K min. span)	
Electrical isolation		
Input/output	375 V (Peak value in accordance with EN 60079-11)	
Input/power supply	375 V (Peak value in accordance with EN 60079-11)	
Input/switching output	375 V (Peak value in accordance with EN 60079-11)	
Output/power supply	300 V_{rms} (Rated insulation voltage, surge voltage category II, pollution degree 2, safe isolation as per EN 61010, EN 50178)	
Ambient temperature range	-20°C ... 65°C	
Humidity	Typ. 5% ... 95% (no condensation)	
Housing material	PA 66-FR	
Inflammability class according to UL 94	V0	
Dimensions W / H / D	17.5 / 99 / 114.5 mm	
Screw connection solid / stranded / AWG	0.2 ... 2.5 mm^2 / 0.2 ... 2.5 mm^2 / 24 - 14	
Spring-cage connection solid / stranded / AWG	0.2 ... 1.5 mm^2 / 0.2 ... 1.5 mm^2 / 24 - 16	
Safety data as per ATEX		
Max. voltage U_o	6 V	
Max. current I_o	7.4 mA	
Max. power P_o	11 mW	
Conformance/approvals		
Conformance	CE-compliant	
ATEX	Ex II (1) G [Ex ia] IIC Ex II (1) D [Ex iaD] Ex II 3 G Ex nAC ic IIC / IIB / IIA T4 X	
IECEx	[Ex ia] IIC; [Ex iaD]; Ex nAC IIC T4 X	
Functional safety (SIL)	SIL 2	

Ordering data

Description		Type	Order No.	Pcs. / Pkt.
Temperature transducer, intrinsically safe input				
Standard configuration	Screw connection	**MACX MCR-EX-T-UI-UP**	**2865654**	1
Standard configuration	Spring-cage conn.	**MACX MCR-EX-T-UI-UP-SP**	**2924689**	1
Order configuration	Screw connection	**MACX MCR-EX-T-UI-UP-C**	**2811763**	1
Order configuration	Spring-cage conn.	**MACX MCR-EX-T-UI-UP-SP-C**	**2924692**	1

Accessories

Programming adapter with USB interface, for programming with the IFS-CONF software	**IFS-USB-PROG-ADAPTER**	**2811271**	1

Order key for temperature transducer MACX-MCR-EX-T-UI-UP(-SP)-C (standard configuration entered as an example)

Order No.	Safety Integrity Level (SIL)	Sensor type	Connection method	Cold junction compensation	Measuring range: Start	Measuring range: End	Measuring unit	Output range	Factory calibration certificate = FCC
2811763 /	ON /	PT100 /	4 /	0 /	-50 /	150 /	C /	OUT02 /	NONE
2811763 ≙ MACX MCR-EX-T-UI-UP-C 2924692 ≙ MACX MCR-EX-T-UI-UP-SP-C	ON ≙ active NONE ≙ not active ON only with output range = OUT02	See below	2 ≙ 2-wire 3 ≙ 3-wire 4 ≙ 4-wire	0 ≙ off, e.g., with RTD, R, potentiometer, mV 1 ≙ on, e.g., with TC	See below	See below	C ≙ °C F ≙ °F O ≙ Ω P ≙ % V ≙ mV	OUT15 ≙ 0...5 mA OUT16 ≙ 0...10 mA OUT01 ≙ 0...20 mA OUT15 ≙ 0...5 mA OUT25 ≙ 1...5 mA OUT26 ≙ 2...10 mA OUT02 ≙ 4...20 mA OUT05 ≙ 0...5 V OUT03 ≙ 0...10 V OUT06 ≙ 1...5 V OUT04 ≙ 2...10 V OUT13 ≙ -5...+5 V OUT14 ≙ -10...+10 V others freely configurable in the software	NONE ≙ without FCC YES ≙ with FCC (a fee is charged) YESPLUS ≙ Factory calibration certificate with 5 measuring points (a fee is charged)

						Smallest measuring range
Resistance thermometers RTD Others can be selected or are freely configured in the software.	PT100 ≙ Pt 100 acc. to IEC/EN 60751	-200	850	°C		20 K
	PT200 ≙ Pt 200 acc. to IEC/EN 60751	-200	850	°C		20 K
	PT500 ≙ Pt 500 acc. to IEC/EN 60751	-200	850	°C		20 K
	PT1000 ≙ Pt 1000 acc. to IEC/EN 60751	-200	850	°C		20 K
	PT100S ≙ Pt 100 acc. to Sama RC21-4-1966	-200	850	°C		20 K
	PT1000S ≙ Pt 1000 acc. to Sama RC21-4-1966	-200	850	°C		20 K
	PT100G ≙ Pt 100 acc. to GOST 6651	-200	850	°C		20 K
	PT1000G ≙ Pt 1000 acc. to GOST 6651	-200	850	°C		20 K
	PT100J ≙ Pt 100 acc. to JIS C1604/1997	-200	850	°C		20 K
	PT1000J ≙ Pt 1000 acc. to JIS C1604/1997	-200	850	°C		20 K
	NI100 ≙ Ni 100 acc. to DIN 43760/DIN IEC 60751	-60	250	°C		20 K
	NI1000 ≙ Ni 1000 acc. to DIN 43760/DIN IEC 60751	-60	250	°C		20 K
	NI100S ≙ Ni 100 acc. to Sama RC21-4-1966	-60	180	°C		20 K
	NI1000S ≙ Ni 1000 acc. to Sama RC21-4-1966	-60	180	°C		20 K
	NI1000L ≙ Ni 1000 (Landis & Gyr)	-50	160	°C		20 K
	CU10 ≙ Cu 10 acc. to Sama RC21-4-1966	-70	500	°C		100 K
	CU50 ≙ Cu 50/Cu 100 acc. to GOST 6651 (α = 1.428)	-50	200	°C		100 K
	CU53 ≙ Cu 53 acc. to GOST 6651 (α = 1.428)	-50	180	°C		100 K
	KTY81 ≙ KTY81-110 (Philips)	-55	150	°C		20 K
	KTY84 ≙ KTY84-130 (Philips)	-40	300	°C		20 K
Thermocouples TC Others can be selected in the software.	B ≙ acc. to IEC/EN 60584 (Pt30Rh-Pt6Rh)	500	1820	°C		50 K
	E ≙ acc. to IEC/EN 60584 (NiCr-CuNi)	-230	1000	°C		50 K
	J ≙ acc. to IEC/EN 60584 (Fe-CuNi)	-210	1200	°C		50 K
	K ≙ acc. to IEC/EN 60584 (NiCr-Ni)	-250	1372	°C		50 K
	N ≙ acc. to IEC/EN 60584 (NiCrSi-NiSi)	-250	1300	°C		50 K
	R ≙ acc. to IEC/EN 60584 (Pt13Rh-Pt)	-50	1768	°C		50 K
	S ≙ acc. to IEC/EN 60584 (Pt10Rh-Pt)	-50	1768	°C		50 K
	T ≙ acc. to IEC/EN 60584 (Cu-CuNi)	-200	400	°C		50 K
	L ≙ acc. to DIN 43760 (Fe-CuNi)	-200	900	°C		50 K
	U ≙ acc. to DIN 43760 (Cu-CuNi)	-200	600	°C		50 K
	CA ≙ C ASTM JE988 (2002)	0	2315	°C		50 K
	DA ≙ D ASTM JE988 (2002)	0	2315	°C		50 K
	A1G ≙ A-1 GOST 8.585-2001	0	2500	°C		50 K
	A2G ≙ A-2 GOST 8.585-2001	0	1800	°C		50 K
	A3G ≙ A-3 GOST 8.585-2001	0	1800	°C		50 K
	MG ≙ M GOST 8.585-2001	-200	100	°C		50 K
	LG ≙ L GOST 8.585-2001	-200	800	°C		50 K
Remote resistance-type sensors R (2-, 3-, 4-wire) Others can be selected in the software.	RES03 ≙ Resistance 0...150 Ω	0	150	Ω		10% of the selected measuring range
	RES05 ≙ Resistance 0...600 Ω	0	600	Ω		
	RES06 ≙ Resistance 0...1200 Ω	0	1200	Ω		
	RES09 ≙ Resistance 0...6250 Ω	0	6250	Ω		
	RES10 ≙ Resistance 0...12,500 Ω	0	12500	Ω		
	RES12 ≙ Resistance 0...50,000 Ω	0	50000	Ω		
Potentiometers 3-wire Others can be selected in the software.	POT03 ≙ Potentiometer 0...150 Ω	0	100	%		10% of the selected measuring range
	POT05 ≙ Potentiometer 0...600 Ω	0	100	%		
	POT06 ≙ Potentiometer 0...1200 Ω	0	100	%		
	POT09 ≙ Potentiometer 0...6250 Ω	0	100	%		
	POT10 ≙ Potentiometer 0...12,500 Ω	0	100	%		
	POT12 ≙ Potentiometer 0...50,000 Ω	0	100	%		
Voltage signals mV Others can be selected in the software.	V04 ≙ Voltage (mV)	-1000	+1000	mV		10% of nominal span

Other setting options can be configured with the IFS-CONF software.

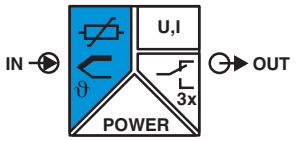
- Freely configurable user characteristic with 30 interpolation points
- Output behavior in the event of a short circuit, sensor break or overrange/underrange is freely configurable or can be set according to NE43 (standard configuration: NE43 upscale)
- Filter setting (standard configuration: 1)
- Restart after failsafe (standard configuration: ON)
- Switching behavior: Switching output ? (limit values, times, etc.) (standard configuration: OFF)

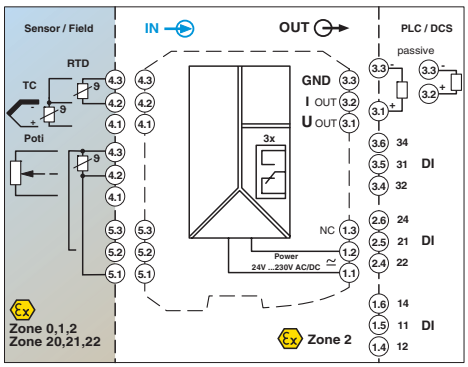
Temperature conversion guide for °C to °F:

$$T\,[°F] = \frac{9}{5}\,T\,[°C] + 32$$

Temperature transducer, Ex i

N





Universal, with three limit value relays, wide-range power supply

Universal temperature transducer with freely configurable properties for intrinsically safe operation of resistance thermometers, thermocouples, resistance-type sensors, and potentiometers installed in Ex areas

- Input for resistance thermometers, thermocouples, resistance-type sensors, potentiometers, and mV sources, [Ex ia] IIC
- Measure differential temperatures
- Freely programmable input and output
- Option of inverse output signal ranges
- Three limit value relays, can be used in combination as a safe limit value relay
- Configuration via software (FDT-DTM) or IFS-OP-UNIT operating and display unit
- Programming during operation with Ex measuring circuit connected and also voltage-free using IFS-USB-PROG-ADAPTER programming adapter
- Plug-in screw or spring-cage connection method (PIT)
- Cold junction compensation with separate connector
- Wide-range power supply: 19.2 ... 253 V AC/DC
- Status indicator for supply voltage, cable, sensor, and module errors
- Up to SIL 2 according to EN 61508
- Installation in Zone 2, protection type "n" (EN 60079-15) permitted

Notes:
To order a product with an order configuration, enter the required configuration by referring to the adjacent order key.
The IFS-CONF configuration software can be downloaded from the Internet (www.phoenixcontact.com).
Information on the IFS-OP-UNIT operating and display unit and the associated IFS-OP-CRADLE DIN rail cradle can be found on page 392

Housing width 35 mm

Technical data

Input data		
Resistance thermometers	Pt, Ni, Cu sensors: 2-, 3-, 4-wire	
Thermocouple sensors	B, E, J, K, N, R, S, T, L, U, CA, DA, A1G, A2G, A3G, MG, LG	
Resistor	0 Ω ... 50 kΩ	
Potentiometer	0 Ω ... 50 kΩ	
Voltage	-1000 mV ... 1000 mV	
Output data	U output	I output
Output signal	4 mA ... 20 mA (with SIL, others can be configured using software)	
Maximum output signal	±11 V	22 mA
Load R_B	≥ 10 kΩ	≤ 600 Ω (at 20 mA)
Behavior in the event of a sensor error	According to NE 43 or freely configurable	
Switching output	**Relay output**	
Contact type	3 PDTs	
Contact material	$AgSnO_2$, hard gold-plated	
Max. switching voltage	250 V AC (250 V DC)	
Max. switching current	2 A (250 V AC) / 2 A (28 V DC)	
General data		
Supply voltage range	24 V ... 230 V AC/DC (-20%/+10%, 50/60 Hz)	
Power consumption	< 2.4 W	
Temperature coefficient	0.01%/K	
Transmission error, total	0.1% (PT100, 20 K min. span)	
Electrical isolation		
Input/output	375 V (Peak value in accordance with EN 60079-11)	
Input/power supply	375 V (Peak value in accordance with EN 60079-11)	
Input/switching output	375 V (Peak value in accordance with EN 60079-11)	
Output/supply/switching output	300 V_{rms} (Rated insulation voltage, surge voltage category II, pollution degree 2, safe isolation as per EN 61010, EN 50178)	
Ambient temperature range	-20°C ... 65°C	
Humidity	Typ. 5% ... 95% (no condensation)	
Housing material	PA 66-FR	
Inflammability class according to UL 94	V0	
Dimensions W / H / D	35 / 99 / 114.5 mm	
Screw connection solid / stranded / AWG	0.2 ... 2.5 mm^2 / 0.2 ... 2.5 mm^2 / 24 - 14	
Spring-cage connection solid / stranded / AWG	0.2 ... 1.5 mm^2 / 0.2 ... 1.5 mm^2 / 24 - 16	
Safety data as per ATEX		
Max. voltage U_o	6 V	
Max. current I_o	7.4 mA	
Max. power P_o	11 mW	
Conformance/approvals		
Conformance	CE-compliant	
ATEX	Ex II (1) G [Ex ia] IIC Ex II (1) D [Ex iaD] Ex II 3 G Ex nAC ic IIC / IIB / IIA T4 X	
IECEx	[Ex ia] IIC; [Ex iaD]; Ex nAC IIC T4 X	
Functional safety (SIL)	SIL 2	

Ordering data

Description		Type	Order No.	Pcs. / Pkt.
Temperature transducer, intrinsically safe input				
Standard configuration	Screw connection	**MACX MCR-EX-T-UIREL-UP**	**2865751**	1
Standard configuration	Spring-cage conn.	**MACX MCR-EX-T-UIREL-UP-SP**	**2924799**	1
Order configuration	Screw connection	**MACX MCR-EX-T-UIREL-UP-C**	**2865722**	1
Order configuration	Spring-cage conn.	**MACX MCR-EX-T-UIREL-UP-SP-C**	**2924809**	1

Accessories

Programming adapter with USB interface, for programming with the IFS-CONF software	**IFS-USB-PROG-ADAPTER**	**2811271**	1

Order key for temperature transducer MACX-MCR-EX-T-UIREL-UP(-SP)-C (standard configuration entered as an example)

Order No.	Safety Integrity Level (SIL)	Sensor type	Connection method	Cold junction compensation	Measuring range: Start	Measuring range: End	Measuring unit	Output range	Factory calibration certificate = FCC
2865722 /	ON /	PT100 /	4 /	0 /	-50 /	150 /	C /	OUT02 /	NONE
2865722 ≙ MACX MCR-EX-T-UIREL-UP-C 2924809 ≙ MACX MCR-EX-T-UIREL-UP-SP-C	ON ≙ active NONE ≙ not active ON only with output range = OUT02	See below	2 ≙ 2-wire 3 ≙ 3-wire 4 ≙ 4-wire	0 ≙ off, e.g., with RTD, R, potentiometer, mV 1 ≙ on, e.g., with TC	See below	See below	C ≙ °C F ≙ °F O ≙ W P ≙ % V ≙ mV	OUT15 ≙ 0...5 mA OUT16 ≙ 0...10 mA OUT01 ≙ 0...20 mA OUT15 ≙ 0...5 mA OUT25 ≙ 1...5 mA OUT26 ≙ 2...10 mA OUT02 ≙ 4...20 mA OUT05 ≙ 0...5 V OUT03 ≙ 0...10 V OUT06 ≙ 1...5 V OUT04 ≙ 2...10 V OUT13 ≙ -5...+5 V OUT14 ≙ -10...+10 V others freely configurable in the software	NONE ≙ without FCC YES ≙ with FCC (a fee is charged) YESPLUS ≙ Factory calibration certificate with 5 measuring points (a fee is charged)

							Smallest measuring range
Resistance thermometers RTD Others can be selected or are freely configured in the software.	PT100	≙ Pt 100 acc. to IEC/EN 60751	-200	850	°C		20 K
	PT200	≙ Pt 200 acc. to IEC/EN 60751	-200	850	°C		20 K
	PT500	≙ Pt 500 acc. to IEC/EN 60751	-200	850	°C		20 K
	PT1000	≙ Pt 1000 acc. to IEC/EN 60751	-200	850	°C		20 K
	PT100S	≙ Pt 100 acc. to Sama RC21-4-1966	-200	850	°C		20 K
	PT1000S	≙ Pt 1000 acc. to Sama RC21-4-1966	-200	850	°C		20 K
	PT100G	≙ Pt 100 acc. to GOST 6651	-200	850	°C		20 K
	PT1000G	≙ Pt 1000 acc. to GOST 6651	-200	850	°C		20 K
	PT100J	≙ Pt 100 acc. to JIS C1604/1997	-200	850	°C		20 K
	PT1000J	≙ Pt 1000 acc. to JIS C1604/1997	-200	850	°C		20 K
	NI100	≙ Ni 100 acc. to DIN 43760/DIN IEC 60751	-60	250	°C		20 K
	NI1000	≙ Ni 1000 acc. to DIN 43760/DIN IEC 60751	-60	250	°C		20 K
	NI100S	≙ Ni 100 acc. to Sama RC21-4-1966	-60	180	°C		20 K
	NI1000S	≙ Ni 1000 acc. to Sama RC21-4-1966	-60	180	°C		20 K
	NI1000L	≙ Ni 1000 (Landis & Gyr)	-50	160	°C		20 K
	CU10	≙ Cu 10 acc. to Sama RC21-4-1966	-70	500	°C		100 K
	CU50	≙ Cu 50/Cu 100 acc. to GOST 6651 (α = 1.428)	-50	200	°C		100 K
	CU53	≙ Cu 53 acc. to GOST 6651 (α = 1.428)	-50	180	°C		100 K
	KTY81	≙ KTY81-110 (Philips)	-55	150	°C		20 K
	KTY84	≙ KTY84-130 (Philips)	-40	300	°C		20 K
Thermocouples TC Others can be selected in the software.	B	≙ acc. to IEC/EN 60584 (Pt30Rh-Pt6Rh)	500	1820	°C		50 K
	E	≙ acc. to IEC/EN 60584 (NiCr-CuNi)	-230	1000	°C		50 K
	J	≙ acc. to IEC/EN 60584 (Fe-CuNi)	-210	1200	°C		50 K
	K	≙ acc. to IEC/EN 60584 (NiCr-Ni)	-250	1372	°C		50 K
	N	≙ acc. to IEC/EN 60584 (NiCrSi-NiSi)	-250	1300	°C		50 K
	R	≙ acc. to IEC/EN 60584 (Pt13Rh-Pt)	-50	1768	°C		50 K
	S	≙ acc. to IEC/EN 60584 (Pt10Rh-Pt)	-50	1768	°C		50 K
	T	≙ acc. to IEC/EN 60584 (Cu-CuNi)	-200	400	°C		50 K
	L	≙ acc. to DIN 43760 (Fe-CuNi)	-200	900	°C		50 K
	U	≙ acc. to DIN 43760 (Cu-CuNi)	-200	600	°C		50 K
	CA	≙ C ASTM JE988 (2002)	0	2315	°C		50 K
	DA	≙ D ASTM JE988 (2002)	0	2315	°C		50 K
	A1G	≙ A-1 GOST 8.585-2001	0	2500	°C		50 K
	A2G	≙ A-2 GOST 8.585-2001	0	1800	°C		50 K
	A3G	≙ A-3 GOST 8.585-2001	0	1800	°C		50 K
	MG	≙ M GOST 8.585-2001	-200	100	°C		50 K
	LG	≙ L GOST 8.585-2001	-200	800	°C		50 K
Remote resistance-type sensors R (2-, 3-, 4-wire) Others can be selected in the software.	RES03	≙ Resistance 0...150 Ω	0	150	Ω		10% of the selected measuring range
	RES05	≙ Resistance 0...600 Ω	0	600	Ω		
	RES06	≙ Resistance 0...1200 Ω	0	1200	Ω		
	RES09	≙ Resistance 0...6250 Ω	0	6250	Ω		
	RES10	≙ Resistance 0...12500 Ω	0	12500	Ω		
	RES12	≙ Resistance 0...50000 Ω	0	50000	Ω		
Potentiometers 3-wire Others can be selected in the software.	POT03	≙ Potentiometer 0...150 Ω	0	100	%		10% of the selected measuring range
	POT05	≙ Potentiometer 0...600 Ω	0	100	%		
	POT06	≙ Potentiometer 0...1200 Ω	0	100	%		
	POT09	≙ Potentiometer 0...6250 Ω	0	100	%		
	POT10	≙ Potentiometer 0...12500 Ω	0	100	%		
	POT12	≙ Potentiometer 0...50000 Ω	0	100	%		
Voltage signals mV Others can be selected in the software.	V04	≙ Voltage (mV)	-1000	+1000	mV		10% of nominal span

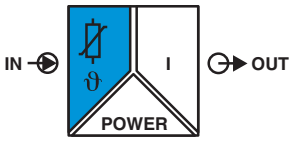
Other setting options can be configured with the IFS-CONF software.

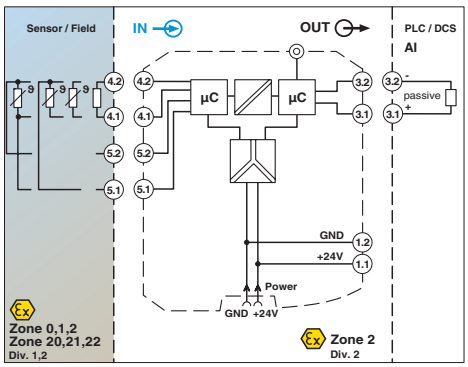
- Freely configurable user characteristic with 30 interpolation points
- Output behavior in the event of a short circuit, sensor break or overrange/underrange is freely configurable or can be set according to NE43 (standard configuration: NE43 upscale)
- Filter setting (standard configuration: 1)
- Restart after failsafe (standard configuration: ON)
- Switching behavior: Switching output ? (limit values, times, etc.) (standard configuration: OFF)

Temperature conversion guide for °C to °F:

$$T\,[°F] = \frac{9}{5}\,T\,[°C] + 32$$

Temperature transducer, Ex i





For resistance thermometers and resistance-type sensors

Ex:
Housing width 12.5 mm

Programmable temperature transducer for intrinsically safe operation of resistance thermometers and resistance-type sensors installed in Ex areas. The measured values are converted into a linear 0 ... 20 mA or 4 ... 20 mA signal.

- Input for resistance thermometers and resistance-type sensors, [Ex ia] IIC
- 0 ... 20 mA or 4 ... 20 mA output
- Configuration via software (FDT/DTM): Sensor type, connection method, measuring range, measuring unit, filter, alarm signal, and output range
- Programming during operation with Ex measuring circuit connected and also voltage-free using IFS-USB-PROG-ADAPTER programming adapter
- Status indicator for supply voltage, cable, sensor, and module errors
- 3-way electrical isolation
- Power supply via DIN rail connector possible
- Up to SIL 2 according to EN 61508
- Installation in Zone 2, protection type "n" (EN 60079-15) permitted

Notes:
To order a product with an order configuration, please enter the desired configuration by referring to the order key, see page 458
The IFS-CONF configuration software can be downloaded from the Internet (www.phoenixcontact.com).
Information about the supply and error evaluation module as well as about the DIN rail connectors and marking material can be found from page 459

Technical data

Input data	
Resistance thermometers	Pt, Ni, Cu sensors: 2-, 3-, 4-wire
Resistor	0 Ω ... 2000 Ω
Cable resistance	50 Ω per line
Sensor input current	(200 µA ... 1 mA)
Measuring range span	Min. 50 K
Output data	
Output signal	0 mA ... 20 mA / 4 mA ... 20 mA
Load	Max. 500 Ω
Behavior in the event of a sensor error	As per NE 43 or can be freely defined
Output ripple	< 50 μA_{PP}
General data	
Supply voltage range	19.2 V DC ... 30 V DC (24 V DC (-20% ... +25%))
Current consumption	< 40 mA (24 V DC)
Power dissipation	< 1 W
Temperature coefficient	0.01%/K
Step response (0–99%)	Typ. 800 ms (with SIL) Max. 1200 ms (with SIL) Typ. 700 ms (without SIL) Max. 1100 ms (without SIL)
Transmission error, total	0.05% x 100 [K] / measuring range span [K] + 0.05%
ZERO / SPAN adjustment	±5% / ±5%
Electrical isolation	
Input/output/power supply	2.5 kV (50 Hz, 1 min., test voltage) 300 V_{rms} (Rated insulation voltage, surge voltage category II, pollution degree 2, safe isolation as per EN 61010, EN 50178)
Input/output	375 V (Peak value in accordance with EN 60079-11)
Input/power supply	375 V (Peak value in accordance with EN 60079-11)
Ambient temperature range	-20°C ... 60°C (Any mounting position)
Humidity	5% ... 95% (no condensation)
Status indication	Green LED (supply voltage, PWR) Red LED, flashing (line, sensor error, ERR) Red LED (module error, ERR)
Housing material	PA 66-FR
Inflammability class according to UL 94	V0
Dimensions W / H / D	12.5 / 99 / 114.5 mm
Screw connection solid / stranded / AWG	0.2 ... 2.5 mm^2 / 0.2 ... 2.5 mm^2 / 24 - 14
Spring-cage connection solid / stranded / AWG	0.2 ... 1.5 mm^2 / 0.2 ... 1.5 mm^2 / 24 - 16
Safety data as per ATEX	
Max. voltage U_o	6 V
Max. current I_o	6.3 mA
Max. power P_o	9.4 mW
Maximum voltage U_m	253 V AC (125 V DC)
Conformance/approvals	
Conformance	CE-compliant, additionally EN 61326
ATEX	II (1) G [Ex ia] IIC II (1) D [Ex iaD] II 3G Ex nA ic IIC T4 X
IECEx	[Ex ia] IIC; [Ex iaD]; Ex nA ic [ia] IIC T4
UL, USA/Canada	Class I Div 2; IS for Class I, II, III Div 1
Functional safety (SIL)	SIL 2 TÜV Rheinland 968/EZ374.00/09

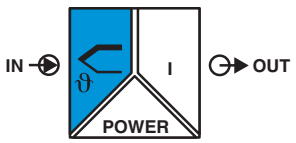
Ordering data

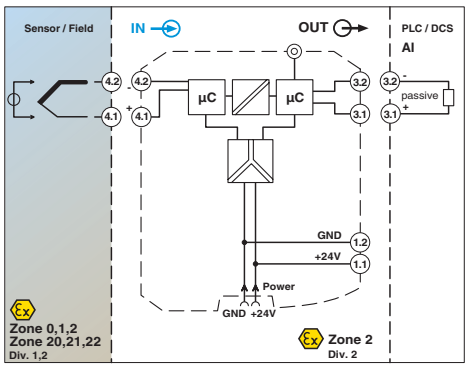
Description		Type	Order No.	Pcs. / Pkt.
Temperature measuring transducers for resistance thermometers, intrinsically safe input				
Order configuration	Screw connection	**MACX MCR-EX-SL-RTD-I**	**2865939**	1
Order configuration	Spring-cage conn.	**MACX MCR-EX-SL-RTD-I-SP**	**2924142**	1
Standard configuration	Screw connection	**MACX MCR-EX-SL-RTD-I-NC**	**2865573**	1
Standard configuration	Spring-cage conn.	**MACX MCR-EX-SL-RTD-I-SP-NC**	**2924168**	1

Accessories

Programming adapter with USB interface, for programming with the IFS-CONF software	**IFS-USB-PROG-ADAPTER**	**2811271**	1

Temperature transducer, Ex i





For thermocouples and mV sources

Ex:
Housing width 12.5 mm

Programmable temperature transducer for intrinsically safe operation of thermocouples and mV sources installed in Ex areas. The measured values are converted into a linear 0 ... 20 mA or 4 ... 20 mA signal.

- Input for thermocouples and mV sources, [Ex ia] IIC
- 0 ... 20 mA or 4 ... 20 mA output
- Configuration via software (FDT/DTM): Sensor type, connection method, measuring range, measuring unit, filter, alarm signal, and output range
- Programming during operation with Ex measuring circuit connected and also voltage-free using IFS-USB-PROG-ADAPTER programming adapter
- Status indicator for supply voltage, cable, sensor, and module errors
- 3-way electrical isolation
- Power supply via DIN rail connector possible
- Up to SIL 2 according to EN 61508
- Installation in Zone 2, protection type "n" (EN 60079-15) permitted

Notes:

To order a product with an order configuration, please enter the desired configuration by referring to the order key, see page 458

The IFS-CONF configuration software can be downloaded from the Internet (www.phoenixcontact.com).

Information about the supply and error evaluation module as well as about the DIN rail connectors and marking material can be found from page 459

Technical data

Input data	
Thermocouple sensors	E, J, K, N as per IEC / EN 60584, L as per DIN 43760
Voltage	-20 mV ... 70 mV
Measuring range span	(Min. 50 K for thermocouples, 3 mV for mV sources)
Output data	
Output signal	0 mA ... 20 mA / 4 mA ... 20 mA
Load	Max. 500 Ω
Behavior in the event of a sensor error	As per NE 43 or can be freely defined
Output ripple	< 50 μA_{PP}
General data	
Supply voltage range	19.2 V DC ... 30 V DC
Current consumption	< 40 mA (24 V DC)
Power dissipation	< 1 W
Temperature coefficient	0.01%/K
Step response (0–99%)	Typ. 800 ms (with SIL) Max. 1200 ms (with SIL) Typ. 700 ms (without SIL) Max. 1100 ms (without SIL)
Transmission error, total	0.05% x 200 [K]/Measuring range span [K] + 0.05%
Cold junction errors	±1 K
ZERO / SPAN adjustment	±5% / ±5%
Electrical isolation	
Input/output/power supply	2.5 kV (50 Hz, 1 min., test voltage) 300 V_{rms} (Rated insulation voltage, surge voltage category II, pollution degree 2, safe isolation as per EN 61010, EN 50178)
Input/output	375 V (Peak value in accordance with EN 60079-11)
Input/power supply	375 V (Peak value in accordance with EN 60079-11)
Ambient temperature range	-20°C ... 60°C (Any mounting position)
Humidity	5% ... 95% (no condensation)
Status indication	Green LED (supply voltage, PWR) Red LED, flashing (line, sensor error, ERR) Red LED (module error, ERR)
Housing material	PA 66-FR
Inflammability class according to UL 94	V0
Dimensions W / H / D	12.5 / 99 / 114.5 mm
Screw connection solid / stranded / AWG	0.2 ... 2.5 mm^2 / 0.2 ... 2.5 mm^2 / 24 - 14
Safety data as per ATEX	
Max. voltage U_o	6 V
Max. current I_o	4.7 mA
Max. power P_o	7 mW
Maximum voltage U_m	253 V AC (125 V DC)
Conformance/approvals	
Conformance	CE-compliant, additionally EN 61326
ATEX	II (1) G [Ex ia] IIC II (1) D [Ex iaD] II 3G Ex nA ic IIC T4 X
IECEx	[Ex ia] IIC; [Ex iaD]; Ex nA ic [ia] IIC T4
UL, USA/Canada	Class I Div 2; IS for Class I, II, III Div 1
Functional safety (SIL)	SIL 2 TÜV Rheinland 968/EZ374.00/09

Ordering data

Description		Type	Order No.	Pcs. / Pkt.
Temperature measuring transducers for thermocouples, intrinsically safe input				
Order configuration	Screw connection	**MACX MCR-EX-SL-TC-I**	**2865942**	1
Standard configuration	Screw connection	**MACX MCR-EX-SL-TC-I-NC**	**2865586**	1

Accessories

Programming adapter with USB interface, for programming with the IFS-CONF software	**IFS-USB-PROG-ADAPTER**	**2811271**	1

Order key and temperature ranges for temperature transducers MACX-MCR-EX-SL-RTD-I(-SP)

Order key for temperature transducers MACX-MCR-EX-SL-RTD-I(-SP) (standard configuration entered as an example)

Order No.	Sensor type	Safety Integrity Level (SIL)	Connection method	Measuring range: Start	Measuring range: End	Measuring unit	Output range	Filter Oversampling	Filter Moving average value
2865939 /	PT100 /	ON /	3 /	0 /	100 /	C /	OUT02 /	10 /	1 / ...
2865939 ≙ MACX MCR-EX-SL-RTD-I 2924142 ≙ MACX MCR-EX-SL-RTD-I-SP	See below	ON ≙ active NONE ≙ not active ON only with output range = OUT02	2 ≙ 2-wire 3 ≙ 3-wire 4 ≙ 4-wire	See below	See below	C ≙ °C F ≙ °F O ≙ Ω	OUT01 ≙ 0...20 mA OUT02 ≙ 4...20 mA	1 ≙ 1 value 3 ≙ 3 values 5 ≙ 5 values 7 ≙ 7 values 10 ≙ 10 values 20 ≙ 20 values	1 ≙ 1 value 2 ≙ 2 values 3 ≙ 3 values 4 ≙ 4 values

					Smallest measuring range
RES01	≙ resistance	0	2000	Ω	25 Ω
PT50	≙ Pt 50 according to IEC/EN 60751	-200	850	°C	50 K
PT100	≙ Pt 100 according to IEC/EN 60751	-200	850	°C	50 K
PT200	≙ Pt 200 according to IEC/EN 60751	-200	850	°C	50 K
PT500	≙ Pt 500 according to IEC/EN 60751	-200	850	°C	50 K
PT100S	≙ Pt 100 according to Sama RC21-4-1966	-200	600	°C	50 K
PT500S	≙ Pt 500 according to Sama RC21-4-1966	-200	600	°C	50 K
NI100DIN	≙ Ni 100 according to DIN 43760	-60	250	°C	50 K
NI500DIN	≙ Ni 500 according to DIN 43760	-60	250	°C	50 K
CU50	≙ Cu 50	-50	200	°C	50 K
CU53	≙ Cu 53	-50	180	°C	50 K

... /	Alarm signal Short circuit/ Overrange	Alarm signal Sensor break/ Underrange	Factory calibration certificate = FCC
	I035 /	I215 /	NONE
	I000 ≙ 0 mA I035 ≙ 3.5 mA I215 ≙ 21.5 mA	I000 ≙ 0 mA I035 ≙ 3.5 mA I215 ≙ 21.5 mA	NONE ≙ without FCC YES ≙ with FCC (a fee is charged) YESPLUS ≙ factory calibration certificate with 5 measuring points (a fee is charged)

I035 only with output range = OUT02

Alarm signals can also be configured individually using software.

Temperature conversion guide for°C to°F:

$$T\,[°F] = \frac{9}{5}\,T\,[°C] + 32$$

Order key and temperature ranges for temperature transducers MACX-MCR-EX-SL-TC-I

Order key for temperature transducers MACX-MCR-EX-SL-TC-I (standard configuration entered as an example)

Order No.	Sensor type	Safety Integrity Level (SIL)	Cold junction compensation	Measuring range: Start	Measuring range: End	Measuring unit	Output range	Filter Oversampling	Filter Moving average value
2924942 /	J /	ON /	1 /	0 /	1000 /	C /	OUT02 /	10 /	1 / ...
MACX MCR-EX-SL-TC-I	See below	ON ≙ active NONE ≙ not active ON only with output range = OUT02	1 ≙ switched on 0 ≙ switched off (e.g., for mV voltage measurement)	See below	See below	C ≙ °C F ≙ °F V ≙ mV	OUT01 ≙ 0...20 mA OUT02 ≙ 4...20 mA	1 ≙ 1 value 3 ≙ 3 values 5 ≙ 5 values 7 ≙ 7 values 10 ≙ 10 values 20 ≙ 20 values	1 ≙ 1 value 2 ≙ 2 values 3 ≙ 3 values 4 ≙ 4 values

					Smallest measuring range
V03	≙ Voltage (mV)	-20	+70	mV	3 mV
E	≙ according to IEC/EN 60584 (NiCr-CuNi)	-250	1000	°C	50 K
J	≙ according to IEC/EN 60584 (Fe-CuNi)	-210	1200	°C	50 K
K	≙ according to IEC/EN 60584 (NiCr-Ni)	-250	1372	°C	50 K
N	≙ according to IEC/EN 60584 (NiCrSi-NiSi)	-250	1300	°C	50 K
L	≙ according to DIN 43760 (Fe-CuNi)	-200	900	°C	50 K

... /	Alarm signal Overrange	Alarm signal Sensor break/ Underrange	Factory calibration certificate = FCC
	I035 /	I215 /	NONE
	I000 ≙ 0 mA I035 ≙ 3.5 mA I215 ≙ 21.5 mA	I000 ≙ 0 mA I035 ≙ 3.5 mA I215 ≙ 21.5 mA	NONE ≙ without FCC YES ≙ with FCC (a fee is charged) YESPLUS ≙ factory calibration certificate with 5 measuring points (a fee is charged)

I035 only with output range = OUT02

Alarm signals can also be configured individually using software.

Temperature conversion guide for°C to°F:

$$T\,[°F] = \frac{9}{5}\,T\,[°C] + 32$$

Accessories

Power and error message module

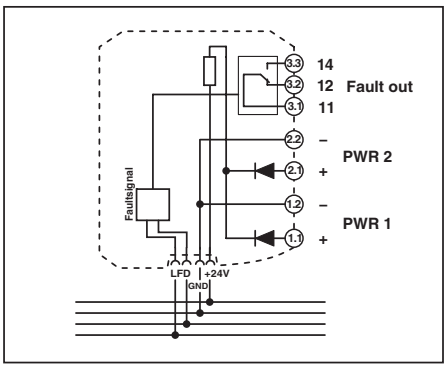
Power and fault signaling module for feeding the 24 V supply voltage to the DIN rail connectors and signaling line faults and power supply failures.

- One-time or redundant supply, decoupled from diode, protected against polarization
- Supply current up to 3.75 A
- Relay output (PDT) and flashing LED for error messages
- Error message in the event of a power supply failure or fuse fault
- Bus cable fault message for MACX MCR-...(2)NAM... devices connected via DIN rail connectors
- Replaceable fuse
- Installation in Zone 2 permissible

ME 6,2 TBUS... T-connector

DIN rail connector (5-pole) for bridging the supply voltage of 12.5 mm wide MACX Analog Ex modules.

- Reduces wiring costs
- System can be extended or module replaced even while process is active
- Inter-extendable



Power and error message module

Ex: Ex // Applied for: UL-EX LIS / CUL-EX LIS
Housing width 17.5 mm

Technical data

Input data	
Input signal	19.2 V DC ... 30 V DC
Redundant supply	yes, decoupled from diodes
Polarization and surge protection	Yes
Output data	
Maximum output signal	3.75 A
Output voltage	(Input voltage - max 0.8 V at 3.75 A)
Switching output	Relay
Contact type	1 PDT
Contact material	Gold (Au)
Max. switching voltage	50 V AC (2 A)
General data	
Current consumption	
Ambient temperature range	-20°C ... 60°C (Any mounting position)
Humidity	5% ... 95% (no condensation)
Fuse	5 A (replaceable), slow-blow 250 V AC
Status indication	1 x red LED (error) 2 x green LEDs (PWR1 and PWR2)
Housing material	Polyamide (PA 6.6)
Inflammability class according to UL 94	V0
Dimensions W / H / D	17.5 / 99 / 114.5 mm
Screw connection solid / stranded / AWG	0.2 ... 2.5 mm² / 0.2 ... 2.5 mm² / 24 - 14
Spring-cage connection solid / stranded / AWG	0.2 ... 1.5 mm² / 0.2 ... 1.5 mm² / 24 - 16
Conformance/approvals	
Conformance	CE-compliant
ATEX	Ex II 3 G Ex nAC IIC T4 X
IECEx	Ex nAC IIC T4 X
UL, USA/Canada	UL 61010

Ordering data

Description	Type	Order No.	Pcs. / Pkt.
Supply and error message module, including the relevant DIN rail connector ME 17,5 TBUS 1,5/5-ST-3,81 GN			
Screw connection	**MACX MCR-PTB**	**2865625**	1
Spring-cage conn.	**MACX MCR-PTB-SP**	**2924184**	1

Accessories

DIN rail connector (TBUS), for bridging the supply voltage, can be snapped onto 35 mm DIN rails as per EN 60715, with UL approval	**ME 6,2 TBUS-2 1,5/5-ST-3,81 GN**	**2869728**	10

Accessories

Multiplexers for HART signals

Multiplexer for digital connection of HART-capable field devices (such as measuring transducers or control valves) to a PC or management system.

- Supports online configuration and diagnostics for the connected HART-capable field devices
- Constant documentation of process variables and states
- 32 HART channels per multiplexer
- Up to 128 HART multiplexers at one PC interface
- Communication via software tool (e.g., HART OPC Server) using RS-485 interface
- Electrical isolation between auxiliary energy, RS-485 bus, and the HART channels
- HART field devices are accessed at the same time that the measurement signal is transmitted without affecting measured value processing
- HART field devices connected via universal HART connection boards; direct connection if processing non-Ex signals, with separate Ex i signal isolator connected upstream if processing Ex signals
- Power supplied via HART connection board

Housing width 35.2 mm

Technical data

Field devices interface (HART)	
Channels	16 or 32; adjustable using a switch
Connection method	Flat-ribbon cable, 14-pole (inclusive)
Signal	HART FSK
HART specification	HART Field Communication Protocol Rev. 6.0 (downward compatible up to Rev 4.0); FSK Physical Layer Specification (Rev. 8.1)
Data transmission display	Two yellow "Tx" and "Rx" "HART" LEDs
Display error	Red "ERR" LED (flashes in case of an error in the HART bus)
RS-485 interface	
Connection method	D-SUB-9 female connector
Signal	RS-485
Data flow control/protocols	Compatible with OPC HART server, AMS, PDM, and PRM
Number of HART multiplexers per bus segment	Max 31
Address setting	0...127; using a rotary switch at the front
Data rate	9600 / 19200 / 38400 / 57600 [bps]; via rotary switch at the front
Transmission length	≤ 1200 m
Display	Two yellow "Tx" and "Rx" "RS-485" LEDs
General data	
Supply voltage range	18 V ... 31.2 V
Nominal supply voltage	24 V DC
Current consumption	55 mA
Power consumption	1.35 W
Operating voltage display	Green "PWR" LED
Undervoltage monitoring	Yes (no faulty devices / output states)
Galvanic isolation of HART signal/RS-485	350 V AC
Galvanic isolation of HART signals between each other	100 V DC (Capacitive)
Galvanic isolation of HART signal/supply	350 V AC
Galvanic isolation of RS-485/supply	350 V AC
Error monitoring	Processor error: The "PWR" LED flashes; error in the HART communication: the "ERR" LED flashes
Ambient temperature range	-20°C ... 60°C
Humidity	≤ 95% (no condensation)
Dimensions W / H / D	35.2 / 99 / 114.5 mm
Conformance/approvals	
Conformance	CE-compliant

Ordering data

Description	Type	Order No.	Pcs. / Pkt.
HART multiplexer, 32-chanel, including two 14-wire flat-ribbon cable	**MACX MCR-S-MUX**	**2865599**	1

Accessories

HART connection board	**MACX MCR-S-MUX-TB**	**2308124**	1
Interface converter, for conversion from RS-232 (V.24) to RS-485, with electrical isolation, rail-mountable, changeover of data direction self-controlling or through RTS/CTS	**PSM-ME-RS232/RS485-P**	**2744416**	1
Repeater, for electrical isolation and increased range	**PSM-ME-RS485/RS485-P**	**2744429**	1

Accessories

Marking material for device marking

– For device marking inside the control cabinet and in the field
– Self-adhesive with high adhesive strengths
– Large temperature range

Description	Color	Ordering data: Type	Order No.	Pcs. / Pkt.
UniCard, with self-adhesive plastic labels, can be labeled with BLUEMARK and CMS-P1-PLOTTER				
10-part, lettering field size: 11 x 9 mm	white	**UC-EMLP (11X9)**	**0819291**	10
UniCard, with self-adhesive plastic labels, **labeled according to customer specifications** For ordering details, see CLIPLINE catalog part 2 or www.phoenixcontact.net/catalog.				
10-part, lettering field size: 11 x 9 mm	white	**UC-EMLP (11X9) CUS**	**0824547**	1

Accessories

Resistance circuit

Double-level terminal block with resistance circuit according to NAMUR for line fault detection in the case of mechanical contacts

Important:

– For intrinsically safe circuits, only in combination with D-UKK 3/5 cover

Description	Color	Ordering data: Type	Order No.	Pcs. / Pkt.
Double-level terminal block, with pre-assembled resistors				
With screw connection		**UKK 5-2R/NAMUR**	**2941662**	50
Cover, width 2.5 mm				
	gray	**D-UKK 3/5**	**2770024**	50
	blue	**D-UKK 3/5 BU**	**2770105**	50

Programmable loop-powered temperature measuring transducer, Ex i

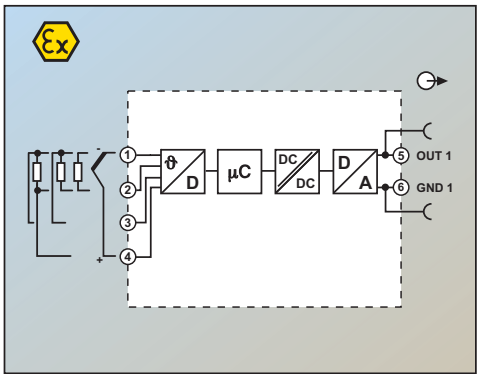
- Single-channel
- Loop-powered
- Input for resistance thermometers, thermocouples, and linear mV signals, Ex ia IIC
- Output 4...20 mA/20...4 mA
- Can be installed in Zone 1
- Galvanic 2-way isolation
- HART-capable (MCR-FL-TS-LP-I-EX)
- Configuration using software

Notes:

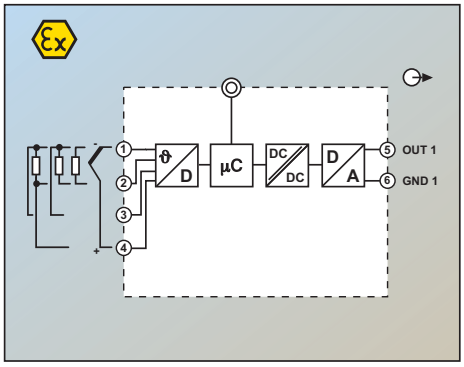
The devices are supplied with the standard configuration: Pt 100 sensor, measuring range 0 ... 100°C, 3-wire connection.

You can implement your own measuring range settings, linearization, and characteristic curve adjustments.
In the case of the MCR-FL-T-LP-I-EX device, you need the MCR-PAC-T programming adapter and the MCR/PI-CONF-WIN configuration software for this purpose, see page 465

To configure the MCR-FL-TS-LP-I-EX HART-capable device, you need a HART modem.



Block diagram MCR-FL-TS-LP-I-EX



Block diagram MCR-FL-T-LP-I-EX

Loop-powered, programmable

Ex:
Housing width 12.5 mm

Technical data

Measuring input			
Resistance thermometers		Pt, Ni (100, 500, 1000); min. measurement range 10 K	
Thermocouple sensors		B, C, D, E, J, K, L, N, R, S, T, U; min. measurement range 50 K/500 K	
Resistor		10 Ω ... 400 Ω (min. measurement range 10 Ω) 10 Ω ... 2000 Ω (min. measurement range 100 Ω)	
Voltage		-10 mV ... 100 mV (min. measurement range 5 mV)	
Configuration		Yes, programmable	
Measuring output			
Output signal range		4 mA ... 20 mA / 20 mA ... 4 mA	
Maximum output signal		≤ 23 mA	
Load		≤ 520 Ω (at U_V = 24 V; U_{supply} - 12 V / 0.023 A)	
Line monitoring		NE 43	
Short-circuit current		≤ 3.6 mA or ≥ 21 mA (adjustable, not for thermocouples)	
Output current with open circuit		≤ 3.6 mA or ≥ 21 mA (adjustable)	
Output current, measuring range overrange/underrange		3.8 mA ... 20.5 mA	
General data			
Supply voltage range		12 V DC ... 30 V DC	
Current consumption		< 3.5 mA	
Step response (10 - 90%)		< 2 s	
Transmission error	Resistance thermometers	0.2 K (Pt 100, Ni 100), 0.5 K (Pt 500, Ni 500), 0.3 K (Pt 1000, Ni 1000)	
	Thermocouple sensors	Type 0.5 K (K, J, T, E, L, U), 1.0 K (N, C, D), 2.0 K (S, B, R)	
	Resistance-type sensors	±0.1 Ω (10...400 Ω), ±1.5 Ω (10...2000 Ω)	
	Voltage sensor	±20 µV (-10...100 mV)	
Test voltage input/output		2 kV AC (50 Hz, 1 min.)	
Switch on delay time		4 s	
Standards / regulations		NAMUR recommendation NE 21	
Housing material		Polyamide PA non-reinforced	
Inflammability class according to UL 94		V0	
Dimensions W / H / D		12.5 / 99 / 114.5 mm	
Connection method		Pluggable screw connection	
Screw connection solid / stranded / AWG		0.2 ... 2.5 mm² / 0.2 ... 2.5 mm² / 24 - 14	
Safety data as per ATEX		MCR-FL-TS-LP-I-EX	MCR-FL-T-LP-I-EX
Max. voltage U_i		30 V	30 V
Max. current I_i		100 mA	100 mA
Max. power P_i		750 mW	750 mW
Max. voltage U_o		5 V DC	4.4 V DC
Max. current I_o		5.9 mA	9.6 mA
Max. power P_o		7.2 mW	10.6 mW
Gas group		II A II B II C	II A II B II C
- Max. external inductance Lo	[mH]	100 100 100	100 100 100
- Max. external capacitance Co	[µF]	10 10 2	12 12 2.4
Max. ambient temperature		T4 = 85°C, T5 = 70°C, T6 = 55°C	T4 = 85°C, T5 = 65°C, T6 = 50°C
Maximum voltage U_m		250 V	250 V
Conformance/approvals			
Conformance		CE-compliant	CE-compliant
ATEX		II 2(1) G Ex ia IIC T6	II 2(1) G Ex ia IIC T4...T6
UL, USA/Canada		cULus	cULus
Functional safety (SIL)		SIL 2 according to EN 61508	-

Ordering data

Description	Type	Order No.	Pcs. / Pkt.
MCR temperature transducer, for resistance thermometers, thermocouples, resistance-type sensors, and voltage sensors			
HART-capable	**MCR-FL-TS-LP-I-EX**	**2864587**	1
	MCR-FL-T-LP-I-EX	**2864574**	1

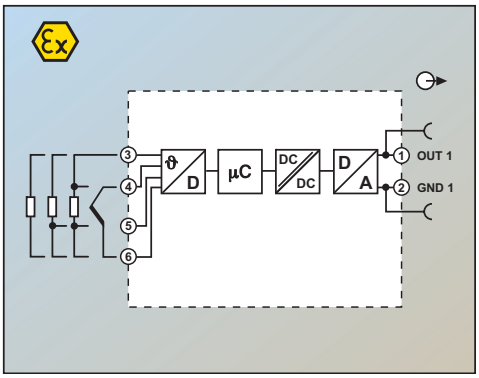
Programmable loop-powered temperature measuring transducers with connection heads, Ex i

- Single-channel
- Loop-powered
- Input for resistance thermometers, thermocouples, and linear mV signals, Ex ia IIC
- Output 4...20 mA/20...4 mA
- Can be installed in Zone 0
- Galvanic 2-way isolation
- HART-capable
- Configuration using software

Notes:

The devices are supplied with the standard configuration:
Pt 100 sensor, measuring range 0 ... 100°C, 3-wire connection.

You can implement your own measuring range settings, linearization, and characteristic curve adjustments. For this purpose, you need a HART modem.
Configuration can be performed using the Hart® protocol or with the MCR/PI-CONF-WIN configuration software, see page 465



Block diagram MCR-FL-HT-TS-I-EX

Loop-powered, programmable

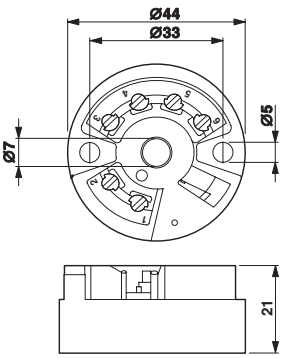
Ex:

Technical data

Measuring input		
Resistance thermometers		Pt, Ni (100, 500, 1000); min. measurement range 10 K
Thermocouple sensors		B, C, D, E, J, K, L, N, R, S, T, U; min. measurement range 50 K/500 K
Resistor		10 Ω ... 400 Ω (min. measurement range 10 Ω) 10 Ω ... 2000 Ω (min. measurement range 100 Ω)
Voltage		-10 mV ... 75 mV (min. measurement range 5 mV)
Configuration		Yes, programmable
Measuring output		
Output signal range		4 mA ... 20 mA / 20 mA ... 4 mA
Maximum output signal		≤ 23 mA
Load		≤ 630 Ω (at UV = 24 V; U_{supply} - 10 V / 0.023 A)
Line monitoring		NE 43
Short-circuit current		≤ 3.6 mA or ≥ 21 mA (adjustable, not for thermocouples)
Output current with open circuit		≤ 3.6 mA or ≥ 21 mA (adjustable)
Output current, measuring range overrange/underrange		3.8 mA ... 20.5 mA (linear increase/decrease)
General data		
Supply voltage range		12 V DC ... 30 V DC
Current consumption		< 3.5 mA
Step response (10 - 90%)		< 2 s
Transmission error	Resistance thermometers	0.2 K (Pt 100, Ni 100), 0.5 K (Pt 500, Ni 500), 0.3 K (Pt 1000, Ni 1000)
	Thermocouple sensors	Type 0.5 K (K, J, T, E, L, U), 1.0 K (N, C, D), 2.0 K (S, B, R)
	Resistance-type sensors	±0.1 Ω (10...400 Ω), ±1.5 Ω (10...2000 Ω)
	Voltage sensor	±20 µV (-10...75 mV)
Test voltage input/output		2 kV AC (50 Hz, 1 min.)
Switch on delay time		6 s
Degree of protection		IP00, IP66 (integrated in the connecting head)
Mounting position		Connecting head in acc. with DIN 43729 form B
Connection		Installation in connection head according to DIN 43729 form B
Standards / regulations		NAMUR recommendation NE 21
Housing material		Polycarbonate, PC
Inflammability class according to UL 94		V0
Screw connection solid / stranded / AWG		0.2 ... 1.75 mm² / 0.2 ... 1.75 mm² / 24 - 15
Safety data as per ATEX		
Max. voltage U_i		30 V
Max. current I_i		100 mA
Max. power P_i		750 mW
Max. voltage U_o		5 V DC
Max. current I_o		5.4 mA
Max. power P_o		6.6 mW
Gas group		II A II B II C
- Max. external inductance Lo	[mH]	100 100 100
- Max. external capacitance Co	[µF]	9.9 9.9 2
Max. ambient temperature		Category 1: T4 = 60°C, T5 = 50°C, T6 = 40°C Category 2: T4 = 85°C, T5 = 70°C, T6 = 55°C
Maximum voltage U_m		250 V
Conformance/approvals		
Conformance		CE-compliant
ATEX		II 1 G and II 2 G Ex ia IIC T6/T5/T4
UL, USA/Canada		cULus
Functional safety (SIL)		SIL 2 according to EN 61508

Ordering data

Description	Type	Order No.	Pcs. / Pkt.
MCR temperature measuring transducer, smart, for resistance thermometers, thermocouples, resistance-type sensors and voltage sensors	**MCR-FL-HT-TS-I-EX**	**2864545**	1



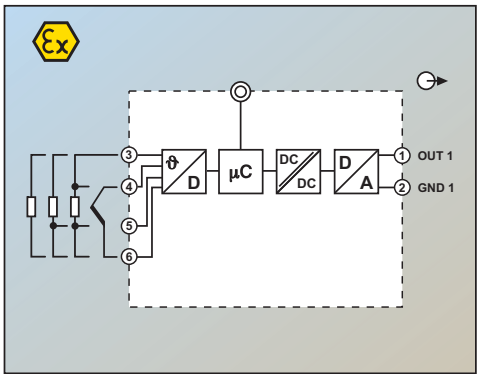
Programmable loop-powered temperature measuring transducers with connection heads, Ex i

- Single-channel
- Loop-powered
- Input for resistance thermometers, thermocouples, and linear mV signals, Ex ia IIC
- Output 4...20 mA/20...4 mA
- Can be installed in Zone 0
- Galvanic 2-way isolation
- Configuration using software

Notes:

The devices are supplied with the standard configuration: Pt 100 sensor, measuring range 0 ... 100°C, 3-wire connection.

You can implement your own measuring range settings, linearization, and characteristic curve adjustments. For this purpose, you need the MCR-PAC-T-USB programming adapter and the MCR/PI-CONF-WIN configuration software, see page 465



Block diagram MCR-FL-HT-T-I-EX

Loop-powered, programmable

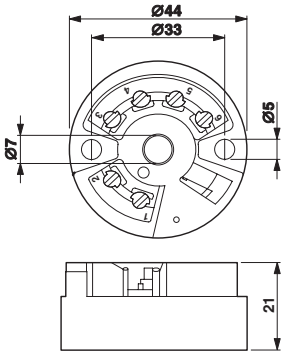
Ex:

Technical data

Measuring input		
Resistance thermometers		Pt, Ni (100, 500, 1000); min. measurement range 10 K
Thermocouple sensors		B, C, D, E, J, K, L, N, R, S, T, U; min. measurement range 50 K/500 K
Resistor		10 Ω ... 400 Ω (min. measurement range 10 Ω) 10 Ω ... 2000 Ω (min. measurement range 100 Ω)
Voltage		-10 mV ... 100 mV (min. measurement range 5 mV)
Configuration		Yes, programmable
Measuring output		
Output signal range		4 mA ... 20 mA / 20 mA ... 4 mA
Maximum output signal		≤ 25 mA
Load		≤ 720 Ω (for U_V = 24 V; U_{supply} - 8 V / 0.025 A)
Line monitoring		NE 43
Short-circuit current		≤ 3.6 mA or ≥ 21 mA (adjustable, not for thermocouples)
Output current with open circuit		≤ 3.6 mA or ≥ 21 mA (adjustable)
Output current, measuring range overrange/underrange		3.8 mA ... 20.5 mA (linear increase/decrease)
General data		
Supply voltage range		8 V DC ... 30 V DC
Current consumption		< 3.5 mA
Step response (10 - 90%)		< 2 s
Transmission error	Resistance thermometers	0.2 K (Pt 100, Ni 100), 0.5 K (Pt 500, Ni 500), 0.3 K (Pt 1000, Ni 1000)
	Thermocouple sensors	Type 0.5 K (K, J, T, E, L, U), 1.0 K (N, C, D), 2.0 K (S, B, R)
	Resistance-type sensors	±0.1 Ω (10...400 Ω), ±1.5 Ω (10...2000 Ω)
	Voltage sensor	±20 µV (-10...100 mV)
Test voltage input/output		2 kV AC (50 Hz, 1 min.)
Switch on delay time		6 s
Degree of protection		IP00, IP66 (integrated in the connecting head)
Mounting position		Connecting head in acc. with DIN 43729 form B
Connection		Installation in connection head according to DIN 43729 form B
Standards / regulations		NAMUR recommendation NE 21
Housing material		Polycarbonate, PC
Inflammability class according to UL 94		V0
Screw connection solid / stranded / AWG		0.2 ... 1.75 mm² / 0.2 ... 1.75 mm² / 24 - 15
Safety data as per ATEX		
Max. voltage U_i		30 V
Max. current I_i		100 mA
Max. power P_i		750 mW
Max. voltage U_o		8.2 V DC
Max. current I_o		4.6 mA
Max. power P_o		9.35 mW
Gas group		II B II C
- Max. external inductance Lo	[mH]	8.5 4.5
- Max. external capacitance Co	[µF]	1.9 0.974
Max. ambient temperature		Category 1: T4 = 60°C, T5 = 50°C, T6 = 40°C Category 2: T4 = 85°C, T5 = 70°C, T6 = 55°C
Maximum voltage U_m		250 V
Conformance/approvals		
Conformance		CE-compliant
ATEX		II 1 G Ex ia IIC T6/T5/T4
UL, USA/Canada		cULus

Ordering data

Description	Type	Order No.	Pcs. / Pkt.
MCR temperature measuring transducer, for resistance thermometers, thermocouples, resistance-type sensors, and voltage sensors	**MCR-FL-HT-T-I-EX**	**2864532**	1



Configuration Software Package

The **MCR/PI-CONF-WIN configuration software package** is used to configure and visualize all parameters for the programmable loop-powered temperature transducers.

– For temperature transducers MCR-FLT(S)-LP-I-EX and MCR-FL-HT-T(S)-I-EX
– Electrical isolation
– Configuration possible during operation
– Straightforward menu interface
– Rapid programming

The computer and the measuring transducer communicate with one another via a software adapter cable and a serial interface.

Notes:

The software runs under the following operating systems: Windows NT™, 2000™, and XP™.

Description	Ordering data: Type	Order No.	Pcs. / Pkt.
MCR configuration software, for programming the MCR-T-..., MCR-...-LP-..., MCR-...-HT-..., MCR-S-..., MCR-f-..., and MCR-PSP-... modules, CD-ROM	**MCR/PI-CONF-WIN**	**2814799**	1

USB adapter cable
Software adapter cable

For connecting the programmable MCR-/PI modules to the USB interface of a computer, the USB adapter cable **CM-KBL-RS232/USB** can be used together with the relevant adapter cables. Programming with the MCR/PI-CONF-WIN software is possible under the operating systems Windows 98™, Windows 2000™, and Windows XP™.

The following modules are supported:

– MCR-FL-T-LP-I-EX
– MCR-FL-HT-T-I-EX

Description	Ordering data: Type	Order No.	Pcs. / Pkt.
USB adapter cable, D-9-SUB to USB, with D-9-SUB to D-25-SUB adapter	**CM-KBL-RS232/USB**	**2881078**	1
Software adapter cable, 2.4 m length, with USB connection, for programming MCR-...-LP-... and MCR-...-HT-... modules	**MCR-PAC-T-USB**	**2309000**	1
Accessories			
Adapter cable, stranded, 9-pole D-SUB socket on 25-pole D-SUB pin	**PSM-KAD 9 SUB 25/BS**	**2761295**	1

INTERFACE Serial

Serial interface converters, isolators, repeaters, and industrial modems

As modern machines and systems become increasingly automated, ever larger amounts of information need to be processed. The higher data volumes, coupled with the integration of complex field devices, are demanding more and more in terms of the performance capabilities of the communication networks used.

The "main arteries" of these networks consist of various types of serial data link, which are neither inter-compatible nor capable of satisfying the increasingly stringent requirements as regards immunity to interference, range, and speed.

The PSI (Phoenix Serial Interfaces) product range is the perfect response to these problems and ensures interference-free, high-performance data transmission in harsh industrial environments. This offers a comprehensive product range that can convert all common serial data interfaces into other copper-based standards, to fiber optics or to wireless transmission without interference.

The product range is rounded off by fast connection technology for the various transmission media and thereby guarantees fast and safe installation of the communication lines.

Product range overview

Product overview 468

Principles of serial data interfaces 470

Principles of fiber optic technology 476

Copper-based data transmission 478

RS-485 repeaters for PROFIBUS, MODBUS, and company-specific 2-wire systems 481

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PSI-REP... repeaters, PSM-ME... converters and isolators

	Repeaters	Active bus termination	Isolator + converter	Segment couplers
System	DeviceNet, PROFIBUS, ControlNet, RS-485	RS-485, Modbus, PROFIBUS	TTY (CL) V.24 (RS-232) / RS-422 / RS-485	Foundation, Profibus PA
Description	Repeaters, for electrical isolation and increasing the range	Termination resistor, for active bus termination	Interface isolator, for electrical isolation and featuring a converter	Device couplers, for Foundation Fieldbus and Profibus PA
Page	From 481	482	486	From 491

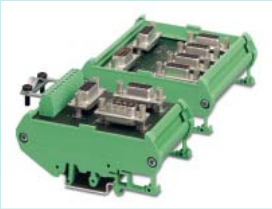
Fiber optic converters

	FO converters	FO converters	FO converters	FO converters
System	PROFIBUS	CANopen, DeviceNet	ControlNet	Modbus, RS-485 2-wire
Description	FO converters for Profibus up to 12 Mbps, terminals, and T-couplers	FO converters, for DeviceNet, CANopen	FO converter,s for ControlNet, terminal and T-coupler	FO converters for RS-485 2-wire systems, terminals, and T-couplers
Page	501	505	503	507

Wireless transmission in accordance with ISM standard

	BT converter	BT Profibus set	WLAN COM server	Trusted Wireless
System	Bluetooth, V.24 (RS-232) / RS-422 / RS-485	Bluetooth, PROFIBUS	WLAN V.24 (RS-232) / RS-422 / RS-485	Trusted Wireless
Description	Bluetooth converter for wireless transmission of serial interfaces	Bluetooth set for wireless Profibus transmission	Serial device server, V.24 (RS-232), RS-422, RS-485 to wireless LAN	Analog/digital signals and serial interfaces
Page	566	567	550	From 639

Accessories

	SUBCON fast connectors		Connection distributors	Connection unit
				
System	V.24 (RS-232) RS-422 RS-485, INTERBUS	PROFIBUS, CANopen	RS-485	Ethernet, PROFINET
Description	D-SUB fast connectors for INTERBUS, V.24 (RS-232), RS-422, RS-485	D-SUB fast connectors for Profibus, CAN, RS-485	RS-485-T-distributor passive connection distributors	Passive mini patch panels with various connection options
Page	574	570	577	553

Ethernet

COM server	WLAN COM server	Media converters	Isolators	Modem
Ethernet V.24 (RS-232) / RS-422 / RS-485	WLAN V.24 (RS-232) / RS-422 / RS-485	EtherNet/IP Modbus PROFINET Ethernet	EtherNet/IP Modbus PROFINET Ethernet	Ethernet V.34 GSM
Serial device server, V.24 (RS-232), RS-422, RS-485 to 10/100Base-T(X)	Serial device server, V.24 (RS-232), RS-422, RS-485 to wireless LAN	Media converters, 10/100Base-T(X) Ethernet to FO	Galvanic Ethernet isolators, 10/100/1000 Base-T(X), up to 4 kV	Ethernet modem, for analog and GSM telephone networks
549	550	545	From 551	From 556

Fiber optic converters

FO converters	FO converters	FO converters	Ethernet media converters
INTERBUS	RS-422 RS-485 4-wire	V.24 (RS-232)	EtherNet/IP Modbus PROFINET Ethernet
FO converters for INTERBUS, terminals, and T-couplers	FO converters for RS-422, RS-485 4-wire, terminals, and T-couplers	FO converters for V.24 (RS-232) up to 115.2 kbps, terminals, and T-couplers	Media converters, 10/100Base-T(X) Ethernet to FO
508	509	513	545

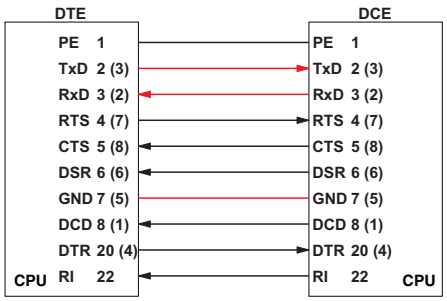
Mobile phone and analog modem

GSM/GPRS/EDGE	UMTS/3G router	SMS relay	Analog modem	SHDSL
GSM Ethernet/V.24 (RS-232)	UMTS/3G Ethernet	GSM I/O	V.34 (analog) Ethernet/V.24 (RS-232)	Ethernet PROFIBUS V.24 (RS-232) / RS-422 / RS-485
GSM/GPRS modem, with V.24 (RS-232) or Ethernet interface	UMTS/3G router with Ethernet interface and VPN	GSM/SMS relay, with 6 analog/digital inputs, 4 digital outputs	Analog V.34 modem, dial-up line and permanent line operation	SHDSL modem for in-house cables
561	560	563	556	559

Accessories

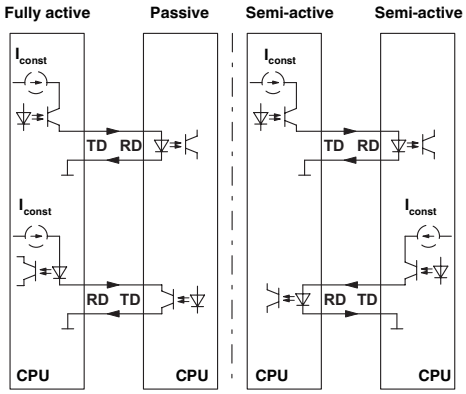
Cable and tool	Cables and tool	FO connector and tool	FO cables	FO cables
PROFIBUS	Ethernet	Connectors	Configurable	Patch cables
Type A Fast Connect Profibus cable and quick stripping tool	CAT 5e SF/UTP cable, RJ 45 connector, crimping pliers	FO fast connectors for polymer and HCS/PCF fibers	FO cables, configurable lengths and connectors	FO patch cables with fixed length and connector configuration
569	552	538	514	536

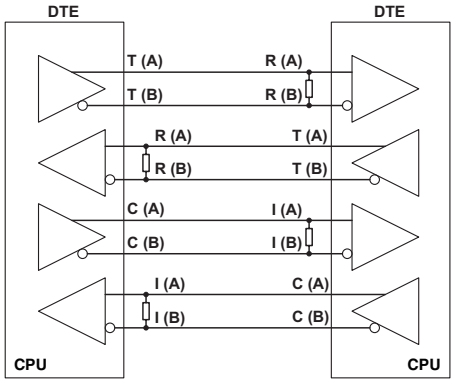
Principles of serial data interfaces



Assignment D-SUB 25 (D-SUB 9)

DTE ≙ Data Terminal Equipment
DCE ≙ Data Communication Equipment





RS-232 (V.24)

One of the most common serial interfaces is defined in the EIA-232 and CCITT V.24 standards.

The interface exchanges data between two devices in full duplex mode (point-to-point connection) up to a maximum of 15 m.

The simplest configuration requires three lines: TxD (Transmit Data), RxD (Receive Data), and GND (common signal ground). Data transmission is controlled by what is known as a software handshake. Additional control, signal, and clock lines are available for transmission involving a hardware handshake.

The device interfaces can take the form of data communication equipment (DCE) or data terminal equipment (DTE). What sets them apart is the different transmission direction on lines with the same designation and pin assignment. Example: In the case of a DTE device, data is transmitted via the TxD connection (transmit data), whereas a DCE device receives data through this connection. This allows a straightforward linear connection between both devices. When interconnecting devices of the same kind, all the connection lines must be crossed.

The signal levels of both data lines are defined with

- -3 V to -15 V for logical "1"
- +3 V to +15 V for logical "0"

On the control/signal lines on the other hand, the logical assignment is inverted (logical "1" = plus potential). The maximum transmission speed is 115.2 kbps. In an industrial environment, it is recommended that the range be reduced to 5 m to ensure this.

TTY

The TTY current loop interface was originally developed within the context of telegraphy. Nowadays, it can still be found in programmable logic controllers (PLCs) and in printers. Separate twisted pairs are needed for both the transmit and the receive data. Data is transmitted in full duplex mode using a software handshake. No provision is made for control lines. A loop current of 20 mA represents the status logical "1". If the circuit is interrupted, this is interpreted as logical "0". Each loop requires a current source which is coupled to either the transmitting or the receiving side. The current sourcing side is described as "active" and the "passive" side is always opposite it. There are three possible interface configurations:

1. **Fully active TTY interfaces** with current sources in both the transmitter and receiver branch
2. **Passive TTY interfaces** without the relevant constant current sources
3. **Semi-active TTY interfaces** with source currents only on the transmitter side (TD). The receiver (RD) is passive. Each current loop has to be operated with just one current source. This means that only fully active/passive and semi-active/semi-active combinations are permitted. Transmission of this kind can bridge distances of up to 1000 m. The maximum transmission speed is 19,200 bps.

RS-422

The requirement of intelligent machines for fast and efficient data communication is covered by the RS-422 standard. Serial data transmission is performed in full duplex mode between two devices at a transmission speed of up to 10 Mbps and across distances of up to 1200 m.

The interface is operated with at least one "transmit" data channel (T) and at least one "receive" data channel (R). The transmit and receive processes are coordinated by means of software handshakes. Alternatively, a transmission process that involves a hardware handshake is available based on the control channel (I) and the signaling channel (C). Reliable transmission is achieved by evaluating the differential mode voltage between each pair of twisted wires. Interference voltages in relation to ground are not evaluated. The electrical levels of the data lines are defined with:

- -0.3 V to -6 V for logical "1"
- +0.3 V to +6 V for logical "0"

The signal status is designated by the voltage between measuring points (A) and (B). If in relation to measuring point (B), measuring point (A) is:

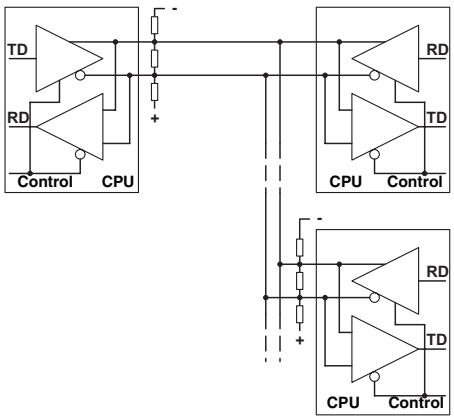
- Negative, data line logical 1, control line logical 0 (UA - UB ≤ 0.3 V)
- Positive, data line logical 0, control line logical 1 (UA - UB ≥ +0.3 V).

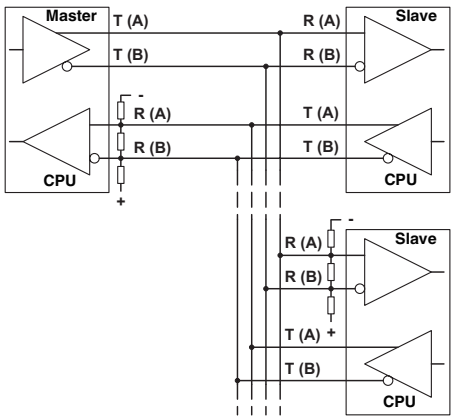
Termination resistors (100...200 ohms) at the receive inputs not only prevent reflection on the transmission line, but also contribute to reliable transmission, due to the resulting pronounced current.

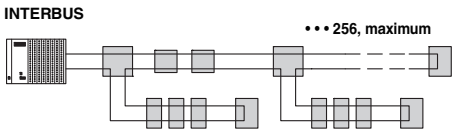
Standards:	ITU-T V.24/DIN 66020-1 ITU-T V.28/DIN 66259-1 TIA/EIA-232
Transmission speed:	115.2 kbps, maximum
Transmission length:	15 m, maximum
Procedure:	Voltage interface
Principle:	Full duplex mode, point-to-point

Standards:	DIN 66258-1 DIN 66348-1
Transmission speed:	19.2 kbps, maximum
Transmission length:	1000 m, maximum
Procedure:	Current loop
Principle:	Full duplex mode, point-to-point

Standards:	ITU-T V.11/DIN 66259-3 TIA/EIA-422
Transmission speed:	10 Mbps, maximum
Transmission length:	1200 m, maximum
Procedure:	Voltage difference, twisted pair
Principle:	Full duplex mode, point-to-point







RS-485 2-wire

As well as offering all the performance benefits of the RS-422 interface, this type of serial interface also supports multipoint connections with up to 32 devices per bus segment. The electrical levels and their logical assignment are identical to those of the RS-422 standard. Due to the 2-wire technology, data transmission can, however, only take place in half duplex mode. This means that data is transmitted and received alternately and must be controlled using appropriate software. In contrast to pure point-to-point communication, an appropriate software protocol is likewise necessary to address and identify all devices of a multipoint connection using one address. Only one device may transmit at any given moment. All other devices are in "listening mode" during this time. The 2-wire bus cable can be up to 1200 m long and must be terminated at both ends by a termination resistor (100...200 ohms). The individual devices can be located up to 5 m away from the bus line using branch lines. The maximum transmission speed is 10 Mbps if a twisted-pair and shielded data cable is used. RS-485 only describes the physical properties, however. This means that the inter-compatibility of RS-485 interfaces is not necessarily guaranteed. Parameters such as transmission speed, data format, and data encoding are defined in system standards such as PROFIBUS, MODBUS, etc.

RS-485 4-wire

Unlike the RS-485 2-wire standard, the RS-485 4-wire standard allows bus connections using full duplex mode. One example of this is the DIN measurement bus. Compared with the 2-wire system, the transmit and receive paths are completely separate, which means they can be operated simultaneously. Master/slave topologies are used mainly in measurement bus systems where the transmitting master transmits to a maximum of 32 receiving devices. The transmit path of the slave has a third switching state at its disposal (tri-state), which keeps it in a high-impedance state. Only the measuring station which has actually been prompted to transmit data activates its transmitter on the bus line. The electrical levels and their logical assignment correspond to the RS-422 standard, as is also the case with all RS-485 interfaces. The maximum transmission speed is 10 Mbps. The bus cable must be terminated and the cable should be twisted in pairs and shielded.

INTERBUS

INTERBUS, which is covered by the international IEC 61158 standard, is structured as a ring system. The forward and return lines are routed in one cable, which means that INTERBUS has the appearance of being a line-like tree structure due to the way lines branch out from a main cable line. These branch lines are connected to the remote bus using branch bus terminal blocks. The connections between remote bus devices are established by means of active point-to-point connections based on the physics of the RS-422 standard. User data is transmitted as differential signals along a twisted double-circuit line (4-wire) in full duplex mode. The transmission speed is 500 kbps or 2 Mbps. This means that the system can cover a total distance of up to 12.8 km, comprising a maximum of 255 sub-segments (each measuring up to 400 m in length).

The use of repeaters and special termination of the bus system is not necessary, as these functions are automatically handled by the remote bus devices.

Standards:	**ISO/IEC 8482/ DIN 66259-4, draft TIA/EIA-485**
Transmission speed:	**10 Mbps, maximum**
Transmission length:	**1200 m, maximum**
Procedure:	**Voltage difference, twisted pair**
Principle:	**Half duplex mode, multipoint**

Standards:	**TIA/EIA-485 DIN 66348-2**
Transmission speed:	**10 Mbps, maximum**
Transmission length:	**1200 m, maximum**
Procedure:	**Voltage difference, twisted pair**
Principle:	**Full duplex mode, multipoint**

INTERBUS	
Standards:	**IEC 61158, type 8**
Transmission speed:	**500 kbps or 2 Mbps**
Segment length:	**400 m, maximum**
Maximum number of devices:	**256**
Transmission procedure:	**RS-422**
Principle:	**Full duplex mode, point-to-point**

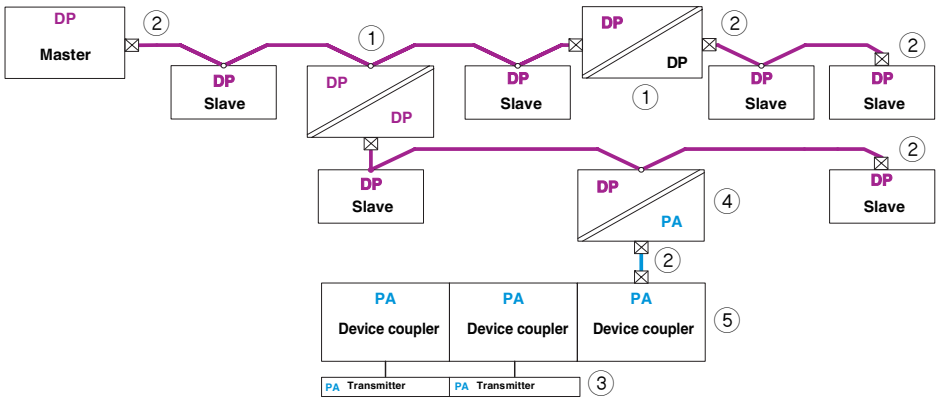


Figure 1

Speed	Segment length	Permissible branch lengths per bus segment
9.6 kbps	1200 m	32 x 3 m
19.2 kbps	1200 m	32 x 3 m
45.45 kbps	1200 m	32 x 3 m
93.75 kbps	1200 m	32 x 3 m
187.5 kbps	1200 m	32 x 2 m
500 kbps	400 m	32 x 1 m
1.5 Mbps	200 m	32 x 0.3 m
3-12 Mbps	100 m	Not permitted

Number of devices per bus segment (FF/PA)	Permissible branch length (FF/PA)
25 to 32	1 m
19 to 24	30 m
15 to 18	60 m
13 to 14	90 m
1 to 12	120 m

PROFIBUS DP

PROFIBUS DP technology, which is standardized in accordance with IEC 61158, is based on an RS-485 2-wire system with half-duplex transmission. Because of this, the bus devices are only capable of either transmitting or receiving data. PROFIBUS DP is defined as a multi-master system, which means there can be more than one master present on the same network. The Profibus system takes the form of a purely linear structure with up to 32 devices and each bus segment covers a distance of 1200 m. The transmission speed in PROFIBUS DP systems can be set between 9.6 kbps and 12 Mbps. This affects the permissible length of the bus segments and that of the passive branch lines (table). The system limits can be increased by using repeaters (Figure 1; ①) and FO converters. These infrastructure components can also be used to create other network structures such as a star, tree or redundant ring.

Only bus cables which are specified for Profibus should be used in order to guarantee interference-free operation, especially in the case of high data transmission speeds. The devices in the Profibus system are interconnected by looping through the twisted two-core bus cable. If a fairly large number of devices need to be networked, the machine or system has to be segmented. In this case, the individual bus segments communicate using bus repeaters (Figure 1; ①), which handle the amplification and electrical isolation of data signals. Each repeater extends the system by an additional bus segment with 32 devices (which includes the repeater itself) and full cable length. A maximum of 127 devices can be addressed. To ensure reliable data transmission, each copper-based Profibus segment must begin and end with an active termination resistor (Figure 1; ②). Suitable D-SUB connectors (e.g., SUBCON) must be used for this purpose, as all devices that have been designed for a speed of 12 Mbps must (according to the Profibus standard) feature external termination. Missing or incorrect termination results in unstable or non-functional networks, particularly in the case of high data rates.

PROFIBUS PA

This version of Profibus has been specifically developed for the field of process automation and is once again covered by the IEC 61158 standard. PA transmitters (Figure 1; ③) are usually connected to a higher-level PROFIBUS DP segment using a DP/PA coupler (Figure 1; ④). This coupler converts the RS-485 physics into MBP (Manchester Bus Powered). This enables both the data and the energy supply for up to 32 devices (including DP/PA coupler) to be transmitted on the 2-wire bus cable.

Profibus PA has a set transmission speed of 31.25 kbps and it is the master of the higher-level DP network that is responsible for control.

Given that the PA transmitters (Figure 1; ③) used for process automation are often located in potentially explosive areas, they are connected to one another using device couplers (Figure 1; ⑤) with either energy-limited or intrinsically safe channels, depending on the Ex zone. This results in a bus system with an extremely high level of availability. Bus termination (Figure 1; ②) at the start and end of the bus segment is also an essential requirement in the case of Profibus PA.

Foundation Fieldbus

Foundation Fieldbus technology is commonly referred to as simply FF. It relies on the same physical transmission method as PROFIBUS PA, which means it also conforms to the IEC 61158 standard. Exactly the same requirements apply in respect of installation (power supply, extent of bus segment, termination, energy limitation, and intrinsic safety in the Ex area).

What distinguishes it from Profibus PA is the protocol that is used:

Foundation Fieldbus communicates on the basis of Foundation H1 and, in contrast to Profibus PA (DP-V1), it functions as a publisher/subscriber rather than as a master/slave system.

Among other things, this makes it possible to implement concepts such as CIF (Control-In-the-Field), whereby individual control processes (e.g., PID loops) are moved from the central host system to distributed process instruments. This optimizes communication on what would otherwise be a fairly slow network.

In practice, each Foundation Fieldbus segment is connected to one of the 4 or 8 channels available on the H1 card of a DCS (Distributed Control System) and is supplied with energy by an FF Power Conditioner. Often these special power supplies, the host system, and the H1 cards are designed redundantly in order to satisfy the SIL requirements of the safety-related system parts involved in process engineering, which are frequently very stringent.

PROFIBUS DP

Standards:	IEC 61158, type 3
Transmission speed:	Up to 12 Mbps
Segment length:	1200 m - 100 m
Maximum number of devices:	127
Transmission procedure:	RS-485 (2-wire)
Transmission principle:	Half duplex mode, multipoint

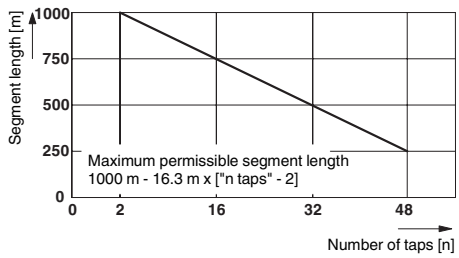
PROFIBUS PA and FOUNDATION Fieldbus

Standards:	IEC 61158, type 1
Transmission speed:	31.25 kbps
Segment length:	1900 m, maximum
Maximum number of devices:	32
Transmission procedure:	MBP/MBPis
Transmission principle:	Half duplex mode

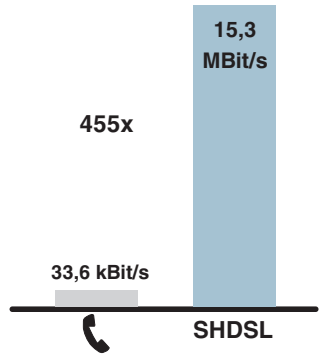
Table 1: Maximum runtime extension of a CAN-based bus system

Transmission speed	CAN runtime distance (network coverage)
10 kbps	5000 m
20 kbps	2500 m
50 kbps	1000 m
125 kbps	500 m
250 kbps	250 m
500 kbps	100 m
800 kbps	50 m
1000 kbps	30 m

ControlNet: Permissible segment length as a function of the number of devices (number of taps)



Comparison of data rates with analog modem (33.6 kbps) and SHDSL (15.3 Mbps)



CAN-based bus systems

The Controller Area Network protocol was originally developed for networking automobile electronics. Further work on the protocol resulted in various derivatives such as CANopen, DeviceNet or SDS for industrial applications. All devices listen in on the bus traffic and start sending data packages when there is a break. Frequently, several devices detect a free bus and start sending data at the same time. Since the various data packages would otherwise interfere with each other, bit-wise arbitration is implemented to prevent data loss. This mechanism is known as Carrier Sense Multiple Access with Collision Avoidance (CSMA/CA). With this approach, the devices compare the level on the bus cable with the levels currently being sent. These can either be dominant (0-level) or recessive (1-level). As soon as the recessive transmitter's own bit pattern is overwritten by a dominant level, it stops transmitting and attempts to send the data packet again during the next break. By specifying the number of dominant bits when the address is assigned, it is possible to prioritize bus access. Depending on the transmission speed, the signal run times (cables and devices) limit the maximum achievable network coverage (table), as the CSMA/CA process only works in a limited time slot.

ControlNet

A typical ControlNet network consists of the following components: main cable, branches, repeater, and termination resistors. The ControlNet main cable is the central component of the system. Either coaxial cables or FO cables can be used. At each network node, the main cable is connected to the branches using BNC plug-in connectors. The branches are fitted with termination resistors at the end of each cable segment.

Repeaters and FO converters can be used to increase the permissible number of branches, to extend the overall length of the bus segment, and to create a star or tree structure (cable branches running from one point in multiple directions). There is a limit to the number of repeaters and overall cable length, with these factors being dependent on the network topology.

The transmission speed is 5 Mbps. A network can support a maximum of 99 addressable devices (taps), with up to 48 permitted per bus segment. The copper-based segment can be anything up to 1 km in length, although this distance decreases as the number of devices in the bus segment increases. Due to the time response of the system, the overall ControlNet length is limited to a maximum of 25 km.

SHDSL

SHDSL (Symmetrical High-speed Digital Subscriber Line) is a modern modulation method that allows the same data transmission speeds to be achieved upstream and downstream. Either one or two double wires can be used in this context. A data rate of up to 15.3 Mbps is possible per line pair, which increases to 30 Mbps when two double wires are used. The maximum possible transmission speed depends on the cable length, the cable cross section, and the type of cable.

Communication between two SHDSL devices takes the form of point-to-point communication; branch lines are not permitted.

All SHDSL devices from Phoenix Contact feature two SHDSL ports. Having two SHDSL ports per device makes it possible to set up point-to-point connections with twice the usual data rate, to implement a redundancy line, and to create a linear structure.

The SHDSL modems from Phoenix Contact have been optimized so that long distances can be covered on in-house cables.

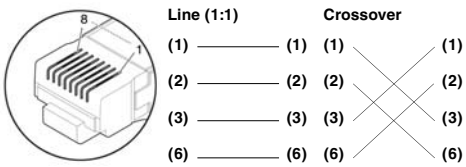
CAN	
Standards:	ISO 11898, EN 50325-4
Transmission speed:	Up to a maximum of 1 Mbps
Segment length:	5000 m, maximum
Maximum number of devices:	128
Transmission procedure:	Similar to RS-485
Transmission principle:	Half duplex mode, multipoint

ControlNet	
Standards:	EN 50170
Transmission speed:	5 Mbps
Segment length:	1000 m, maximum
Maximum number of devices:	99
Transmission procedure:	Manchester, biphase
Transmission principle:	Half duplex mode, multipoint

SHDSL	
Standards:	G.991.2 Annex F +
Transmission speed:	Up to 15.3 Mbps (2-wire), 30 Mbps (4-wire)
Segment length:	Up to 18 km, depending on cable
Transmission principle:	Full duplex mode, point-to-point

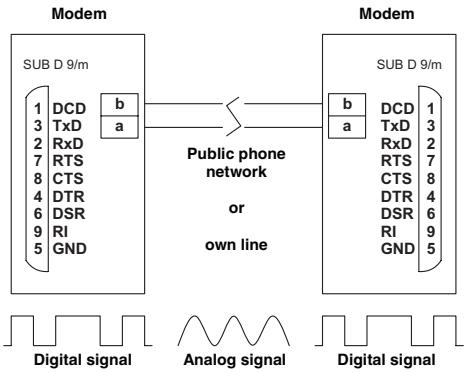
Principles of serial data interfaces

Cable assignment



	PC/RFC	IBS gateway	I/O bus terminal module	Switch	Hub	Media converter
PC/RFC	Cross	Cross	Cross	Line	Line	Line
IBS gateway	Cross	Cross	Cross	Line	Line	Line
I/O bus terminal module	Cross	Cross	Cross	Line	Line	Line
Switch	Line	Line	Line	Cross	Cross	Cross
Hub	Line	Line	Line	Cross	Cross	Cross
Media converter	Line	Line	Line	Cross	Cross	Cross

- Line 1:1 = gray protective caps
- Crossover = green protective caps



Ethernet

Ethernet is described in the IEEE 802 standards and was originally developed for communication between office devices (PCs, printers, etc.). This involved the use of a line topology and coaxial cables. Today, the networks are built exclusively as distributed star topologies with twisted-pair or fiber optic cables. Transmission speeds of 10 and 100 Mbps have become the norm for industrial networks. By cascading star couplers (hubs, switches, routers), it is possible to adapt the structures to the conditions required.

If hubs are used for data distribution, the system must be operated in half duplex mode. In this case, data traffic is safeguarded by means of the **C**arrier **S**ense **M**ultiple **A**ccess with **C**ollision **D**etection (CSMA/CD) mechanism. In this scenario, the devices listen in to the traffic on the network and do not start sending data until there is a break in transmission. The packet is sent to each device on the network. Each device checks the target address included with the data packet against its own addresses and only accepts the data packet if the addresses match.

Frequently, several devices detect a free line and start sending data at the same time. This results in a head-on conflict between the data packets (referred to as a collision). The first active device to detect the collision immediately asks all devices to stop sending data. The transmitters must receive the feedback before the last bit of the message is sent so that the data packets are not lost and can be resent.

The time restriction for collision feedback directly affects the maximum distance that the network is able to cover. As a result, these collision domains (as they are known) are limited by network adapters, routers or switches. Dividing the network into segments like this makes it possible to overcome the restrictions associated with hub-based cabling, allowing long distances to be covered while at the same time optimizing data traffic.

Ideally, each terminal should be directly connected to a switch port so that it has its own collision domain. This approach increases the performance capability of the network, since the possibility of collisions is eliminated, the CSMA/CD mechanism can be deactivated, and the network can be operated with double the bandwidth in full duplex mode.

During installation, attention must be paid to the device type used. Ethernet devices are available with MDI or MDIx interfaces (which correspond to the DTE/DCE interfaces for V.24 (RS-232) devices). Devices of the same type must always be connected using crossed connecting cables, whereas those of different types are connected with 1:1 cables.

The interface can be switched over manually or automatically (auto crossing, auto MDI/MDI-X) at a local level using an internal switch-over feature. Many devices have this feature built into them. This enables the connection to be established with 1:1 cables in all cases. Another automatic mechanism is the auto negotiation function, which the devices use to select a common transmission speed and a transmission type (half or full duplex mode).

The maximum distance that can be bridged with copper-based twisted-pair cabling is 100 m. That is why fiber optic technology is preferred in the case of long distances and where the environmental conditions involve high levels of interference. With this technology, data can be transmitted over a distance of up to 36 km without any risk of interference.

Modem

The normal telephone network only allows analog signals to be transmitted in the range 300 Hz to 3.4 kHz. Digital signals from serial interfaces must, therefore, be converted before the data can be transmitted via the telephone network. At each end, a device is required to convert the digital data flow into analog waves and back again. This process is referred to as modulation and demodulation, and the device doing the work is called a modem. A dial-up connection has to be established in accordance with international standards. Here, carrier frequencies are used to synchronize the two modems. In this way, worldwide data connections can be realized using the public telephone network. However, even when a separate line is used, distances of up to 20 km are no problem with permanent line operation.

Although only two wires are required, data communication generally takes place in full duplex mode.

The maximum performance on an analog line is 33.6 kbps.

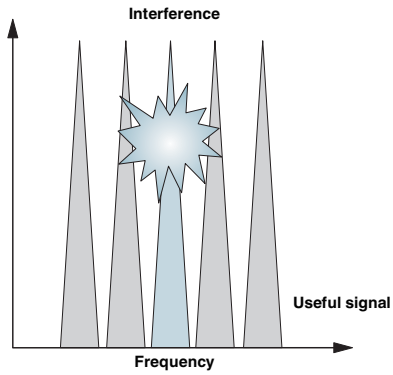
Transmission in accordance with the V.90 standard at a speed of 56 kbps only works in the direction from the Internet server to the modem. In the opposite direction (i.e., from the V.90 modem to the Internet server or from one V.90 modem to another V.90 modem), transmission is likewise subject to a maximum speed of 33.6 kbps.

Standards:	**TBR 21, TBR 15**
Transmission speed:	**33.6 kbps**
Transmission length:	**20 km or ∞**
Procedure:	**QAM**
Principle:	**Full duplex mode, point-to-point**

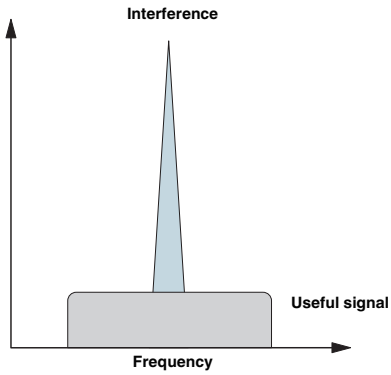
Realistic transmission speeds:

	Uplink	Downlink	Connection
CSD	14,400 bps	14,400 bps	Dial-up operation
GPRS	26,800 bps	54,000 bps	TCP/IP
EDGE	110,000 bps	220,000 bps	TCP/IP
UMTS	384,000 bps	384,000 bps	TCP/IP
HSPA	2 Mbps	7.2 Mbps	TCP/IP

FHSS - Frequency Hopping Spread Spectrum



DSSS - Direct Sequence Spread Spectrum



GSM/GPRS and UMTS/HSPA

GSM (Global System for Mobile Communications) is a standard for digital mobile phone networks that is used in more than 200 countries.

The following four frequencies are used worldwide: 850 MHz, 900 MHz, 1800 MHz, and 1900 MHz. A line (circuit switched data) GSM data connection is established by dialing a telephone number in the same way as you would if you were actually calling someone. The provider charges for this data connection (which has a speed of up to 14,400 bps) on the basis of how long you remain connected.

GPRS (General Packet Radio Service) is a service that is available on GSM networks for the purpose of exchanging data in packets via the mobile GSM phone network. GPRS is TCP/IP-based, which means that there is no need to dial a telephone number to establish the connection. To access the service, all that needs to happen is for the radio cell to be notified. In this context, each mobile terminal is assigned its own, dynamic IP address. Because the providers charge for GPRS connections on the basis of data volumes, GPRS modems can remain permanently connected.

In practice, a maximum of four time slots can be used, depending on the network load. Data rates of up to 54,000 bps can be achieved using this method. For higher transmission speeds, something called Enhanced Data Rates for GSM Evolution (EDGE) is available. EDGE refers to a technology that increases the data rates on GSM mobile phone networks by introducing an additional modulation method.

The Universal Mobile Telecommunications System (UMTS) is a third-generation (3G) mobile phone standard that supports data transmission speeds of up to 384 kbps. High Speed Downlink Packet Access (HSDPA) is a data transmission method based on the UMTS mobile phone standard that offers a receive data rate (downlink) of up to 7.2 Mbps and a transmit data rate (uplink) of up to 2 Mbps.

Bluetooth (IEEE 802.15.1)

Bluetooth is a wireless communication standard that is covered by IEEE 802.15.1. Bluetooth uses the 2.4 GHz ISM (Industrial, Scientific, and Medical) frequency band for transmission purposes, which is available free of charge all over the world and without the need for a license. The transmission process involves something known as FHSS (Frequency Hopping Spread Spectrum). Here, the available frequency band (from 2.402 GHz to 2.480 GHz) is divided into 79 channels, each with a bandwidth of 1 MHz. The transmission channel is switched 1600 times per second (every 625 µs). If interference is caused by any other wireless devices that are present (e.g., other Bluetooth or WLAN systems), the telegram is subsequently repeated on a new channel.

The features include:

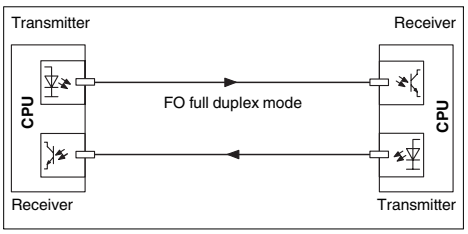
- Very robust and reliable transmission method for use in metallic environments
- Supports operation of a large number of local Bluetooth networks in parallel
- Can be operated in parallel with WLAN 802.11b/g without interference thanks to AFH (Adaptive Frequency Hopping Spread Spectrum)
- Wireless networks with up to seven devices
- Gross data throughput of up to 1 Mbps (maximum of 732.2 kbps net); a gross speed of up to 3 Mbps can be achieved with Enhanced Data Rate (maximum of 2.1 Mbps net)
- High level of data integrity thanks to 128-bit data encoding, password protection, and fixed and undiscoverable device pairing
- Range of up to 150 m or more (depending on environment, antenna technology, and products used)

WLAN (IEEE 802.11b/g)

WLAN (Wireless Local Area Network) is a standard for local wireless networks that is covered by IEEE 802.11b/g. WLAN IEE 802.11b/g uses the 2.4 GHz ISM (Industrial, Scientific, and Medical) frequency band for transmission purposes, which is available free of charge all over the world and without the need for a license. The transmission process involves something known as DSSS (Direct Sequence Spread Spectrum). Here, the available frequency band (from 2.401 GHz to 2.483 GHz) is divided into 13 channels, each with a bandwidth of 22 MHz. The signal power is then distributed across this bandwidth. Since the channels overlap, they cannot all be used at the same time without the devices interfering with each other. Therefore, the standard recommendation is that only channels 1 | 6 | 11 should be used. However, in Europe channels 1 | 7 | 13 or 2 | 7 | 12 or even 3 | 8 | 13 can be used in parallel without any mutual interference.

The features include:

- Supports large networks with several hundred devices
- Highly mobile full coverage networks can be realized via automatic roaming
- Gross data throughput of up to 54 Mbps
- High level of data integrity thanks to use of extensive encryption mechanisms (WEP, WPA, WPA PSK) and authentication (EAP)
- Range of up to 150 m or more (depending on environment, antenna technology, and products used)



Data transmission using fiber optics is the method of choice when the physical limits of copper-based data communication have been reached with regard to:
– Immunity to interference
– Range or
– Transmission speed

Fiber optic transmission paths are characterized in particular by:
– Complete resistance to interference, even when exposed to extreme electromagnetic influences
– High-quality electrical isolation between communication units
– Transmission distances up to several kilometers in length and, at the same time
– Maximum transmission speeds

These properties have made fiber optics a standard feature of modern industrial systems. They are not just a substitute for expensive lightning current absorbing data cables outdoors and extra surge arresters. In fact, this technology, which has now become inexpensive and easy to handle, offers significantly higher levels of immunity to interference and better efficiency across the entire system.

The technology can be split into three groups, depending on the range required:
– Inexpensive polymer fiber terminals and cables are used for distances up to 100 m. The cable can be self-assembled quickly using F-SMA fast connection connectors
– Polymer fiber terminals are also used for distances up to 800 m, however this time with HCS cables. This cable can also be self-assembled by the user. All that is required is a special tool for stripping the cable and cutting the optical fibers
– If distances of up to 2800 m are to be realized with HCS fast connection technology or 4800 m with multi-mode glass fibers, glass fiber devices with a wavelength of 850 nm are used. In addition, single-mode fibers can be used on devices with 1300 nm for distances of up to 45 km. In the case of both glass fiber types, it makes sense to buy pre-assembled cables for individual applications or to have trained personnel assemble the connectors on site using the appropriate tools

An extensive range of polymer, HCS, and glass fiber cables for indoor and outdoor installation is presented together with other fiber optic accessories starting on page 514. If required, all cables can be supplied ready for connection.

Notes regarding the use of fiber optics

The following parameters should be borne in mind when planning and using fiber optics with a view to ensuring optimal functional reliability as far as transmission paths are concerned:
– Tractive, compression, and pressure forces which may occur
– Observance of the bending radii of the cable

See page 514 onwards for technical data relating to Phoenix Contact fiber optics.

Operating principle

In order for information to be transmitted via fiber optics, the electrical signal must be converted into an optical signal (E/O converter). Once at the receiver, the optical signal is converted back into an electrical signal (O/E converter). The separate transmitting and receiving units allow full duplex mode using two optical fibers (duplex cable).

As with a radio or television broadcast, the information carrier in the context of optical signal transmission is a radiated electromagnetic field. While different frequencies are used for wireless transmission, with the optical transmission method there is a common consensus that fields should be specified in terms of wavelengths. The wavelength range used goes from 660 nm to 1550 nm.

The human eye is only capable of perceiving a small part of the huge spectrum of electromagnetic waves. This visible range extends from a wavelength of 420 nm, which is perceived by the eye as violet, to a deep red with a wavelength of 720 nm (Figure 1).

When producing optical fibers, irregularities in the material (microscopic inhomogeneities) cannot always be fully avoided. These irregularities cause the light to disperse (e.g., Rayleigh dispersion), which reduces the optical signal output. This effect, which is documented in the data sheet as an attenuation value, has various causes.

Firstly, it is caused by what are known as internal faults, where the radiation is absorbed by impurities in the material of the fiber or flaws such as air bubbles or micro-fissures.

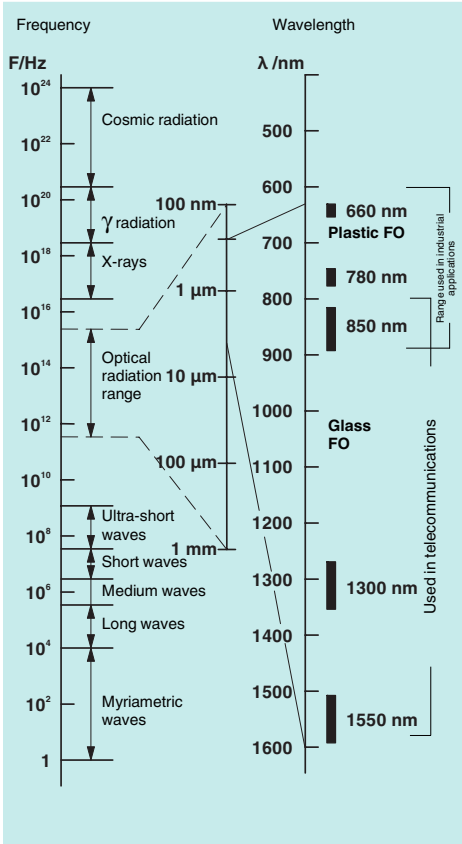


Figure 1: Electromagnetic radiation spectrum

Secondly, it is caused by external faults. These faults primarily consist of badly polished fiber ends and manufacturer tolerances for connectors. Other faults that fall into this category are when reflection occurs at the beginning and end of the optical fiber or when a minimum critical angle necessary for guiding the light is undershot due to impermissible bends in the cable.

Since the attenuation is dependent on the wavelength of the radiation, optical transmission of messages is possible in wavelength ranges in which the transmission medium indicates minimum attenuation values.

Pure quartz glass and polymer have proven themselves to be the best basic materials for the conductors. The latter is suited to a radiation wavelength in the visible range of the spectrum. Glass fibers, however, are better suited to low frequency invisible infrared light.

The fiber optics made of polymer, which

is a cheap and flexible basic material, have a relatively large core which allows large amounts of light to be launched. This type of fiber optic material is, however, only suitable for short transmission distances of up to 100 m due to its high attenuation.

Quartz glass, on the other hand, is a very pure material based on silicon. Due to its low attenuation, it can be used to transmit data over several kilometers.

Wave propagation in the fiber

The basic principle of wave propagation in fiber optics relates to the effect of the total reflection.

To illustrate this more clearly, this form of light propagation can be compared with a linear optical path.

When making the transition from one medium to another, one part of the light beam refracts at the interface and another part is reflected. If you keep increasing the angle of incidence between the beam and the perpendicular, you eventually reach a point where the non-reflected part starts running parallel to the interface before being fully reflected.

It is precisely this principle that fiber optic technology is able to exploit. The radiated electromagnetic field is reflected totally at the interface between the core and the cladding and thereby directed into the fiber.

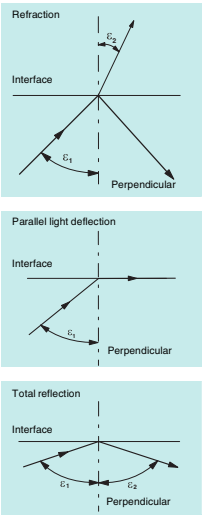


Figure 2

Types of fiber optics

As well as being classified according to the base materials used (glass or polymer fibers), fiber optic conductors are divided into two main categories:

– Multi-mode fibers and
– Single-mode fibers

The single-mode fibers (mono-mode) are step index fibers with a core diameter which, in contrast to multi-mode fibers, is so narrow that only one light wave (mode) can propagate. This suppresses the pulse expansion that arises as a result of different run times. This provides the fibers with a very wide bandwidth and allows them to be used for distances of up to 45 km. From the point of view of light launching, the narrow core diameter of 9 µm is disadvantageous and has to be compensated with very precise and expensive fiber optic

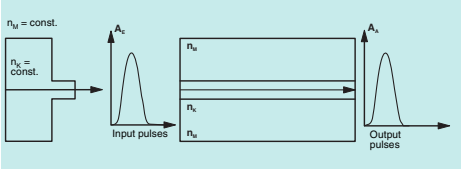


Figure 5: Wave propagation in a single-mode fiber

components with a wavelength of 1300 nm or 1550 nm. The cables are marked with the code number 9/125 µm and 10/125 µm to describe the core/cladding diameter.

Multi-mode fibers have a relatively large core diameter which allows several natural waves (modes) to propagate in the core of the conductor.

They are subdivided into step index fibers and gradient index fibers.

With step index fibers (Figure 3), the rays are totally reflected at the interface between the core and the cladding.

Since some waves are reflected more often than others with this type of fiber, the difference in propagation time results in pulse dispersion. For this reason, step index multi-mode fibers are only suitable for short distances in industrial applications. This is all the more important in light of the high attenuation associated with fibers with larger core diameters. These characteristics are typified by the polymer fibers (980/1000 µm) and the HCS standard fibers (200/230 µm).

With gradient index fibers (Figure 4), by contrast, the refractive index of the fiber optics gradually decreases from the fiber axis to the cladding. Consequently, the rays

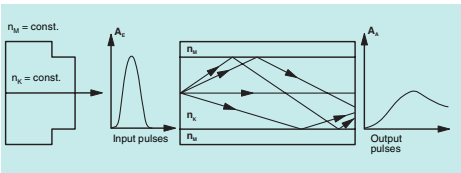


Figure 3: Wave propagation in a step index fiber

do not propagate in a "zigzag manner", but in the form of waves.

The advantage of these fibers is that the rays propagate more rapidly in the fiber layers which refract less outwards than inwards.

Assuming that the index profile is precise, the pulses only disperse slightly. The gradient fibers are therefore suitable for distances in

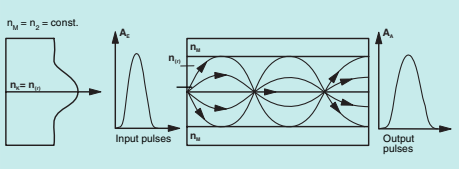


Figure 4: Wave propagation in a gradient index fiber

industrial applications of up to 4800 m due to their low attenuation and large bandwidth. The types that have become more or less standard are the 50/125 µm and 62.5/125 µm fibers as well as the 200/230 µm HCS-GI broadband fibers.

Standards: DIN EN 60794 and DIN IEC 60793: Fiber optics for telecommunications

The new PSI-REP ... repeater series from Phoenix Contact allows structured installation concepts to be realized in PROFIBUS DP/PA, MODBUS, ControlNet, DeviceNet, and numerous RS-485 systems. With its modular structure, the active repeater system allows individual branching in branch, linear, star, and tree structures. For this purpose, each repeater can be operated as a stand-alone device or can be converted into a modular hot-swap-capable hub as part of the overall topology.

The PSM-ME... converter series has been specifically developed for the exacting requirements of process environments - that is to say, in control cabinets or boxes. The following versions are available for the different industrial applications:

- V.24 (RS-232)/RS-422 or RS-485
- V.24 (RS-232)/TTY (CL)
- V.24 (RS-232)/V.24 (RS-232) and
- RS-485/RS-485

The devices can be supplied with either 24 V AC or DC to cater for a wide range of applications in both mechanical and plant engineering contexts, as well as that of building technology.

These narrow 22.5 mm modules are simply snapped onto the DIN rail and at the same time automatically contact the shield discharge function. For a high degree of transmission safety, the serial interfaces are also electrically isolated with high-quality isolation.

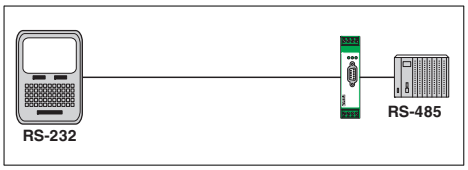
The V.24 (RS-232) interface is connected using a standard D-SUB-9 connector. In contrast, the TTY, RS-422 or RS-485 field interfaces are connected in line with industrial requirements using plug-in screw terminal blocks. Two separate LEDs signal the incoming and outgoing data flow, thereby allowing easy startup and connection diagnostics.

The FB… product range has been specifically developed to cope with the challenging requirements of process environments. It includes device couplers that can be used with both Foundation Fieldbus and Profibus PA.

To ensure maximum system availability, the couplers offer short-circuit protection on a segment-by-segment basis and energy-limited outputs.

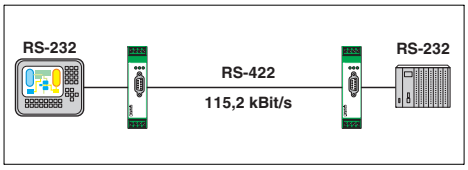
Thanks to numerous approvals, they can be installed in potentially explosive areas that have been classified as Zone 2 or Division 2.

Main applications:



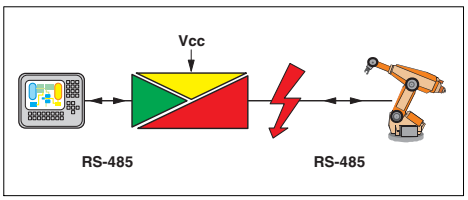
1. Interface adaptation

Data interfaces with different electrical standards can be connected to each other using PSM-ME...converters.



2. Increased range and speed

By converting them into fast and efficient signals, low-capacitance data interfaces with a short range can be made capable of interference-proof remote transmission.



3. Electrical isolation

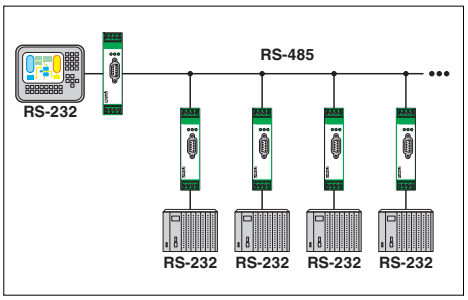
Due to the high-quality electrical isolation between the devices, equalizing currents are avoided and the terminals are effectively protected against transient interference.

Repeater for PROFIBUS

Modular repeater, for electrical isolation and increasing the range for PROFIBUS up to 12 Mbps with 4-way isolation.
Page 481.

RS-485/RS-485 universal repeaters

Repeaters, for electrical isolation and increasing the range for RS-485 2-wire systems up to 1.5 Mbps.
Page 481.



4. Networking

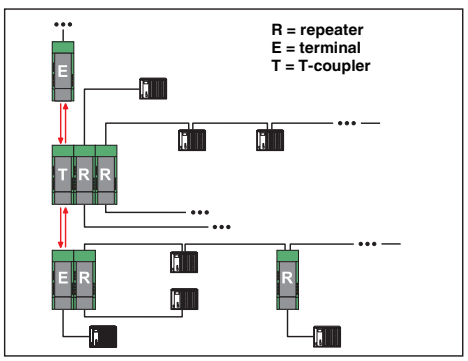
V.24 (RS-232) interfaces only permit point-to-point connections. By converting them to the bus-capable RS-485 standard, a network can be established with up to 32 devices.

Active bus termination for PROFIBUS

Termination resistor for active bus termination with PROFIBUS DP and RS-485 networks.
Page 482.

Repeaters for ControlNet/DeviceNet

Modular repeaters, for electrical isolation and increasing the range for ControlNet/DeviceNet.
Page 483.

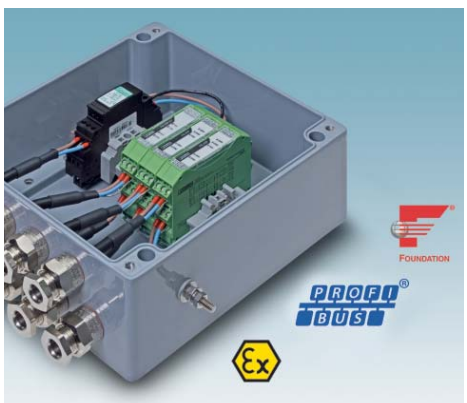


5. Structured installation

RS-485 only allows linear structures. The PSI-REP... repeater series makes it possible to implement structured installation concepts in branch, tree, and star structures.

Interface isolator/converter

Isolator for electrical isolation of V.24 (RS-232) interfaces and converter for converting V.24 (RS-232) into: RS-422, TTY (CL), RS-485 2-, and 4-wire.
Page 486.



Foundation Fieldbus/PROFIBUS PA

Modular network components:
- Power conditioners
- Device couplers/Ex barriers
- Complete junction boxes

Page 491.

Repeater for PROFIBUS DP and RS-485 2-wire systems

The performance and availability of bus systems can be significantly increased by using repeaters. Segmenting the bus with repeaters makes it possible to increase the permissible extent of the network many times over and to extend the number of devices. Bus cable short circuits only affect the relevant segment.

The **PSI-REP-PROFIBUS/12MB** modular repeater has been specially developed for the requirements of PROFIBUS systems. As stipulated by the PROFIBUS installation guidelines, the PROFIBUS network is connected using D-SUB connectors.

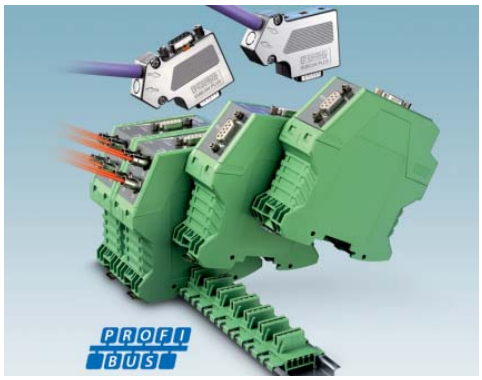
- Automatic data rate detection or fixed data rate setting via DIP switches
- Suitable for all data rates of up to 12 Mbps
- High-quality 4-way electrical isolation between all interfaces (PROFIBUS (A) // PROFIBUS (B) // power supply // DIN rail connector)
- Bit oversampling for reliable detection of sporadic disturbances
- Bit retiming for unrestricted cascading of devices
- Filtering of faulty telegrams based on start delimiter detection
- Routing of supply voltage and data signals through DIN rail connectors
- Redundant power supply supported in the form of optional system power supply unit
- All connections pluggable using SUBCON or COMBICON screw terminal block
- Can be combined with PSI-MOS FO converters in a modular way using DIN rail connectors
- Approved for use in Zone 2

As a modular repeater, the **PSI-REP-RS485W2** can be used in RS-485 2-wire bus systems. The device supports bus systems that rely on the UART/NRZ data format with a character length of 10 or 11 bits.

- Suitable for data rates of up to 500 kbps (adjustable via DIP switches)
- High-quality 4-way isolation between all interfaces (RS-485 (A) // RS-485 (B) // power supply // DIN rail connector)
- Bit oversampling for reliable detection of sporadic disturbances
- Bit retiming for unrestricted cascading of devices
- Integrated, connectable termination resistors
- All connections via COMBICON plug-in screw terminal blocks
- Can be combined with PSI-MOS FO converters in a modular way using DIN rail connectors
- Approved for use in Zone 2

The **PSM-ME-RS485/RS485-P** compact repeater is for universal use in RS-485 2-wire bus systems. The device supports bus systems that rely on the UART/NRZ data format with a character length of 10 or 11 bits.

- Transmission speeds of up to 1.5 Mbps
- Space-saving slim 22.5 mm device
- High-quality 3-way isolation (RS-485 (A) // RS-485 (B) // power supply)
- Integrated, connectable termination resistors
- All connections via COMBICON plug-in screw terminal blocks
- Shipbuilding approval according to DNV

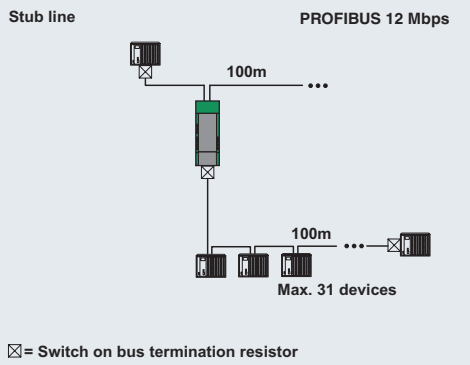


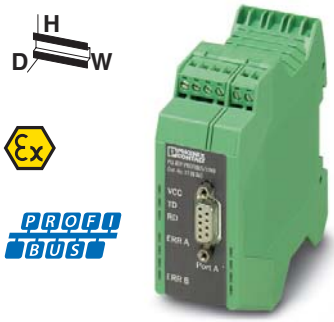
Supply	
Supply voltage	
Nominal current consumption	
RS-485 interface	
Data format/encoding	
Data direction switching	
Termination resistor	
Transmission speed	
Transmission length	
Connection method	
General data	
Bit distortion, input	
Bit distortion, output	
Bit delay	
Alarm output	
Test voltage	
Ambient temperature range	
Electrical isolation	
Dimensions	W / H / D
Conformance/approvals	
ATEX	
UL, USA/Canada	

Description
Repeater, for electrical isolation and increased range
for PROFIBUS up to 12 Mbps, 4-way isolation, modular expansion possible
for RS-485-2-wire bus systems, 4-way isolation, modular expansion possible
for RS-485-2-wire bus systems, 3-way isolation

DIN rail connector (optional), for routing through the supply voltage and data signal, two pieces are required per device

System power supply unit, primary-switched





Repeater for PROFIBUS

Technical data	
	24 V DC ±20% 90 mA (24 V DC)
	PROFIBUS according to IEC 61158, RS-485 2-wire
	UART (11 bits, NRZ) Automatic control, min. station response time 2 bits
	External Manual and automatic adjustment: 9.6/19.2/45.45/93.75/187.5/500 kbps; 1.5/3/6/12 Mbps
	Max. 1200 m (Depends on transmission speed and cable type)
	D-SUB-9 female connector
	Max. ±35%
	< 6.25%
	< 1 bit
	60 V DC / 42 V AC, 1 A
	1.5 kV
	-20°C ... 60°C
	PROFIBUS (A) // PROFIBUS (B) // Supply // DIN rail connector
	35 mm / 99 mm / 105 mm
	II 3 G Ex nAC IIC T4 X
	cUL 508 recognized

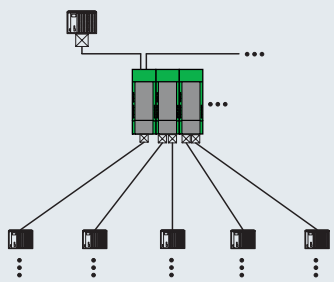
Ordering data

Type	Order No.	Pcs. / Pkt.
PSI-REP-PROFIBUS/12MB	2708863	1

Accessories

ME 17,5 TBUS 1,5/ 5-ST-3,81 GN	2709561	10
MINI-SYS-PS-100-240AC/24DC/1.5	2866983	1

Star structure



☒= Switch on bus termination resistor

Repeater for RS-485 2-wire systems

Technical data	
	24 V DC ±20% 75 mA (24 V DC)
	RS-485 interface, in acc. with EIA/TIA-485, DIN 66259-4/RS-485 2-wire
	UART (11/10 bit switchable; NRZ) Automatic control, min. station response time 2 bits
	180 Ω can be connected; pull up/down 390 Ω Can be set manually: 4,8/9,6/19,2/38,4/57,6/75/93,75/115,2/136/187,5/375/500 kbps
	Max. 1200 m (depends on transmission speed, bus system, and cable type) Pluggable screw connection
	Max. ±35%
	< 6.25%
	< 1 bit
	-
	1.5 kV
	-20°C ... 60°C
	RS-485 (A) // RS-485 (B) // Supply // DIN rail connector
	35 mm / 99 mm / 105 mm
	II 3 G Ex nA II T4 X
	cUL 508 recognized

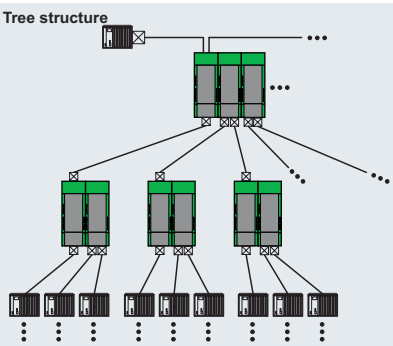
Ordering data

Type	Order No.	Pcs. / Pkt.
PSI-REP-RS485W2	2313096	1

Accessories

ME 17,5 TBUS 1,5/ 5-ST-3,81 GN	2709561	10
MINI-SYS-PS-100-240AC/24DC/1.5	2866983	1

Tree structure



☒= Switch on bus termination resistor

Basic repeater for RS-485 2-wire systems

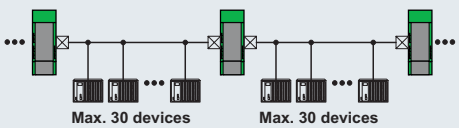
Technical data	
	24 V AC/DC ±20% 90 mA (24 V DC)
	RS-485 interface, in acc. with EIA/TIA-485, DIN 66259-4/RS-485 2-wire
	UART (11/10 bit switchable; NRZ) Automatic control, min. station response time 1 bit
	220 Ω can be connected; pull up/down 390 Ω 4.8/ 9.6/ 19.2/ 38.4/ 57.6/ 75/ 93.75/ 115.2/ 136/ 187.5/ 375/ 500/ 1500 kbps
	Max. 1200 m(depends on transmission speed, bus system, and cable type) Pluggable screw connection
	Max. ±35%
	< 3.6%
	< 200 ns
	-
	2 kV
	0°C ... 55°C
	RS-485 (A) // RS-485 (B) // supply
	22.5 mm / 99 mm / 114.5 mm
	-
	Class I, Div. 2, Groups A, B, C, D

Ordering data

Type	Order No.	Pcs. / Pkt.
PSM-ME-RS485/RS485-P	2744429	1

Accessories

Linear structure



☒= Switch on bus termination resistor

N

Active bus termination for PROFIBUS DP and RS-485 networks

PROFIBUS and RS-485 networks can be actively terminated using the PSI-TERMINATOR-PB.

This device relies on permanent termination to ensure interference-free communication, particularly in applications that involve alternating bus devices. The bus cable can be connected using either a pluggable double spring terminal block or a D-SUB female connector.

Active programming and diagnostic devices are supplied with power via the D-SUB connection. This also makes the device ideal for use as a defined service and measuring connection within a bus system.

Active bus termination

Properties:

- Interference-free bus communication thanks to active termination
- Fixed programming interface on the network
- Electrical isolation of supply and data interface
- Redundant power supply
- Diagnostic LEDs for voltage and data activity
- Extended temperature range of -20° … +65°C
- Termination can be activated externally
- Compact housing type
- DIN rail mounting

Application:

Motor Control Center (MCC)
- Replacement of MCC racks

Automatic vehicles
- Mobile industrial trucks that are regularly coupled to and uncoupled from machining stations

Changeover tools
- Robot tools with bus interface

Service, programming, and diagnostics
- Fixed programming interface in the bus system

Technical data

Supply		
Supply voltage		24 V DC ±25% (via COMBICON plug-in screw terminal block)
Nominal current consumption		45 mA (24 V DC)
RS-485 interface		PROFIBUS according to IEC 61158, RS-485 2-wire
Termination resistor		390 Ω - 220 Ω - 390 Ω (switchable)
Transmission speed		≤ 12 Mbps
Transmission length		≤ 1200 m (Depends on transmission speed and cable type)
Nominal output voltage		-
Strain relief		Shield connection clamp in spring-cage terminal block
Connection method		COMBICON 9-pole D-SUB socket (alternative)
General data		
Test voltage		1.5 kV
Ambient temperature range		-20°C ... 65°C
Electrical isolation		RS-485 // VCC
Dimensions	W / H / D	22.5 mm / 99 mm / 56 mm
Conformance/approvals		
ATEX		-
UL, USA/Canada		-

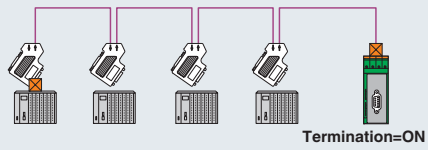
Ordering data

Description	Type	Order No.	Pcs. / Pkt.
Active termination resistor, for PROFIBUS and RS-485 bus systems, compact design, electrical isolation, bus termination that can be activated, programming interface	**PSI-TERMINATOR-PB**	**2313944**	1

Accessories

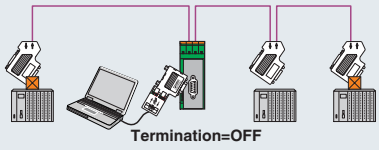
PROFIBUS connector, up to 12 Mbps, integrated termination resistor which can be switched on externally, 9-pole D-SUB male connector, pin assignment 3, 5, 6, 8 - IDC connection, angled 90° - Angled 90°, screw or IDC connection	**SUBCON-PLUS-PROFIB/90/IDC** **SUBCON-PLUS-PROFIB/90/SC**	**2313672** **2313698**	1 1
PROFIBUS cable, Fast Connect type, up to 12 Mbps, for permanent connection (02YSY (ST)CY 1X2X22 AWG) (Length in meters as per customer specifications)	**PSM-CABLE-PROFIB/FC**	**2744652**	1

Termination operation



☒ = Active bus termination resistor

Programming access



☒ = Active bus termination resistor

Repeater for ControlNet

The **PSI-REP-CNET** modular repeater has been specially developed for the requirements of ControlNet systems. The ControlNet connection is established using standard BNC connectors.

The performance and availability of bus systems can be significantly increased by using repeaters. Segmenting the bus with repeaters makes it possible to increase the permissible extent of the network many times over and to extend the number of devices. Another advantage is that bus cable short circuits are restricted to the relevant segment.

- High-quality electrical isolation between all interfaces (ControlNet (A) // ControlNet (B) // power supply // DIN rail connector)
- Bit retiming for unrestricted cascading of devices
- Routing of supply voltage and data signals through DIN rail connectors
- Redundant power supply supported in the form of optional system power supply unit
- All connections can be plugged in using BNC connectors or a COMBICON screw terminal block
- Can be combined with the PSI-MOS FO converters in a modular way using DIN rail connectors
- Approved for use in Zone 2

Repeater for ControlNet

Technical data

Supply		
Supply voltage		24 V DC ±25%
Nominal current consumption		65 mA (24 V DC)
ControlNet interface		ControlNet interface, according to EN 50170
Transmission speed		5 Mbps
Transmission length		≤ 1000 m
Connection method		75 Ω BNC
General data		
Bit distortion, input		±35%
Bit distortion, output		< 6.25%
Bit delay		< 3 bits
Test voltage		1.5 kV_{rms} (50 Hz, 1 min.)
Ambient temperature range		-20°C ... 60°C
Electrical isolation		ControlNet // ControlNet // VCC
Dimensions	W / H / D	35 mm / 107,5 mm / 117 mm
Conformance/approvals		
ATEX		Ex II 3 G Ex nA II T4 X

Ordering data

Description	Type	Order No.	Pcs. / Pkt.
Repeater for electrical isolation and increasing the range	**PSI-REP-CNET**	**2313737**	1

Accessories

DIN rail connector (optional), for routing through the supply voltage and data signal, two pieces are required per device	**ME 17,5 TBUS 1,5/ 5-ST-3,81 GN**	**2709561**	10
System power supply unit, primary-switched	**MINI-SYS-PS-100-240AC/24DC/1.5**	**2866983**	1

Repeater, segment coupler, and bridge for DeviceNet and CANopen

The new infrastructure components for CAN-based transmission systems (DeviceNet and CANopen) can be used to implement interference-free and high-performance networks. Important requirements such as segmentation, electrical isolation, and expansion of the network coverage can now be implemented as easily as almost any network structures. The use of active infrastructure components increases network availability significantly.

Depending on the transmission speed, the signal runtimes in cables and devices limit the maximum achievable network coverage, as the CSMA/CA method typical of CAN only works in a limited time slot. Repeaters and segment couplers can be configured to eliminate these restrictions. This means that there is a choice between either highly dynamic networks with limited geographical coverage or networks that cover a large geographical area.

The **PSI-REP-DNET CAN** modular repeater provides an electrically isolated connection between two segments with the same data rate. It is configured via DIP switches.

– Automatic data rate detection or fixed data rate setting via DIP switches
– Data rates of up to 1 Mbps
– High-quality 4-way isolation between all interfaces (CAN (A) // CAN (B) // power supply // DIN rail connector)
– Can be combined with PSI-MOS FO converters in a modular way using DIN rail connectors
– All connections can be plugged in using COMBICON screw terminal blocks
– Approved for use in Zone 2

The **PSI-SC-DNET CAN** modular segment coupler connects two segments with different data rates. The segment coupler is configured using the PSI-CONF software that is supplied as standard so that only data telegrams with specific addresses (identifiers) are transmitted to the other segment. A segment coupler can be used to connect remote network segments using a slower CAN data rate.

– Data rates of up to 1 Mbps
– High-quality 4-way isolation between all interfaces (CAN (A) // CAN (B) // power supply // DIN rail connector)
– Can be combined with PSI-MOS FO converters in a modular way using DIN rail connectors
– All connections can be plugged in using COMBICON screw terminal blocks
– Approved for use in Zone 2

The **PSI-BRIDGE-DNET CAN** modular bridge connects two segments of a network via different infrastructure solutions. The segments can operate at the same or different data rates. Modem/DSL paths, wireless connections or Ethernet networks can be used as alternative transmission technologies via the FL COMSERVER. An RS-422 interface is integrated as standard for connecting the desired infrastructure. The bridge is configured using the PSI-CONF software that is supplied as standard so that only data telegrams with specific addresses (identifiers) are transmitted via the RS-422. The advantage of the bridge is that it can be used to combine CAN-based networks with alternative infrastructure solutions.

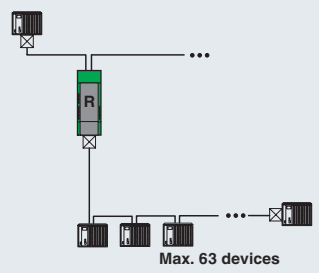
– CAN data rates of up to 1 Mbps
– RS-422 data rates of up to 500 kbps
– High-quality 4-way isolation (CAN // RS-422 // power supply // DIN rail connector)
– Can be combined with PSI-MOS FO converters in a modular way using DIN rail connectors
– All connections can be plugged in using COMBICON screw terminal blocks
– Approved for use in Zone 2

Supply	
Supply voltage	
Nominal current consumption	
RS-422 interface	
Termination resistor	
Transmission speed	
Transmission length	
Connection method	
CAN interface	
Termination resistor	
Transmission speed	
Transmission length	
Connection method	
General data	
Bit distortion, input	
Bit distortion, output	
Bit delay	
Alarm output	
Test voltage	
Ambient temperature range	
Electrical isolation	
Dimensions	W / H / D
Conformance/approvals	
ATEX	

Description
Modular repeater for electrical isolation and increasing the range
Modular segment coupler for connecting slow network segments
Modular bridge that allows the use of alternative transmission technologies

System power supply unit, primary-switched

Stub line



☒ = Switch on bus termination resistor

Repeater for DeviceNet

Technical data

24 V DC ±25%
80 mA (24 V DC)
-
-
-
-
CAN interface, in accordance with ISO/IS 11898 for DeviceNet, CAN, CANopen
124 Ω, integrated and can be connected
1000 kbps, maximum
≤ 5000 m (Dependent on the data rate and the protocol used)
COMBICON plug-in screw terminal block
±35%
< 6.25%
< 1 bit (configurable)
60 V DC, 0.5 A
1.5 kV_{rms} (50 Hz, 1 min.)
-20°C ... 60°C
CAN A // CAN B // VCC
35 mm / 116 mm / 119 mm
Ex II 3 G Ex nA II T4 X

Ordering data

Type	Order No.	Pcs. / Pkt.
PSI-REP-DNET CAN	**2313423**	1

Accessories

MINI-SYS-PS-100-240AC/24DC/1.5	**2866983**	1

Segment coupler for DeviceNet

Technical data

24 V DC ±25%
80 mA (24 V DC)
-
-
-
-
CAN interface, in accordance with ISO/IS 11898 for DeviceNet, CAN, CANopen
124 Ω, integrated and can be connected
1000 kbps, maximum
≤ 5000 m (Dependent on the data rate and the protocol used)
COMBICON plug-in screw terminal block
±35%
< 6.25%
< 1 bit (configurable)
60 V DC, 0.5 A
1.5 kV_{rms} (50 Hz, 1 min.)
-20°C ... 60°C
CAN A // CAN B // VCC
35 mm / 116 mm / 119 mm
Ex II 3 G Ex nA II T4 X

Ordering data

Type	Order No.	Pcs. / Pkt.
PSI-SC-DNET CAN	**2313449**	1

Accessories

MINI-SYS-PS-100-240AC/24DC/1.5	**2866983**	1

Bridge for DeviceNet

Technical data

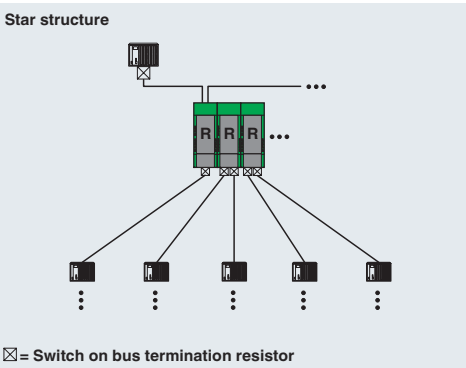
24 V DC ±25%
80 mA (24 V DC)
RS-422 interface in acc. with ITU-T V.11, EIA/TIA-422, DIN 66348-1
Integrated, cannot be switched
≤ 500 kbps
≤ 1200 m (Dependent on the data rate)
COMBICON plug-in screw terminal block
CAN interface, in accordance with ISO/IS 11898 for DeviceNet, CAN, CANopen
124 Ω, integrated and can be connected
1000 kbps, maximum
≤ 5000 m (Dependent on the data rate and the protocol used)
COMBICON plug-in screw terminal block
±35%
< 6.25%
-
60 V DC, 0.5 A
1.5 kV_{rms} (50 Hz, 1 min.)
-20°C ... 60°C
CAN // RS-422 // VCC
35 mm / 107 mm / 121 mm
Ex II 3 G Ex nA II T4 X

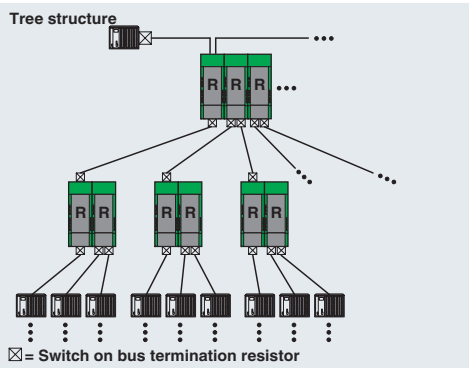
Ordering data

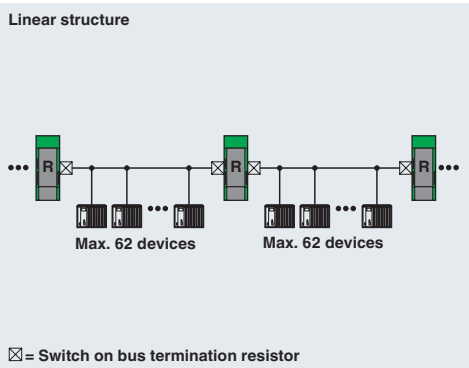
Type	Order No.	Pcs. / Pkt.
PSI-BRIDGE-DNET CAN	**2313533**	1

Accessories

MINI-SYS-PS-100-240AC/24DC/1.5	**2866983**	1







Interface isolator

V.24 (RS-232) / V.24 (RS-232) interface isolator

The V.24 (RS-232) interface is an asymmetric voltage interface (common signal ground for all signals). As well as having a very low signal power, the signal ground is connected to ground potential. This results in very little immunity to interference and a maximum range of 15 m.

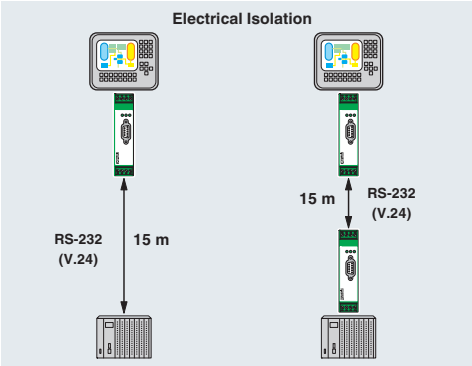
A considerably higher level of immunity to interference can be achieved in industrial applications by using V.24 (RS-232) isolator modules. The high-quality 3-way isolation results in an electrically isolated and interference-proof V.24 (RS-232) interface. This decoupling also protects the expensive terminal devices against damage.

Features:

- High-quality 3-way isolation up to 2 kV (VCC // V.24 (RS-232) // V.24 (RS-232))
- Max. transmission rate of up to 115.2 kbps
- 24 V DC or AC power supply suitable for control cabinet
- Mounting on standard EN DIN rails
- Integrated surge protection with transient discharge to the DIN rail
- In the case of variable cable lengths, the V.24 (RS-232) connection on the field side can be established conveniently using plug-in screw terminal blocks
- Transmission of TxD/RxD data channels and RTS/CTS control lines
- Active data transmission indicated by separate data indicators for the transmit and receive channels

Application:

- Higher level of immunity to interference for industrial conditions
- Compensating currents avoided through electrical isolation
- Protection of expensive terminal devices through decoupling
- Optimum protection of both interface sides thanks to two V.24 (RS-232)/V.24 (RS-232) interface isolators



V.24 (RS-232) interface isolator

Ex:

Technical data

Supply	
Supply voltage	24 V AC/DC ±20%
Nominal current consumption	40 mA (24 V DC)
V.24 (RS-232) interface	V.24 (RS-232) interface in acc. with ITU-T V.28, EIA/TIA-232, DIN 66259-1
Transmission speed	115.2 kbps
Transmission length	15 m (twisted pair)
Connection method	D-SUB-9 male connector Pluggable screw connection
General data	
Bit distortion	< 5%
Bit delay	< 3 µs
Test voltage	2 kV
Ambient temperature range	0°C ... 55°C
Housing material	PA
Transmission channels	4 (2/2), RxD, TxD, RTS, CTS; full duplex
Electrical isolation	V.24 (RS-232) (A) // V.24 (RS-232) (B) // supply
Dimensions W / H / D	22.5 mm / 99 mm / 118.6 mm
Conformance/approvals	
UL, USA/Canada	cUL 508 recognized

Ordering data

Description	Type	Order No.	Pcs. / Pkt.
Interface isolator, for electrical isolation of RS-232 (V.24) interfaces, four channels, rail-mountable	**PSM-ME-RS232/RS232-P**	**2744461**	1

Accessories

V.24 (RS-232) D-SUB cable, length: 2 m			
- 9-pole socket on 25-pole socket	**PSM-KA 9 SUB 25/BB/2METER**	**2761059**	1
- 9-pole socket on 9-pole socket	**PSM-KA9SUB9/BB/2METER**	**2799474**	1

Interface converters

V.24 (RS-232) / TTY interface converter

This converter converts a V.24 (RS-232) interface into a 20 mA TTY current loop interface bidirectionally.

The interference-immune TTY signal allows problem-free data transmission over distances of up to 1000 m using a twisted-pair and shielded 4-wire cable.

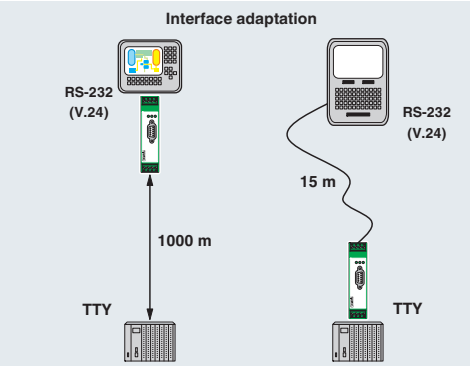
Features:

- Conversion of V.24 (RS-232) TxD/RxD full duplex data signals into the TTY current loop standard
- Semi-active, active or passive TTY operating mode, depending on pin assignment
- Transmission speed of up to 19.2 kbps
- Transmission distances of up to 1000 m in active TTY mode
- 24 V DC or AC power supply suitable for control cabinet
- Active data transmission indicated by separate data indicators for the transmit and receive channels
- Convenient connection for variable cable lengths, enabling the TTY connection on the field side to be established via pluggable screw terminal blocks
- V.24 (RS-232) connection via D-SUB 9 and standard V.24 (RS-232) cable
- High-quality 3-way isolation up to 2 kV (VCC // V.24 (RS-232) // TTY)
- Mounting on standard EN DIN rails
- Integrated surge protection with transient discharge to the DIN rail

Application:

The following tasks are generally solved with the converters (see illustration):

- Interface adaptation between V.24 (RS-232) and TTY interfaces
- Increased range of up to 1000 m
- Programming connection between PC (V.24 (RS-232)) and, for example, S5 controllers with TTY programming interface for temporary coupling



TTY converter, 2 channels

Ex:

Technical data

Supply		
Supply voltage		24 V AC/DC ±20%
Nominal current consumption		75 mA (24 V DC)
V.24 (RS-232) interface		V.24 (RS-232) interface in acc. with ITU-T V.28, EIA/TIA-232, DIN 66259-1
Transmission speed		19.2 kbps
Transmission length		15 m (twisted pair)
Connection method		D-SUB-9 male connector
TTY interface		TTY interface, CL2 in acc. with DIN 66348-1
Transmission speed		19.2 kbps
Transmission length		1000 m (twisted pair)
Connection method		Pluggable screw connection
Operating mode		Active, semi active, passive
Load		≤ 500 Ω
General data		
Bit distortion		< 5%
Bit delay		< 3 µs
Test voltage		2 kV
Ambient temperature range		0°C ... 55°C
Housing material		PA
Transmission channels		2 (1/1), RxD, TxD, full duplex
Electrical isolation		V.24 (RS-232) // TTY // supply
Dimensions	W / H / D	22.5 mm / 99 mm / 118.6 mm
Conformance/approvals		
UL, USA/Canada		Class I, Div. 2, Groups A, B, C, D

Ordering data

Description	Type	Order No.	Pcs. / Pkt.
Interface converter, for conversion from RS-232 (V.24) to TTY, with electrical isolation, two channels, rail-mountable	**PSM-ME-RS232/TTY-P**	**2744458**	1

Accessories

V.24 (RS-232) D-SUB cable, length: 2 m			
- 9-pole socket on 25-pole socket	**PSM-KA 9 SUB 25/BB/2METER**	**2761059**	1
- 9-pole socket on 9-pole socket	**PSM-KA9SUB9/BB/2METER**	**2799474**	1

Interface converters
RS-232 (V.24) / RS-422 (V.11)
RS-232 (V.24) / RS-485

The RS-422 standard can be used to set up rapid, interference-free point-to-point connections in industrial applications. Connections covering a distance of up to 1200 m can be established using a twisted-pair and shielded 4-wire cable.

The RS-485 standard allows more than two devices to communicate with one another. Converting the V.24 (RS-232) point-to-point interface into the bus-capable RS-485 standard makes it possible to network up to 32 devices via a 2- or 4-wire cable.

PSM-ME-RS232/RS485-P

This interface converter converts TxD/RxD data signals with speeds of up to 115.2 kbps on the V.24 (RS-232) interface bidirectionally into either RS-422 or RS-485 signals. The V.24 (RS-232) connection is established via a 9-pole D-SUB, and the RS-422/RS-485 field connection is established using COMBICON plug-in screw terminal blocks.

Features:
- RS-422 4-wire point-to-point mode
- RS-485 2-wire mode, half duplex
- RS-485 4-wire mode, full duplex
- Automatic RS-485 transmit/receive changeover
- Transmission speed between 4.8 kbps and 115.2 kbps
- Integrated data indicator for dynamic indication of send and receive data
- High-quality 3-way isolation between power supply, V.24 (RS-232), and RS-422/485 for reliable decoupling of the potentials with 2 kV
- Integrated surge protection with transient discharge to the DIN rail

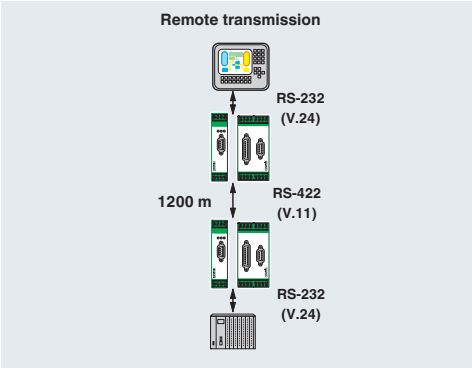
Applications:
- Fast and interference-free point-to-point connection between two V.24 (RS-232) interfaces via RS-422
- Increase in range or remote transmission up to 1200 m
- Interface adaptation between V.24 (RS-232) and RS-422 interfaces
- Programming or parameterizing link between PC (V.24 (RS-232)) and a piece of equipment such as a PLC or variable frequency drive with an RS-422 connection
- A V.24 (RS-232) master interface can be coupled to an RS-485 bus system
- A V.24 (RS-232) device can be integrated into an RS-485 bus system
- Up to 32 V.24 (RS-232) interfaces can be networked via the RS-485 standard (provided they can be addressed)
- A temporary programming or parameterizing link can be set up between a PC (V.24 (RS-232)) and a piece of equipment such as a PLC or variable frequency drive with an RS-485 connection

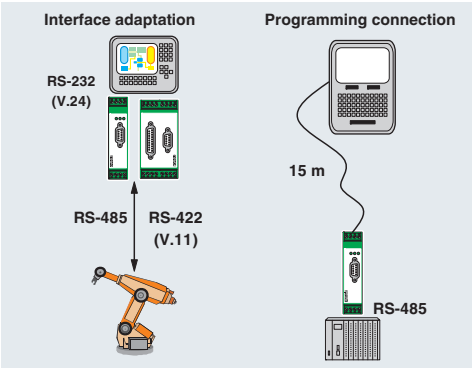
PSM-EG-RS 232/RS 422-P/4K

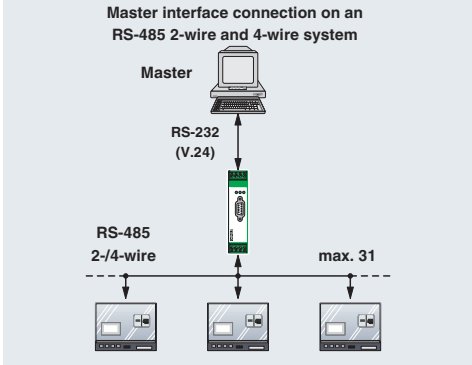
The PSM-EG... control cabinet module also converts the V.24 (RS-232) signals in full duplex mode with a data rate of up to 64 kbps to the powerful RS-422 standard. However, in addition to the TxD/RxD transmit and receive channels, the converter also provides two further channels for transmitting RTS and CTS control lines.

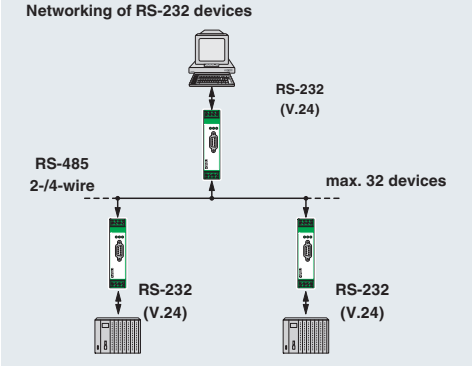
Features:
- RS-422 4-wire point-to-point mode
- High-quality 3-way isolation between power supply, V.24 (RS-232), and RS-422 for reliable electrical isolation of the potentials with 2.5 kV
- Integrated surge protection with transient discharge to the DIN rail
- Transmission speed of up to 64 kbps
- As an alternative, data cables can be connected via D-SUB connectors or plug-in screw terminal blocks

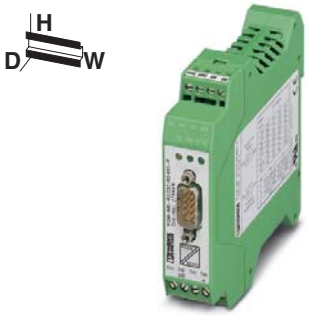
Applications:
- Fast and interference-free point-to-point connection between two V.24 (RS-232) interfaces via RS-422
- Interface conversion between V.24 (RS-232) and RS-422 interfaces.
- Programming or parameterizing link between PC (V.24 (RS-232)) and a piece of equipment such as a PLC or variable frequency drive with an RS-422 connection
- Increased range of up to 1200 m, incl. control cables



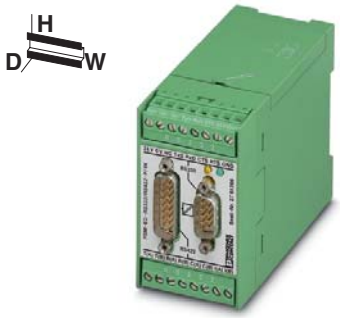








V.24 (RS-232) converter for RS-422 and RS-485, 2 channels



V.24 (RS-232) converter for RS-422, 4 channels

Ex:

		Technical data	Technical data
Supply			
Supply voltage		24 V AC/DC ±20%	24 V DC ±20%
Nominal current consumption		85 mA (24 V DC)	130 mA (24 V DC)
V.24 (RS-232) interface		V.24 (RS-232) interface in acc. with ITU-T V.28, EIA/TIA-232, DIN 66259-1	V.24 (RS-232) interface in acc. with ITU-T V.28, EIA/TIA-232, DIN 66259-1
Transmission speed		115.2 kbps	64 kbps
Connection method		D-SUB-9 male connector	D-SUB-9 male connector
RS-422 interface		RS-422 interface in acc. with ITU-T V.11, EIA/TIA-422, DIN 66348-1	RS-422 interface in acc. with ITU-T V.11, EIA/TIA-422, DIN 66348-1
Termination resistor		150 Ω can be connected; pull up/down 390 Ω	150 Ω receiver; pull up/down 510 Ω
Transmission speed		115.2 kbps	64 kbps
Transmission length		1200 m (twisted pair)	1200 m (twisted pair)
Connection method		Pluggable screw connection	D-SUB-15 male connector
RS-485 interface		RS-485 interface in acc. with EIA/TIA-485, DIN 66259-1	
Data direction switching		Automatic control or via RTS/CTS	-
Termination resistor		150 Ω can be connected; pull up/down 390 Ω	-
Transmission length		1200 m (twisted pair)	-
Connection method		Pluggable screw connection	-
General data			
Bit distortion		≤ 5%	≤ 5%
Bit delay		≤ 3 µs	≤ 3 µs
Test voltage		2 kV	2.5 kV
Ambient temperature range		0°C ... 55°C	0°C ... 50°C
Housing material		PA	ABS
Transmission channels		2 (1/1), RxD, TxD, full duplex	4 (2/2), RxD, TxD, RTS, CTS; full duplex
Electrical isolation		V.24 (RS-232) // RS-422 // supply	V.24 (RS-232) // RS-422, supply // RS-422
Dimensions	W / H / D	22.5 mm / 99 mm / 118.6 mm	45 mm / 75 mm / 110 mm
Conformance/approvals			
UL, USA/Canada		Class I, Div. 2, Groups A, B, C, D	cUL 508 recognized

	Ordering data			Ordering data		
Description	Type	Order No.	Pcs. / Pkt.	Type	Order No.	Pcs. / Pkt.
Interface converter, for conversion from RS-232 (V.24) to RS-485, with electrical isolation, rail-mountable, changeover of data direction self-controlling or through RTS/CTS						
- 2 channels	**PSM-ME-RS232/RS485-P**	**2744416**	1			
Interface converter, for conversion from RS-232 (V.24) to RS-422 (V.11), with electrical isolation, rail-mountable						
- 4 channels				**PSM-EG-RS232/RS422-P/4K**	**2761266**	1

	Accessories			Accessories		
V.24 (RS-232) D-SUB cable, length: 2 m						
- 9-pole socket on 25-pole socket	**PSM-KA 9 SUB 25/BB/2METER**	**2761059**	1	**PSM-KA 9 SUB 25/BB/2METER**	**2761059**	1
- 9-pole socket on 9-pole socket	**PSM-KA9SUB9/BB/2METER**	**2799474**	1	**PSM-KA9SUB9/BB/2METER**	**2799474**	1

The FB… line of modular fieldbus components offers connectivity from the process controller to the field devices. Together with redundant bulk power, surge protection, and cabling cordsets, a complete connection architecture is provided.

The line includes device couplers for use with both Foundation Fieldbus and Profibus PA.These couplers provide short-circuit protection to ensure that a fault on a spur does not disrupt the entire segment. They also offer energy limited outputs, intrinsic safety and galvanic isolation.

Also available are redundant and simplex power supplies. Each galvanically isolated supply provides power while allowing digital communications to one segment. Passive power conditioning allows for high reliability, and high efficiency eliminates derating in any mounting configuration.

Field junction boxes provide a ready to install solution. These boxes, in either stainless steel or aluminum, are specifically designed to accommodate the modular device couplers and ease wiring considerations.

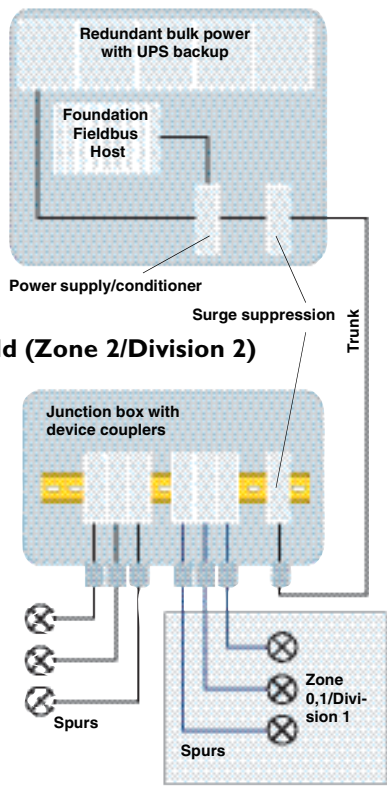
Based on the T-bus connection system, the field components are hot-swappable and allow easy system expansion. Single-loop-integrity can be acheived by connection of a single module to a single instrument. With the limited width on the rail, the size and weight of the associated field enclosure is minimized.

The FB… line was designed specifically to meet the tough requirements of the process environment. This includes various approvals for installation in Zone 2 or Division 2 hazardous locations.

All components include built-in status LEDs. Integrated terminators in the power supplies, together with a connector-mounted version in the field, reduce the opportunity for segment termination error.

Typical Foundation Fieldbus H1-Segment

Control Cabinet



Field junction boxes

- Designed specifically for field device coupler systems
- Includes trunk module FB-ET and allows installation of additional couplers and PT plug
- Bus bar and shield clamps
- Entries for trunk in, trunk out, and breather connections
- Each enclosure is equipped with M20 ports and can be configured as desired
- Cable glands, plugs, and breather ordered separately

N

Stainless steel enclosure

N

Aluminum enclosure

Technical data

General data		FB-9-SS	FB-15-SS
Housing material		Stainless steel, 316L, electropolished	
DIN rail, material		NS35, galvanized, passivated	
Weight		3500 g	4680 g
Dimensions	W / H / D	235 mm / 260 mm / 121 mm	325 mm / 300 mm / 121 mm
Mounting position		Vertical	
Degree of protection		IP66 / NEMA 4X	
Ambient temperature (operation)		-40°C ... 85°C	
Conformance/approvals			
ATEX		Ex II 2 G/2 D	

Technical data

General data		FB-8-AL	FB-15-AL
Housing material		Aluminum, die-cast, corrosion-resistant, powder-coated	
DIN rail, material		NS35, galvanized, passivated	
Weight		3220 g	4140 g
Dimensions	W / H / D	202 mm / 232 mm / 111 mm	330 mm / 230 mm / 111 mm
Mounting position		Vertical	
Degree of protection		IP66 / NEMA 4X	
Ambient temperature (operation)		-40°C ... 85°C	
Conformance/approvals			
ATEX		Ex II 2 G/2 D	

Ordering data

Description	Type	Order No.	Pcs. / Pkt.
Enclosure, stainless steel			
- 9 ports	**FB-9-SS**	**2316213**	1
- 15 ports	**FB-15-SS**	**2316190**	1
Enclosure, aluminum			
- 8 ports			
- 15 ports			

Ordering data

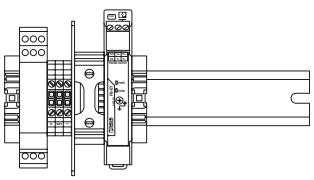
Type	Order No.	Pcs. / Pkt.
FB-8-AL	**2316200**	1
FB-15-AL	**2316187**	1

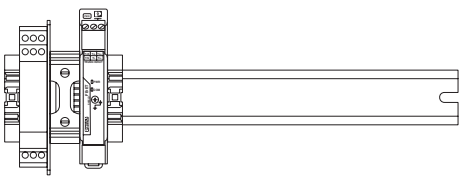
Accessories

Cable gland, M20, includes nut	**FB-M-KV-M20-EX**	**2900197**	10
Stopping plug, M20, includes nut	**FB-M-BS-M20-EX**	**2900209**	10
Breather plug, M20, includes nut	**FB-M-BD-M20-EX**	**2901859**	1

Accessories

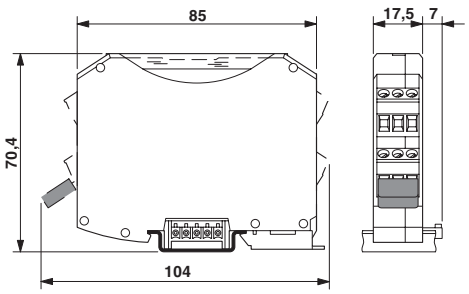
	FB-M-KV-M20-EX	**2900197**	10
	FB-M-BS-M20-EX	**2900209**	10
	FB-M-BD-M20-EX	**2901859**	1





DIN rail components, small enclosure vs. large enclosure

Device couplers for the field



The fieldbus device couplers are suitable for Foundation Fieldbus and PROFIBUS PA. They provide an interface between the fieldbus trunk line and field devices. The compact width on the DIN rail reduces the required dimensions and weight of the field housing.

FB-ET

- Connects to the trunk and provides voltage limiting
- Includes a pre-installed external terminator, ensuring termination is always available
- A selector switch is provided to select the correct shield/ground connection
- Diagnostic LEDs include DC OK, low voltage warning, and communication on the segment. External terminator includes a connection LED

FB-2SP and FB-ISO

- Couple field devices and provide short-circuit current limiting with a user-selectable setpoint
- Voltage and communication are routed via the ME 17,5 TBUS… connectors installed on the DIN rail
- Provide non-incendive, FISCO ic, and FNICO spur connections
- Hot-swappable and scalable
- Single-sided connector configuration simplifies wiring in field housing
- Can be installed together in the same field housing
- Diagnostic LEDs indicate DC OK and errors at the spur connection

FB-ISO only

- Comprehensive channel-to-channel galvanic isolation
- Provides an intrinsically safe, FISCO connection
- Single-loop integrity is achieved by the connection of a single FB-ISO coupler to a single device. With dedicated circuitry for each device, the redundancy achieved by the segment power supply is not compromised

Supply	
Supply voltage range	
Rated current	
Nominal current consumption	
Fieldbus interface	
Rated voltage	
Rated current	
Electrical isolation	
Termination resistor	
Surge protection	
General data	
Screw connection solid / stranded / AWG	
Weight	
Degree of protection	
Ambient temperature (operation)	
Max. permissible relative humidity (operation)	
Conformance/approvals	
Conformance	
NE	
ATEX	
IECEx	
CSA, USA/Canada	
Fieldbus Foundation	

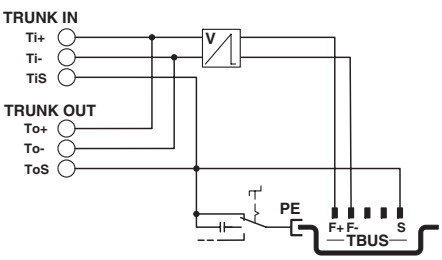
Description
Device coupler, for Foundation Fieldbus and PROFIBUS PA
- Trunk module with external termination resistor and TBUS connector
- 2-spur connections, includes TBUS connector
- 1-spur connection, electrically isolated, intrinsically safe, includes TBUS connector

Device coupler with TBUS for trunk line connection and termination

Ex:

Technical data
10.3 V DC ... 32 V DC (input on trunk line side)
≤ 1 A (Trunk line input side to TBUS)
8 mA (without termination resistor)
-
-
-
100 Ω, external removable connector included Active if voltage exceeds 39 V (typ.) or 41 V (max.)
0.2 - 2.5 mm² / 0.2 - 2.5 mm² / 24 - 12 66 g IP20 -40°C ... 85°C 95% (no condensation)
CE-compliant, additionally EN 61326 NAMUR NE 21 II 3 G Ex nA IIC T4 Gc Ex nA IIC T4 Gc Class I, Zone 2, AEx nA IIC T4 Class I, Division 2, Groups A,B,C,D FF-846

Ordering data		
Type	**Order No.**	**Pcs. / Pkt.**
FB-ET	**2316048**	1

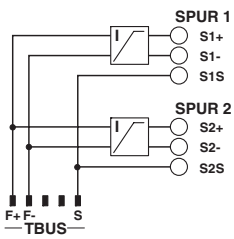


Device coupler with TBUS for 2 spurs

Ex:

Technical data
10.3 V DC ... 32 V DC (input on trunk line side)
-
6 mA
≤ 32 V (each spur)
15 mA (each spur, adjustable via selector switch, -40…85°C) 25 mA (each spur, adjustable via selector switch, -40…80°C) 35 mA (each spur, adjustable via selector switch, -40…75°C) 45 mA (each spur, adjustable via selector switch, -40…70°C)
-
-
-
0.2 - 2.5 mm² / 0.2 - 2.5 mm² / 24 - 12 64 g IP20 -40°C ... 85°C (depending on set rated current) 95% (no condensation)
CE-compliant, additionally EN 61326 NAMUR NE 21 II 3(3) G Ex nA [nL Gc] IIB T4 Gc, FNICO spurs II 3(3) G Ex nA [ic Gc] IIB T4 Gc, FISCO ic spurs Ex nA [nL Gc] IIB T4 Gc, FNICO spurs Ex nA [ic Gc] IIB T4 Gc, FISCO ic spurs Class I, Zone 2, AEx nA[nL] IIB T4 Class I, Division 2, Groups C, D FF-846

Ordering data		
Type	**Order No.**	**Pcs. / Pkt.**
FB-2SP	**2316051**	1

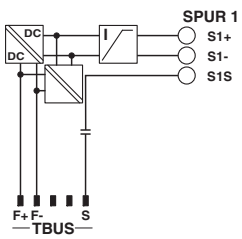


Device coupler with TBUS for 1 electrically isolated spur connection

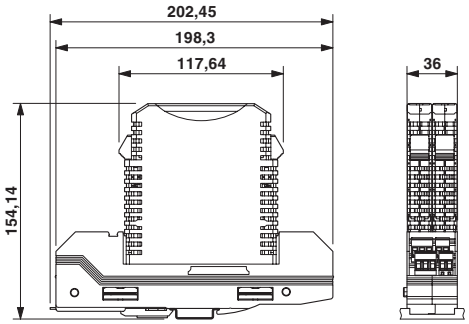
Ex:
Applied for: CSA

Technical data
17 V DC ... 32 V DC (input on trunk line side)
-
10 mA
≥ 10 V (each spur)
15 mA (each spur, adjustable via selector switch) 25 mA (each spur, adjustable via selector switch) 35 mA (each spur, adjustable via selector switch)
500 V AC (between input and output, routine test)
-
-
0.2 - 2.5 mm² / 0.2 - 2.5 mm² / 24 - 12 96 g IP20 -40°C ... 70°C 95% (no condensation)
CE-compliant, additionally EN 61326 NAMUR NE 21 II 3(3) G Ex nA [nL Gc] IIC T4 Gc, FNICO power supply (spur) II 3(1) GD Ex nA [ia Ga Da] IIC T4 Gc, FISCO power supply (spur) Ex nA [nL Gc] IIC T4 Gc, FNICO power supply (spur) Ex nA [ia Ga Da] IIC T4 Gc, FISCO power supply (spur) CSA applied for -

Ordering data		
Type	**Order No.**	**Pcs. / Pkt.**
FB-ISO	**2316064**	1



Power supply



Each DIN rail-mounted fieldbus power supply provides high-integrity power for one H1 segment. Built-in output impedance allows digital communication and DC power to co-exist on a pair of wires.

- Galvanically isolated
- Fixed end-of-line terminator included
- Passive filtering allows for low heat dissipation and long service life
- Pluggable connectors and local diagnostic LEDs permit easy installation and troubleshooting

FB-PS… modular redundant power supply

- Modular base, one per segment, eliminates unused capacitance
- Swappable bases for increased plant integrity
- Compact width optimizes critical enclosure space
- Redundant power modules, with common conditioning in the base, provides greatest system performance and reliability
- Quick-latch modules and base
- Preventative function monitoring: self diagnostics with output relay integrated in each power module. Eliminates need for separate diagnostics and contact module
- Dedicated relay connection per base
- Bussable power and relay through pluggable side-base connectors
- Redundant host connections to common segment
- Redundant power connections feed each power module separately
- Auto Current Balance technology enhances product life by closely sharing power between modules
- High efficiency including MOSFET outputs

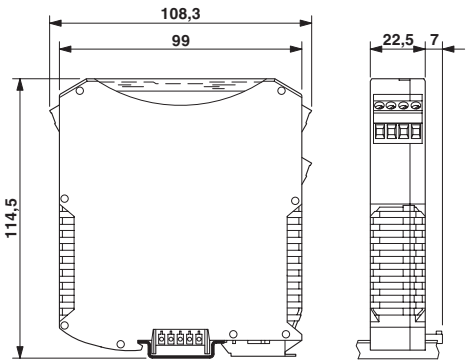
FB-PS… simplex power supply

- Connections for redundant bulk power
- Power is bussed to the power supply through the T-bus
- No space required between modules to optimize enclosure size

Input data
DC input voltage range
Nominal current range
Output data
Output voltage range
Output current
Can be connected in parallel / series
Max. power dissipation
Signaling
Signaling DC OK
Signaling alarm
Signaling overload
Redundancy indication OK
General data
Weight / Dimensions W x H x D
Degree of protection / Protection class
Ambient temperature (operation)
Ambient temperature (storage / transport)
Max. permissible relative humidity (operation)
Conformance/approvals
ATEX
UL, USA/Canada
NE
EN
Fieldbus Foundation

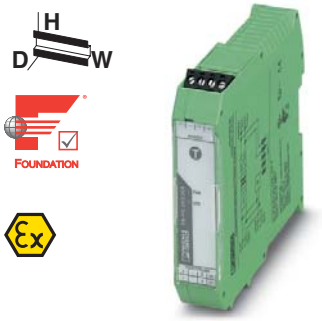
Description
Power supply, modular redundant
- Plug, 28 V DC, 500 mA
- Base
Power supply, simplex, with built-in 100 Ω termination
- 25 V DC, 360 mA

PCB connector, 5.0 mm pitch, color: Black
PCB connector, 3.5 mm pitch, color: Green
End cap



Power supply plug

Power supply base



Simplex power supply

Ex:

Technical data	Technical data	Technical data
18.5 V DC ... 30.5 V DC	- ... -	19.2 V DC ... 35 V DC
700 mA ... 1100 mA	-	340 mA ... 630 mA
27 V DC ... 30 V DC (on the trunk)	-	25 V DC ... 27 V DC (on the trunk)
500 mA	-	360 mA
Yes / No	- / -	- / -
4 W (typical)	-	2 W (typical)
Green LED	-	Green LED
Yellow LED	-	-
-	-	Red LED
Green LED	-	-
181 g / 17.5 x 117.6 x 115 mm	259 g / 36 x 202.5 x 61.5 mm	210 g / 22.5 x 114.5 x 108.3 mm
IP20 / -	IP20 / -	IP20 / -
-40°C ... 60°C	-40°C ... 60°C	-40°C ... 60°C
-40°C ... 85°C	-40°C ... 85°C	-40°C ... 85°C
95% (no condensation)	95% (no condensation)	95% (no condensation)
-	-	II 3 G Ex nA II T4 X
-	-	Class I, Zone 2, Group IIC T4
		Class I, Div. 2, Groups A, B, C, D, T4
NAMUR NE 21	NAMUR NE 21	NAMUR NE 21
EN 61326	EN 61326	EN 61326, EN 60068-2-27, EN 60068-2-6
-	-	FF-831

Ordering data

Type	Order No.	Pcs. / Pkt.
FB-PS-PLUG-24DC/28DC/0.5/EX	**2316132**	1

Accessories

Ordering data

Type	Order No.	Pcs. / Pkt.
FB-PS-BASE/EX	**2316145**	1

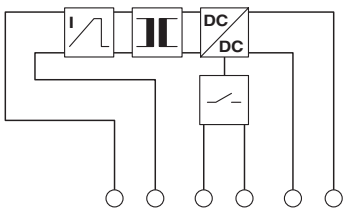
Accessories

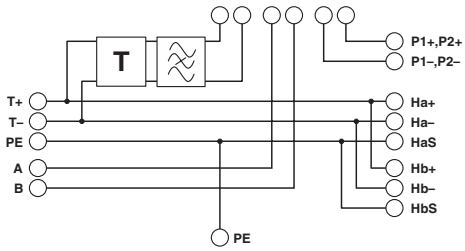
ZEC 1,5/ 4-LPV-5,0 C2 BK	**1793260**	50
ZEC 1,0/ 6-LPV-3,5 C1	**1915699**	50
D-FB-PS	**2316226**	10

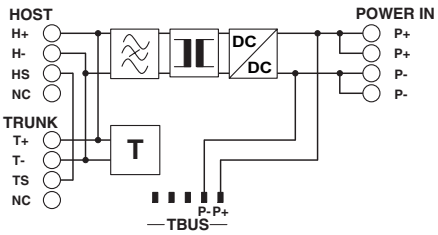
Ordering data

Type	Order No.	Pcs. / Pkt.
FB-PS-25/0.36A	**2316035**	1

Accessories



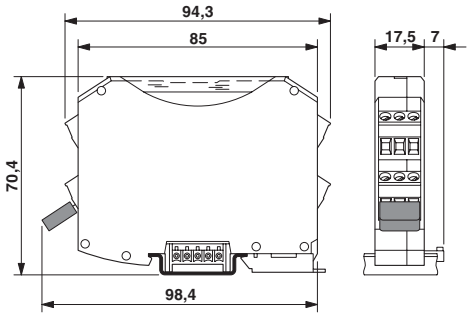


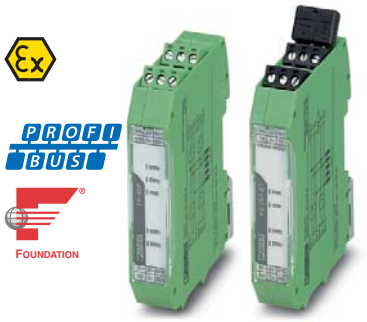


Device coupler for the cabinet

The FB device couplers are suitable for Foundation Fieldbus and PROFIBUS PA. They provide an interface between the fieldbus trunk cable and field devices.

- The **FB-2SP-ET** interfaces between the trunk and up to 2 spurs. The **FB-4SP** allows connection of up to 4 spurs
- T-bus connectors carry fieldbus data between the trunk and expansion modules
- Power is supplied to the device couplers through the T-bus
- Built-in short-circuit protection
- FB-2SP-ET includes external terminator plug
- LEDs indicate power and error status
- The FB-2SP-ET includes a segment communication LED
- Recommended for high-density cabinet installation
- Not intended for use with FB-ET, FB-2SP or FB-ISO device couplers





Device coupler with TBUS

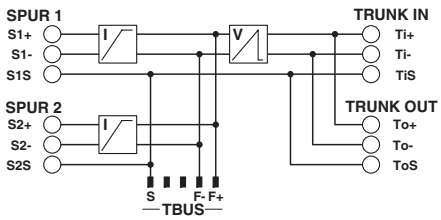
Ex:

Technical data

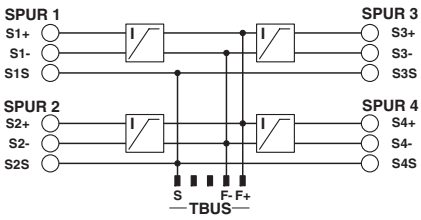
Supply	FB-2SP-ET	FB-4SP
Supply voltage range	9 V DC ... 31 V DC (input on trunk line side)	
Rated current	≤ 4.5 A (input on trunk line side)	
Nominal current consumption	7 mA	3.5 mA
Fieldbus interface		
Rated voltage	≤ 31 V (each spur)	≤ 31 V (each spur)
Rated current	≤ 43 mA (each spur)	≤ 43 mA (each spur)
Short-circuit current	≤ 58 mA (each spur)	
Voltage drop of the trunk line / outputs	≤ 1.3 V	
Termination resistor	100 Ω, external removable connector included	
Surge protection	Active if voltage exceeds 39 V (typ.) or 41 V (max.)	
Safety data as per ATEX		
Max. voltage U_o	32 V	32 V
Max. current I_o	70 mA	70 mA
Max. inductance L_0	0.25 mH	
Max. capacitance C_0	60 nF	
General data		
Weight	75 g	
Mounting position	horizontal DIN rail NS 35, EN 60715	
Degree of protection	IP20	
Ambient temperature (operation)	-40°C ... 70°C	
Ambient temperature (storage / transport)	-40°C ... 85°C	
Max. permissible relative humidity (operation)	95% (no condensation)	
Conformance/approvals		
NE	NAMUR NE 21	
ATEX	II 3 G Ex nA [nL] IIC T4 X	
IEC	IEC 60529, IEC 61158-2	
UL, USA/Canada	Class I, Zone 2, Group IIC T4 Class I, Div. 2, Groups A, B, C, D, T4	
EN	EN 61326, EN 60068-2-27, EN 60068-2-6	

Ordering data

Description	Type	Order No.	Pcs. / Pkt.
Device coupler, for Foundation Fieldbus and PROFIBUS PA			
- Trunk + 2 spurs, includes external terminator and TBUS	**FB-2SP-ET**	**2316022**	1
- 4-spur expansion module, includes TBUS	**FB-4SP**	**2316019**	1



Connection diagram: FB-2SP-ET

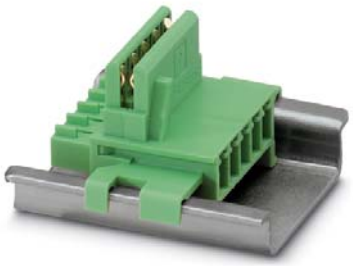


Connection diagram: FB-4SP

Accessories

- Surge protection in input
- The DIN rail connector ME 22.5 TBUS bridges input power between several simplex power supplies (FB-PS-25/0.36A)
- Note: The modular device couplers already include the required T-Bus connector ME 17.5, so a separate order is not necessary

Double conductor protection for floating signal circuits



TBUS connector

Description	Ordering data: Type	Order No.	Pcs. / Pkt.	Ordering data: Type	Order No.	Pcs. / Pkt.
SURGETRAB protective adapter for installation on measuring sensors for Ex protection zones Outer thread: M20 x 1.5	**S-PT-EX-24DC**	**2800034**	1			
PLUGTRAB, pluggable surge protection for Foundation Fieldbus						
Protective connector	**PT 2X2-FF-ST**	**2800755**	1			
Base element with bridge between 3/4 (⏚) and 9/10	**PT 4-BE**	**2839402**	10			
Base element with gas-filled surge arrester between 3/4 (⏚) and 9/10	**PT 4+F-BE**	**2839415**	10			
TBUS DIN rail connector				**ME 22,5 TBUS 1,5/ 5-ST-3,81 GN**	**2707437**	50

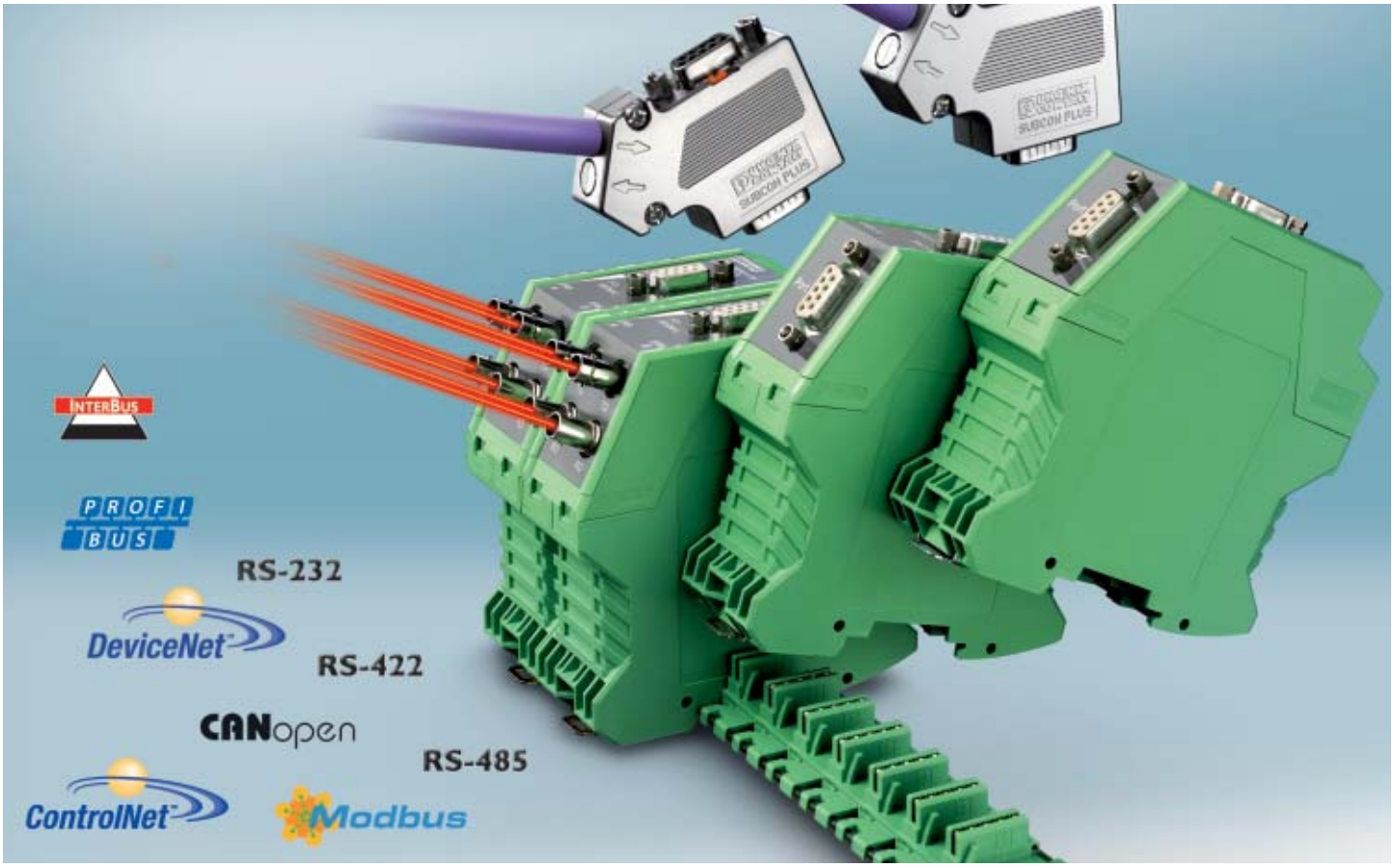
Accessories

- End clamp, ground and shield clamps (CLIPLINE)
- Terminal block bases that can be lined up next to each other in order to set up any number of positions
- Marking material

Clamps and terminal blocks

Marking materials

Description	Color	Ordering data: Type	Order No.	Pcs. / Pkt.	Ordering data: Type	Order No.	Pcs. / Pkt.
End clamp, to snap on NS 35, 9.5 mm wide, can be labeled with ZB 6, ZB 8/27, KLM...							
	gray	**CLIPFIX 35**	**3022218**	50			
	gray	**E/ME TBUS NS35 GY**	**2713780**	50			
Terminal block, for mounting on NS 35...	gray	**UT 2,5**	**3044076**	50			
Cover, width 2.2 mm	gray	**D-UT 2,5/10**	**3047028**	50			
Shrink sleeve, for conductor diameters 3.2 - 9.5 mm 1 roll = 500 markers, à 30 mm long	white				**WMS 9,5 (30X16)R**	**0800377**	1
UniCard sheets, for labeling of terminal blocks with a zack marker strip groove, 32-section, can be labeled with the BLUEMARK and CMS–P1–PLOTTER	white				**UC-TM 16**	**0819217**	10
UniCard materials, for labeling terminal blocks with a flat marker groove, 32-section, can be labeled with BLUEMARK and CMS–P1–PLOTTER	white				**UC-TMF 16**	**0819262**	10



Over recent years, fiber optic data transmission has been playing an increasingly important role within industry. It has become the norm in particularly critical applications with very high requirements regarding availability. This is due to the many advantages that fiber optic data transmission has over traditional copper systems.

The main advantages are:

- Maximum immunity to interference, even when exposed to extreme electromagnetic influences
- High-quality electrical isolation between the devices
- Maximum transmission distances of several dozen kilometers with an extremely high data rate
- Maximum number of devices is not limited by the electrical properties of the communication interface used

This leads to a marked gain in performance and immunity to interference as far as the communication infrastructure in industrial applications is concerned, without having to consider complex surge protection measures, shielding, and equipotential bonding concepts.

PSI-MOS, the new modular FO transmission system, has been designed for maximum transmission security and system availability in industrial applications. With

this product group, users can, for the first time ever, enjoy the advantages of FO data transmission in the context of an integrated system for all serial communication interfaces and bus systems. This enables the restrictions of copper-based communications technology (in terms of transmission range, the number of devices per bus segment, and above all immunity to electromagnetic interference) to be elegantly overcome.

The universal and modular PSI-MOS system particularly stands out by virtue of its numerous performance features that fully utilize the advantages of FO technology.

1. Modular station structure

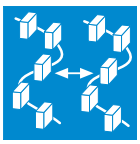
Star and line distributors can be combined in a modular manner and extended with PSI-REP repeaters in accordance with the required number of channels and fiber-specific connection method. Cross-wiring for data signals and the supply voltage is taken care of automatically through the backplane bus when the devices are snapped onto the EN rail. The DIN rail connectors allow individual modules to be removed from a star coupler topology even during operation without affecting the other modules. The optional system power supply fits into the system seamlessly.

2. Integrated optical diagnostics with proactive alarm

All the devices in the PSI-MOS FO transmission system feature FO diagnostics in the form of a bar chart display. This provides detailed information about the signal quality of the FO path right from startup. Complicated calibration of the FO paths can therefore be dispensed with and the user always has exact information on the status of the FO connection, even during operation.

If the quality of optical transmission drops during operation and the sensitivity limit is reached, an early warning is sent via the integrated switch contact before a system failure is able to occur.

3. Integrated redundancy



Thanks to PSI-MOS, it is now possible to design all common industrial communication systems redundantly for the first time ever. Depending on the particular communication system, there are various options available for increasing system availability. These range from redundant point-to-point, star or tree structures, down to redundant fiber optic rings. Besides the fiber optic paths, redundancy also covers the voltage supply and, depending on the application, also the converter itself. A switch contact integrated into the devices provides information about the particular redundancy case.

4. For all network topologies

The PSI-MOS FO converters and the PSI-REP repeaters make completely individual installation concepts possible. In addition to purely linear structures, networks can be set up in the form of star, tree or hybrid structures, and if the communication system used allows it, a redundant ring structure is also possible. In this context, PSI-REP repeaters can be combined with PSI-MOS FO converters in universal stations. In this way, users have the flexibility to always adapt their network structure perfectly to their application.

The PSI-REP repeaters detect damaged data telegrams by means of bit oversampling and prevent faults being transmitted to subsequent bus segments. The integrated bit retiming supports practically any cascadable network structures.

5. For maximum transmission distances

The PSI-MOS system features new fiber optic transceivers with high-performance capability and is able to achieve ranges that were once only possible with glass fiber. With the added benefit of really straightforward fast connection technology, a range of 100 m can be achieved with polymer fiber. A distance of 880 m is possible with HCS fiber at 660 nm, which rises to 2800 m at 850 nm. If this is still not enough, there is always the option of using multi-mode glass fiber with a range of 4800 m or single-mode fiber with a range of up to 45 km. This means that PSI-MOS can be scaled to suit any application and offers the right device with the ideal cost-benefit ratio for every type of fiber.

6. Optimized for universal industrial application

- PSI-MOS can be used for PROFIBUS, INTERBUS, ControlNet, DeviceNet, CANopen, MODBUS, RS-422, V.24 (RS-232), and over 70 company-specific RS-485 bus systems
- Comprehensive diagnostic functions
- Modular station structure
- Mounting on EN DIN rail
- 24 V supply voltage designed for control cabinets and with a wide tolerance range
- Very straightforward FO fast connection technology for B-FOC (ST®), F-SMA, and SC Duplex
- Extended operating temperature range from -20°C to +60°C
- Use in potentially explosive areas

FO converters for PROFIBUS

The **PSI-MOS-PROFIB/FO...** devices have been specially developed for use in demanding industrial applications. They convert copper-bound PROFIBUS interfaces for fiber optics. The conversion is performed using a transparent protocol for all data rates of up to 12 Mbps. The integrated optical diagnostics allow permanent monitoring of the FO paths during installation and also during operation. The floating switch contact is activated when the signal output on the fiber optic paths drops to a critical level. This early alarm generation enables critical system states to be diagnosed well before they result in failure. Depending on which wavelength is used in conjunction with the corresponding fibers, transmission distances of 70 m to 45 km can be achieved between two devices. Depending on the wavelength, devices can be used with polymer, HCS, and glass fibers.

- Automatic data rate detection or fixed data rate setting via DIP switches
- Suitable for all data rates of up to 12 Mbps
- Integrated optical diagnostics for continuous monitoring of fiber optic paths
- Floating switch contact for leading alarm generation in relation to critical fiber optic paths
- High-quality electrical isolation between all interfaces (PROFIBUS // fiber optic ports // power supply // DIN rail connector)
- Bit retiming for any cascading depth
- Routing of supply voltage and data signals through DIN rail connectors
- Redundant power supply supported in the form of optional system power supply unit
- Connections can be plugged in using a COMBICON screw terminal block
- Can be combined with the PSI copper repeater in a modular way using DIN rail connectors
- Approved for use in Zone 2
- Intrinsically safe FO interface (Ex op is) for direct connection to devices in Zone 1 (all 660 and 850 nm versions)

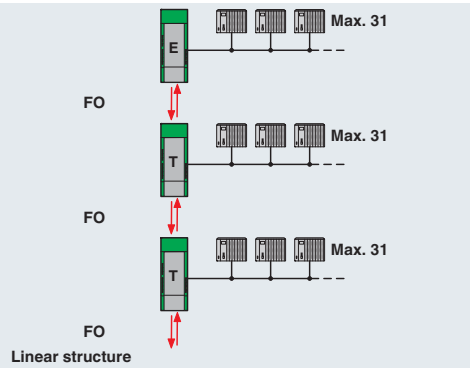
The **PSI-MOS-PROFIB/FO... E** terminal devices convert a PROFIBUS interface for a **FO cable**. They are ideal for point-to-point connections.

The **PSI-MOS-PROFIB/FO... T** T-couplers allow the interface to be converted for two **FO cables**. They can be used to create linear structures and ring structures for increased system availability.

Supply voltage	
Nominal current consumption	
RS-485 interface	
Data format/encoding	
Transmission speed	
Transmission length	
Connection method	
Optical interface	
Connection	
Wavelength	
Transmission length Incl. 3 dB system reserve	
General data	
Bit delay	
Ambient temperature range	
Dimensions	W / H / D
Conformance/approvals	
ATEX	
UL, USA/Canada	

Description
Terminal device, for converting data signals from PROFIBUS FMS/DP **to an FO line**
T-coupler, for converting data signals from PROFIBUS FMS/DP **to two FO lines**

DIN rail connector (optional), for routing through the supply voltage and data signal, two pieces are required per device
DIN rail connector (optional), for routing through of the supply voltage, 2 required per device
System power supply unit, primary-switched



PROFIBUS polymer and HCS fibers

Ex:

Technical data

24 V DC ±25%
85 mA (24 V DC)
PROFIBUS according to IEC 61158, RS-485 2-wire, half duplex, automatic control
UART (11 bits, NRZ)
9.6/19.2/45.45/93.75/187.5/500/1500/3000/6000/12000 kbps, automatic detection, optional setting using a DIP switch
Max. 1200 m (depending on the data rate, with shielded, twisted pair data cable)
D-SUB-9 female connector
F-SMA 660 nm 70 m (with F-P 980/1000 230 dB/km with quick mounting connector) 400 m (with F-K 200/230 10 dB/km with quick mounting connector)
< 1 bit -20°C ... 60°C 35 mm / 99 mm / 106 mm
II 3 G Ex nAC IIC T4 X II (2) GD [Ex op is] IIC (PTB 06 ATEX 2042 U) Class I, Zone 2, AEx nc IIC

Ordering data

Type	Order No.	Pcs. / Pkt.
PSI-MOS-PROFIB/FO 660 E	2708290	1
PSI-MOS-PROFIB/FO 660 T	2708287	1

Accessories

ME 17,5 TBUS 1,5/ 5-ST-3,81 GN	2709561	10
ME 17,5 TBUS 1,5/PP000-3,81 BK	2890014	10
MINI-SYS-PS-100-240AC/24DC/1.5	2866983	1

PROFIBUS HCS and glass fibers (multi-mode)

Ex:

Technical data

24 V DC ±25%
100 mA (24 V DC)
PROFIBUS according to IEC 61158, RS-485 2-wire, half duplex, automatic control
UART (11 bits, NRZ)
9.6/19.2/45.45/93.75/187.5/500/1500/3000/6000/12000 kbps, automatic detection, optional setting using a DIP switch
Max. 1200 m (depending on the data rate, with shielded, twisted pair data cable)
D-SUB-9 female connector
B-FOC (ST®) 850 nm 800 m (with F-K 200/230 10 dB/km with quick mounting connector) 2600 m (with F-G 50/125 2.5 dB/km) 3300 m (with F-G 62,5/125 3.0 dB/km)
< 1 bit -20°C ... 60°C 35 mm / 99 mm / 106 mm
II 3 G Ex nAC IIC T4 X II (2) GD [Ex op is] IIC (PTB 06 ATEX 2042 U) Class I, Zone 2, AEx nc IIC

Ordering data

Type	Order No.	Pcs. / Pkt.
PSI-MOS-PROFIB/FO 850 E	2708274	1
PSI-MOS-PROFIB/FO 850 T	2708261	1

Accessories

ME 17,5 TBUS 1,5/ 5-ST-3,81 GN	2709561	10
ME 17,5 TBUS 1,5/PP000-3,81 BK	2890014	10
MINI-SYS-PS-100-240AC/24DC/1.5	2866983	1

PROFIBUS glass fiber (multi-mode and single mode)

Technical data

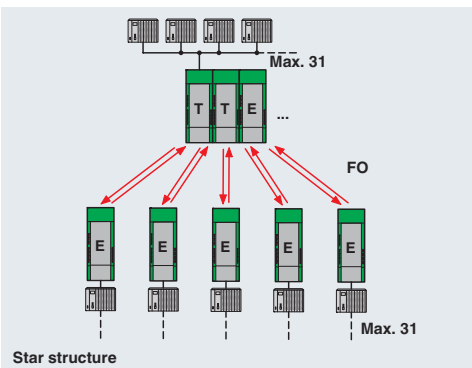
24 V DC ±25%
110 mA (24 V DC)
PROFIBUS according to IEC 61158, RS-485 2-wire, half duplex, automatic control
UART (11 bits, NRZ)
9.6/19.2/45.45/93.75/187.5/500/1500/3000/6000/12000 kbps, automatic detection, optional setting using a DIP switch
Max. 1200 m (depending on the data rate, with shielded, twisted pair data cable)
D-SUB-9 female connector
SC duplex 1300 nm 25 km (with F-G 50/125 0.7 dB/km at 1300 nm) 22 km (with F-G 62.5/125 0.8 dB/km at 1300 nm) 45 km (with F-E 9/125 0,4 dB/km at 1300 nm)
< 1 bit -20°C ... 60°C 35 mm / 105 mm / 106 mm
II 3 G Ex nAC IIC T4 X
cUL 508 recognized

Ordering data

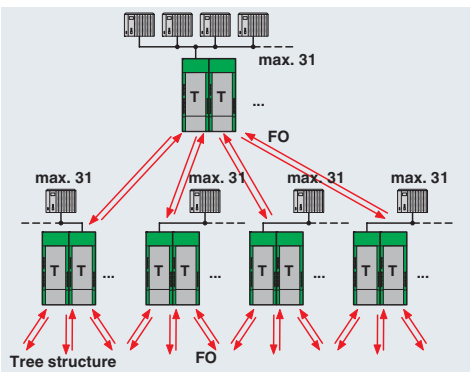
Type	Order No.	Pcs. / Pkt.
PSI-MOS-PROFIB/FO1300 E	2708559	1
PSI-MOS-PROFIB/FO1300 T	2708892	1

Accessories

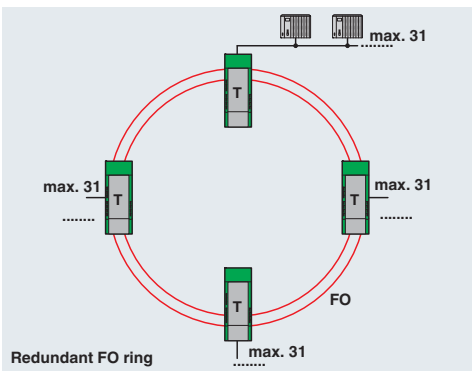
ME 17,5 TBUS 1,5/ 5-ST-3,81 GN	2709561	10
ME 17,5 TBUS 1,5/PP000-3,81 BK	2890014	10
MINI-SYS-PS-100-240AC/24DC/1.5	2866983	1



Star structure



Tree structure



Redundant FO ring

For additional information, visit www.phoenixcontact.net/catalog

FO converters for ControlNet

With the new infrastructure components for ControlNet, copper-based and fiber optic networks can benefit from the advantages of active devices. The main advantage is the electrically isolated connection of bus devices, which means that the negative effects of voltage equalization currents and electromagnetic interference on the bus cables are a thing of the past. In addition, bus cable short circuits only affect the specific potential segment concerned. In addition to interference-free and electrically isolated networking, the use of fiber optic technology also enables longer branch lines and star and tree structures to be created. This increases the overall availability of your system, and improves flexibility in terms of the design of the bus topology. Particular importance has been placed on the diagnostics of the entire system. Automatic, permanent evaluation of the received optical power is indicated on PSI-MOS devices via a four-stage bar graph. If the optical power is insufficient, an error is indicated via a floating switch contact.

- Integrated optical diagnostics for continuous monitoring of fiber optic paths
- Floating switch contact for leading alarm generation in relation to critical fiber optic paths
- High-quality electrical isolation between all interfaces (ControlNet // fiber optic ports // power supply // DIN rail connector)
- Routing of supply voltage and data signals through DIN rail connectors
- Redundant power supply supported in the form of optional system power supply unit
- Connections can be plugged in using a COMBICON screw terminal block
- Can be combined with the PSI copper repeater in a modular way using DIN rail connectors
- Approved for use in Zone 2
- Intrinsically safe FO interface (Ex op is) for direct connection to devices in Zone 1 (all 660 and 850 nm versions)

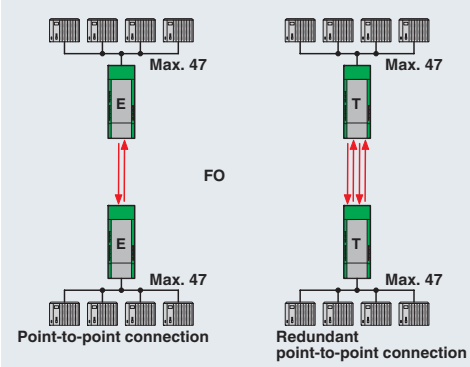
The **PSI-MOS-CNET/FO... E** terminal device converts a PROFIBUS interface for a **fiber optic cable**. It is ideal for point-to-point connections.

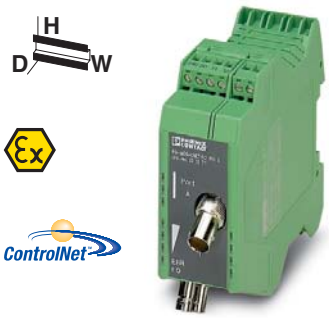
The **PSI-MOS-CNET/FO... T** T-coupler allows the interface to be converted for **two FO cables**. This device can be used to create redundant network structures for increased system availability.

Supply	
Supply voltage	
Nominal current consumption	
ControlNet interface	
Transmission speed	
Transmission length	
Connection method	
Optical interface	
Connection	
Wavelength	
Transmission length Incl. 3 dB system reserve	
General data	
Bit delay	
Alarm output	
Test voltage	
Ambient temperature range	
Electrical isolation	
Dimensions	W / H / D
Conformance/approvals	
ATEX	

Description
Fiber optic converter, termination device for converting data signals to a fiber optic cable
Fiber optic converter, T-coupler for converting data signals to two fiber optic cables

DIN rail connector (optional), for routing through the supply voltage and data signal, two pieces are required per device
System power supply unit, primary-switched





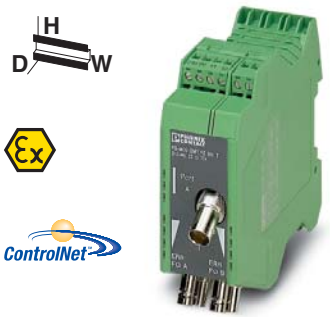
ControlNet, one optical channel

Ex:

Technical data	
24 V DC ±25%	
85 mA (24 V DC)	
ControlNet interface, according to EN 50170	
5 Mbps	
≤ 1000 m	
75 Ω BNC	
B-FOC (ST®)	
850 nm	
≤ 1200 m (with F-K 200/230 8 dB/km with quick mounting connector)	
≤ 3100 m (with F-G 50/125 2.5 dB/km)	
≤ 3000 m (with F-G 62,5/125 3.0 dB/km)	
< 3 bits	
2x 18...32 V DC (VCC)/ 0.5 A	
1.5 kV_{rms} (50 Hz, 1 min.)	
-20°C ... 60°C	
ControlNet // VCC	
35 mm / 102 mm / 117 mm	
II 3 G Ex nA II T4 X	
II (2) GD [Ex op is] IIC (PTB 06 ATEX 2042 U)	

Ordering data		
Type	**Order No.**	Pcs. / Pkt.
PSI-MOS-CNET/FO 850 E	**2313711**	1

Accessories		
ME 17,5 TBUS 1,5/ 5-ST-3,81 GN	**2709561**	10
MINI-SYS-PS-100-240AC/24DC/1.5	**2866983**	1



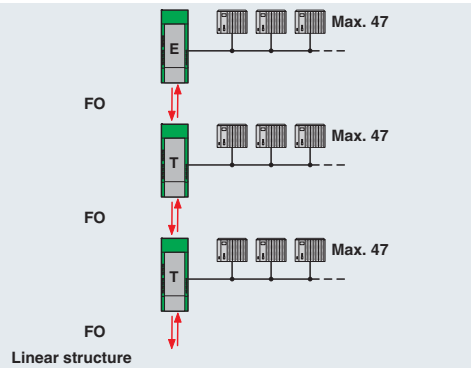
ControlNet, two optical channels

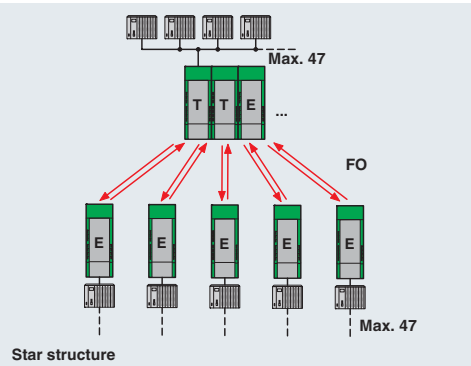
Ex:

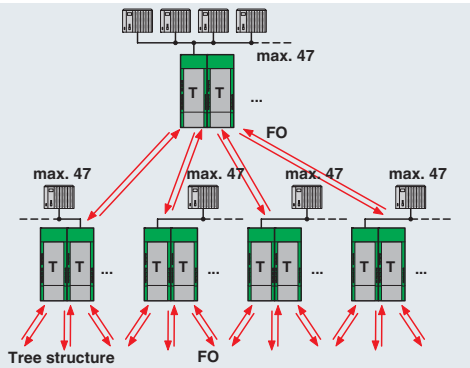
Technical data	
24 V DC ±25%	
140 mA (24 V DC)	
ControlNet interface, according to EN 50170	
5 Mbps	
≤ 1000 m	
75 Ω BNC	
B-FOC (ST®)	
850 nm	
≤ 1200 m (with F-K 200/230 8 dB/km with quick mounting connector)	
≤ 3100 m (with F-G 50/125 2.5 dB/km)	
≤ 3000 m (with F-G 62,5/125 3.0 dB/km)	
< 3 bits	
2x 18...32 V DC (VCC)/ 0.5 A	
1.5 kV_{rms} (50 Hz, 1 min.)	
-20°C ... 60°C	
ControlNet // VCC	
35 mm / 102 mm / 117 mm	
II 3 G Ex nA II T4 X	
II (2) GD [Ex op is] IIC (PTB 06 ATEX 2042 U)	

Ordering data		
Type	**Order No.**	Pcs. / Pkt.
PSI-MOS-CNET/FO 850 T	**2313724**	1

Accessories		
ME 17,5 TBUS 1,5/ 5-ST-3,81 GN	**2709561**	10
MINI-SYS-PS-100-240AC/24DC/1.5	**2866983**	1







FO converters for DeviceNet and CANopen

The PSI-MOS-DNET... fiber optic transmission system enables DeviceNet and CANopen users to benefit from simple and interference-free networking based on fiber optics. The main advantage of this system is the electrically isolated connection of the bus devices, which makes mutual interference due to compensating currents and electromagnetic interference on the bus cables a thing of the past. In addition, bus cable short circuits only affect the specific potential segment concerned. This increases overall availability, and improves flexibility when designing the bus topology. The use of fiber optic technology enables branch lines, and star and tree structures, to be created.

The 22.5 mm space-saving devices from the **PSI-MOS-DNET CAN/FO…** series feature an internal backplane and support data rates of up to 800 kbps. The maximum level of network coverage that can be achieved (sum total of copper and fiber optic cables) essentially depends on the data rate used.

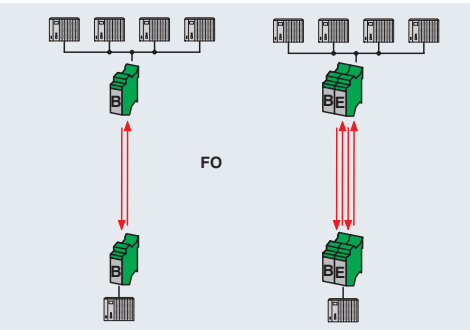
- Data rates of up to 800 kbps, set via DIP switches
- Integrated optical diagnostics for continuous monitoring of fiber optic paths
- Floating switch contact in basic module for leading alarm generation in relation to critical fiber optic paths
- High-quality electrical isolation between all interfaces (DeviceNet // fiber optic port // power supply // backplane)
- Integrated termination resistor that can be activated internally
- Integrated backplane for routing through the supply voltage and data signals
- Connections can be plugged in using a COMBICON screw terminal block
- Approved for use in Zone 2
- Intrinsically safe FO interface (Ex op is) for direct connection to devices in Zone 1

The modular devices from the **PSI-MOS-DNET/FO…** series support the external backplane via the DIN rail connectors and allow data rates of up to 1000 kbps. The extended functionality of these devices means that network coverage is no longer dependent on the data rate.

- Automatic data rate detection or fixed data rate setting via DIP switches
- Data rates of up to 1000 kbps
- Integrated optical diagnostics for continuous monitoring of fiber optic paths
- Floating switch contact for leading alarm generation in relation to critical fiber optic paths
- High-quality electrical isolation between all interfaces (DeviceNet // fiber optic ports // power supply // DIN rail connector)
- Routing of supply voltage and data signals through DIN rail connectors
- Redundant power supply supported in the form of optional system power supply unit
- Connections can be plugged in using a COMBICON screw terminal block
- Can be combined with the PSI copper repeater in a modular way using DIN rail connectors
- Approved for use in Zone 2
- Intrinsically safe FO interface (Ex op is) for direct connection to devices in Zone 1

Supply voltage	
Nominal current consumption	
CAN interface	
Termination resistor	
Transmission speed	
Transmission length	
Connection method	
Optical interface	
Connection	
Wavelength	
Transmission length Incl. 3 dB system reserve	
General data	
Bit delay	
Alarm output	
Test voltage	
Ambient temperature range	
Dimensions	W / H / D
Conformance/approvals	
ATEX	
UL, USA/Canada	

Description
Basic module for conversion of the CAN-based interface **to a fiber optic interface**
Extension module with a fiber optic interface
FO converter, terminal device for converting a CAN-based interface for a fiber optic cable
FO converter, T-coupler for converting a CAN-based interface for two fiber optic cables



Branch line / redundant branch line

DeviceNet
polymer and HCS fibers

Ex:

Technical data

24 V DC ±25%
100 mA (24 V DC)
CAN interface, in accordance with ISO/IS 11898 for DeviceNet, CAN, CANopen
120 Ω, integrated connection in the basic module
Maximum 800 kbps
Max. 5000 m (Dependent on the data rate and the protocol used)
Pluggable screw connection
F-SMA
660 nm
100 m (with F-P 980/1000 230 dB/km with quick mounting connector)
800 m (with F-K 200/230 10 dB/km with quick mounting connector)
< 1 bit
60 V DC / 42 V AC, 1 A
1.5 kV_{rms} (50 Hz, 1 min.)
-20°C ... 60°C
22.5 mm / 99 mm / 114.5 mm
II 3 G Ex nAC IIC T4 X
II (2) GD [Ex op is] IIC (PTB 06 ATEX 2042 U)
Class I, Zone 2, AEx nc IIC

Ordering data

Type	Order No.	Pcs. / Pkt.
PSI-MOS-DNET CAN/FO 660/BM	**2708054**	1
PSI-MOS-DNET CAN/FO 660/EM	**2708067**	1

DeviceNet
HCS and glass fibers
(multi-mode)

Ex:

Technical data

24 V DC ±25%
100 mA (24 V DC)
CAN interface, in accordance with ISO/IS 11898 for DeviceNet, CAN, CANopen
120 Ω, integrated connection in the basic module
Maximum 800 kbps
Max. 5000 m (Dependent on the data rate and the protocol used)
Pluggable screw connection
B-FOC (ST®)
850 nm
2800 m (with F-K 200/230 8 dB/km with quick mounting connector)
4800 m (with F-G 50/125 2.5 dB/km)
4200 m (with F-G 62,5/125 3.0 dB/km)
< 1 bit
60 V DC / 42 V AC, 1 A
1.5 kV_{rms} (50 Hz, 1 min.)
-20°C ... 60°C
22.5 mm / 99 mm / 114.5 mm
II 3 G Ex nAC IIC T4 X
II (2) GD [Ex op is] IIC (PTB 06 ATEX 2042 U)
Class I, Zone 2, AEx nc IIC

Ordering data

Type	Order No.	Pcs. / Pkt.
PSI-MOS-DNET CAN/FO 850/BM	**2708083**	1
PSI-MOS-DNET CAN/FO 850/EM	**2708096**	1

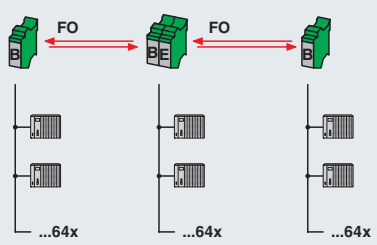
DeviceNet
HCS and glass fibers
(multi-mode) external backplane

Technical data

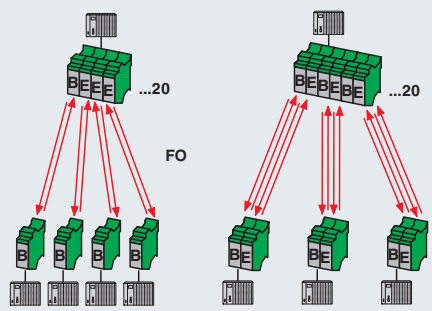
24 V DC ±25%
130 mA (24 V DC)
CAN interface, in accordance with ISO/IS 11898 for DeviceNet, CAN, CANopen
124 Ω, integrated and can be connected
1000 kbps, maximum
≤ 5000 m (Dependent on the data rate and the protocol used)
COMBICON plug-in screw terminal block
B-FOC (ST®)
850 nm
1800 m (with F-K 200/230 8 dB/km with quick mounting connector)
4600 m (with F-G 50/125 2.5 dB/km)
4200 m (with F-G 62,5/125 3.0 dB/km)
< 1 bit (configurable)
60 V DC, 0.5 A
1.5 kV_{rms} (50 Hz, 1 min.)
-20°C ... 60°C
35 mm / 102 mm / 119 mm
II 3 G Ex nA II T4 X
II (2) GD [Ex op is] IIC (PTB 06 ATEX 2042 U)
UL applied for

Ordering data

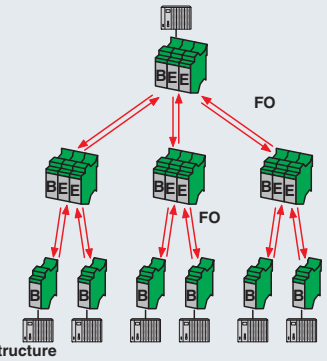
Type	Order No.	Pcs. / Pkt.
PSI-MOS-DNET/FO 850 E	**2313999**	1
PSI-MOS-DNET/FO 850 T	**2313986**	1



Linear structure



Star structure / redundant star structure



Tree structure

Fiber optic converters for RS-485 2-wire bus systems

The RS-485 2-wire interface is the most widely used interface in the field of automation technology. Well-known bus systems, such as SUCONET K, MODBUS ASCII, MODBUS RTU, S-BUS, and DH-485, are all based on this interface, as are many other company-specific bus systems.

The **PSI-MOS-RS485W2/FO... FO** converters convert the electrical data signal into an optical one using a transparent protocol. The integrated optical diagnostics enable fiber optic paths to be monitored continuously during installation and even during operation. The floating switch contact is activated when the signal output on the fiber optic paths drops to a critical level. This early alarm generation enables critical system states to be diagnosed before they result in failure. Depending on which wavelength is used in conjunction with the corresponding fibers, distances of 100 m to 45 km can be achieved between two devices.

- Automatic data rate detection or fixed data rate setting via DIP switches
- Suitable for data rates of up to 500 kbps
- Integrated optical diagnostics for continuous monitoring of fiber optic paths
- Floating switch contact for leading alarm generation in relation to critical fiber optic paths
- High-quality electrical isolation between all interfaces (RS-485 // fiber optic ports // power supply // DIN rail connector)
- Routing of supply voltage and data signals through DIN rail connectors
- Redundant power supply supported in the form of optional system power supply unit
- Connections can be plugged in using a COMBICON screw terminal block
- Can be combined with the PSI copper repeater in a modular way using DIN rail connectors
- Approved for use in Zone 2
- Intrinsically safe FO interface (Ex op is) for direct connection to devices in Zone 1 (all 660 and 850 nm versions)

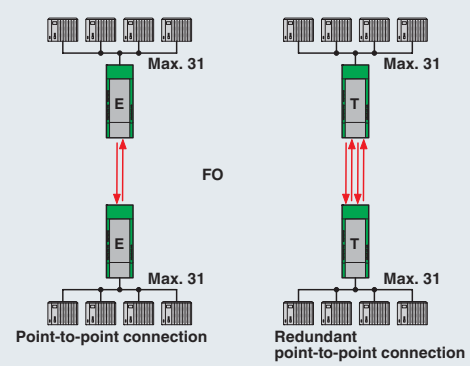
The **PSI-MOS-RS485W2/FO... E** terminal devices convert an RS-485 interface for an FO cable. They are ideal for point-to-point connections.

The **PSI-MOS-RS485W2/FO... T** T-couplers allow the interface to be converted for **two FO cables**. They can be used to create linear structures and redundant structures for increased system availability.

Supply voltage	
Nominal current consumption	
RS-485 interface	
Data format/encoding	
Termination resistor	
Transmission speed	
Transmission length	
Connection method	
Optical interface	
Connection	
Wavelength	
Transmission length Incl. 3 dB system reserve	
General data	
Bit delay	
Alarm output	
Test voltage	
Ambient temperature range	
Dimensions	W / H / D
Conformance/approvals	
ATEX	
UL, USA/Canada	

Description
Terminal device, for converting data signals from RS-485 2-wire **to an FO line**
T-coupler, for converting data signals from RS-485 2-wire **to two FO lines**

DIN rail connector (optional), for routing through the supply voltage and data signal, two pieces are required per device
DIN rail connector (optional), for routing through of the supply voltage, 2 required per device
System power supply unit, primary-switched



RS-485 2-wire polymer and HCS fibers

Ex:

Technical data

24 V DC ±25%
85 mA (24 V DC)
RS-485 interface, 2-wire
UART (11/10 bit switchable; NRZ), slip-tolerant
220 Ω can be connected; pull up/down 390 Ω
4,8/ 9,6/ 19,2/ 38,4/ 57,6/ 75/ 93,75/ 115,2/ 136/ 187,5/ 375/ 500
Max. 1200 m (depending on the data rate, with shielded, twisted data cable)
Pluggable screw connection
F-SMA
660 nm
100 m (with F-P 980/1000 230 dB/km with quick mounting connector)
800 m (with F-K 200/230 10 dB/km with quick mounting connector)
< 1 bit
60 V DC / 42 V AC, 1 A
1.5 kV_{rms} (50 Hz, 1 min.)
-20°C ... 60°C
35 mm / 99 mm / 105 mm
II 3 G Ex nAC IIC T4 X
II (2) GD [Ex op is] IIC (PTB 06 ATEX 2042 U)
Class I, Zone 2, AEx nc IIC

Ordering data

Type	Order No.	Pcs. / Pkt.
PSI-MOS-RS485W2/FO 660 E	2708313	1
PSI-MOS-RS485W2/FO 660 T	2708300	1

Accessories

ME 17,5 TBUS 1,5/ 5-ST-3,81 GN	2709561	10
ME 17,5 TBUS 1,5/PP000-3,81 BK	2890014	10
MINI-SYS-PS-100-240AC/24DC/1.5	2866983	1

RS-485 2-wire HCS and glass fibers (multi-mode)

Ex:

Technical data

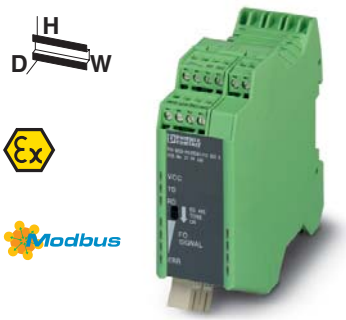
24 V DC ±25%
100 mA (24 V DC)
RS-485 interface, 2-wire
UART (11/10 bit switchable; NRZ), slip-tolerant
220 Ω can be connected; pull up/down 390 Ω
4,8/ 9,6/ 19,2/ 38,4/ 57,6/ 75/ 93,75/ 115,2/ 136/ 187,5/ 375/ 500
Max. 1200 m (depending on the data rate, with shielded, twisted data cable)
Pluggable screw connection
B-FOC (ST®)
850 nm
2800 m (with F-K 200/230 8 dB/km with quick mounting connector)
4200 m (with F-G 50/125 2.5 dB/km)
3300 m (with F-G 62,5/125 3.0 dB/km)
< 1 bit
60 V DC / 42 V AC, 1 A
1.5 kV_{rms} (50 Hz, 1 min.)
-20°C ... 60°C
35 mm / 99 mm / 105 mm
II 3 G Ex nAC IIC T4 X
II (2) GD [Ex op is] IIC (PTB 06 ATEX 2042 U)
Class I, Zone 2, AEx nc IIC

Ordering data

Type	Order No.	Pcs. / Pkt.
PSI-MOS-RS485W2/FO 850 E	2708339	1
PSI-MOS-RS485W2/FO 850 T	2708326	1

Accessories

ME 17,5 TBUS 1,5/ 5-ST-3,81 GN	2709561	10
ME 17,5 TBUS 1,5/PP000-3,81 BK	2890014	10
MINI-SYS-PS-100-240AC/24DC/1.5	2866983	1



RS-485 2-wire glass fiber (multi-mode and single mode)

Technical data

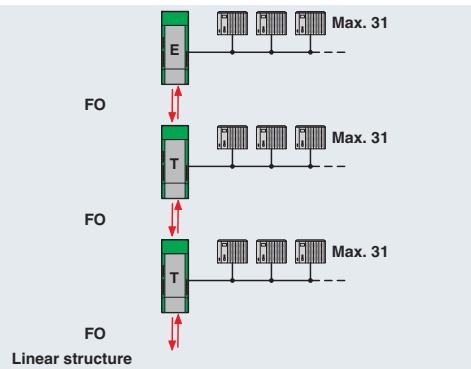
24 V DC ±25%
110 mA (24 V DC)
RS-485 interface, 2-wire
UART (11/10 bit switchable; NRZ), slip-tolerant
220 Ω can be connected; pull up/down 390 Ω
4,8/ 9,6/ 19,2/ 38,4/ 57,6/ 75/ 93,75/ 115,2/ 136/ 187,5/ 375/ 500
Max. 1200 m (depending on the data rate, with shielded, twisted data cable)
Pluggable screw connection
SC duplex
1300 nm
25 km (with F-G 50/125 0.7 dB/km at 1300 nm)
22 km (with F-G 62.5/125 0.8 dB/km at 1300 nm)
45 km (with F-E 9/125 0,4 dB/km at 1300 nm)
< 1 bit
60 V DC / 42 V AC, 1 A
1.5 kV_{rms} (50 Hz, 1 min.)
-20°C ... 60°C
35 mm / 99 mm / 105 mm
II 3 G Ex nAC IIC T4 X
cUL 508 recognized

Ordering data

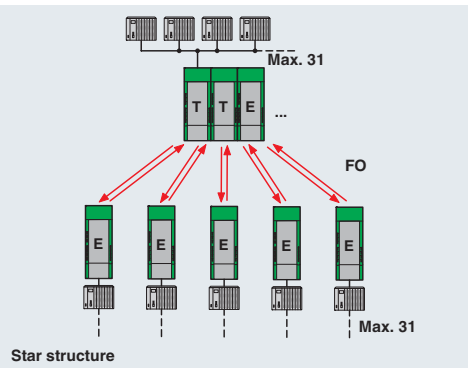
Type	Order No.	Pcs. / Pkt.
PSI-MOS-RS485W2/FO1300 E	2708562	1

Accessories

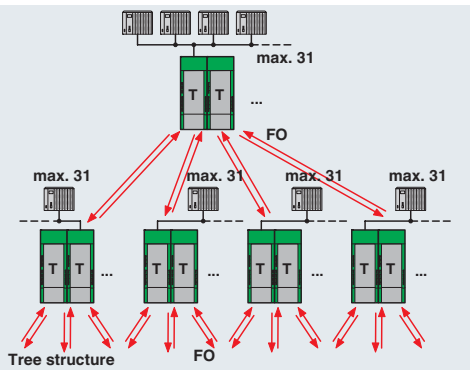
ME 17,5 TBUS 1,5/ 5-ST-3,81 GN	2709561	10
ME 17,5 TBUS 1,5/PP000-3,81 BK	2890014	10
MINI-SYS-PS-100-240AC/24DC/1.5	2866983	1



Linear structure



Star structure



Tree structure

Fiber optic converter for INTERBUS

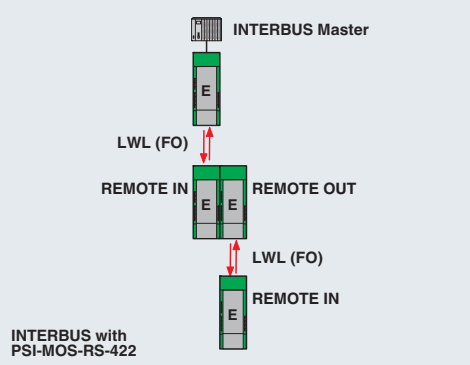
The **PSI-MOS-RS422/FO...** devices are used for converting INTERBUS interfaces for fiber optics. The conversion is performed using a transparent protocol for all data rates up to max. 2 Mbps. The integrated optical diagnostics allow permanent monitoring of the FO paths during installation and also during operation. The floating switch contact is activated when the signal output on the fiber optic paths drops to a critical level. This early alarm generation enables critical system states to be diagnosed before they result in failure.

- Automatic data rate detection for all data rates up to 2 Mbps
- Integrated optical diagnostics for continuous monitoring of fiber optic paths
- Floating switch contact for leading alarm generation in relation to critical fiber optic paths
- High-quality electrical isolation between all interfaces (INTERBUS // fiber optic ports // power supply // DIN rail connector)
- Connections can be plugged in using a COMBICON screw terminal block
- Redundant power supply supported in the form of optional system power supply unit
- Routing through of the supply voltage via the DIN rail connector
- Approved for use in Zone 2
- Intrinsically safe FO interface (Ex op is) for direct connection to devices in Zone 1 (all 660 and 850 nm versions)

INTERBUS lines are constructed with the **PSI-MOS-RS422...E terminal devices**. The **PSI-MOS-RS422...T T-couplers** also allow redundant **INTERBUS connections** via fiber optics.

Supply voltage	
Nominal current consumption	
RS-422 interface	
Transmission length	
Connection method	
Optical interface	
Connection	
Wavelength	
Transmission length Incl. 3 dB system reserve	
General data	
Bit delay	
Alarm output	
Test voltage	
Ambient temperature range	
Dimensions	W / H / D
Conformance/approvals	
ATEX	
UL, USA/Canada	

Description
Terminal device, for converting data signals from RS-422 (V.11) /RS-485 4-wire **to an FO line**
T-coupler, for converting data signals from RS-422 (V.11) /RS-485 4-wire **to two FO lines**
DIN rail connector (optional), for routing through of the supply voltage, 2 required per device
System power supply unit, primary-switched



INTERBUS polymer and HCS fibers

Ex:

Technical data

24 V DC ±25% 130 mA (24 V DC)
RS-422 interface in acc. with ITU-T V.11, EIA/TIA-422, DIN 66348-1
Max. 1000 m (depending on the data rate, with shielded, twisted data cable) Pluggable screw connection
F-SMA 660 nm 100 m (with F-P 980/1000 230 dB/km with quick mounting connector) 800 m (with F-K 200/230 10 dB/km with quick mounting connector)
< 1 bit 60 V DC / 42 V AC, 1 A 1.5 kV_{rms} (50 Hz, 1 min.) -20°C ... 60°C 35 mm / 99 mm / 103 mm
II 3 G Ex nAC IIC T4 X II (2) GD [Ex op is] IIC (PTB 06 ATEX 2042 U) Class I, Zone 2, AEx nc IIC

Ordering data

Type	Order No.	Pcs. / Pkt.
PSI-MOS-RS422/FO 660 E	2708342	1
PSI-MOS-RS422/FO 660 T	2708384	1

Accessories

ME 17,5 TBUS 1,5/PP000-3,81 BK	2890014	10
MINI-SYS-PS-100-240AC/24DC/1.5	2866983	1

INTERBUS HCS and glass fibers (multi-mode)

Ex:

Technical data

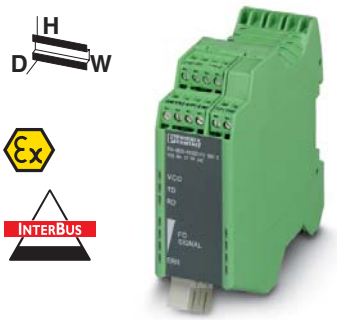
24 V DC ±25% 130 mA (24 V DC)
RS-422 interface in acc. with ITU-T V.11, EIA/TIA-422, DIN 66348-1
Max. 1000 m (depending on the data rate, with shielded, twisted data cable) Pluggable screw connection
B-FOC (ST®) 850 nm 2800 m (with F-K 200/230 8 dB/km with quick mounting connector) 4200 m (with F-G 50/125 2.5 dB/km) 4800 m (with F-G 62,5/125 3.0 dB/km)
< 1 bit 60 V DC / 42 V AC, 1 A 1.5 kV_{rms} (50 Hz, 1 min.) -20°C ... 60°C 35 mm / 99 mm / 103 mm
II 3 G Ex nAC IIC T4 X II (2) GD [Ex op is] IIC (PTB 06 ATEX 2042 U) Class I, Zone 2, AEx nc IIC

Ordering data

Type	Order No.	Pcs. / Pkt.
PSI-MOS-RS422/FO 850 E	2708355	1
PSI-MOS-RS422/FO 850 T	2708397	1

Accessories

ME 17,5 TBUS 1,5/PP000-3,81 BK	2890014	10
MINI-SYS-PS-100-240AC/24DC/1.5	2866983	1



INTERBUS glass fiber (multi-mode and single mode)

Technical data

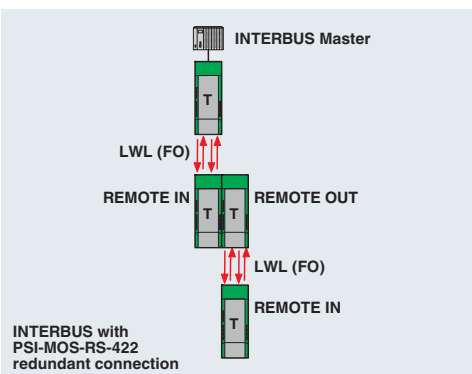
24 V DC ±25% 110 mA (24 V DC)
RS-422 interface in acc. with ITU-T V.11, EIA/TIA-422, DIN 66348-1
Max. 1000 m (depending on the data rate, with shielded, twisted data cable) Pluggable screw connection
SC duplex 1300 nm 27 km (with F-G 50/125 0.7 dB/km at 1300 nm) 22 km (with F-G 62.5/125 0.8 dB/km at 1300 nm) 45 km (with F-E 9/125 0,4 dB/km at 1300 nm)
< 1 bit 60 V DC / 42 V AC, 1 A 1.5 kV_{rms} (50 Hz, 1 min.) -20°C ... 60°C 35 mm / 105 mm / 103 mm
II 3 G Ex nAC IIC T4 X cUL 508 recognized

Ordering data

Type	Order No.	Pcs. / Pkt.
PSI-MOS-RS422/FO1300 E	2708575	1

Accessories

ME 17,5 TBUS 1,5/PP000-3,81 BK	2890014	10
MINI-SYS-PS-100-240AC/24DC/1.5	2866983	1



FO converters for RS-422 and RS-485 4-wire bus systems

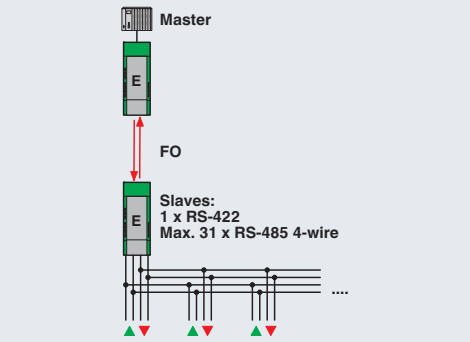
Data transfer via copper cables reaches its limits very quickly in an industrial environment. Particularly in applications with a high level of electromagnetic interference, interference-free communication can only be achieved with great complexity in terms of shielding and surge protection. The **PSI-MOS-RS422/FO...** devices convert copper for fiber optics. A transparent protocol is used for conversion.

- Automatic data rate detection for all data rates up to 2 Mbps
- Integrated optical diagnostics for continuous monitoring of fiber optic paths
- Floating switch contact for leading alarm generation in relation to critical fiber optic paths
- High-quality electrical isolation between all interfaces (RS-422 // fiber optic ports // power supply // DIN rail connector)
- Connections can be plugged in using a COMBICON screw terminal block
- Redundant power supply supported in the form of optional system power supply unit
- Routing of supply voltage and data signals through DIN rail connectors
- Approved for use in Zone 2
- Intrinsically safe FO interface (Ex op is) for direct connection to devices in Zone 1 (all 660 and 850 nm versions)

If RS-422 terminal devices are used, only one terminal device can be connected to each PSI-MOS-RS422/FO... device. If devices with an RS-485 4-wire interface are used, it is possible to create a network with up to 31 slave devices connected to one FO converter. In both cases, a suitable communication protocol capable of terminal device addressing is required (e.g., Modbus RTU).

Supply voltage	
Nominal current consumption	
RS-422 interface	
Transmission length	
Connection method	
Optical interface	
Connection	
Wavelength	
Transmission length Incl. 3 dB system reserve	
General data	
Bit delay	
Alarm output	
Test voltage	
Ambient temperature range	
Dimensions	W / H / D
Conformance/approvals	
ATEX	
UL, USA/Canada	

Description
Terminal device, for converting data signals from RS-422 (V.11) /RS-485 4-wire **to an FO line**
T-coupler, for converting data signals from RS-422 (V.11) /RS-485 4-wire **to two FO lines**
DIN rail connector (optional), for routing through the supply voltage and data signal, two pieces are required per device
DIN rail connector (optional), for routing through of the supply voltage, 2 required per device
System power supply unit, primary-switched



Point-to-point connection

RS-422/RS-485 4-wire polymer and HCS fibers

Ex:

Technical data

24 V DC ±25%
130 mA (24 V DC)
RS-422 interface in acc. with ITU-T V.11, EIA/TIA-422, DIN 66348-1
Max. 1000 m (depending on the data rate, with shielded, twisted data cable)
Pluggable screw connection
F-SMA
660 nm
100 m (with F-P 980/1000 230 dB/km with quick mounting connector)
800 m (with F-K 200/230 10 dB/km with quick mounting connector)
< 1 bit
60 V DC / 42 V AC, 1 A
1.5 kV_{rms} (50 Hz, 1 min.)
-20°C ... 60°C
35 mm / 99 mm / 103 mm
II 3 G Ex nAC IIC T4 X
II (2) GD [Ex op is] IIC (PTB 06 ATEX 2042 U)
Class I, Zone 2, AEx nc IIC

Ordering data

Type	Order No.	Pcs. / Pkt.
PSI-MOS-RS422/FO 660 E	2708342	1
PSI-MOS-RS422/FO 660 T	2708384	1

Accessories

ME 17,5 TBUS 1,5/ 5-ST-3,81 GN	2709561	10
ME 17,5 TBUS 1,5/PP000-3,81 BK	2890014	10
MINI-SYS-PS-100-240AC/24DC/1.5	2866983	1

RS-422/RS-485 4-wire HCS and glass fibers (multi-mode)

Ex:

Technical data

24 V DC ±25%
130 mA (24 V DC)
RS-422 interface in acc. with ITU-T V.11, EIA/TIA-422, DIN 66348-1
Max. 1000 m (depending on the data rate, with shielded, twisted data cable)
Pluggable screw connection
B-FOC (ST®)
850 nm
2800 m (with F-K 200/230 8 dB/km with quick mounting connector)
4200 m (with F-G 50/125 2.5 dB/km)
4800 m (with F-G 62,5/125 3.0 dB/km)
< 1 bit
60 V DC / 42 V AC, 1 A
1.5 kV_{rms} (50 Hz, 1 min.)
-20°C ... 60°C
35 mm / 99 mm / 103 mm
II 3 G Ex nAC IIC T4 X
II (2) GD [Ex op is] IIC (PTB 06 ATEX 2042 U)
Class I, Zone 2, AEx nc IIC

Ordering data

Type	Order No.	Pcs. / Pkt.
PSI-MOS-RS422/FO 850 E	2708355	1
PSI-MOS-RS422/FO 850 T	2708397	1

Accessories

ME 17,5 TBUS 1,5/ 5-ST-3,81 GN	2709561	10
ME 17,5 TBUS 1,5/PP000-3,81 BK	2890014	10
MINI-SYS-PS-100-240AC/24DC/1.5	2866983	1

RS-422/RS-485 4-wire glass fiber (multi-mode and single mode)

Technical data

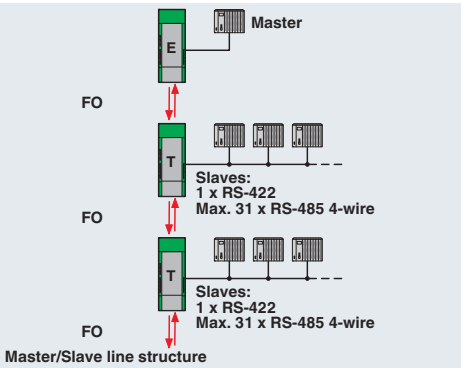
24 V DC ±25%
110 mA (24 V DC)
RS-422 interface in acc. with ITU-T V.11, EIA/TIA-422, DIN 66348-1
Max. 1000 m (depending on the data rate, with shielded, twisted data cable)
Pluggable screw connection
SC duplex
1300 nm
27 km (with F-G 50/125 0.7 dB/km at 1300 nm)
22 km (with F-G 62.5/125 0.8 dB/km at 1300 nm)
45 km (with F-E 9/125 0,4 dB/km at 1300 nm)
< 1 bit
60 V DC / 42 V AC, 1 A
1.5 kV_{rms} (50 Hz, 1 min.)
-20°C ... 60°C
35 mm / 105 mm / 103 mm
II 3 G Ex nAC IIC T4 X
cUL 508 recognized

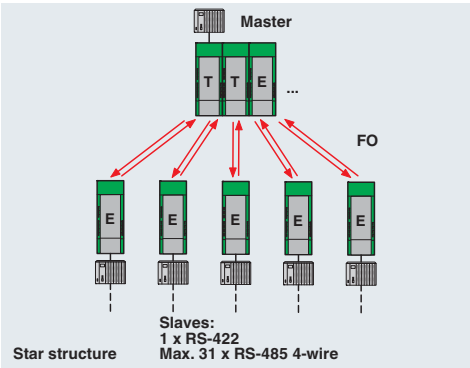
Ordering data

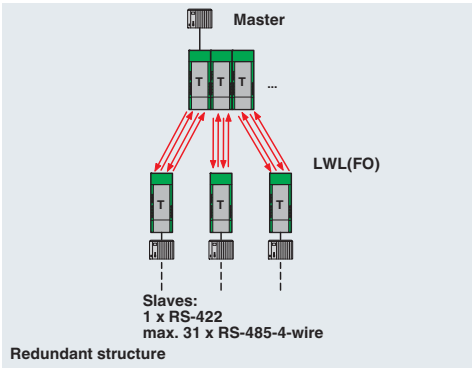
Type	Order No.	Pcs. / Pkt.
PSI-MOS-RS422/FO1300 E	2708575	1

Accessories

ME 17,5 TBUS 1,5/ 5-ST-3,81 GN	2709561	10
ME 17,5 TBUS 1,5/PP000-3,81 BK	2890014	10
MINI-SYS-PS-100-240AC/24DC/1.5	2866983	1







Fiber optic converters for RS-232 (V.24)

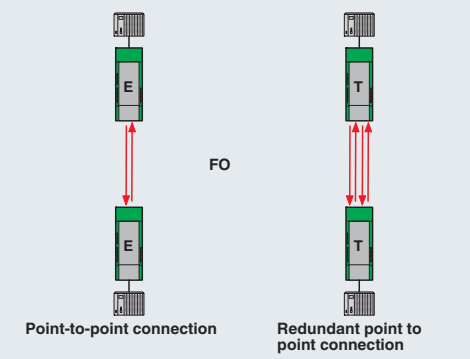
Due to its electrical properties, the V.24 (RS-232) is very susceptible to EMC influences and potential differences. For this reason, it can only be used for short distances of up to max. 15 m. FO transmission technology is, therefore, the first choice for longer transmission distances and for eliminating EMC influences. The **PSI-MOS-RS232/FO...** devices convert the V.24 (RS-232) interface for fiber optics. A transparent protocol is used for conversion. If addressable V.24 (RS-232) devices and a suitable communication protocol are used, even multipoint networks can be constructed. These can be implemented as linear, star, and even redundant star structures.

- Automatic data rate detection for all data rates up to 115.2 kbps
- Integrated optical diagnostics for continuous monitoring of fiber optic paths
- Floating switch contact for leading alarm generation in relation to critical fiber optic paths
- High-quality electrical isolation between all interfaces (V.24 (RS-232) // fiber optic ports // power supply // DIN rail connector)
- Redundant power supply supported in the form of optional system power supply unit
- Connections can be plugged in using a COMBICON screw terminal block
- Routing of supply voltage and data signals through DIN rail connectors
- Approved for use in Zone 2
- Intrinsically safe FO interface (Ex op is) for direct connection to devices in Zone 1 (all 660 and 850 nm versions)

Supply voltage	
Nominal current consumption	
V.24 (RS-232) interface	
Transmission length	
Connection method	
Optical interface	
Connection	
Wavelength	
Transmission length Incl. 3 dB system reserve	
General data	
Bit delay	
Alarm output	
Test voltage	
Ambient temperature range	
Dimensions	W / H / D
Conformance/approvals	
ATEX	
UL, USA/Canada	

Description
Terminal equipment, for converting data signals from RS-232 (V.24) **to an FO line**
T-coupler, for converting data signals from RS-232 (V.24) **to two FO lines**

DIN rail connector (optional), for routing through the supply voltage and data signal, two pieces are required per device
DIN rail connector (optional), for routing through of the supply voltage, 2 required per device
System power supply unit, primary-switched



RS-232

V.24 (RS-232)
polymer and HCS fibers

Ex:

Technical data
24 V DC ±25%
85 mA (24 V DC)
V.24 (RS-232) interface in acc. with ITU-T V.28, EIA/TIA-232, DIN 66259-1
15 m
D-SUB-9 male connector
F-SMA
660 nm
100 m (with F-P 980/1000 230 dB/km with quick mounting connector) 800 m (with F-K 200/230 10 dB/km with quick mounting connector)
< 1 bit
60 V DC / 42 V AC, 1 A
1.5 kV_{rms} (50 Hz, 1 min.)
-20°C ... 60°C
35 mm / 99 mm / 105 mm
II 3 G Ex nAC IIC T4 X II (2) GD [Ex op is] IIC (PTB 06 ATEX 2042 U) Class I, Zone 2, AEx nc IIC

Ordering data		
Type	Order No.	Pcs. / Pkt.
PSI-MOS-RS232/FO 660 E	2708368	1
PSI-MOS-RS232/FO 660 T	2708410	1

Accessories		
ME 17,5 TBUS 1,5/ 5-ST-3,81 GN	2709561	10
ME 17,5 TBUS 1,5/PP000-3,81 BK	2890014	10
MINI-SYS-PS-100-240AC/24DC/1.5	2866983	1

RS-232

V.24 (RS-232)
HCS and glass fibers
(multi-mode)

Ex:

Technical data
24 V DC ±25%
100 mA (24 V DC)
V.24 (RS-232) interface in acc. with ITU-T V.28, EIA/TIA-232, DIN 66259-1
15 m
D-SUB-9 male connector
B-FOC (ST®)
850 nm
2800 m (with F-K 200/230 8 dB/km with quick mounting connector) 4200 m (with F-G 50/125 2.5 dB/km) 4800 m (with F-G 62,5/125 3.0 dB/km)
< 1 bit
60 V DC / 42 V AC, 1 A
1.5 kV_{rms} (50 Hz, 1 min.)
-20°C ... 60°C
35 mm / 99 mm / 105 mm
II 3 G Ex nAC IIC T4 X II (2) GD [Ex op is] IIC (PTB 06 ATEX 2042 U) Class I, Zone 2, AEx nc IIC

Ordering data		
Type	Order No.	Pcs. / Pkt.
PSI-MOS-RS232/FO 850 E	2708371	1
PSI-MOS-RS232/FO 850 T	2708423	1

Accessories		
ME 17,5 TBUS 1,5/ 5-ST-3,81 GN	2709561	10
ME 17,5 TBUS 1,5/PP000-3,81 BK	2890014	10
MINI-SYS-PS-100-240AC/24DC/1.5	2866983	1

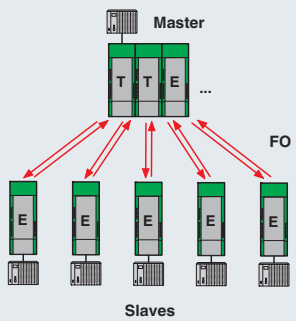
RS-232

V.24 (RS-232)
glass fiber
(multi-mode and single mode)

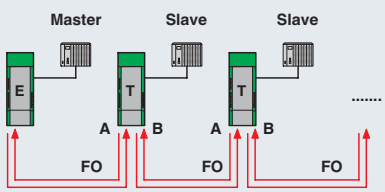
Technical data
24 V DC ±25%
110 mA (24 V DC)
V.24 (RS-232) interface in acc. with ITU-T V.28, EIA/TIA-232, DIN 66259-1
15 m
D-SUB-9 male connector
SC duplex
1300 nm
27 km (with F-G 50/125 0.7 dB/km at 1300 nm) 22 km (with F-G 62.5/125 0.8 dB/km at 1300 nm) 45 km (with F-E 9/125 0,4 dB/km at 1300 nm)
< 1 bit
60 V DC / 42 V AC, 1 A
1.5 kV_{rms} (50 Hz, 1 min.)
-20°C ... 60°C
35 mm / 99 mm / 105 mm
II 3 G Ex nAC IIC T4 X cUL 508 recognized

Ordering data		
Type	Order No.	Pcs. / Pkt.
PSI-MOS-RS232/FO1300 E	2708588	1

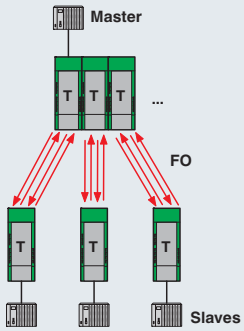
Accessories		
ME 17,5 TBUS 1,5/ 5-ST-3,81 GN	2709561	10
ME 17,5 TBUS 1,5/PP000-3,81 BK	2890014	10
MINI-SYS-PS-100-240AC/24DC/1.5	2866983	1



Star structure

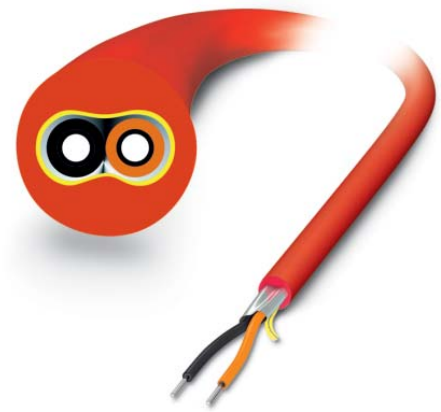


Master/Slave line structure



Redundant structure

Universal POF cable for free assembly, type KDHEAVY-1011



- Universal installation cable for fixed installation indoors
- 2.2 mm individual wires made from extremely hard-wearing polyamide chloride (PA)
- Halogen-free, ozone and UV resistant
- Rugged polyurethane (PUR) outer cable sheath

	Free end		FSMA connector, IP20		SCRJ connector, IP20	
	OE		FSMA		SCRJ	
	Ordering data		Ordering data		Ordering data	
		Order No.		Order No.		Order No.
Free end OE	By the meter	2744319	Variable	2901553	Variable	2901553
FSMA connector, IP20 FSMA	Variable	2901553	Variable	2901553	Variable	2901553
SCRJ connector, IP20 SCRJ	Variable	2901553	Variable	2901553	Variable	2901553
B-FOC (ST®) connector, IP20 BFOC	Variable	2901553	Variable	2901553	Variable	2901553
SCRJ connector, IP67 IP67	Variable	1402188	Variable	1402188	Variable	1402188
Push/pull SCRJ, plastic PPCPL	Variable	1402188	Variable	1402188	Variable	1402188
Push/pull SCRJ, metal PPCME	Variable	1402188	Variable	1402188	Variable	1402188

Ordering example for configured cable:

For a **POF cable 15 m in length** equipped with an **SCRJ connector** at one end and an **SCRJ push/pull plastic connector** at the other end, the order data is as follows:

Order No.		Connector 1		Connector 2		Length [m]
1402188	/	SCRJ	/	PPCPL	/	15

Length:	Min. 0.4 m Max. 100 m	
Increment:	0.25 m 1 m	1 m ... 5 m 5 m ... 100 m

Ordering example for goods by the meter:

For a **POF cable 70 m in length**, the order data is as follows:

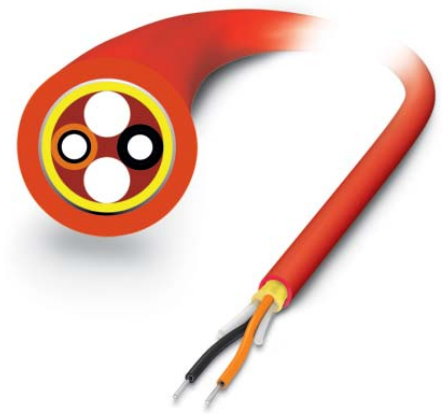
Order No.		Length [m]
2744319	/	70

Length:	Min. 0.4 m Max. 500 m/cable drum	
Increment:	0.25 m 1 m	1 m ... 5 m 5 m ... 500 m

B-FOC (ST®) connector, IP20	SCRJ connector, IP67	Push/pull SCRJ, plastic	Push/pull SCRJ, metal
BFOC	IP67	PPCPL	PPCME
Ordering data	Ordering data	Ordering data	Ordering data
Order No.	Order No.	Order No.	Order No.
Variable 2901553	Variable 1402188	Variable 1402188	Variable 1402188
Variable 2901553	Variable 1402188	Variable 1402188	Variable 1402188
Variable 2901553	Variable 1402188	Variable 1402188	Variable 1402188
Variable 2901553	Variable 1402188	Variable 1402188	Variable 1402188
Variable 1402188	Variable 1402188		
Variable 1402188		Variable 1402188	
Variable 1402188			Variable 1402188

	Technical data
Cable data	
Cable abbreviation in accordance with IEC 61977:2010	J-V11Y 4Y2P 980/1000 160A 10
Fibers	Polymer fiber, 980/1000 µm
Attenuation, typical	230 dB/km (at 660 nm)
Outer sheath	
Material	PUR
Color	red
Diameter	5.5 - 6.5 mm
Strain relief elements	Non-metal, aramid fiber
Individual wire	
Material	PA
Color	black/orange
Diameter	2.2 mm ±0.07 mm
General data	
Weight	33 kg/km
Ambient temperature (operation)	-20°C ... 70°C
Ambient temperature (storage / transport)	-40°C ... 80°C
Ambient temperature (installation)	-5°C ... 50°C
Halogen-free as per:	According to IEC 60754-2

Rugged POF cable for free assembly, type RUGGED-1012



- Rugged installation cable for fixed installation indoors
- Dimensioned for higher requirements in respect of tensile load and lateral pressure
- 2.2 mm individual wires made from extremely hard-wearing polyamide chloride (PA)
- Halogen-free, ozone and UV resistant
- Reinforced polyurethane (PUR) outer cable sheath

	Free end		FSMA connector, IP20		SCRJ connector, IP20	
	OE		FSMA		SCRJ	
	Ordering data		Ordering data		Ordering data	
		Order No.		Order No.		Order No.
Free end OE	By the meter	2744322	Variable	2901548	Variable	2901548
FSMA connector, IP20 FSMA	Variable	2901548	Variable	2901548	Variable	2901548
SCRJ connector, IP20 SCRJ	Variable	2901548	Variable	2901548	Variable	2901548
B-FOC (ST®) connector, IP20 BFOC	Variable	2901548	Variable	2901548	Variable	2901548
SCRJ connector, IP67 IP67	Variable	1402185	Variable	1402185	Variable	1402185
Push/pull SCRJ, plastic PPCPL	Variable	1402185	Variable	1402185	Variable	1402185
Push/pull SCRJ, metal PPCME	Variable	1402185	Variable	1402185	Variable	1402185

Ordering example for configured cable:

For a **POF cable 15 m in length** equipped with an **SCRJ connector** at one end and an **SCRJ push/pull plastic connector** at the other end, the order data is as follows:

Order No.		Connector 1		Connector 2		Length [m]
1402185	/	SCRJ	/	PPCPL	/	15

Length:	Min. 0.4 m Max. 100 m	
Increment:	0.25 m 1 m	1 m ... 5 m 5 m ... 100 m

Ordering example for goods by the meter:

For a **POF cable 70 m in length**, the order data is as follows:

Order No.		Length [m]
2744322	/	70

Length:	Min. 0.4 m Max. 500 m/cable drum	
Increment:	0.25 m 1 m	1 m ... 5 m 5 m ... 500 m

B-FOC (ST®) connector, IP20	SCRJ connector, IP67	Push/pull SCRJ, plastic	Push/pull SCRJ, metal
BFOC	IP67	PPCPL	PPCME
Ordering data	Ordering data	Ordering data	Ordering data
Order No.	Order No.	Order No.	Order No.
Variable 2901548	Variable 1402185	Variable 1402185	Variable 1402185
Variable 2901548	Variable 1402185	Variable 1402185	Variable 1402185
Variable 2901548	Variable 1402185	Variable 1402185	Variable 1402185
Variable 2901548	Variable 1402185	Variable 1402185	Variable 1402185
Variable 1402185	Variable 1402185		
Variable 1402185		Variable 1402185	
Variable 1402185			Variable 1402185

	Technical data
Cable data	
Cable abbreviation in accordance with IEC 61977:2010	J-V11Y 4Y2P 980/1000 160A 10
Fibers	Polymer fiber, 980/1000 µm
Attenuation, typical	230 dB/km (at 660 nm)
Outer sheath	
Material	PUR
Color	red
Diameter	7.5 - 8.5 mm
Strain relief elements	Non-metal, aramid fiber
Individual wire	
Material	PA
Color	black/orange
Diameter	2.2 mm ±0.07 mm
General data	
Weight	54 kg/km
Ambient temperature (operation)	-20°C ... 70°C
Ambient temperature (storage / transport)	-40°C ... 80°C
Ambient temperature (installation)	-5°C ... 50°C
Halogen-free as per:	According to IEC 60754-2

Highly flexible POF cable for free assembly, type RUGGED-FLEX-1013

- Highly flexible round cable for use in trailing cables or drag chains
- Dimensioned for an alternating bending frequency of up to 5,000,000 cycles
- 2.2 mm individual wires made from extremely hard-wearing polyamide chloride (PA)
- Halogen-free, ozone and UV resistant
- Rugged polyurethane (PUR) outer cable sheath

	Free end		FSMA connector, IP20		SCRJ connector, IP20	
	OE		FSMA		SCRJ	
	Ordering data		Ordering data		Ordering data	
		Order No.		Order No.		Order No.
Free end OE	By the meter	2744335	Variable	2901549	Variable	2901549
FSMA connector, IP20 FSMA	Variable	2901549	Variable	2901549	Variable	2901549
SCRJ connector, IP20 SCRJ	Variable	2901549	Variable	2901549	Variable	2901549
B-FOC (ST®) connector, IP20 BFOC	Variable	2901549	Variable	2901549	Variable	2901549
SCRJ connector, IP67 IP67	Variable	1402187	Variable	1402187	Variable	1402187
Push/pull SCRJ, plastic PPCPL	Variable	1402187	Variable	1402187	Variable	1402187
Push/pull SCRJ, metal PPCME	Variable	1402187	Variable	1402187	Variable	1402187

Ordering example for configured cable:

For a **POF cable 15 m in length** equipped with an **SCRJ connector** at one end and an **SCRJ push/pull plastic connector** at the other end, the order data is as follows:

Order No.		Connector 1		Connector 2		Length [m]
1402187	/	SCRJ	/	PPCPL	/	15

Length	Min. 0.4 m Max. 100 m	
Increment:	0.25 m 1 m	1 m ... 5 m 5 m ... 100 m

Ordering example for goods by the meter:

For a **POF cable 70 m in length**, the order data is as follows:

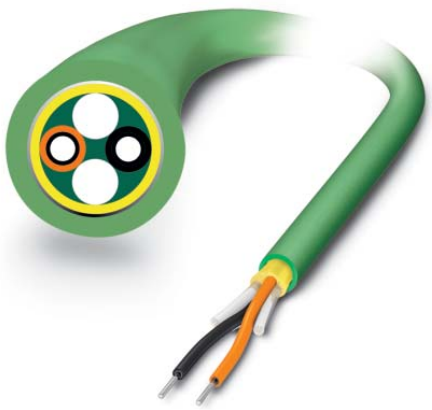
Order No.		Length [m]
2744335	/	70

Length	Min. 0.4 m Max. 500 m/cable drum	
Increment:	0.25 m 1 m	1 m ... 5 m 5 m ... 500 m

B-FOC (ST®) connector, IP20	SCRJ connector, IP67	Push/pull SCRJ, plastic	Push/pull SCRJ, metal
BFOC	IP67	PPCPL	PPCME
Ordering data	Ordering data	Ordering data	Ordering data
Order No.	Order No.	Order No.	Order No.
Variable 2901549	Variable 1402187	Variable 1402187	Variable 1402187
Variable 2901549	Variable 1402187	Variable 1402187	Variable 1402187
Variable 2901549	Variable 1402187	Variable 1402187	Variable 1402187
Variable 2901549	Variable 1402187	Variable 1402187	Variable 1402187
Variable 1402187	Variable 1402187		
Variable 1402187		Variable 1402187	
Variable 1402187			Variable 1402187

	Technical data
Cable data	
Cable abbreviation in accordance with IEC 61977:2010	J-V11Y 4Y2P 980/1000 180A 10
Fibers	Polymer fiber, 980/1000 µm
Attenuation, typical	275 dB/km (at 660 nm)
Outer sheath	
Material	PUR
Color	red
Diameter	7.5 - 8.5 mm
Strain relief elements	Non-metal, aramid fiber
Individual wire	
Material	PA
Color	black/orange
Diameter	2.2 mm ±0.07 mm
General data	
Weight	54 kg/km
Ambient temperature (operation)	-20°C ... 70°C
Ambient temperature (storage / transport)	-40°C ... 80°C
Ambient temperature (installation)	-5°C ... 50°C
Halogen-free as per:	According to IEC 60754-2

PROFINET B POF cable for free assembly, type PN-B-1000



- Universal installation cable for fixed installation indoors
- 2.2 mm individual wires made from extremely hard-wearing polyamide chloride (PA)
- Halogen-free, ozone and UV resistant
- Rugged polyurethane (PUR) outer cable sheath
- PROFINET type B

Ethernet

	Free end		FSMA connector, IP20		SCRJ connector, IP20	
	OE		FSMA		SCRJ	
	Ordering data		Ordering data		Ordering data	
		Order No.		Order No.		Order No.
Free end OE	By the meter	2313397	Variable	2901551	Variable	2901551
FSMA connector, IP20 FSMA	Variable	2901551	Variable	2901551	Variable	2901551
SCRJ connector, IP20 SCRJ	Variable	2901551	Variable	2901551	Variable	2901551
B-FOC (ST®) connector, IP20 BFOC	Variable	2901551	Variable	2901551	Variable	2901551
Push/pull SCRJ, plastic PPCPL	Variable	1402172	Variable	1402172	Variable	1402172
Push/pull SCRJ, metal PPCME	Variable	1402172	Variable	1402172	Variable	1402172

Ordering example for configured cable:

For a **POF cable 15 m in length** equipped with an **SCRJ connector** at one end and an **SCRJ push/pull plastic connector** at the other end, the order data is as follows:

Order No.		Connector 1		Connector 2		Length [m]
1402172	/	SCRJ	/	PPCPL	/	15

Length:	Min. 0.4 m Max. 100 m	
Increment:	0.25 m 1 m	1 m ... 5 m 5 m ... 100 m

Ordering example for goods by the meter:

For a **POF cable 70 m in length**, the order data is as follows:

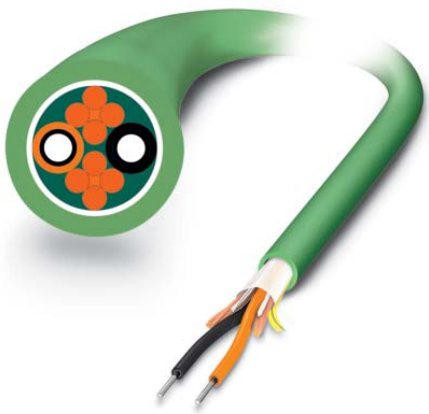
Order No.		Length [m]
2313397	/	70

Length:	Min. 0.4 m Max. 500 m/cable drum	
Increment:	0.25 m 1 m	1 m ... 5 m 5 m ... 500 m

B-FOC (ST®) connector, IP20		Push/pull SCRJ, plastic		Push/pull SCRJ, metal	
BFOC		PPCPL		PPCME	
Ordering data		Ordering data		Ordering data	
	Order No.		Order No.		Order No.
Variable	2901551	Variable	1402172	Variable	1402172
Variable	2901551	Variable	1402172	Variable	1402172
Variable	2901551	Variable	1402172	Variable	1402172
Variable	2901551	Variable	1402172	Variable	1402172
Variable	1402172	Variable	1402172		
Variable	1402172			Variable	1402172

	Technical data
Cable data	
Cable abbreviation in accordance with IEC 61977:2010	J-V11Y 4Y2P 980/1000 160A 10
Fibers	Polymer fiber, 980/1000 µm
Attenuation, typical	230 dB/km (at 660 nm)
Outer sheath	
Material	PUR
Color	Green
Diameter	7.5 - 8.5 mm
Strain relief elements	Non-metal, aramid fiber
Individual wire	
Material	PA
Color	Black and orange with arrow labeling
Diameter	2.2 mm ±0.07 mm
General data	
Weight	49 kg/km
Ambient temperature (operation)	-20°C ... 70°C
Ambient temperature (storage / transport)	-40°C ... 80°C
Ambient temperature (installation)	5°C ... 50°C
Halogen-free as per:	According to IEC 60754-2

Highly flexible PROFINET C POF cable for free assembly, type PN-C-1003



- Highly flexible round cable for use in trailing cables or drag chains
- Dimensioned for an alternating bending frequency of up to 5,000,000 cycles
- 2.2 mm individual wires made from extremely hard-wearing polyamide chloride (PA)
- Halogen-free, ozone and UV resistant
- Rugged polyurethane (PUR) outer cable sheath
- PROFINET type C

Ethernet

	Free end		FSMA connector, IP20		SCRJ connector, IP20	
	OE		FSMA		SCRJ	
	Ordering data		Ordering data		Ordering data	
	Order No.		Order No.		Order No.	
Free end OE	By the meter	2313407	Variable	2901552	Variable	2901552
FSMA connector, IP20 FSMA	Variable	2901552	Variable	2901552	Variable	2901552
SCRJ connector, IP20 SCRJ	Variable	2901552	Variable	2901552	Variable	2901552
B-FOC (ST®) connector, IP20 BFOC	Variable	2901552	Variable	2901552	Variable	2901552
Push/pull SCRJ, plastic PPCPL	Variable	1402175	Variable	1402175	Variable	1402175
Push/pull SCRJ, metal PPCME	Variable	1402175	Variable	1402175	Variable	1402175

Ordering example for configured cable:

For a **POF cable 15 m in length** equipped with an **SCRJ connector** at one end and an **SCRJ push/pull plastic connector** at the other end, the order data is as follows:

Order No.		Connector 1		Connector 2		Length [m]
1402175	/	SCRJ	/	PPCPL	/	15

Length:	Min. 0.4 m Max. 100 m	
Increment:	0.25 m 1 m	1 m ... 5 m 5 m ... 100 m

Ordering example for goods by the meter:

For a **POF cable 70 m in length**, the order data is as follows:

Order No.		Length [m]
2313407	/	70

Length:	Min. 0.4 m Max. 500 m/cable drum	
Increment:	0.25 m 1 m	1 m ... 5 m 5 m ... 500 m

B-FOC (ST®) connector, IP20		Push/pull SCRJ, plastic		Push/pull SCRJ, metal	
BFOC		PPCPL		PPCME	
Ordering data		Ordering data		Ordering data	
	Order No.		Order No.		Order No.
Variable	2901552	Variable	1402175	Variable	1402175
Variable	2901552	Variable	1402175	Variable	1402175
Variable	2901552	Variable	1402175	Variable	1402175
Variable	2901552	Variable	1402175	Variable	1402175
Variable	1402175	Variable	1402175		
Variable	1402175			Variable	1402175

	Technical data
Cable data	
Cable abbreviation in accordance with IEC 61977:2010	J-V11Y 4Y2P 980/1000 180A 10
Fibers	Polymer fiber, 980/1000 µm
Attenuation, typical	275 dB/km (at 660 nm)
Outer sheath	
Material	PUR
Color	Green
Diameter	7.5 - 8.5 mm
Strain relief elements	Non-metal, aramid fiber
Individual wire	
Material	PA
Color	Black and orange with arrow labeling
Diameter	2.2 mm ±0.07 mm
General data	
Weight	51 kg/km
Ambient temperature (operation)	-20°C ... 70°C
Ambient temperature (storage / transport)	-40°C ... 80°C
Ambient temperature (installation)	5°C ... 50°C
Halogen-free as per:	According to IEC 60754-2

Universal PROFINET B HCS cable for free assembly, type PN-B-HCS-1018

- Universal installation cable for fixed installation indoors
- 2.2 mm individual wires made from extremely hard-wearing polyvinyl chloride (PVC)
- Halogen-free, ozone and UV resistant
- PVC outer cable sheath
- PROFINET type B

Ethernet

	Free end		FSMA connector, IP20		SCRJ connector, IP20	
	OE		FSMA		SCRJ	
	Ordering data		Ordering data		Ordering data	
		Order No.		Order No.		Order No.
Free end OE	By the meter	2313766	Variable	2901556	Variable	2901556
FSMA connector, IP20 FSMA	Variable	2901556	Variable	2901556	Variable	2901556
SCRJ connector, IP20 SCRJ	Variable	2901556	Variable	2901556	Variable	2901556
SC duplex connector, IP20 SCDUP	Variable	2901556	Variable	2901556	Variable	2901556
B-FOC (ST®) connector, IP20 BFOC	Variable	2901556	Variable	2901556	Variable	2901556
LC connector LC	Variable	2901556	Variable	2901556	Variable	2901556
Push/pull SCRJ, plastic PPCPL	Variable	1402190	Variable	1402190	Variable	1402190
Push/pull SCRJ, metal PPCME	Variable	1402190	Variable	1402190	Variable	1402190

Ordering example for configured cable:

For an **HCS cable 15 m in length** equipped with an **SCRJ connector** at one end and an **SCRJ push/pull plastic connector** at the other end, the order data is as follows:

Order No.	Connector 1	Connector 2	Length [m]
1402190	SCRJ	PPCPL	15

Length:	Min. 1 m Max. 2000 m	
Increment:	0.25 m 1 m	1 m ... 5 m 5 m ... 2000 m

Ordering example for goods by the meter:

For an **HCS cable 70 m in length**, the order data is as follows:

Order No.	Length [m]
2313766	70

Length:	Min. 1 m Max. 2000 m/cable drum	
Increment:	0.25 m 1 m	1 m ... 5 m 5 m ... 2000 m

SC duplex connector, IP20	B-FOC (ST®) connector, IP20	LC connector	Push/pull SCRJ, plastic	Push/pull SCRJ, metal
SCDUP	BFOC	LC	PPCPL	PPCME
Ordering data	Ordering data	Ordering data	Ordering data	Ordering data
Order No.	Order No.	Order No.	Order No.	Order No.
Variable 2901556	Variable 2901556	Variable 2901556	Variable 1402190	Variable 1402190
Variable 2901556	Variable 2901556	Variable 2901556	Variable 1402190	Variable 1402190
Variable 2901556	Variable 2901556	Variable 2901556	Variable 1402190	Variable 1402190
Variable 2901556	Variable 2901556	Variable 2901556	Variable 1402190	Variable 1402190
Variable 2901556	Variable 2901556	Variable 2901556	Variable 1402190	Variable 1402190
Variable 2901556	Variable 2901556	Variable 2901556	Variable 1402190	Variable 1402190
Variable 1402190	Variable 1402190	Variable 1402190	Variable 1402190	
Variable 1402190	Variable 1402190	Variable 1402190		Variable 1402190

	Technical data
Cable data	
Cable abbreviation in accordance with IEC 61977:2010	AT-V(ZN)YY 2K200/230 HCS
Fibers	HCS, 200/230 µm
Attenuation, typical	10 dB/km (at 660 nm), 8 dB/km (at 850 nm)
Outer sheath	
Material	PVC
Color	Green
Diameter	6.7 - 7.7 mm
Strain relief elements	Non-metal, aramid fiber
Individual wire	
Material	PVC
Color	Black and orange with arrow labeling
Diameter	2.2 mm ±0.1 mm
Strain relief elements	Non-metal, aramid fibers
General data	
Weight	45 kg/km
Ambient temperature (operation)	-40°C ... 90°C
Ambient temperature (storage / transport)	-40°C ... 90°C
Ambient temperature (installation)	-5°C ... 50°C
Halogen-free as per:	-

PROFINET C HCS broadband cable (GI) for free assembly, type PN-C-HCS-GI-1005

- Rugged installation cable for indoor use
- Gradient index fiber for maximum power requirements in respect of transmission bandwidth
- Can be used in 10/100/1000 Mbps Ethernet systems
- 2.2 mm individual wires made from polyvinyl chloride (PVC)
- Halogen-free, ozone and UV resistant
- Rugged polyurethane (PUR) outer cable sheath
- Highly tear-resistant aramid strain relief elements
- PROFINET type C

Ethernet

	Free end		FSMA connector, IP20		SCRJ connector, IP20	
	OE		FSMA		SCRJ	
	Ordering data		Ordering data		Ordering data	
		Order No.		Order No.		Order No.
Free end OE	By the meter	2313410	Variable	2901554	Variable	2901554
FSMA connector, IP20 FSMA	Variable	2901554	Variable	2901554	Variable	2901554
SCRJ connector, IP20 SCRJ	Variable	2901554	Variable	2901554	Variable	2901554
SC duplex connector, IP20 SCDUP	Variable	2901554	Variable	2901554	Variable	2901554
B-FOC (ST®) connector, IP20 BFOC	Variable	2901554	Variable	2901554	Variable	2901554
LC connector LC	Variable	2901554	Variable	2901554	Variable	2901554
Push/pull SCRJ, plastic PPCPL	Variable	1402189	Variable	1402189	Variable	1402189
Push/pull SCRJ, metal PPCME	Variable	1402189	Variable	1402189	Variable	1402189

Ordering example for configured cable:

For an **HCS cable 15 m in length** equipped with an **SCRJ connector** at one end and an **SCRJ push/pull plastic connector** at the other end, the order data is as follows:

Order No.	Connector 1	Connector 2	Length [m]
1402189	SCRJ	PPCPL	15

Length:	Min. 1 m Max. 2000 m	
Increment:	0.25 m 1 m	1 m ... 5 m 5 m ... 2000 m

Ordering example for goods by the meter:

For an **HCS cable 70 m in length**, the order data is as follows:

Order No.	Length [m]
2313410	70

Length:	Min. 1 m Max. 2000 m/cable drum	
Increment:	0.25 m 1 m	1 m ... 5 m 5 m ... 2000 m

SC duplex connector, IP20	B-FOC (ST®) connector, IP20	LC connector	Push/pull SCRJ, plastic	Push/pull SCRJ, metal
SCDUP	BFOC	LC	PPCPL	PPCME
Ordering data	Ordering data	Ordering data	Ordering data	Ordering data
Order No.	Order No.	Order No.	Order No.	Order No.
Variable 2901554	Variable 2901554	Variable 2901554	Variable 1402189	Variable 1402189
Variable 2901554	Variable 2901554	Variable 2901554	Variable 1402189	Variable 1402189
Variable 2901554	Variable 2901554	Variable 2901554	Variable 1402189	Variable 1402189
Variable 2901554	Variable 2901554	Variable 2901554	Variable 1402189	Variable 1402189
Variable 2901554	Variable 2901554	Variable 2901554	Variable 1402189	Variable 1402189
Variable 2901554	Variable 2901554	Variable 2901554	Variable 1402189	Variable 1402189
Variable 1402189	Variable 1402189	Variable 1402189	Variable 1402189	
Variable 1402189	Variable 1402189	Variable 1402189		Variable 1402189

	Technical data
Cable data	
Cable abbreviation in accordance with IEC 61977:2010	J-V(ZN)12Y(ZN)11Y 2GK200/230 GI-HCS
Fibers	HCS gradient index, 200/230 µm
Attenuation, typical	18 dB/km (at 660 nm), 12 dB/km (at 850 nm)
Outer sheath	
Material	PUR
Color	Green
Diameter	7.5 - 8.5 mm
Strain relief elements	Non-metal, aramid fiber
Individual wire	
Material	PVC
Color	Black and orange with arrow labeling
Diameter	2.2 mm ±0.1 mm
Strain relief elements	Non-metal, aramid fibers
General data	
Weight	52 kg/km
Ambient temperature (operation)	-20°C ... 70°C
Ambient temperature (storage / transport)	-40°C ... 70°C
Ambient temperature (installation)	-5°C ... 50°C
Halogen-free as per:	According to IEC 60754-2

Rugged HCS cable for free assembly, type HCS-RUGGED-1014

- Rugged installation cable for indoor use
- Highly tear-resistant aramid strain relief elements
- 2.9 mm individual wires made from highly flexible FRNC material
- Halogen-free, ozone and UV resistant
- Rugged polyurethane (PUR) outer cable sheath

	Free end		FSMA connector, IP20		SCRJ connector, IP20	
	OE		FSMA		SCRJ	
	Ordering data		Ordering data		Ordering data	
		Order No.		Order No.		Order No.
Free end OE	By the meter	2799885	Variable	2901555	Variable	2901555
FSMA connector, IP20 FSMA	Variable	2901555	Variable	2901555	Variable	2901555
SCRJ connector, IP20 SCRJ	Variable	2901555	Variable	2901555	Variable	2901555
SC duplex connector, IP20 SCDUP	Variable	2901555	Variable	2901555	Variable	2901555
B-FOC (ST®) connector, IP20 BFOC	Variable	2901555	Variable	2901555	Variable	2901555
LC connector LC	Variable	2901555	Variable	2901555	Variable	2901555
Push/pull SCRJ, plastic PPCPL	Variable	1402191	Variable	1402191	Variable	1402191
Push/pull SCRJ, metal PPCME	Variable	1402191	Variable	1402191	Variable	1402191
SCRJ connector, IP67 IP67	Variable	1402191	Variable	1402191	Variable	1402191

Ordering example for configured cable:

For an **HCS cable 15 m in length** equipped with an **SCRJ connector** at one end and an **SCRJ push/pull plastic connector** at the other end, the order data is as follows:

Order No.		Connector 1		Connector 2		Length [m]
1402191	/	SCRJ	/	PPCPL	/	15

Length:	Min. 1 m Max. 2000 m	
Increment:	0.25 m 1 m	1 m ... 5 m 5 m ... 2000 m

Ordering example for goods by the meter:

For an **HCS cable 70 m in length**, the order data is as follows:

Order No.		Length [m]
2799885	/	70

Length:	Min. 1 m Max. 2000 m/cable drum	
Increment:	0.25 m 1 m	1 m ... 5 m 5 m ... 2000 m

SC duplex connector, IP20	B-FOC (ST®) connector, IP20	LC connector	Push/pull SCRJ, plastic	Push/pull SCRJ, metal	SCRJ connector, IP67
SCDUP	BFOC	LC	PPCPL	PPCME	IP67
Ordering data	**Ordering data**	**Ordering data**	**Ordering data**	**Ordering data**	**Ordering data**
Order No.	Order No.Or-	Order No.	Order No.	Order No.	Order No.
Variable 2901555	Variable 2901555	Variable 2901555	Variable 1402191	Variable 1402191	Variable 1402191
Variable 2901555	Variable 2901555	Variable 2901555	Variable 1402191	Variable 1402191	Variable 1402191
Variable 2901555	Variable 2901555	Variable 2901555	Variable 1402191	Variable 1402191	Variable 1402191
Variable 2901555	Variable 2901555	Variable 2901555	Variable 1402191	Variable 1402191	Variable 1402191
Variable 2901555	Variable 2901555	Variable 2901555	Variable 1402191	Variable 1402191	Variable 1402191
Variable 2901555	Variable 2901555	Variable 2901555	Variable 1402191	Variable 1402191	Variable 1402191
Variable 1402191	Variable 1402191	Variable 1402191	Variable 1402191		
Variable 1402191	Variable 1402191	Variable 1402191		Variable 1402191	
Variable 1402191	Variable 1402191	Variable 1402191			Variable 1402191

	Technical data
Cable data	
Cable abbreviation in accordance with IEC 61977:2010	I-VH11Y 2K200/230 HCS
Fibers	HCS, 200/230 µm
Attenuation, typical	10 dB/km (at 660 nm), 8 dB/km (at 850 nm)
Outer sheath	
Material	PUR
Color	orange
Diameter	7.5 - 8.5 mm
Individual wire	
Material	FRNC material
Color	Red/Green
Diameter	2.9 mm ±0.1 mm
Strain relief elements	Non-metal, aramid fibers
General data	
Weight	54 kg/km
Ambient temperature (operation)	-40°C ... 70°C
Ambient temperature (storage / transport)	-40°C ... 70°C
Ambient temperature (installation)	-20°C ... 60°C

Outdoor cables for free assembly, type HCSO-1015

- Rugged round cable for laying outdoors
- Longitudinally water-tight
- Integrated vapor barrier and rodent-proof scrim
- 2.9 mm individual wires made from highly flexible FRNC material
- Ozone and UV resistant
- Extremely rugged polyethylene outer cable sheath

	Free end		FSMA connector, IP20		SCRJ connector, IP20	
	OE		FSMA		SCRJ	
	Ordering data		Ordering data		Ordering data	
		Order No.		Order No.		Order No.
Free end OE	By the meter	2799445	Variable	2901557	Variable	2901557
FSMA connector, IP20 FSMA	Variable	2901557	Variable	2901557	Variable	2901557
SCRJ connector, IP20 SCRJ	Variable	2901557	Variable	2901557	Variable	2901557
SC duplex connector, IP20 SCDUP	Variable	2901557	Variable	2901557	Variable	2901557
B-FOC (ST®) connector, IP20 BFOC	Variable	2901557	Variable	2901557	Variable	2901557
LC connector LC	Variable	2901557	Variable	2901557	Variable	2901557

Ordering example for configured cable:

For an **HCS cable 15 m in length** equipped with an **SCRJ connector** at one end and a **B-FOC(ST®) connector, IP20** at the other end, the order data is as follows:

Order No.		Connector 1		Connector 2		Length [m]
2901557	/	SCRJ	/	BFOC	/	15

Length:	Min. 1 m Max. 1000 m	
Increment:	0.25 m 1 m	1 m ... 5 m 5 m ... 1000 m

Ordering example for goods by the meter:

For an **HCS cable 70 m in length**, the order data is as follows:

Order No.		Length [m]
2799445	/	70

Length:	Min. 1 m Max. 1000 m/cable drum	
Increment:	0.25 m 1 m	1 m ... 5 m 5 m ... 1000 m

SC duplex connector, IP20	B-FOC (ST®) connector, IP20	LC connector
SCDUP	BFOC	LC
Ordering data	Ordering data	Ordering data
Order No.	Order No.	Order No.
Variable 2901557	Variable 2901557	Variable 2901557
Variable 2901557	Variable 2901557	Variable 2901557
Variable 2901557	Variable 2901557	Variable 2901557
Variable 2901557	Variable 2901557	Variable 2901557
Variable 2901557	Variable 2901557	Variable 2901557
Variable 2901557	Variable 2901557	Variable 2901557
Variable 2901557	Variable 2901557	Variable 2901557
Variable 2901557	Variable 2901557	Variable 2901557

	Technical data
Cable data	
Cable abbreviation in accordance with IEC 61977:2010	AT-VQHB2Y 2K200/230 10A17+8B20
Fibers	HCS, 200/230 µm
Attenuation, typical	10 dB/km (at 660 nm), 8 dB/km (at 850 nm)
Outer sheath	
Material	PE
Color	black
Diameter	10 - 11 mm
Strain relief elements	Non-metal, aramid fiber
Rodent protection	Glass fibers
Lengthwise waterproofing	IEC 60794-1-2
Individual wire	
Material	FRNC material
Color	Red/Green
Diameter	2.9 mm ±0.1 mm
Strain relief elements	Non-metal, aramid fibers
General data	
Weight	97 kg/km
Ambient temperature (operation)	-20°C ... 70°C
Ambient temperature (storage / transport)	-25°C ... 70°C
Ambient temperature (installation)	-5°C ... 50°C
Halogen-free as per:	According to IEC 60754-2

Multi-mode glass fiber cables for free assembly, type GDM-RUGGED-1016

- Rugged installation cable for indoor use
- Highly tear-resistant aramid strain relief elements
- 2.9 mm individual wires made from highly flexible FRNC material
- Halogen-free, ozone and UV resistant
- Rugged polyurethane (PUR) outer cable sheath

	Free end		FSMA connector, IP20		SCRJ connector, IP20	
	OE		FSMA		SCRJ	
	Ordering data		Ordering data		Ordering data	
		Order No.		Order No.		Order No.
Free end OE	By the meter	2799322	Variable	2901558	Variable	2901558
FSMA connector, IP20 FSMA	Variable	2901558	Variable	2901558	Variable	2901558
SCRJ connector, IP20 SCRJ	Variable	2901558	Variable	2901558	Variable	2901558
SC duplex connector, IP20 SCDUP	Variable	2901558	Variable	2901558	Variable	2901558
B-FOC (ST®) connector, IP20 BFOC	Variable	2901558	Variable	2901558	Variable	2901558
LC connector LC	Variable	2901558	Variable	2901558	Variable	2901558
Push/pull SCRJ, plastic PPCPL	Variable	1402193	Variable	1402193	Variable	1402193
Push/pull SCRJ, metal PPCME	Variable	1402193	Variable	1402193	Variable	1402193
SCRJ connector, IP67 IP67	Variable	1402193	Variable	1402193	Variable	1402193

Ordering example for configured cable:

For a **glass fiber cable 15 m in length** equipped with an SCRJ connector at one end and an **SCRJ push/pull plastic connector** at the other end, the order data is as follows:

Order No.		Connector 1		Connector 2		Length [m]
1402193	/	SCRJ	/	PPCPL	/	15

Length	Min. 1 m Max. 1000 m	
Increment:	1 m	1 m ... 1000 m

Ordering example for goods by the meter:

For a **glass fiber cable 70 m in length**, the order data is as follows:

Order No.		Length [m]
2799322	/	70

Length	Min. 1 m Max. 1000 m/cable drum	
Increment:	1 m	1 m ... 1000 m

SC duplex connector, IP20	B-FOC (ST®) connector, IP20	LC connector	Push/pull SCRJ, plastic	Push/pull SCRJ, metal	SCRJ connector, IP67
SCDUP	BFOC	LC	PPCPL	PPCME	IP67
Ordering data	**Ordering data**	**Ordering data**	**Ordering data**	**Ordering data**	**Ordering data**
Order No.	Order No.	Order No.	Order No.	Order No.	Order No.
Variable 2901558	Variable 2901558	Variable 2901558	Variable 1402193	Variable 1402193	Variable 1402193
Variable 2901558	Variable 2901558	Variable 2901558	Variable 1402193	Variable 1402193	Variable 1402193
Variable 2901558	Variable 2901558	Variable 2901558	Variable 1402193	Variable 1402193	Variable 1402193
Variable 2901558	Variable 2901558	Variable 2901558	Variable 1402193	Variable 1402193	Variable 1402193
Variable 2901558	Variable 2901558	Variable 2901558	Variable 1402193	Variable 1402193	Variable 1402193
Variable 2901558	Variable 2901558	Variable 2901558	Variable 1402193	Variable 1402193	Variable 1402193
Variable 1402193	Variable 1402193	Variable 1402193	Variable 1402193		
Variable 1402193	Variable 1402193	Variable 1402193		Variable 1402193	
Variable 1402193	Variable 1402193	Variable 1402193			Variable 1402193

	Technical data
Cable data	
Cable abbreviation in accordance with IEC 61977:2010	I-V(ZN)H11Y 2G50/125 2,5B600+0,7F1200
Fibers	Glass fiber, 50/125 µm
Attenuation, typical	2.5 dB/km (at 850 nm), 0.7 dB/km (at 1300 nm)
Outer sheath	
Material	PUR
Color	orange
Diameter	7.5 - 8.5 mm
Individual wire	
Material	FRNC material
Color	Red/Green
Diameter	2.9 mm ±0.1 mm
General data	
Weight	50 kg/km
Ambient temperature (operation)	-20°C ... 70°C
Ambient temperature (storage / transport)	-25°C ... 70°C
Ambient temperature (installation)	-5°C ... 50°C
Halogen-free as per:	According to IEC 60754-2

Outdoor multi-mode glass fiber cables for free assembly, type GDO-1017

- Rugged round cable for laying outdoors
- Longitudinally water-tight
- Integrated vapor barrier and rodent-proof scrim
- 2.2 mm individual wires made from highly flexible FRNC material
- Ozone and UV resistant
- Extremely rugged polyethylene outer cable sheath

	Free end		FSMA connector, IP20		SCRJ connector, IP20	
	OE		FSMA		SCRJ	
	Ordering data		Ordering data		Ordering data	
		Order No.		Order No.		Order No.
Free end OE	By the meter	2799432	Variable	2901559	Variable	2901559
FSMA connector, IP20 FSMA	Variable	2901559	Variable	2901559	Variable	2901559
SCRJ connector, IP20 SCRJ	Variable	2901559	Variable	2901559	Variable	2901559
SC duplex connector, IP20 SCDUP	Variable	2901559	Variable	2901559	Variable	2901559
B-FOC (ST®) connector, IP20 BFOC	Variable	2901559	Variable	2901559	Variable	2901559
LC connector LC	Variable	2901559	Variable	2901559	Variable	2901559

Ordering example for configured cable:

For a **glass fiber cable 15 m in length** equipped with an **SCRJ connector** at one end and a **B-FOC(ST®) connector, IP20** at the other end, the order data is as follows:

Order No.		Connector 1		Connector 2		Length [m]
2901559	/	SCRJ	/	BFOC	/	15

Length:	Min. 1 m Max. 1000 m	
Increment:	1 m	1 m ... 1000 m

Ordering example for goods by the meter:

For a **glass fiber cable 70 m in length**, the order data is as follows:

Order No.		Length [m]
2799432	/	70

Length:	Min. 1 m Max. 1000 m/cable drum	
Increment:	1 m	1 m ... 1000 m

SC duplex connector, IP20		B-FOC (ST®) connector, IP20		LC connector	
SCDUP		BFOC		LC	
Ordering data		Ordering data		Ordering data	
	Order No.		Order No.		Order No.
Variable	2901559	Variable	2901559	Variable	2901559
Variable	2901559	Variable	2901559	Variable	2901559
Variable	2901559	Variable	2901559	Variable	2901559
Variable	2901559	Variable	2901559	Variable	2901559
Variable	2901559	Variable	2901559	Variable	2901559
Variable	2901559	Variable	2901559	Variable	2901559

	Technical data
Cable data	
Cable abbreviation in accordance with IEC 61977:2010	AT-VQH(BN)2Y 2G50/125 2,5B600+0,7F1200
Fibers	Glass fiber, 50/125 µm
Attenuation, typical	2.5 dB/km (at 850 nm), 0.7 dB/km (at 1300 nm)
Outer sheath	
Material	PE
Color	black
Diameter	10 - 11 mm
Strain relief elements	Non-metal, aramid fiber
Rodent protection	Glass fibers
Lengthwise waterproofing	IEC 60794-1-2
Individual wire	
Material	FRNC material
Color	Red/Green
Diameter	2.9 mm ±0.1 mm
Strain relief elements	Non-metal, aramid fibers
General data	
Weight	97 kg/km
Ambient temperature (operation)	-25°C ... 70°C
Ambient temperature (storage / transport)	-30°C ... 70°C
Ambient temperature (installation)	-5°C ... 50°C
Halogen-free as per:	According to IEC 60754-2

Fiber optic patch cables

N

For fast integration of fiber optic devices into existing fiber optic networks, it is best to use pre-assembled patch cables. Patch cables can be ordered in lengths of one, two, and five meters for the following connector formats: SCRJ, SC duplex, LC, and B-FOC (ST®). Both single- and multi-mode glass fiber options are available.

Developed specifically for industrial applications, the pre-assembled patch cables feature a rugged design. The strong outer cable sheath and connector transitions with bending protection sleeve mean that they can be safely used inside control cabinets.

The extremely rugged patch cables are suitable for all fiber optic devices with an optical interface that supports single- and/or multi-mode glass fiber.

Connectors:
– LC
– SC duplex
– SCRJ
– B-FOC (ST®)

Fixed lengths:
– 1 m
– 2 m
– 5 m

Fiber types:
– Multi-mode glass fiber (MM)
– Single-mode glass fiber (SM)

Sheath colors:
– Multi-mode: Orange
– Single mode: Yellow

Technical Data:
– Halogen-free
– Flame-retardant
– No corrosive or toxic fumes
– External dimensions: 2.8 mm x 5.7 mm

LC connector

Technical data

Cable, properties	
Individual wire diameter	2.8 mm
Outer sheath, material	FRNC
External sheath, strain relief elements	Non-metal, aramid fiber
Lateral pressure, long-term	60 N/cm
Tensile strength short-term/long-term	600 N
Halogen-free	According to IEC 60754-2
General data	
Ambient temperature (storage / transport)	-25°C ... 70°C
Ambient temperature (installation)	-5°C ... 50°C
Ambient temperature (operation)	-5°C ... 70°C

Ordering data

Description	Length of cable	Type	Order No.	Pcs. / Pkt.
FO patch cable with **multi-mode glass fiber (OM2)** - **LC connector** to LC, SC duplex, B-FOC or SCRJ connector				
	1 m	**FL MM PATCH 1,0 LC-LC**	**2989158**	1
	2 m	**FL MM PATCH 2,0 LC-LC**	**2989255**	1
	5 m	**FL MM PATCH 5,0 LC-LC**	**2901799**	1
FO patch cable with **multi-mode glass fiber (OM2)** - **SC duplex connector** to SC duplex, B-FOC or SCRJ connector				
	1 m			
	2 m			
	5 m			
FO patch cable with **multi-mode glass fiber (OM2)** - **B-FOC connector** to B-FOC or SCRJ connector				
	1 m			
	2 m			
	5 m			
FO patch cable with **multi-mode glass fiber (OM2)** - **SCRJ connector** to SCRJ connector				
	1 m			
	2 m			
	5 m			
FO patch cable with **single-mode glass fiber (OS1)** - **LC connector** to LC, SC duplex or B-FOC connector				
	1 m	**FL SM PATCH 1,0 LC-LC**	**2989187**	1
	2 m	**FL SM PATCH 2,0 LC-LC**	**2989284**	1
	5 m	**FL SM PATCH 5,0 LC-LC**	**2901826**	1
FO patch cable with **single-mode glass fiber (OS1)** - **SC duplex connector** to SC duplex or B-FOC connector				
	1 m			
	2 m			
	5 m			
FO patch cable with **single-mode glass fiber (OS1)** - **B-FOC connector** to B-FOC connector				
	1 m			
	2 m			
	5 m			

N

SC duplex connector

N

B-FOC connector

N

SCRJ connector

Technical data

2.8 mm
FRNC
Non-metal, aramid fiber
60 N/cm
600 N
According to IEC 60754-2

-25°C ... 70°C
-5°C ... 50°C
-5°C ... 70°C

Ordering data

Type	Order No.	Pcs. / Pkt.
FL MM PATCH 1,0 LC-SC	2989161	1
FL MM PATCH 2,0 LC-SC	2989268	1
FL MM PATCH 5,0 LC-SC	2901800	1
FL MM PATCH 1,0 SC-SC	2901805	1
FL MM PATCH 2,0 SC-SC	2901807	1
FL MM PATCH 5,0 SC-SC	2901808	1
FL SM PATCH 1,0 LC-SC	2989190	1
FL SM PATCH 2,0 LC-SC	2989297	1
FL SM PATCH 5,0 LC-SC	2901827	1
FL SM PATCH 1,0 SC-SC	2901829	1
FL SM PATCH 2,0 SC-SC	2901830	1
FL SM PATCH 5,0 SC-SC	2901831	1

Technical data

2.8 mm
FRNC
Non-metal, aramid fiber
60 N/cm
600 N
According to IEC 60754-2

-25°C ... 70°C
-5°C ... 50°C
-5°C ... 70°C

Ordering data

Type	Order No.	Pcs. / Pkt.
FL MM PATCH 1,0 LC-ST	2989174	1
FL MM PATCH 2,0 LC-ST	2989271	1
FL MM PATCH 5,0 LC-ST	2901801	1
FL MM PATCH 1,0 SC-ST	2901809	1
FL MM PATCH 2,0 SC-ST	2901810	1
FL MM PATCH 5,0 SC-ST	2901811	1
FL MM PATCH 1,0 ST-ST	2901815	1
FL MM PATCH 2,0 ST-ST	2901816	1
FL MM PATCH 5,0 ST-ST	2901817	1
FL SM PATCH 1,0 LC-ST	2989242	1
FL SM PATCH 2,0 LC-ST	2989349	1
FL SM PATCH 5,0 LC-ST	2901828	1
FL SM PATCH 1,0 SC-ST	2901832	1
FL SM PATCH 2,0 SC-ST	2901833	1
FL SM PATCH 5,0 SC-ST	2901834	1
FL SM PATCH 1,0 ST-ST	2901836	1
FL SM PATCH 2,0 ST-ST	2901837	1
FL SM PATCH 5,0 ST-ST	2901838	1

Technical data

2.8 mm
FRNC
Non-metal, aramid fiber
60 N/cm
600 N
According to IEC 60754-2

-25°C ... 70°C
-5°C ... 50°C
-5°C ... 70°C

Ordering data

Type	Order No.	Pcs. / Pkt.
FL MM PATCH 1,0 LC-SCRJ	2901802	1
FL MM PATCH 2,0 LC-SCRJ	2901803	1
FL MM PATCH 5,0 LC-SCRJ	2901804	1
FL MM PATCH 1,0 SC-SCRJ	2901812	1
FL MM PATCH 2,0 SC-SCRJ	2901813	1
FL MM PATCH 5,0 SC-SCRJ	2901814	1
FL MM PATCH 1,0 ST-SCRJ	2901820	1
FL MM PATCH 2,0 ST-SCRJ	2901821	1
FL MM PATCH 5,0 ST-SCRJ	2901822	1
FL MM PATCH 1,0 SCRJ-SCRJ	2901823	1
FL MM PATCH 2,0 SCRJ-SCRJ	2901824	1
FL MM PATCH 5,0 SCRJ-SCRJ	2901825	1

Quick mounting connectors for polymer fiber cable

These connectors are easy to assemble and allow fast and simple self-assembly on site. They correspond to the international F-SMA and SCRJ standards, although their quick mounting mechanism makes them stand out from conventional connectors. The stripped fiber is simply pushed into the connector and tightened with the knurled screw. To ensure optimum performance, the end face is then polished. The tools required are also available as a complete DIY case (PSM-POF-KONFTOOL).

Quick mounting connector for HCS (PCF) cables

The PSM-SET-...HCS connector sets for the 200/230 µm fibers make it possible to enjoy the benefits of self-assembly for the kinds of distances that could otherwise only be achieved by using cables made purely from glass fiber. The F-SMA, B-FOC (ST®), SCRJ, and SC duplex connector types are internationally standardized, although their quick mounting mechanism makes them stand out from conventional connectors. This new patented clamping device eliminates all time-consuming tasks such as crimping, sticking, and polishing operations. All that is required is to strip the fibers, slide and screw on the connector, and score and break off the protruding fibers. All the tools required, including the fiber scoring tool, are included in the PSM-HCS-KONFTOOL... tool set. Other connector-specific fiber cleaving tools can be added on request.

Connectors with a diameter of 2.9 mm must be used for our standard HCS fibers. In the case of our PROFINET-compliant fibers, connectors with a diameter of 2.2 mm should be used. Please refer to the following table and to the data sheets for our FO cables.

Quick mounting connector for polymer and HCS fibers

Technical data

Insertion attenuation	Polymer fiber	HCS fiber
- F-SMA connector	< 1.5 dB	< 2 dB
- B-FOC (ST®)	-	< 2 dB
- SCRJ connector	< 1.5 dB	< 2 dB
- SC duplex connector	-	< 2 dB

Ordering data

Description	Type	Order No.	Pcs. / Pkt.
Connector set for polymer fibers (diameter of the individual elements: 2.2 mm), for self-assembly, with bend protection			
- F-SMA set, 4 connectors	**PSM-SET-FSMA/4-KT**	**2799720**	1
- SCRJ set, 2 duplex connectors	**PSM-SET-SCRJ-DUP/2-POF**	**2708656**	1
Connector set for HCS fibers (diameter of the individual elements: 2.9 mm), for self-assembly, with bend protection			
- F-SMA set, 4 connectors	**PSM-SET-FSMA/4-HCS**	**2799487**	1
- B-FOC (ST®) set, 4 connectors	**PSM-SET-B-FOC/4-HCS**	**2708481**	1
- SCRJ set, 2 duplex connectors	**PSM-SET-SCRJ-DUP/2-HCS**	**2313070**	1
Connector set for PROFINET HCS fibers (diameter of the individual elements: 2.2 mm), for self-assembly, with bend protection			
- B-FOC (ST®) set, 4 connectors	**PSM-SET-B-FOC/4-HCS/PN**	**2313782**	1
- SCRJ set, 2 duplex connectors	**PSM-SET-SCRJ-DUP/2-HCS/PN**	**2313546**	1
- SC duplex set, 2 duplex connectors	**PSM-SET-SC-DUPLEX/2-HCS/PN**	**2313779**	1

Accessories

Polymer fiber DIY case, comprising: Stripping knife, stripping pliers, polishing wheel for F-SMA and SCRJ quick mounting connectors, polishing pad, and emery paper	**PSM-POF-KONFTOOL**	**2744131**	1
Polymer fiber polishing set for quick mounting connectors, comprising polishing pads and polishing disks			
- For F-SMA connectors	**PSM-SET-FSMA-POLISH**	**2799348**	1
- For SCRJ connectors	**VS-SCRJ-POF-POLISH**	**1656673**	1
HCS DIY case for F-SMA quick mounting connectors, comprising stripping blade, stripping pliers, aramid yarn scissors, fiber stripper, fiber cleaving tool, and microscope			
- For F-SMA connectors	**PSM-HCS-KONFTOOL**	**2799526**	1
- For B-FOC (ST®) connectors	**PSM-HCS-KONFTOOL/B-FOC**	**2708465**	1
- For SCRJ/SC duplex connectors	**PSM-HCS-KONFTOOL/SC-RJ**	**2708876**	1

Permissible combinations of fiber optic cables and connector sets

Fiber optic cable		Connector set	
2799885	**PSM-LWL-HCS-RUGGED-200/230**	**2799487**	**PSM-SET-FSMA/4-HCS**
2799445	**PSM-LWL-HCSO-200/230**	**2708481**	**PSM-SET-B-FOC/4-HCS**
		2313070	**PSM-SET-SCRJ-DUP/2-HCS**
2313410	**FL FOC PN-C-HCS-GI-200/230**	**2313779**	**PSM-SET-SC-DUPLEX/2-HCS/PN**
2313766	**FL FOC PN-B-HCS-200/230**	**2313782**	**PSM-SET-B-FOC/4-HCS/PN**
		2313546	**PSM-SET-SCRJ-DUP/2-HCS/PN**

Assembly case for quick mounting connector

The DIY cases for polymer and HCS cables are designed for practical on-site assembly. These cases contain the complete tool range for assembly of the appropriate quick mounting connectors.

Polymer fiber cables are assembled quickly and easily using the PSM-POF-KONFTOOL DIY case. The F-SMA or SCRJ connectors are used in this context.

Various PSM-HCS-KONFTOOL... tool sets are available for fitting connectors to the powerful HCS fibers, as the HCS fibers can be connected to F-SMA, B-FOC (ST®), SCRJ, and SC duplex connectors, depending on the application and device concerned. An individual fiber cleaving tool (cleave tool) is required for this due to the different connector receptacles.

All fiber cleaving tools can also be ordered separately to allow the existing DIY cases to be upgraded if required. Similarly, all the tools in the DIY case can be ordered individually as replacement parts.

We will also provide you with our tool sets for a low rent from time to time on request. Please contact us for an individual offer.

Assembly case for quick mounting connector

Ordering data

Description	Type	Order No.	Pcs. / Pkt.
Polymer fiber DIY case, comprising: Stripping knife, stripping pliers, polishing wheel for F-SMA and SCRJ quick mounting connectors, polishing pad, and emery paper	PSM-HCS-KONFTOOL/B-FOC	2708465	1
HCS DIY case for F-SMA quick mounting connectors, comprising stripping blade, stripping pliers, aramid yarn scissors, fiber stripper, fiber cleaving tool, and microscope	PSM-HCS-KONFTOOL	2799526	1
HCS (GI) DIY case for B-FOC (ST®) quick mounting connectors, stripping blade, stripping pliers, aramid yarn scissors, fiber stripper, fiber cleaving tool, and microscope	PSM-HCS-KONFTOOL/B-FOC	2708465	1
HCS (GI) DIY case for SCRJ and SC duplex quick mounting connectors, stripping blade, stripping pliers, aramid yarn scissors, fiber stripper, fiber cleaving tool, and microscope	PSM-HCS-KONFTOOL/SC-RJ	2708876	1

Accessories

Fiber cleaving tool for HCS fiber, pin arrangement F-SMA	PSM-HCS-CLEAVETOOL	2744995	1
Fiber cleaving tool for HCS (GI) fiber, pin arrangement B-FOC (ST®)	PSM-HCS-CLEAVETOOL/B-FOC	2708478	1
Fiber cleaving tool for HCS (GI) fiber, pin arrangement SCRJ/SC duplex	PSM-HCS-CLEAVETOOL/SCRJ	2313122	1

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Measurement technology for fiber optics

The PSM-FO-POWERMETER fiber optic measuring case is used for carrying out optical power measurements. It provides a straightforward method for determining path attenuations and the remaining system reserves in fiber optic transmission systems with 660 nm and 850 nm.

The case contains a power meter and all the necessary reference cables and couplings for checking polymer, HCS, and glass fiber paths with an F-SMA or B-FOC (ST®) connection. An optional set can be ordered for terminal devices with an SCRJ connection.

- The power meter can be switched over between the following wavelengths: 660 nm, 780 nm, and 850 nm
- Suitable for terminal devices with an F-SMA, B-FOC (ST®), and SCRJ connection
- Reference cables with polymer, HCS, and glass fibers

Universal fiber optics measuring case

Technical data

Measuring instrument	
Receiver	Large-format silicon element
Wavelength	660 nm, 780 nm, 850 nm
Measuring range	-70 dB ... 6 dB
Accuracy	±0.25 dB
Resolution	0.01 dB
Ambient temperature range	0°C ... 45°C
Relative humidity	Max. 95%
Weight	180 g
Dimensions L / W / H	115 mm / 70 mm / 25 mm
Reference fibers, fiber optic measuring case	
Insertion attenuation in accordance with IEC 874-1 method 7	
Polymer fiber 980/1000 µm F-SMA	1.5 dB ... 2 dB
HCS fiber 200/230 µm F-SMA	1.5 dB ... 2 dB
HCS fiber 200/230 µm B-FOC (ST®)	1.5 dB ... 2 dB
Glass fiber 50/125 µm B-FOC (ST®)	1.5 dB ... 2 dB
Reference fibers, power meter supplementary set	
Insertion attenuation in accordance with IEC 874-1 method 7	
Polymer fiber 980/1000 µm SC/F-SMA	1.5 dB ... 2 dB
HCS GI fiber 200/230 µm SC/BFOC (ST®)	1.5 dB ... 2 dB

Ordering data

Description	Type	Order No.	Pcs. / Pkt.
Fiber optic measuring case, comprising an optical power meter, F-SMA and B-FOC (ST®) coupling, reference fibers, and operating instructions	**PSM-FO-POWERMETER**	**2799539**	1
Power meter supplementary set for devices with SCRJ interface, comprising one-meter polymer reference fiber (SC Simplex connector to F-SMA connector), one-meter HCS GI reference fiber (SC Simplex connector to B-FOC (ST®) connector), and SCRJ coupling	**PSM-FO-POWERMETER SCRJ-SET**	**2901560**	1

Couplings for fiber optics

Couplings are used to connect two FO connectors with the same pin arrangement. Couplings are used when a cable needs to be extended or when creating a non-permanent panel feed-through. However, the extra transitional attenuation (< 2 dB for all couplings) must be taken into consideration when planning the path resources. The sets include two F-SMA couplings or two B-FOC (ST®) couplings for connecting duplex cables. The SCRJ duplex, SC duplex, and LC couplings are supplied separately.

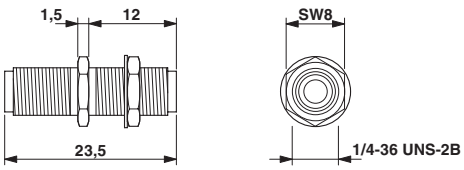
Notes:

Key:
B-FOC ≙ ST® (registered trademark of AT&T)

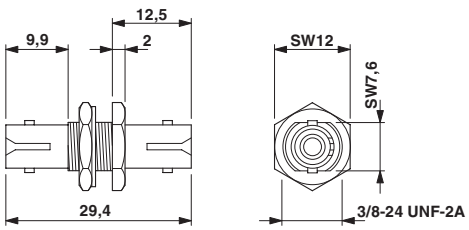
Couplings for connecting FO cables

Ordering data

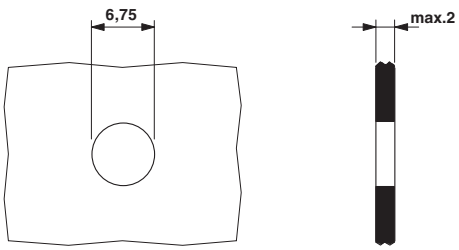
Description	Type	Order No.	Pcs. / Pkt.
Coupling; set, comprising:			
- 2x F-SMA/F-SMA	**PSM-SET-FSMA-LINK/2**	**2799416**	1
- 2x B-FOC (ST®)/B-FOC (ST®)	**PSM-SET-BFOC-LINK/2**	**2799429**	1
- 1x SCRJ/SCRJ (duplex)	**VS-SCRJ-GOF-BU/BU**	**1652978**	1
- 1 x LC/LC (duplex, multi-mode fiber)	**FL MM PATCH COUPLER LC-LC**	**2700312**	1
- 1 x LC/LC (duplex, single mode fiber)	**FL SM PATCH COUPLER LC-LC**	**2700313**	1
- 1x SC duplex/SC duplex	**FL COUPLER SC-DUPLEX**	**2901788**	1



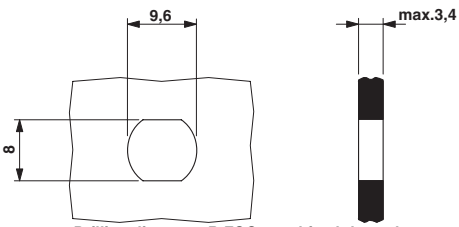
Dimensional drawing F-SMA coupling



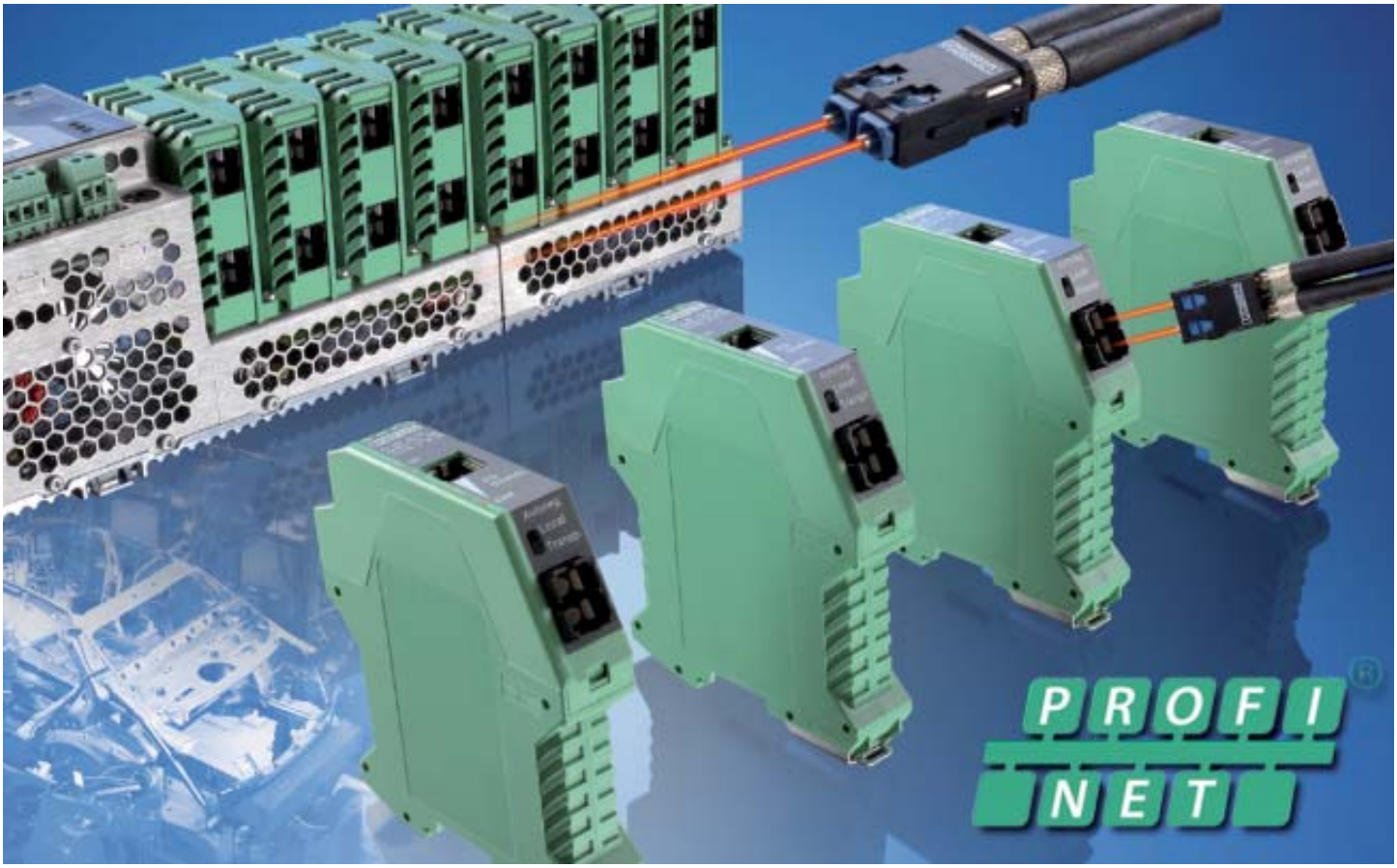
Dimensional drawing B-FOC coupling



Drilling diagram F-SMA panel feed-through



Drilling diagranm B-FOC panel feed-through



Full range of Ethernet application options

Vertical integration between Office and Factory Automation increasingly requires that industrial communication is expanded by the addition of Ethernet networks. In this context, the industrial ambient conditions place exacting demands on the components used.

Phoenix Contact offers a comprehensive range of industrial Ethernet products and services, and can thus provide an Ethernet-based automation solution at all configuration levels. Factoryline infrastructure products include hubs, switches and managed switches, media converters, network management and gateway software, copper-, glass-, and polymer-fiber-cable connection methods, as well as IP20 and IP67 connectors. Phoenix Contact also offers I/O systems, control technology, HMIs, and industrial PCs with an Ethernet connection for both control and monitoring applications.

Innovation and flexibility for industrial applications

Factoryline products combine standard switch technology with functions (e.g., type, modularity) to allow the creation of a distributed and modular infrastructure.

Ethernet solutions

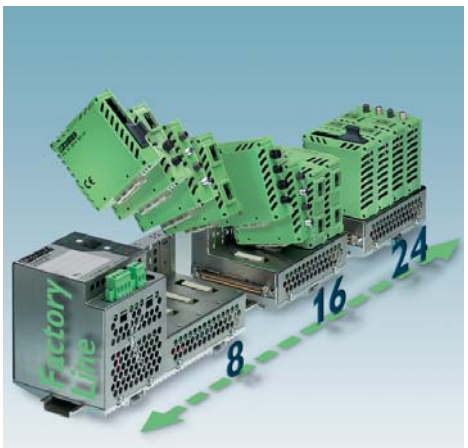
The characteristics in detail:

- Optimum construction of networks for both centralized and distributed positioning of terminals using products with a fixed or variable number of ports
- Redundant power supply and alarm contact
- Use of powerful switch technology for maximum data throughput
- Standard protocol interfaces such as SNMP, Boot-P, and OPC for infrastructure configuration, control, and diagnostics
- Optional use of copper, glass or polymer fiber cables for reliable connections

Easy installation and maintenance

Factoryline products combine "PLC-like" diagnostics and easy configuration required by plant floor personnel with the SW interfaces required by IT department network management tools:

- Uncomplicated and easy-to-understand LED and diagnostic displays
- "PLC-like" network management software
- Web-based-management-integrated Web pages, including product documentation



Switches constitute the basic Ethernet infrastructure components, via which controllers, field devices, and the higher-level production management level communicate with one another. These switches play a major role in determining the realtime properties, data throughput, and network and system availability. At Phoenix Contact, you will find the right switch for any application. The range includes everything from economical standard switches to modular managed switches for gigabit applications. Further information can be found in the AUTOMATION catalog.

In industrial environments, potential differences and surge voltages pose a constant problem with regard to interference-free data transmission. The **FL ISOLATOR** is a powerful device for control cabinets that can be used for electrical isolation on Ethernet networks.

Copper-based Ethernet devices are reliably protected up to 4 kV.

Immunity to interference in industrial applications is improved considerably at transmission speeds of up to 1 Gbps.

To support worldwide data communication and remote maintenance on Ethernet networks, there is the option of an analog dial-up modem as well as a UMTS/GPRS/EDGE **modem** with integrated firewall and VPN (Virtual Private Network).

Using the **FL COMSERVER**, it is possible to incorporate serial device interfaces, e.g., programming and diagnostic ports, bar code scanners, etc., into the Ethernet. Serial data can be accessed using UDP, TCP or MODBUS-TCP in Client or Server operating mode. As a result, it is just as easy to replace programming connecting cables as it is to convert a Modbus gateway from TCP to serial.

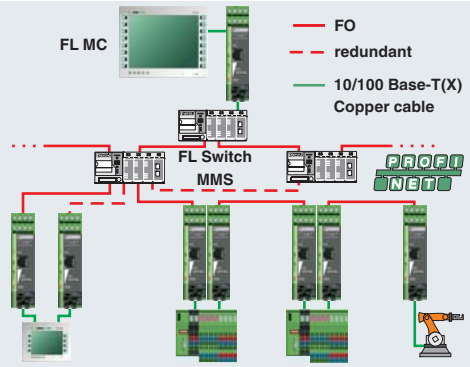
Stand-alone **media converters** in POF/HCS, glass MM, and glass SM are available for interference-free connection and coverage of long distances.

Depending on the application and the required range, distances of 50 m, 200 m, 10 km or 40 km can be covered.

There is also an FO T-coupler available with two copper and two FO ports for setting up linear, star, tree, and redundant structures of up to 300 m. This device is, therefore, simply the logical extension of the established concept of FO networking for fieldbus systems for an Ethernet context.

The CAT5e **Ethernet cables and FO cables** with a rugged PUR outer sheath ensure an industry-compliant network installation. The transition from field to control cabinet installation can be conveniently set up using DIN rail-mountable mini patch panels. The product range is rounded off by RJ45 connectors and tools.

Ethernet Factoryline
10/100Base-T(X) / FO media converters



Media converter with 1300 nm wavelength

The FL MC 10/100BASE-T/FO 1300… media converters convert the 10/100Base-T(X) Ethernet interface for fiber optics (100 Mbps according to the FX standard). This allows maximum immunity to interference and maximum transmission ranges in industrial Ethernet applications.

Depending on the technology used and the transmission speed selected, ranges of up to 40 km can be bridged.

Applications:
- Increased transmission range in industrial Ethernet applications
- Immunity to electromagnetic interference

Ethernet interface:
- RJ45 socket
- 10/100 Mbps
- Auto negotiation
- MDI/MDI-X switch-over
- Signal LEDs for activity, link status, and 100 Mbps

Fiber optic interface
- B-FOC (ST®) or SC DUPLEX connection, depending on device
- Multi-mode or single mode glass fibers, depending on device
- Transmission length of up to 10 km with multi-mode glass fiber
- Transmission length of up to 36 km with single mode glass fiber
- 1300 nm wavelength
- Signal LEDs for link status

Features:
- Backplane bus contact (TBUS), enabling alternative or redundant 24 V power supply
- Link through function for easy connection monitoring. The availability of the connected cable connection and devices is monitored and signaled
- Choice between local or transparent auto negotiation function for maximum transmission capacitance

FL MC 10/100BASE-T/FO G1300 ST
- 1300 nm wavelength
- For multi-mode glass fiber
- B-FOC (ST®) connection

FL MC 10/100BASE-T/FO G1300
- 1300 nm wavelength
- For multi-mode glass fiber
- SC duplex connection

FL MC 10/100BASE-T/FO G1300 SM
- 1300 nm wavelength
- For single mode glass fiber
- SC duplex connection

Supply	
Supply voltage	
Supply voltage	
Nominal current consumption	
FO interface	
Wavelength	
Transmission length Incl. 3 dB system reserve	
Signal LEDs	
Ethernet interface	
Connection method	
Transmission speed	
Auto-negotiation modes	
Transmission length	
Link through	
MDI-/MDI-X switch-over	
Signal LEDs	
General data	
Ambient temperature (operation)	
Electrical isolation	
Test voltage	
Dimensions	W / H / D
Conformance/approvals	
ATEX	
UL, USA/Canada	

Description
FO converter, for converting 10/100Base-TX to multi-mode glass fiber (1300 nm)
B-FOC (ST®) connection
SC duplex connection
FO converter, for converting 10/100Base-TX to single mode glass fiber (1300 nm)
SC duplex connection

TBUS DIN rail connector
System power supply unit, primary-switched

Ethernet

PROFINET

For multi-mode glass fiber, B-FOC (ST®) connection

Ex:

Technical data

24 V DC ±20% (via COMBICON plug-in screw terminal block)

24 V DC ±5% (alternative or redundant, via backplane bus contact and system power supply)

≤ 95 mA (24 V DC)

1300 nm
6.4 km (with F-G 50/125 0,7 dB/km F 1200)
2.8 km (with F-G 50/125 1,6 dB/km F 800)
10 km (with F-G 62,5/125 0,7 dB/km F 1000)
3 km (with F-G 62.5/125 2.6 dB/km F 600)
2 km (with 2GK200/230 GI-HCS)
Link status (green)

RJ45 female connector, shielded
10/100 Mbps
Optionally transparent via TP and FO (default) or locally on TP

100 m (twisted pair, shielded)
Link down is automatically forwarded to the second connection

Built-in switch for line (1:1) and crossover connection

Activity (yellow), Link status (green), 100 Mbps (green)

0°C ... 55°C
10/100Base-T // supply
1.5 kV_{rms} (50 Hz, 1 min.)
22.5 mm / 99 mm / 122 mm

II 3 G Ex nAC IIC T4 X
Class I, Zone 2, AEx nc IIC

Ordering data

Type	Order No.	Pcs. / Pkt.
FL MC 10/100BASE-T/FO G1300 ST	2708986	1

Accessories

ME 22,5 TBUS 1,5/ 5-ST-3,81 GN	2707437	50
MINI-SYS-PS-100-240AC/24DC/1.5	2866983	1

Ethernet

PROFINET

For multi-mode glass fiber, SC duplex connection

Ex:

Technical data

24 V DC ±20% (via COMBICON plug-in screw terminal block)

24 V DC ±5% (alternative or redundant, via backplane bus contact and system power supply)

≤ 95 mA (24 V DC)

1300 nm
6.4 km (with F-G 50/125 0,7 dB/km F 1200)
2.8 km (with F-G 50/125 1,6 dB/km F 800)
10 km (with F-G 62,5/125 0,7 dB/km F 1000)
3 km (with F-G 62.5/125 2.6 dB/km F 600)
2 km (with 2GK200/230 GI-HCS)
Link status (green)

RJ45 female connector, shielded
10/100 Mbps
Optionally transparent via TP and FO (default) or locally on TP

100 m (twisted pair, shielded)
Link down is automatically forwarded to the second connection

Built-in switch for line (1:1) and crossover connection

Activity (yellow), Link status (green), 100 Mbps (green)

0°C ... 55°C
10/100Base-T // supply
1.5 kV_{rms} (50 Hz, 1 min.)
22.5 mm / 99 mm / 114.5 mm

II 3 G Ex nAC IIC T4 X
Class I, Zone 2, AEx nc IIC

Ordering data

Type	Order No.	Pcs. / Pkt.
FL MC 10/100BASE-T/FO G1300	2708164	1

Accessories

ME 22,5 TBUS 1,5/ 5-ST-3,81 GN	2707437	50
MINI-SYS-PS-100-240AC/24DC/1.5	2866983	1

Ethernet

PROFINET

For single mode glass fiber, SC duplex connection

Technical data

24 V DC ±20% (via COMBICON plug-in screw terminal block)

24 V DC ±5% (alternative or redundant, via backplane bus contact and system power supply)

≤ 95 mA (24 V DC)

1300 nm
36 km (with F-E 9/125 0.36 dB/km)
32 km (with F-E 9/125 0.4 dB/km)
26 km (with F-E 9/125 0.5 dB/km)

Link status (green)

RJ45 female connector, shielded
10/100 Mbps
Optionally transparent via TP and FO (default) or locally on TP

100 m (twisted pair, shielded)
Link down is automatically forwarded to the second connection

Built-in switch for line (1:1) and crossover connection

Activity (yellow), Link status (green), 100 Mbps (green)

0°C ... 55°C
10/100Base-T // supply
1.5 kV_{rms} (50 Hz, 1 min.)
22.5 mm / 99 mm / 114.5 mm

II 3 G Ex nAC IIC T4 X
cUL 508 recognized

Ordering data

Type	Order No.	Pcs. / Pkt.
FL MC 10/100BASE-T/FO G1300 SM	2708177	1

Accessories

ME 22,5 TBUS 1,5/ 5-ST-3,81 GN	2707437	50
MINI-SYS-PS-100-240AC/24DC/1.5	2866983	1

Ethernet Factoryline
10/100Base-T(X) / FO media converters

Media converter with 660 nm wavelength

The FL MC 10/100BASE-T/FO 660 media converter converts the 10/100Base-T(X) Ethernet interface for fiber optics. This allows maximum immunity to interference and maximum transmission ranges in industrial Ethernet applications.

Integrated fiber optic diagnostics continuously signal the receiving capacitance by means of an LED bar graph and two floating switching outputs.

Applications:

- Increased transmission range in industrial Ethernet applications
- Immunity to electromagnetic interference

Ethernet interface:

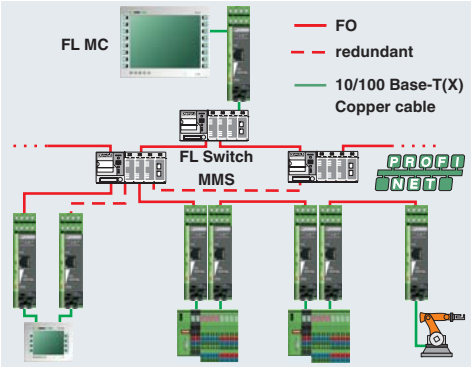
- RJ45 socket
- 10/100 Mbps
- Auto negotiation
- MDI/MDI-X switch-over
- Signal LEDs for activity, link status, and 100 Mbps

Fiber optic interface

- SCRJ connection
- Polymer and HCS (PCF) fibers
- Transmission distance of up to 300 m at 100 Mbps with HCS GI fibers
- 660 nm wavelength
- Signal LEDs for link status
- LED bar graph for signaling the receiving capacitance

Features:

- Backplane bus contact (T-Bus), enabling alternative or redundant 24 V power supply
- Link through function for easy connection monitoring. The availability of the connected cable connection and devices is monitored and signaled
- Choice between local or transparent auto negotiation function for maximum transmission capacitance



For polymer and HCS fibers

Technical data

Supply	
Supply voltage	24 V DC ±20% (via COMBICON plug-in screw terminal block)
Supply voltage	24 V DC ±5% (alternative or redundant, via backplane bus contact and system power supply)
Nominal current consumption	≤ 100 mA (24 V DC)
FO interface	
Wavelength	660 nm
Transmission length Incl. 3 dB system reserve	70 m (Polymer fiber with F-P 980/1000 230 dB/km at 10 Mbps) 300 m (HCS fiber with F-K 200/230 8 dB/km at 10 Mbps) 50 m (Polymer fiber with F-P 980/1000 230 dB/km at 100 Mbps) 100 m (HCS fiber with F-K 200/230 8 dB/km at 100 Mbps) 300 m (HCS GI fiber with F-GK 200/230 at 100 Mbps)
Signal LEDs	Optical receiver power: Very good (green), good (green), critical (yellow), fault (red)
Switching output	Two floating relay outputs
Ethernet interface	
Connection method	RJ45 female connector, shielded
Transmission speed	10/100 Mbps
Auto-negotiation modes	Optionally transparent via TP and FO (default) or locally on TP
Transmission length	100 m (twisted pair, shielded)
Link through	Link down is automatically forwarded to the second connection
MDI-/MDI-X switch-over	Built-in switch for line (1:1) and crossover connection
Signal LEDs	Activity (yellow), link status (green, UL flashing), 100 Mbps (green)
General data	
Ambient temperature (operation)	-20°C ... 60°C
Electrical isolation	10/100Base-T // supply
Test voltage	1.5 kV_{rms} (50 Hz, 1 min.)
Dimensions W / H / D	22.5 mm / 99 mm / 114.5 mm
Conformance/approvals	
ATEX	Ex II 3 G Ex nAC IIC T4 X
UL, USA/Canada	cUL 508 recognized

Ordering data

Description	Type	Order No.	Pcs. / Pkt.
FO converter, for converting 10/100Base-T to polymer or HCS fiber (660 nm) SC-RJ connection	**FL MC 10/100BASE-T/FO-660**	**2708193**	1

Accessories

POF polymer fiber cable, duplex, 980/1000 µm, heavy-duty PROFINET version, for permanent indoor installation			
- Sold by the meter without connectors	**FL FOC PN-B-980/1000**	**2313397**	1
- Sold by the meter without connectors	**FL FOC PN-C-FLEX-980/1000**	**2313407**	1
PROFINET HCS GI cable, duplex, 200/230 µm, for indoor installation			
- Sold by the meter without connectors	**FL FOC PN-C-HCS-GI-200/230**	**2313410**	1
	PSM-SET-SCRJ-DUP/2-POF	**2708656**	1
Connector set for PROFINET HCS fibers (diameter of the individual elements: 2.2 mm), for self-assembly, with bend protection	**PSM-SET-SCRJ-DUP/2-HCS/PN**	**2313546**	1
TBUS DIN rail connector	**ME 22,5 TBUS 1,5/ 5-ST-3,81 GN**	**2707437**	50
System power supply unit, primary-switched	**MINI-SYS-PS-100-240AC/24DC/1.5**	**2866983**	1

Manageable Ethernet switch with 2 RJ45 ports and 2 FX ports with extensive diagnostic functions

The **FL MC ETH/FO 660 T** supports the conversion of the 10/100Base-T Ethernet interface for polymer and HCS fibers (660 nm).

The fiber optic connection conforms to the SCRJ standard, which is specified for PROFINET systems.

A high level of network availability is ensured by continuous path monitoring of the optical receiving power together with the RSTP redundancy protocol. Configurable error messages can be output via a floating contact.

Interfaces:
– 2x fiber optic SCRJ ports
– 2x 10/100 Mbps RJ45 ports

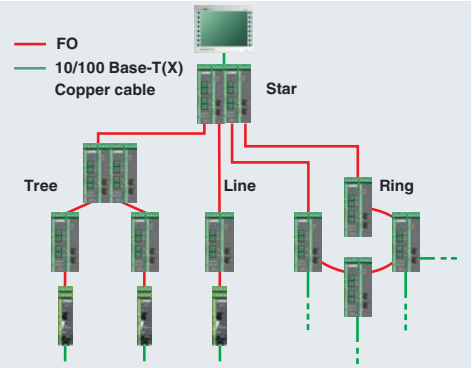
Fiber optic transmission ranges:
– 300 m with HCS GI fiber at 100 Mbps
– 100 m with HCS fiber at 100 Mbps
– 50 m with polymer fiber at 100 Mbps

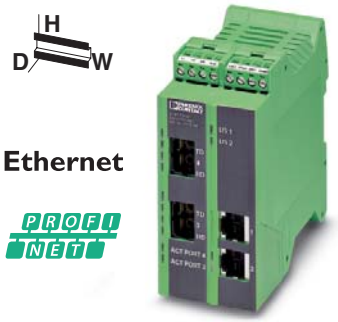
Features:
– Redundant power supply
– Alarm signaling contacts
– Configuration via web-based management
– Continuous fiber optics monitoring with LED bar graph
– SNMP traps and values
– Port prioritization with V-LAN 802.1Q
– Port mirroring
– Multicast filtering with IGMP snooping
– Extended temperature range of -20°C to +55°C

Protocols:
– PROFINET
– Modbus TCP
– Ethernet/IP

Network structures:
– Line, star, branch, tree
– (Redundant) rings

Redundancy functions:
– RSTP (Rapid Spanning Tree) 802.1w
– Fast ring detection for rapid redundant networks





Ethernet fiber optic T-coupler for polymer and HCS fibers

Applied for:
UL listed / CUL listed

Technical data

Supply	
Supply voltage	24 V DC ±20% (via COMBICON plug-in screw terminal block)
Supply voltage	24 V DC ±5% (alternative or redundant, via backplane bus contact and system power supply)
Nominal current consumption	≤ 400 mA (24 V DC)
FO interface	
Wavelength	660 nm
Transmission length Incl. 3 dB system reserve	50 m (Polymer fiber with F-P 980/1000 230 dB/km at 100 Mbps) 100 m (HCS fiber with F-K 200/230 8 dB/km at 100 Mbps) 300 m (HCS GI fiber with F-GK 200/230 at 100 Mbps)
Signal LEDs	Per fiber optic port: Link/Activity (yellow), 4-level bar chart (optical receiving power, 2 x green, yellow, red)
Switching output	A floating relay output
Ethernet interface	
Connection method	RJ45 female connector, shielded
Transmission speed	10/100 Mbps
Transmission length	100 m (twisted pair, shielded)
Signal LEDs	Per ETH port: Link/Activity (yellow), Full duplex/Collision (yellow)
Functions	
Basic functions	Store-and-forward media converter
Integrated mechanisms	Port mirroring, multicast filtering, IGMP snooping, V-LAN
Redundancy	Rapid Spanning Tree 802.1w, fast ring detection
Structures / cascading depth	Line, star, tree, and redundant ring; any cascading depth
General data	
Ambient temperature (operation)	-20°C ... 55°C
Electrical isolation	10/100Base-T // supply
Test voltage	1.5 kV_{rms} (50 Hz, 1 min.)
Dimensions W / H / D	45 mm / 99 mm / 118 mm

Ordering data

Description	Type	Order No.	Pcs. / Pkt.
FO T coupler, for converting 10/100BASE-T to polymer or HCS fiber (660 nm), SCRJ connection	**FL MC ETH/FO 660 T**	**2313164**	1

Accessories

POF polymer fiber cable, duplex, 980/1000 µm, heavy-duty PROFINET version, for permanent indoor installation			
- Sold by the meter without connectors	**FL FOC PN-B-980/1000**	**2313397**	1
- Sold by the meter without connectors	**FL FOC PN-C-FLEX-980/1000**	**2313407**	1
PROFINET HCS GI cable, duplex, 200/230 µm, for indoor installation			
- Sold by the meter without connectors	**FL FOC PN-C-HCS-GI-200/230**	**2313410**	1
Connector set for PROFINET HCS fibers (diameter of the individual elements: 2.2 mm), for self-assembly, with bend protection	**PSM-SET-SCRJ-DUP/2-POF**	**2708656**	1
	PSM-SET-SCRJ-DUP/2-HCS/PN	**2313546**	1
TBUS DIN rail connector	**ME 22,5 TBUS 1,5/ 5-ST-3,81 GN**	**2707437**	50
System power supply unit, primary-switched	**MINI-SYS-PS-100-240AC/24DC/1.5**	**2866983**	1

Device servers for converting serial interfaces into Ethernet networks

The **FL COMSERVER...232/422/485** products are used to integrate serial V.24 (RS-232)/RS-422/RS-485 interfaces into existing Ethernet networks. This provides an easy way of implementing functions such as cable replacement, network integration or a Modbus gateway.

The cable is replaced by using two devices for the purpose of converting serial connections to Ethernet and tunneling these through the network using either the TCP or UDP protocol.

If, on the other hand, automation devices are available, such as controllers or frequency inverters with associated programming and diagnostics software, the serial cable is replaced using COM diversion software. This diverts the serial data of the application software to the PC network card.

The integrated Modbus gateway function provided in FL COMSERVER UNI converts serial Modbus ASCII or RTU data into Modbus TCP. Naturally, the conversion process also works in the opposite direction.

Features common to all devices:

- Serial interfaces, V.24 (RS-232), RS-422, RS-485
- 10/100 Base-T(X) interface
- Software for virtual COM ports supplied as standard
- Extended temperature range of -25°C to +60°C
- Redundant power supply and modular station structure with T-BUS connectors
- 3-way electrical isolation VCC // V.24 (RS-232)/RS-422/RS-485 // network
- Integration into network management tools and visualization systems with the support of SNMP services
- LED diagnostic indicators
- Configuration via web-based management

FL COMSERVER UNI...

- Supports TCP, UDP, Modbus TCP/RTU/ASCII
- Can be used exactly as required on Modbus master or slave

FL COMSERVER BASIC...

- Best-value version
- Supports TCP and UDP

FL COMSERVER MPI-SET:

- For programming S7 controllers remotely over Ethernet
- Pre-configured FL COMSERVER BASIC...
- MPI adapter and V.24 (RS-232) cable supplied as standard

FL COMSERVER PRO...

Individual solutions that cannot be implemented with the the standard devices can be created with this freely programmable version. To do this, users program their own application program.

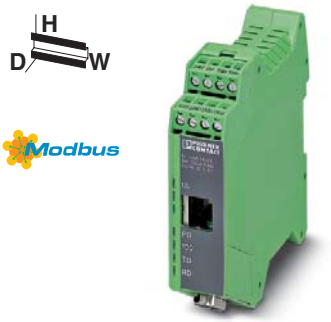
- Freely programmable version
- Programming in BCL (similar to BASIC)
- Integrated web server for visualization
- Pre-processing of data stream
- Adaptation of old protocols for compatibility with modern systems

Applications:

- Cable replacement, serial interfaces are converted to Ethernet and tunneled through existing Ethernet networks
- Network integration, integration of automation devices and serial devices
- Modbus gateway, conversion from Modbus RTU/ASCII to Modbus TCP

Supply	
Supply voltage	
Supply voltage	
Nominal current consumption	
Serial port	
Interfaces	
Connection method	V.24 (RS-232) RS-422 RS-485
Data format/encoding	
Data flow control/protocols	
Transmission speed	
Termination resistor	
Ethernet interface	
Connection method	
Transmission speed	
Transmission length	
Supported protocols	
Auxiliary protocols	
Functions	
Management	
General data	
Ambient temperature (operation)	
Electrical isolation	
Test voltage	
Electromagnetic compatibility	
Dimensions	W / H / D

Description
FL COMSERVER...232/422/485, for converting serial interfaces to Ethernet. COM port redirector software and additional software supplied as standard
TCP, UDP, MODBUS, PPP
TCP, UDP
FL COMSERVER PRO..., freely programmable version. Similar to BASIC. HTTP server for visualization. Software development kit containing examples and documentation supplied as standard
MPI programming set, pre-configured, for coupling to the programming interface of a Siemens S7-300/400 controller, comprising COM server, MPI adapter, and V.24 (RS-232) cable
V.24 (RS-232) D-SUB cable, length: 2 m - 9-pole socket on 9-pole socket - 9-pole socket on 25-pole socket
TBUS DIN rail connector
System power supply unit, primary-switched



Serial device server for 10/100Base-T(X) with V.24 (RS-232), RS-422, and RS-485 interface

Technical data	
24 V DC ±20% (via COMBICON plug-in screw terminal block)	
24 V DC ±5% (alternative or redundant, via backplane bus contact and system power supply)	
100 mA (24 V DC)	
V.24 (RS-232), RS-422, RS-485	
D-SUB-9 male connector	
Plug-in/screw connection via COMBICON	
Plug-in/screw connection via COMBICON	
Serial asynchronous UART/NRZ, 7/8 data, 1/2 stop, 1 parity, 10/11-bit character length	
Software handshake, Xon/Xoff, or hardware handshake RTS/CTS // 3964 R compatible, Modbus RTU/ASCII	
300, 600, 1200, 2400, 4800, 7200, 9600, 19200, 38400, 57600, 115200, 187500, 230400 bps, can be set with web-based management	
390 Ω - 180 Ω - 390 Ω (can be connected)	
RJ45 female connector, shielded	
10/100 Mbps	
100 m (shielded twisted pair)	
TCP/IP, UDP, TFTP, HTTP, MODBUS TCP, PPP	
ARP, DHCP, BOOTP, SNMP, RIP, RARP	
Web-based management, SNMP, emergency exit with Telnet and serial	
-25°C ... 60°C	
Supply // Ethernet (TP) // Serial	
1.5 kV_{rms} (50 Hz, 1 min.)	
Conformance with EMC Directive 2004/108/EC	
22.5 mm / 99 mm / 114.5 mm	

Ordering data		
Type	**Order No.**	**Pcs. / Pkt.**
FL COMSERVER UNI 232/422/485	**2313452**	1
FL COMSERVER BASIC 232/422/485	**2313478**	1

Accessories		
PSM-KA9SUB9/BB/2METER	**2799474**	1
PSM-KA 9 SUB 25/BB/2METER	**2761059**	1
ME 22,5 TBUS 1,5/ 5-ST-3,81 GN	**2707437**	50
MINI-SYS-PS-100-240AC/24DC/1.5	**2866983**	1

Freely programmable device server with HTTP server

Technical data	
24 V DC ±20% (via COMBICON plug-in screw terminal block)	
24 V DC ±5% (alternative or redundant, via backplane bus contact and system power supply)	
100 mA (24 V DC)	
V.24 (RS-232), RS-422, RS-485	
D-SUB-9 male connector	
Plug-in/screw connection via COMBICON	
Plug-in/screw connection via COMBICON	
Serial asynchronous UART/NRZ, 7/8 data, 1/2 stop, 1 parity, 10/11-bit character length	
Software handshake, Xon/Xoff or hardware handshake RTS/CTS	
300, 600, 1200, 2400, 4800, 7200, 9600, 19200, 38400, 57600, 115200, 187500, 230400 bps, can be set with web-based management	
390 Ω - 180 Ω - 390 Ω (can be connected)	
RJ45 female connector, shielded	
10/100 Mbps	
100 m (shielded twisted pair)	
TCP/IP, UDP, TFTP, HTTP	
ARP, DHCP, BOOTP, SNMP, RIP, RARP	
Web-based management, SNMP, serial emergency access	
-25°C ... 60°C	
Supply // Ethernet (TP) // Serial	
1.5 kV_{rms} (50 Hz, 1 min.)	
Conformance with EMC Directive 2004/108/EC	
22.5 mm / 99 mm / 114.5 mm	

Ordering data		
Type	**Order No.**	**Pcs. / Pkt.**
FL COMSERVER PRO 232/422/485	**2313465**	1

Accessories		
PSM-KA9SUB9/BB/2METER	**2799474**	1
PSM-KA 9 SUB 25/BB/2METER	**2761059**	1
ME 22,5 TBUS 1,5/ 5-ST-3,81 GN	**2707437**	50
MINI-SYS-PS-100-240AC/24DC/1.5	**2866983**	1

MPI-SET device server, V.24 (RS-232) cable, and MPI adapter

Technical data	
24 V DC ±20% (via COMBICON plug-in screw terminal block)	
24 V DC ±5% (alternative or redundant, via backplane bus contact and system power supply)	
100 mA (24 V DC)	
V.24 (RS-232)	
D-SUB-9 male connector	
-	
-	
Serial asynchronous UART/NRZ, 8 data, 1 stop, odd parity, 11-bit character length	
Hardware handshake RTS/CTS	
19200, 38400 bps, adjustable via web-based management	
-	
RJ45 female connector, shielded	
10/100 Mbps	
100 m (shielded twisted pair)	
TCP/IP, UDP, TFTP, HTTP	
ARP, DHCP, BOOTP, SNMP, RIP, RARP	
Web-based management, SNMP, emergency exit with Telnet and serial	
-25°C ... 60°C	
Supply // Ethernet (TP) // Serial	
1.5 kV_{rms} (50 Hz, 1 min.)	
Conformance with EMC Directive 2004/108/EC	
22.5 mm / 99 mm / 114.5 mm	

Ordering data		
Type	**Order No.**	**Pcs. / Pkt.**
FL COMSERVER-MPI-SET	**2313588**	1

Accessories		
PSM-KA9SUB9/BB/2METER	**2799474**	1
PSM-KA 9 SUB 25/BB/2METER	**2761059**	1
ME 22,5 TBUS 1,5/ 5-ST-3,81 GN	**2707437**	50
MINI-SYS-PS-100-240AC/24DC/1.5	**2866983**	1

Device servers for converting serial interfaces into Ethernet networks

The **FL COMSERVER WLAN 232/422/485** enables wireless connection of serial interfaces for machine and system access. This means that controllers and control panels can be integrated into wireless LAN networks via these device servers.

This device is ideal for use in all mobile and industrial mobile applications involving serial interfaces.

Easy cable replacement is performed in ad-hoc or infrastructure operating mode. Serial devices can be directly connected to each other or integrated into the network via access points.

Comprehensive diagnostics displays and an LED bar graph for displaying the wireless reception performance are integrated. They ensure straightforward startup and continuous monitoring during operation. In addition, the current signal strength can be read digitally and processed externally.

Interfaces:
- V.24 (RS-232), RS-422, RS-485, and USB
- 54 Mbps WLAN interface according to IEEE 802.11 b/g
- External SMA antenna connection

Security:
- WEP, up to 128 bits
- WPA / WPA2 (AES / TKIP)
- LED bar graph for displaying wireless reception performance

Features:
- Ad-hoc or infrastructure operation
- Software for virtual COM ports supplied as standard
- Extended temperature range of -25°C to +60°C
- Redundant power supply and modular station structure with T-BUS connectors
- 3-way electrical isolation VCC // V.24 (RS-232)/RS-422/RS-485 // network
- LED diagnostic indicators
- Straightforward configuration software

Applications:
- Replacement of cables with wireless connections
- Network integration, wireless integration of automation devices and serial devices
- Remote maintenance

WLAN

Serial device server for 802.11 Wireless LAN

Technical data

Supply		
Supply voltage		24 V DC ±20% (via COMBICON plug-in screw terminal block)
Supply voltage		24 V DC ±5% (alternative or redundant, via backplane bus contact and system power supply)
Nominal current consumption		100 mA (24 V DC)
Serial port		
Interfaces		V.24 (RS-232), RS-422, RS-485
Connection method	V.24 (RS-232)	D-SUB-9 male connector
	RS-422	Plug-in/screw connection via COMBICON
	RS-485	Plug-in/screw connection via COMBICON
Data format/encoding		Serial asynchronous UART/NRZ, 7/8 data, 1/2 stop, 1 parity, 10/11-bit character length
Data flow control/protocols		Software handshake, Xon/Xoff or hardware handshake RTS/CTS
Transmission speed		300, 600, 1200, 2400, 4800, 7200, 9600, 19200, 38400, 57600, 115200, 230400 bps, can be set with configuration software
Termination resistor		390 Ω - 180 Ω - 390 Ω (can be connected)
Wireless interface		
Interfaces		WLAN according to IEEE 802.11b/g
Function		Infrastructure mode, ad-hoc mode
Transmission speed		Max. 54 Mbps
Security		802.11i, WPA PSK (pre-shared key), WPA2 PSK, AES, 64-bit/128-bit WEP, TKIP
Antenna connection		SMA, female
Transmission power		16.9 dBm
Receiver sensitivity		-85.00 dBm
Frequencies		2.402 GHz ... 2.48 GHz (ISM bandwidth)
Supported protocols		TCP/IP, UDP, TFTP, HTTP
Auxiliary protocols		ARP, DHCP, BOOTP, SNMP, RIP, RARP
General data		
Ambient temperature (operation)		-25°C ... 60°C
Electrical isolation		Supply // WLAN, Serial
Test voltage		1.5 kV_{rms} (50 Hz, 1 min.)
Electromagnetic compatibility		Conformance with EMC Directive 2004/108/EC
Dimensions	W / H / D	22.5 mm / 99 mm / 120 mm

Ordering data

Description	Type	Order No.	Pcs. / Pkt.
Serial device server, to convert a serial interface to 802.11 WLAN, incl. CD-ROM with drivers, additional software, and user documentation TCP, UDP	**FL COMSERVER WLAN 232/422/485**	**2313559**	1

Accessories

V.24 (RS-232) D-SUB cable, length: 2 m			
- 9-pole socket on 9-pole socket	**PSM-KA9SUB9/BB/2METER**	**2799474**	1
- 9-pole socket on 25-pole socket	**PSM-KA 9 SUB 25/BB/2METER**	**2761059**	1
TBUS DIN rail connector	**ME 22,5 TBUS 1,5/ 5-ST-3,81 GN**	**2707437**	50
System power supply unit, primary-switched	**MINI-SYS-PS-100-240AC/24DC/1.5**	**2866983**	1
OMNI omnidirectional antenna with protection against vandals	**RAD-ISM-2400-ANT-VAN- 3-0-SMA**	**2885867**	1
PANEL directional wireless antenna (without cable)	**RAD-ISM-2400-ANT-PAN- 8-0**	**2867610**	1
Antenna extension cable	**RAD-CAB-EF393- 3M**	**2867649**	1

N

4 kV Ethernet ISOLATOR for electrical isolation

The new FL ISOLATOR is used for electrical isolation in copper-based Ethernet networks.

In industrial environments, potential differences pose a constant problem with regard to interference-free data transmission.

The high-quality isolation for up to 4 kV provides reliable protection for Ethernet devices and interfaces. This results in considerably higher immunity to interference in industrial applications.

Features:

- Electrical isolation of data cables and cable shielding
- Dielectric strength up to 4 kV
- Continuous insulation voltage of 250 V_{RMS}
- Transmission speed of up to 1000 Mbps
- No power supply required
- Protection against aggressive environmental influences, particularly harsh industrial environments, thanks to coated PCB
- Approval for railway applications (rolling stock) according to EN 50155 and EN 50121
- Mounting on EN DIN rail
- Extended temperature range of -25°C to +85°C

FL ISOLATOR 1000-RJ/RJ

- Up to 1000 Mbps
- Connection: RJ45/RJ45

FL ISOLATOR 100-RJ/RJ

- Up to 100 Mbps
- Connection: RJ45/RJ45

FL ISOLATOR 100-RJ/SC

- Up to 100 Mbps
- Connection: RJ45/plug-in COMBICON screw terminal block
- For cross-control-cabinet field cabling with variable cable lengths
- Can be used as a patch panel with electrical isolation

Galvanic Ethernet isolators

Technical data

Ethernet interface		
Connection method		RJ45 female connector, shielded
Transmission speed		10/100/1000 Mbps
Transmission length		≤ 100 m (Dependent on the data rate and the cable used)
General data		
Ambient temperature (operation)		-25°C ... 75°C
Electrical isolation		Ethernet // Ethernet
Test voltage		4 kV AC (50 Hz, 1 min.)
Electromagnetic compatibility		Conformance with EMC Directive 2004/108/EC
Standards / regulations		EN 50121 and EN 50155 (for railway applications)
Dimensions	W / H / D	22.5 mm / 99 mm / 92 mm

Ordering data

Description	Type	Order No.	Pcs. / Pkt.
Network isolator for electrical isolation in Ethernet networks. For protection against potential differences of up to 4 kV			
- For transmission speeds of up to 1 Gbps, connection: 2x RJ45 female connectors	**FL ISOLATOR 1000-RJ/RJ**	**2313915**	1
- For transmission speeds of up to 100 Mbps, connection: 2x RJ45 female connectors	**FL ISOLATOR 100-RJ/RJ**	**2313931**	1
- For transmission speeds of up to 100 Mbps, connection: 1x RJ45 female connector and COMBICON plug-in screw terminal block	**FL ISOLATOR 100-RJ/SC**	**2313928**	1

Accessories

Patch cable, CAT5, pre-assembled				
	0.5 m	**FL CAT5 PATCH 0,5**	**2832263**	10
	1 m	**FL CAT5 PATCH 1,0**	**2832276**	10
	2 m	**FL CAT5 PATCH 2,0**	**2832289**	10
	3 m	**FL CAT5 PATCH 3,0**	**2832292**	10
Patch cable, CAT6, pre-assembled				
	0.5 m	**FL CAT6 PATCH 0,5**	**2891288**	10
	1 m	**FL CAT6 PATCH 1,0**	**2891385**	10
	2 m	**FL CAT6 PATCH 2,0**	**2891589**	10
	3 m	**FL CAT6 PATCH 3,0**	**2891686**	10

Factoryline Ethernet cable

The Ethernet cables of category 5e (up to 125 Mbps), which have been developed especially for industrial applications, round off the range to form a complete industrial installation concept.

The installation cable **FL CAT 5 HEAVY...** with solid twisted pair conductors is particularly suitable for permanent installation outside the control cabinet or switch box. It is characterized by a highly durable second outer sheath made of polyurethane (PUR). With an external diameter of 7.5 mm, the cable has a high degree of mechanical load carrying capacitance and fits perfectly through standard cable screw connections. Inside the control cabinet, the second outer sheath is simply removed (Ø 5.75 mm). The cable can thus be assembled directly with the RJ45 connector and connected to the modules. In line with CAT 5e, cable lengths up to 100 m are permissible.

The flexible and lightweight design **FL CAT5 FLEX...** is used for wiring inside the control cabinet (e.g., as patch cable between switch and terminal device). Flexible individual wires and a cable diameter of 5.75 mm facilitate installation where space is restricted. The permissible cable length with these highly flexible cables is 50 m.

Both cable types can be supplied ready assembled with RJ45 connector if required (see order sample).

Factoryline Ethernet connector and tool

The **FL PLUG...** connectors and matching crimping pliers are available for on-site assembly. The connectors comply with category 5e (up to 125 MHz) due to an extremely negligible cross-talk response. Therefore, the connectors can be used in 10/100 Mbps systems as well as in 1000Base-T-systems. For connections that are not crossed, it is recommended that you use the connector set (two connectors) with gray bend protection sleeve and for connections that are crossed, the connector set with green bend protection sleeve.

Ethernet

Ethernet cable, 2-pair, CAT5/CAT5e in solid and stranded

Ordering data

Description	Type	Order No.	Pcs. / Pkt.
CAT5e-SF/UTP cable (J-02YS(ST)C HP 2 x 2 x 24 AWG), heavy duty installation cable 2 x 2 x 0.22 mm², solid conductor, shielded Outer sheath: 7.5 mm Ø ±0.3 mm Inner sheath: 5.75 mm Ø ±0.15 mm (Length in meters as per customer specifications)	**FL CAT5 HEAVY**	**2744814**	1
CAT5e-SF/UTP cable, same as before, however, assembled with RJ45 connector (refer to the order sample) on both sides	**FL CAT5 HEAVY CONF/**	**2744827**	1
CAT5e-SF/UTP cable (J-LI02YS(ST)C H 2 x 2 x 26 AWG), light duty stranded installation cable 2 x 2 x 0.14 mm², fine strand conductor, shielded Outer sheath: 5.75 mm Ø ±0.15 mm (Length in meters as per customer specifications)	**FL CAT5 FLEX**	**2744830**	1
CAT5e-SF/UTP cable, same as before, however, assembled with RJ45 connector (refer to the order sample) on both sides	**FL CAT5 FLEX CONF/**	**2744843**	1

Accessories

RJ45 connector, shielded, with bend protection sleeve, x 2			
- gray for straight cables	**FL PLUG RJ45 GR/2**	**2744856**	1
– green for crossed cables	**FL PLUG RJ45 GN/2**	**2744571**	1
Crimping pliers, for assembling the RJ45 connectors	**FL CRIMPTOOL**	**2744869**	1

Ordering example for cable **with** connector

Light-weight and flexible installation cable, assembled with RJ45 connectors, crossover assignment, 3.5 m long

Quantity	Order No.		Connection		Length [m][1])
1	2744843	/	CO	/	3.5

CO ≙ Crossover
LI ≙ Line

[1]) min. 0.25 m
max. 50 m with FL CAT5 Flex
max. 100 m with FL CAT5 Heavy
step width: 0.25 m

Ordering example for cable **with** connector

Heavy-duty installation cable, 20 m long

Cable length	Order No.	Order designation
20	2744814	FL CAT5 HEAVY

In meters

Factoryline
Passive patch panel for DIN rail

The mini patch panels provide a convenient alternative to on-site assembly of RJ45 connectors.

The cross-control-cabinet field cabling is simply connected to screw, spring-cage or LSA connection terminal blocks, depending on which option is selected. The connection to the terminal devices is then completed using pre-assembled RJ45 patch cables.

The completely shielded conduit ensures transmission quality of up to 100 Mbps.

General features
– CAT5e
– 10/100 Mbps
– Mounted on DIN rails
– Safe shield connection to ground potential

FL CAT 5 TERMINAL BOX
– RJ45 socket
– Screw terminal blocks
– 4-pin assignment: 1, 2, 3, 6
– Clearly labeled with PROFINET cable colors

FL-PP-RJ45-SCC
– RJ45 socket
– Spring-cage connection terminal blocks
– 8-pin assignment: 1:1
– Option of shield contacting on DIN rail via jumpers

FL-PP-RJ45-SC
– RJ45 socket
– Screw terminal blocks
– 8-pin assignment: 1:1
– Option of shield contacting on DIN rail via jumpers

FL-PP-RJ45-LSA
– RJ45 socket
– LSA connection terminal blocks
– 8-pin assignment: 1:1
– Option of shield contacting on DIN rail via jumpers

FL-PP-RJ45/RJ45
– RJ45 socket
– RJ45 socket
– 8-pin assignment: 1:1
– Option of shield contacting on DIN rail via jumpers

Notes:
Mini patch panel with electrical isolation, see page 551.

Ethernet

PROFINET

Mini patch panel with various connection options

Technical data

Cable impedance	100 Ω
Transmission speed	up to 100 Mbps
Connection line	twisted pair, shielded, CAT5 or better
Transmission length	100 m (Incl. 2 x 10 m patch cables)
Plug connection	RJ45 shielded
Insertion/withdrawal cycles	Min. 2500 (with FL Plug RJ45...)
Cable cross section (max./min.)	10 mm / 6 mm
Screw connection solid / stranded / AWG	0.14 - 1.5 mm^2 / 0.14 - 1 mm^2 / 26 - 16
Ambient temperature (operation)	-20°C ... 75°C
Housing material	PVC
Weight	39 g
Dimensions W / H / D	25 mm / 90 mm / 52 mm

Ordering data

Description	Type	Order No.	Pcs. / Pkt.
Patch panel, an **RJ45 female connector on 4 screw connection terminal blocks** (assignment 1, 2, 3, 6), CAT5e, 10/100 Mbps, DIN rail mounting, IP20, shield contacting on DIN rail	**FL CAT5 TERMINAL BOX**	**2744610**	1
Patch panel, an **RJ45 female connector on 8 spring-cage connection terminal blocks** (1:1 assignment), CAT5e, 10/100 Mbps, DIN rail mounting, IP20, option of shield contacting on DIN rail via jumpers	**FL-PP-RJ45-SCC**	**2901642**	1
Patch panel, an **RJ45 female connector on 8 screw connection terminal blocks** (1:1 assignment), CAT5e, 10/100 Mbps, DIN rail mounting, IP20, option of shield contacting on DIN rail via jumpers	**FL-PP-RJ45-SC**	**2901643**	1
Patch panel, an **RJ45 female connector on 8 LSA connection terminal blocks** (1:1 assignment), CAT5e, 10/100 Mbps, DIN rail mounting, IP20, option of shield contacting on DIN rail via jumpers	**FL-PP-RJ45-LSA**	**2901645**	1
Patch panel, two RJ45 female connectors (1:1 assignment), CAT5e, 10/100 Mbps, DIN rail mounting, IP20, option of shield contacting on DIN rail via jumpers	**FL-PP-RJ45/RJ45**	**2901646**	1
Mini patch panel with electrical isolation, for protection against potential differences of up to 4 kV, transmission speeds of up to 100 Mbps, RJ45 connection and plug-in screw terminal block	**FL ISOLATOR 100-RJ/SC**	**2313928**	1

Industrial modems for all interfaces
- For I/O signals
- For serial interfaces
- For Ethernet networks

Universal data links
Worldwide suitability without being linked to a specific controller.

Secure communication
Integrated security functions offer manipulation and expertise protection.

Efficient remote access solutions
Reliable and high-performance use in harsh industrial environments.

The Industrial Modem Line can be used to connect to machines and systems worldwide for efficient remote maintenance, continuous data acquisition, and automatic early warnings.

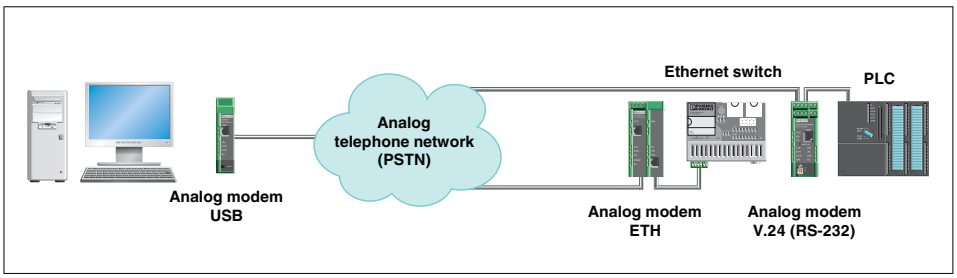
Remote maintenance via dial-up connection
Direct, worldwide access to controllers and Ethernet networks makes it possible to carry out maintenance and service work quickly and efficiently.

Remote control via a permanent line
Secure and continuous transmission of process data to the control center means that even remote external stations and substations can be monitored and controlled.

Automatic alarm messaging
Proactive and precise early warning messages via SMS or e-mail mean that faults can be resolved quickly, thereby minimizing production downtimes.

Analog modems

Access remote control systems and network devices directly using the telephone network, which is available worldwide.

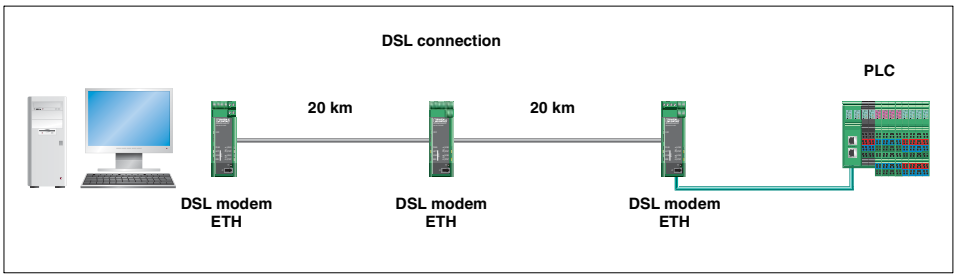


Analog telephone network

- Worldwide data links via the public telephone network
- Serial data up to 33.6 kbps
- Direct access to controllers and login into remote Ethernet networks

SHDSL modems

Use existing copper cables for transmission speeds of up to 30 Mbps.

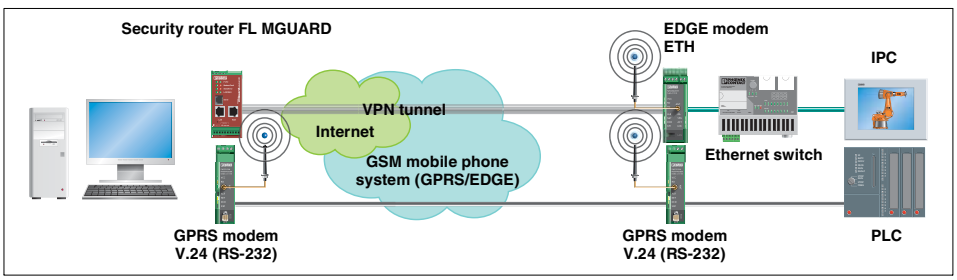


DSL high-speed connections

- Long ranges of up to 20 km supported (depending on line)
- Data rates of up to 30 Mbps (depending on line)
- Transparent connections for Ethernet, Profibus, and serial applications

Mobile phone modems

Transmit your data via a VPN connection using the mobile phone network.



GSM mobile phone network

- Worldwide data links via the mobile phone network
- Serial data up to 9.6 kbps

GPRS/EDGE/3G

- Worldwide, packet-oriented data links via the GSM mobile phone network
- TCP/IP data up to 7.2 Mbps

Industrial analog modems

Applications:

These analog modems are specifically designed to meet industrial requirements for worldwide remote maintenance and alarm generation. Serial connections on the public, analog phone network with speeds of up to 33.6 kbps are supported, as is dial-up to the GSM mobile phone network.

Remote maintenance via dial-up connection:

– Direct access to remotely located controllers for software updates and remote diagnostics

Remote control via permanent line:

– Substations permanently connected to control room for the purpose of monitoring and controlling remote system components

Automatic alarm messaging:

– Individual, configurable SMS and e-mail messaging functions for quick resolution of faults

Features:

PSI-MODEM/ETH

Dial-up line modem for accessing a remote Ethernet network
– Permanent 128-bit authentication
– CHAP protocol

PSI-DATA/FAX-MODEM/RS232

Dial-up/permanent line modem with advanced alarm generation functions for remote control, remote maintenance, and alarm generation applications
– 1x switching input/output

PSI-DATA/BASIC-MODEM/RS232

Dial-up line modem for remote maintenance of systems with a V.24 (RS-232) interface

PSI-MODEM-BASIC/USB

Dial-up line modem for remote maintenance of systems with USB interface
– 5 V DC supply via USB interface

All devices feature:

a) For interference-proof operation, including under harsh EMC conditions:
– High-quality electrical isolation
– Integrated surge protection

b) Comprehensive security functions that prevent unauthorized access by means of
– Configurable, selective call acceptance
– Connection establishment with password protection
– Callback function

Ethernet

Modem for dial-up operation with Ethernet connection (LAN)

Technical data

Supply	
Supply voltage	10 V DC ... 30 V DC (via COMBICON plug-in screw terminal block)
Supply voltage	-
Supply voltage	24 V DC ±5% (alternative or redundant, via backplane bus contact and system power supply)
Nominal current consumption	< 100 mA (24 V DC)
Standby current consumption	< 70 mA
V.24 (RS-232) interface	
Connection method	RJ45 female connector, shielded
Data format/encoding	-
Data flow control/protocols	TCP/IP, UDP, TFTP, HTTP, MODBUS TCP, PPP, PROFINET, EtherNet IP, CHAP
Transmission speed	10/100 Mbps, auto negotiation
PSTN port (a/b line)	
Connection method	RJ12, 6-pole
Dialing procedure	Multiple frequency/pulse dialing, configuration via software
Input/output	
Switching input	-
Switching output	-
General data	
Ambient temperature (operation)	0°C ... 55°C
Electrical isolation	Power supply // PSTN // Ethernet
Test voltage	1.5 kV
Approvals for countries	EU, USA, Canada, other countries in preparation
Electromagnetic compatibility	Conformance with EMC Directive 2004/108/EC
Dimensions W / H / D	45 mm / 99 mm / 114.5 mm

Ordering data

Description	Type	Order No.	Pcs. / Pkt.
Industrial, analog Ethernet modem, scope of supply: Modem, RJ12/RJ12 cable, TAE adapter	**PSI-MODEM/ETH**	**2313300**	1
Industrial analog modem, scope of supply: Modem, CD with configuration software, manual, and RJ12/RJ12 cable			
Industrial analog modem with USB connection, scope of supply: Modem, driver CD with manual, USB cable, and RJ12/RJ12 cable			

Accessories

System power supply unit, primary-switched	**MINI-SYS-PS-100-240AC/24DC/1.5**	**2866983**	1
TBUS DIN rail connector	**ME 22,5 TBUS 1,5/ 5-ST-3,81 GN**	**2707437**	50
MPI adapter for coupling to the programming interface of a Siemens SIMATIC® S7-300/400 controller			
Interface converter for switching between two V.24 (RS-232) interfaces			
V.24 (RS-232) D-SUB cable, length: 2 m			
V.24 (RS-232) D-SUB cable, length: 0.5 m			

Modem for dial-up/permanent line operation with V.24 (RS-232) connection and 1 DI/DO

Ex:

Technical data	
10 V DC ... 60 V DC (via COMBICON plug-in screw terminal block)	
16 V AC ... 40 V AC (via COMBICON plug-in screw terminal block)	
24 V DC ±5% (alternative or redundant, via backplane bus contact and system power supply)	
< 100 mA (24 V DC) < 40 mA	
D-SUB-9 male connector Serial asynchronous UART/NRZ, 7/8 data, 1/2 stop, 1 parity, 10/11-bit character length Software handshake, Xon/Xoff, direct mode or hardware handshake RTS/CTS Automatic data rate detection (default) or fixed setting to 300, 1200, 2400, 4800, 9600, 19200, 38400, 57600, 115200 bps, can be set via software	
RJ12, 6-pole, or pluggable COMBICON screw terminal block	
Multiple frequency/pulse dialing, configuration via software	
U_{Nom} 24 V DC / 5 mA, input range 9...48 V DC, floating	
Miniature switching relay 60 V DC / 1 A; 42 V AC / 1 A, N/O contact	
0°C ... 55°C Supply // PSTN // V.24 (RS-232) 1.5 kV EU, USA, Canada, Australia, other countries in preparation	
Conformance with EMC Directive 2004/108/EC 35 mm / 99 mm / 114.5 mm	

Ordering data		
Type	**Order No.**	Pcs. / Pkt.
PSI-DATA/FAX-MODEM/RS232	**2708203**	1

Accessories		
MINI-SYS-PS-100-240AC/24DC/1.5	**2866983**	1
ME 17,5 TBUS 1,5/ 5-ST-3,81 GN	**2709561**	10
PSI-MPI/RS232-PC	**2313148**	1
PSI-MODEM-SPLITTER	**2708766**	1
PSM-KA9SUB9/BB/2METER	**2799474**	1
PSM-KA9SUB9/BB/0,5METER	**2708520**	1

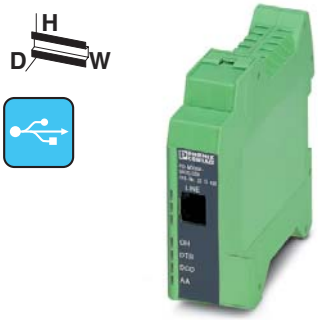
Modem for dial-up operation with V.24 (RS-232) connection

Ex:

Technical data	
10 V DC ... 30 V DC (via COMBICON plug-in screw terminal block)	
-	
24 V DC ±5% (alternative or redundant, via backplane bus contact and system power supply)	
< 100 mA (24 V DC) < 40 mA	
D-SUB-9 male connector Serial asynchronous UART/NRZ, 7/8 data, 1/2 stop, 1 parity, 10/11-bit character length Software handshake, Xon/Xoff or hardware handshake RTS/CTS Automatic data rate detection 300, 1200, 2400, 4800, 9600, 19200, 38400, 57600, 115200 bps	
RJ12, 6-pole	
Multiple frequency/pulse dialing, configuration via software	
-	
-	
0°C ... 55°C Supply // PSTN // V.24 (RS-232) 1.5 kV EU, USA, Canada, other countries in preparation	
Conformance with EMC Directive 2004/108/EC 22.5 mm / 99 mm / 114.5 mm	

Ordering data		
Type	**Order No.**	Pcs. / Pkt.
PSI-DATA/BASIC-MODEM/RS232	**2313067**	1

Accessories		
MINI-SYS-PS-100-240AC/24DC/1.5	**2866983**	1
ME 22,5 TBUS 1,5/ 5-ST-3,81 GN	**2707437**	50
PSI-MPI/RS232-PC	**2313148**	1
PSM-KA9SUB9/BB/2METER	**2799474**	1
PSM-KA9SUB9/BB/0,5METER	**2708520**	1



Modem for dial-up operation with USB connection

Technical data	
-	
-	
5 V DC (via mini USB type B)	
< 100 mA (for 5 V DC, nominal operation) < 40 mA (for 5 V DC, sleep mode)	
Mini USB type B - - -	
RJ12, 6-pole	
Multiple frequency/pulse dialing, configuration via software	
-	
-	
0°C ... 55°C PSTN // USB 1.5 kV EU, USA, Canada, other countries in preparation	
Conformance with EMC Directive 2004/108/EC 22.5 mm / 99 mm / 114.5 mm	

Ordering data		
Type	**Order No.**	Pcs. / Pkt.
PSI-MODEM-BASIC/USB	**2313436**	1

Accessories		

SHDSL permanent line modem

PSI-MODEM-SHDSL/ETH

Application:

Integrate remote Ethernet devices into the network via broadband using in-house cables, via plug and play.

Topology:
- Point-to-point connection
- Star structure, 3 devices
- Linear structure, up to 255 devices

Features:
- Symmetrical data transmission
- 2 SHDSL ports per device
- Up to 15.3 Mbps in 2-wire operation
- Up to 30 Mbps in 4-wire operation
- Automatic SHDSL data rate detection
- Network transparent (no IP configuration required)
- Transparent protocol
- Future-proof (IPv4 and IPv6 capable)
- Automatic detection of network cable type (Auto MDI(X))
- Automatic network data rate detection (10/100 Mbps)
- Two digital outputs for alerting external controllers
- Simple startup, plug and play

PSI-MODEM-SHDSL/PB

Application:

Interconnect PROFIBUS segments using in-house cables. Distances in excess of 1200 m can be bridged (typ. PROFIBUS distance: max. 1200 m).

Topology:
- Point-to-point connection
- Linear structure, up to 30 SHDSL devices
- Mixed structure involving other PROFIBUS infrastructure components from PHOENIX CONTACT

Features:
- Symmetrical data transmission
- 2 SHDSL ports per device
- Two digital outputs for alerting external controllers
- Simple configuration

PROFIBUS data rate
- Up to 500 kbps (linear structure)
- Up to 1.5 Mbps (point-to-point)

PSI-MODEM-SHDSL/SERIAL

Application:

Network serial devices (V.24 (RS-232), RS-422, RS-485) using in-house cables for a higher data rate.

Topology:
- Point-to-point connection
- Star structure
- Linear structure, up to 255 devices

Features:
- Symmetrical data transmission
- 2 SHDSL ports per device
- V.24 (RS-232), up to 230.4 kbps
- RS-422, up to 2000 kbps
- RS-485, up to 2000 kbps
- Two digital outputs for alerting external controllers
- Simple configuration

It is not possible to combine different types of SHDSL modem, e.g., SHDSL PROFIBUS with SHDSL Ethernet.

The cable cross section and path length have a major impact on the maximum data rate that can be achieved.

Additional information can be found in the relevant data sheets/user manuals.

All devices also feature:

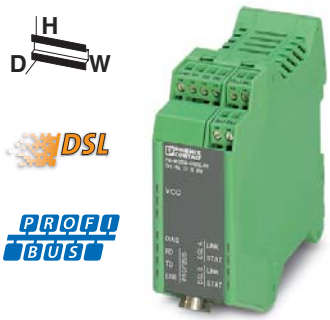
Free software for:
- Reading out the log book entries
- Realtime diagnostics
- Individual device configuration
- Guided project configuration
- Saving/printing
  - Of device configurations
  - Of project configurations

Supply	
Supply voltage	
Supply voltage	
Nominal current consumption	
V.24 (RS-232) interface	
Connection method	
Transmission speed	
RS-422 interface	
Connection method	
Transmission speed	
RS-485 interface	
Connection method	
Transmission speed	
Ethernet interface	
Connection method	
Transmission speed	
SHDSL interface	
Connection method	
Transmission speed	
USB interface	
Connection method	
Transmission length	
Functions	
Management	
Input/output	
Switching output	
General data	
Ambient temperature (operation)	
Electrical isolation	
Test voltage	
Electromagnetic compatibility	
Dimensions	W / H / D

Description
SHDSL permanent line modem, for point-to-point, linear, and star structures on in-house 2- and 4-wire cables
System power supply unit, primary-switched
DIN rail connector (optional), for routing through the supply voltage and data signal, two pieces are required per device
DATATRAB, surge protection for two signal pairs of the analog and digital (DSL) telecommunication interface

Permanent line modem SHDSL Ethernet

Permanent line modem SHDSL serial



Permanent line modem SHDSL PROFIBUS

Technical data	Technical data	Technical data
18 V DC ... 30 V DC 24 V DC ±5% (alternative or redundant, via backplane bus contact and system power supply)	18 V DC ... 30 V DC 24 V DC ±5% (alternative or redundant, via backplane bus contact and system power supply)	18 V DC ... 30 V DC 24 V DC ±5% (alternative or redundant, via backplane bus contact and system power supply)
< 180 mA (24 V DC)	< 180 mA (24 V DC)	< 180 mA (24 V DC)
- -	D-SUB-9 male connector 0.11/0.3/1.2/2.4/4.8/9.6/19.2/38.4/57.6/115.2/230.4 kbps, NRZ	- -
	RS-422 interface in acc. with ITU-T V.11, EIA/TIA-422, DIN 66348-1	
- -	Plug-in/screw connection via COMBICON 1.2/2.4/4.8/7.0/9.6/19.2/38.4/57.6/75/93.75/115.2/136/187.5/375/500/1500/2000 kbps, NRZ	- -
	RS-485 interface, in acc. with EIA/TIA-485, DIN 66259-4/RS-485 2-wire	PROFIBUS according to IEC 61158, RS-485 2-wire, half duplex, automatic control
- -	Plug-in/screw connection via COMBICON 1.2/2.4/4.8/7.0/9.6/19.2/38.4/57.6/75/93.75/115.2/136/187.5/375/500/1500/2000 kbps, NRZ	D-SUB-9 female connector 9.6/19.2/45.45/93.75/187.5/500/1500 kbps, set via configuration software
RJ45 female connector, shielded 10/100 Mbps	- -	- -
SHDSL interface according to ITU-T G.991.2.bis	SHDSL interface according to ITU-T G.991.2.bis	SHDSL interface according to ITU-T G.991.2.bis
2 x 2-pos. COMBICON plug-in screw terminal blocks 4-wire operation: 64 kbps ... 30 Mbps 2-wire operation: 32 kbps ... 15.3 Mbps	2 x 2-pos. COMBICON plug-in screw terminal blocks 4-wire operation: 64 kbps ... 30 Mbps 2-wire operation: 32 kbps ... 15.3 Mbps	2 x 2-pos. COMBICON plug-in screw terminal blocks 4-wire operation: 64 kbps ... 30 Mbps 2-wire operation: 32 kbps ... 15.3 Mbps
USB 2.0	USB 2.0	USB 2.0
Mini-USB type B, 5-pos. Max. 5 m (only for configuration and diagnostics)	Mini-USB type B, 5-pos. Max. 5 m (only for configuration and diagnostics)	Mini-USB type B, 5-pos. Max. 5 m (only for configuration and diagnostics)
Plug and play, user-friendly software: Diagnostic functions, log book, individual configuration	User-friendly software: Guided configuration, plausibility checks, diagnostic functions, log book	User-friendly software: Guided configuration, plausibility checks, diagnostic functions, log book
2 x U_{Nom}/150 mA (the digital outputs cannot be used for power supply via the TBUS), short-circuit-proof	2 x U_{Nom}/150 mA (the digital outputs cannot be used for power supply via the TBUS), short-circuit-proof	2 x U_{Nom}/150 mA (the digital outputs cannot be used for power supply via the TBUS), short-circuit-proof
-20°C ... 60°C (for derating, see technical documentation)	-20°C ... 60°C (for derating, see technical documentation)	-20°C ... 60°C (for derating, see technical documentation)
VCC // ETHERNET // DSL // FE 1.5 kV_{rms} (50 Hz, 1 min.) Conformance with EMC Directive 2004/108/EC 35 mm / 99 mm / 114.5 mm	VCC // RS-422 // DSL // FE 1.5 kV_{rms} (50 Hz, 1 min.) Conformance with EMC Directive 2004/108/EC 35 mm / 99 mm / 114.5 mm	VCC // PROFIBUS // DSL // FE 1.5 kV_{rms} (50 Hz, 1 min.) Conformance with EMC Directive 2004/108/EC 35 mm / 99 mm / 114.5 mm

Ordering data

Type	Order No.	Pcs. / Pkt.
PSI-MODEM-SHDSL/ETH	**2313643**	1

Accessories

MINI-SYS-PS-100-240AC/24DC/1.5	**2866983**	1
ME 17,5 TBUS 1,5/ 5-ST-3,81 GN	**2709561**	10
DT-TELE-RJ45	**2882925**	1

Ordering data

Type	Order No.	Pcs. / Pkt.
PSI-MODEM-SHDSL/SERIAL	**2313669**	1

Accessories

MINI-SYS-PS-100-240AC/24DC/1.5	**2866983**	1
ME 17,5 TBUS 1,5/ 5-ST-3,81 GN	**2709561**	10
DT-TELE-RJ45	**2882925**	1

Ordering data

Type	Order No.	Pcs. / Pkt.
PSI-MODEM-SHDSL/PB	**2313656**	1

Accessories

MINI-SYS-PS-100-240AC/24DC/1.5	**2866983**	1
ME 17,5 TBUS 1,5/ 5-ST-3,81 GN	**2709561**	10
DT-TELE-RJ45	**2882925**	1

N

3G mobile phone router with firewall, VPN, and alarm inputs and outputs

The PSI-MODEM-3G router is an industrial router that can be used to transmit sensitive data securely via mobile phone networks.

Mobile phone network:
- UMTS mobile phone network: 850, 1900, and 2100 MHz
- GSM mobile phone network: 850, 900, 1800, and 1900 MHz
- For worldwide use
- 2 SIM cards for maximum network availability

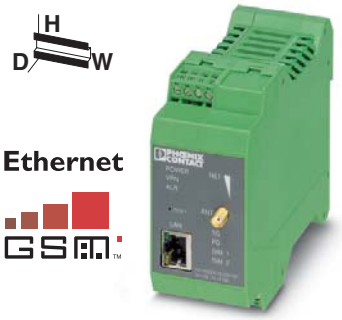
TCP/IP connection (HSPA/UMTS/GPRS/EDGE):
- Connection established via IP addresses
- Data rates of up to 7.2 Mbps
- Security:
  - Firewall
  - NAT table

Ethernet interface:
- 10/100 Mbps automatic detection
- Autocrossing

VPN (virtual private network):
- IPsec and OpenVPN support
- Up to three VPN tunnels simultaneously
- Authentication with X.509 certificates
- Starting of VPN via call
- Starting of VPN via SMS

Digital I/Os:
- 6 digital switching inputs: Sending of freely configurable text messages (SMS, FAX, e-mail) and starting of user-defined functions
- Four switching outputs: Can be activated via SMS and Ethernet and for GSM and connection diagnostics

Additional features:
- Encryption of both SIM card PINs
- Configuration via web-based management
- Upload and download configuration
- Configurable daily restart
- High electromagnetic compatibility
- Electrical isolation
- Connection monitoring



UMTS/HSPA mobile phone router with firewall and VPN

Technical data

Supply	
Supply voltage	10 V DC ... 30 V DC (via COMBICON plug-in screw terminal block)
Nominal current consumption	< 360 mA (24 V DC)
Standby current consumption	< 90 mA
Ethernet interface	
Connection method	RJ45 female connector, shielded
Transmission speed	10/100 Mbps
Transmission length	100 m (shielded twisted pair)
Functions	
Management	Web-based management, SNMP
GSM/GPRS	
Frequencies	850 MHz (2 W (EGSM)) / 900 MHz (2 W (EGSM)) / 1800 MHz (1 W (EGSM)) / 1900 MHz (1 W (EGSM)) / 850 MHz (0.25 W (UMTS)) / 1900 MHz (0.25 W (UMTS)) / 2100 MHz (0.25 W (UMTS))
SIM interface	1.8 V and 3 V SIM card
GPRS compatibility	GPRS class 12, class B/encoding scheme: CS1 to CS4; EDGE (E-GPRS) multislot class 10
Network function	4 time slots for receiving data, 4 time slots for transmitting data. The PIN is saved in the modem. After a voltage interruption, automatically redials into the network. Integrated TCP/IP stack, firewall and VPN support, independent connection establishment
Network check	LED bar graph to display receive quality
Antenna connection	50 Ω impedance SMA female antenna connector
Input/output	
Switching input	6 x $U_{nominal,}$ input range 10 V DC ... 30 V DC
Switching output	4 x $U_{nominal,}$ input range 10 V DC ... 30 V DC / 250 mA, short-circuit-proof
General data	
Ambient temperature (operation)	-25°C ... 65°C (not aligned)
Electrical isolation	VCC // UMTS // ETH // PE
Test voltage	1.5 kV (50 Hz, 1 min.)
Approvals for countries	EU, USA, Canada, other countries in preparation
Electromagnetic compatibility	Conformance with R&TTE Directive 1999/5/EC
Dimensions W / H / D	45 mm / 99 mm / 114.5 mm

Ordering data

Description	Type	Order No.	Pcs. / Pkt.
Industrial UMTS/HSPA mobile phone router for Ethernet with firewall, VPN, and alarm inputs and outputs	**PSI-MODEM-3G/ROUTER**	**2314008**	1

Accessories

Multiband antenna for UMTS and quad-band GSM, with omnidirectional characteristic, 2 m antenna cable with SMA round connector, degree of protection: IP65, dimensions: 76 x 20 mm	**PSI-GSM/UMTS-QB-ANT**	**2313371**	1
System power supply unit, primary-switched	**MINI-SYS-PS-100-240AC/24DC/1.5**	**2866983**	1

Quad band GPRS/EDGE mobile phone router with firewall, VPN, and alarm inputs and outputs

The PSI-MODEM-GSM/ETH GSM modem is an industrial router that can be used to transmit sensitive data securely via GSM networks.

Mobile phone network:
– GSM mobile phone network: 850, 900, 1800, and 1900 MHz
– For worldwide use

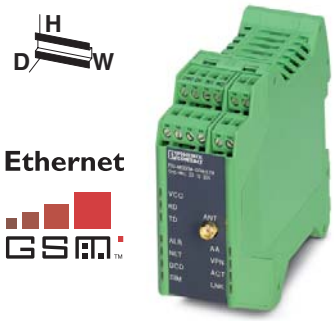
TCP/IP connection (GPRS/EDGE):
– Connection established via IP addresses
– Data rates of up to 210 kbps
– Security:
  - Firewall
  - NAT table

Ethernet interface:
– 10/100 Mbps automatic detection
– Autocrossing

VPN (virtual private network):
– IPsec and OpenVPN support
– Up to three VPN tunnels simultaneously
– Authentication with X.509 certificates
– Starting of VPN via call
– Starting of VPN via SMS

Digital I/Os:
– 6 digital switching inputs: Sending of freely configurable text messages (SMS, FAX, e-mail) and starting of user-defined functions
– Four switching outputs: Can be activated via SMS and Ethernet and for GSM and connection diagnostics

Additional features:
– Encryption of SIM card PINs
– Configuration via web-based management
– Upload and download configuration
– Configurable daily restart
– High electromagnetic compatibility
– Electrical isolation



GPRS/EDGE mobile phone router with firewall and VPN

Technical data

Supply	
Supply voltage	10 V DC ... 30 V DC (via COMBICON plug-in screw terminal block)
Supply voltage	24 V DC ±5% (alternative or redundant, via backplane bus contact and system power supply)
Nominal current consumption	< 360 mA (24 V DC)
Standby current consumption	< 90 mA
Ethernet interface	
Connection method	RJ45 female connector, shielded
Transmission speed	10/100 Mbps
Transmission length	100 m (shielded twisted pair)
Functions	
Management	Web-based management, SNMP
GSM/GPRS	
Frequencies	850 MHz (2 W (EGSM)) / 900 MHz (2 W (EGSM)) / 1800 MHz (1 W (EGSM)) / 1900 MHz (1 W (EGSM))
SIM interface	1.8 V and 3 V SIM card
GPRS compatibility	GPRS class 12, class B/encoding scheme: CS1 to CS4; EDGE (E-GPRS) multislot class 10
Network function	4 time slots for receiving data, 4 time slots for transmitting data. The PIN is saved in the modem. After a voltage interruption, automatically redials into the network. Integrated TCP/IP stack, firewall and VPN support, independent connection establishment
Network check	LED to indicate data signal quality
Antenna connection	50 Ω impedance SMA female antenna connector
Input/output	
Switching input	6 x $U_{nominal,}$ input range 10 V DC ... 30 V DC
Switching output	4 x $U_{nominal,}$ input range 10 V DC ... 30 V DC / 250 mA, short-circuit-proof
General data	
Ambient temperature (operation)	-25°C ... 60°C
Electrical isolation	VCC//GSM//ETH//PE
Test voltage	1.5 kV (50 Hz, 1 min.)
Approvals for countries	EU, USA, Canada, other countries in preparation
Electromagnetic compatibility	Conformance with R&TTE Directive 1999/5/EC
Dimensions W / H / D	35 mm / 99 mm / 114.5 mm

Ordering data

Description	Type	Order No.	Pcs. / Pkt.
Industrial GPRS/EDGE modem for Ethernet with integrated firewall and VPN	**PSI-MODEM-GSM/ETH**	**2313355**	1

Accessories

Multiband antenna for UMTS and quad-band GSM, with omnidirectional characteristic, 2 m antenna cable with SMA round connector, degree of protection: IP65, dimensions: 76 x 20 mm	**PSI-GSM/UMTS-QB-ANT**	**2313371**	1
System power supply unit, primary-switched	**MINI-SYS-PS-100-240AC/24DC/1.5**	**2866983**	1
DIN rail connector (optional), for routing through the supply voltage and data signal, two pieces are required per device	**ME 17,5 TBUS 1,5/ 5-ST-3,81 GN**	**2709561**	10

Quad band modem for GPRS and GSM with V.24 (RS-232) interface and 2 alarm inputs

Send V.24 (RS-232) data all around the world via mobile phone network

Mobile phone network:
- GSM mobile phone network: 850, 900, 1800, and 1900 MHz
- For worldwide use

TCP/IP connection (GPRS)
- Connection established via IP addresses
- Client/server functionality
- IPT compatible
- Integrated TCP/IP stack for integrating devices without a TCP/IP stack into a network
- Data rates of up to 53.6 kbps
- Security:
  - Firewall

Dial-up connection (GSM):
- Connection established via data phone number (CSD)
- Security:
  - Connection established with password protection
  - Selective call acceptance
  - Callback function
- Fixed bandwidth (9.6 kbps or 14.4 kbps)
- Fixed latency

V.24 (RS-232) interface:
- Freely parameterizable (baud rate, data bits, parity, stop bit, flow control)

Digital I/Os:
- Two digital switching inputs: Sending of freely configurable text messages (SMS, FAX, e-mail)
- One switching output on backplane, can be activated via SMS with password protection

Additional features:
- Encryption of SIM card PINs
- Can be used regardless of controller manufacturer
- High electromagnetic compatibility
- Electrical isolation
- NEW: Convenient configuration software
- NEW: Configuration via SMS, e.g., update phone book entries, for SMS alerts
- NEW: IPT supported

Notes:

For application examples, see the user manual.

Quad band modem for GPRS and GSM with V.24 (RS-232) interface, integrated TCP/IP stack, and

Technical data

Supply	
Supply voltage	10 V DC ... 30 V DC (via COMBICON plug-in screw terminal block)
Supply voltage	24 V DC ±5% (alternative or redundant, via backplane bus contact and system power supply)
Nominal current consumption	< 350 mA (24 V DC)
Standby current consumption	< 80 mA
V.24 (RS-232) interface	
Connection method	D-SUB-9 male connector
Data format/encoding	Serial asynchronous UART/NRZ, 7/8 data, 1/2 stop, 1 parity, 10/11-bit character length
Data flow control/protocols	Software handshake, Xon/Xoff or hardware handshake RTS/CTS
Transmission speed	Automatic data rate detection (default) or fixed setting to 300, 1200, 2400, 4800, 9600, 19200, 38400, 57600, 115200 bps, can be set via software
GSM/GPRS	
Frequencies	850 MHz (2 W (EGSM)) / 900 MHz (2 W (EGSM)) / 1800 MHz (1 W (EGSM)) / 1900 MHz (1 W (EGSM))
SIM interface	1.8 V and 3 V SIM card
GPRS compatibility	GPRS class 10, class B/encoding scheme: CS1 to CS4
Network function	4 time slots for receiving data, 2 time slot for transmitting data. The PIN is saved in the modem. After a voltage interruption, automatically redials into the network Integrated TCP/IP Stack, independent connection establishment
Network check	LED to indicate data signal quality
Antenna connection	50 Ω impedance SMA female antenna connector
Input/output	
Switching input	2 x U_{Nom} 24 V DC / 5 mA, input range 9...60 V DC
Switching output	On the backplane (10 V DC ... 30 V DC / 80 mA at 24 V DC)
General data	
Ambient temperature (operation)	-25°C ... 60°C
Electrical isolation	Supply // V.24 (RS-232) // Antenna
Test voltage	1.5 kV
Approvals for countries	EU, USA, Canada, other countries in preparation
Electromagnetic compatibility	Conformance with R&TTE Directive 1999/5/EC
Dimensions W / H / D	22.5 mm / 99 mm / 118.6 mm

Ordering data

Description	Type	Order No.	Pcs. / Pkt.
Industrial GPRS/GSM modem with V.24 (RS-232) interface, scope of supply: Modem, CD with configuration software and user manual	**PSI-GPRS/GSM-MODEM/RS232-QB**	**2313106**	1

Accessories

Multiband antenna for UMTS and quad-band GSM, with omnidirectional characteristic, 2 m antenna cable with SMA round connector, degree of protection: IP65, dimensions: 76 x 20 mm	**PSI-GSM/UMTS-QB-ANT**	**2313371**	1
System power supply unit, primary-switched	**MINI-SYS-PS-100-240AC/24DC/1.5**	**2866983**	1
TBUS DIN rail connector	**ME 22,5 TBUS 1,5/ 5-ST-3,81 GN**	**2707437**	50
MPI adapter for coupling to the programming interface of a Siemens SIMATIC® S7-300/400 controller	**PSI-MPI/RS232-PC**	**2313148**	1
V.24 (RS-232) D-SUB cable, length: 2 m	**PSM-KA9SUB9/BB/2METER**	**2799474**	1
V.24 (RS-232) D-SUB cable, length: 0.5 m	**PSM-KA9SUB9/BB/0,5METER**	**2708520**	1

SMS relay modules

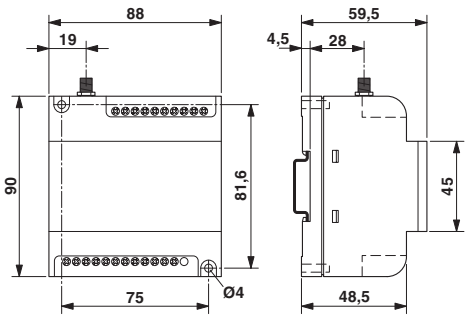
The PSI-MODEM-SMS-REL… is a compact remote control and signaling system. Six digital or configurable analog/digital inputs and four relay outputs with PDT contacts are monitored and controlled using SMS messages via any GSM mobile phone network.

Product features:

- GSM mobile phone network: 850, 900, 1800, and 1900 MHz
- For worldwide use
- Message via SMS in case of status change at the input
- Alarm in case of voltage failure via SMS
- SMS remote control of the outputs
- Switching of outputs for a predefined time
- SMS status query of all inputs and outputs
- Password protection
- V.24 (RS-232) configuration interface
- Configuration software and programming cable supplied as standard
- Easy configuration on the PC without programming knowledge
- Integrated phone book for up to 50 numbers
- Max. 5 recipients per SMS
- Installation component device as per DIN 43880

Possible areas of application for the PSI-MODEM-SMS-REL… are:

- Machine, building, and system monitoring
- Pumps, sewage treatment plants, water supply
- Light controllers, remote switching systems
- Lifts, doors
- Alarm and domestic engineering
- Climate and ventilation engineering
- Temperature monitoring



SMS remote and signaling system with six inputs and four relay outputs

Technical data

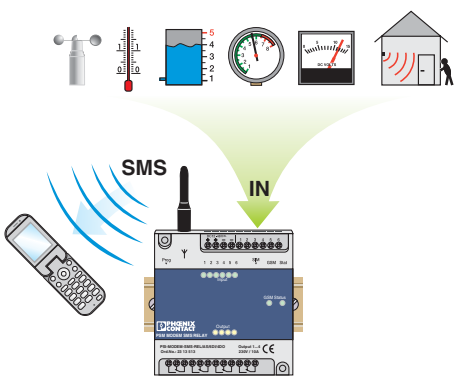
Supply		
Supply voltage	12 V DC ... 48 V DC	110 V AC ... 240 V AC
Nominal current consumption	15 mA	10 mA
Input data		
Switching input	Digital: 6 x U_N, switching threshold 9.5 V DC Analog: 0 - 10 V	Digital: 6 x U_N, switching threshold 85 V AC Analog: -
Output data		
Contact type	Single contact, 4 x SPDT contact	
Max. switching voltage	250 V AC/DC	
Min. switching voltage	12 V AC/DC	
Limiting continuous current	10 A	
GSM		
Frequencies	850 MHz (2 W (EGSM)) / 900 MHz (2 W (EGSM)) / 1800 MHz (1 W (EGSM)) / 1900 MHz (1 W (EGSM))	
SIM interface	3 V SIM card	
Antenna connection	50 Ω impedance SMA female antenna connector	
General data		
Ambient temperature (operation)	-25°C ... 55°C	
Electromagnetic compatibility	Conformance with R&TTE Directive 1999/5/EC	
Dimensions W / H / D	88 mm / 90 mm / 60 mm	

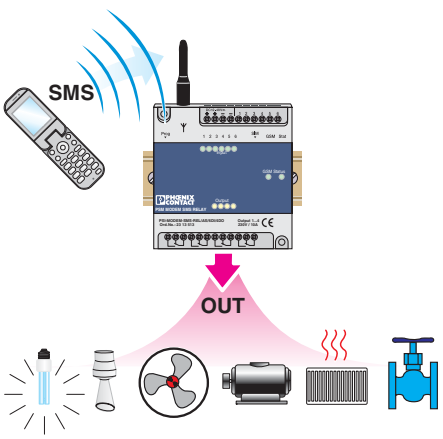
Ordering data

Description	Voltage U_N	Type	Order No.	Pcs. / Pkt.
SMS relay with six digital inputs and four relay outputs	110 V AC ... 240 V AC	**PSI-MODEM-SMS-REL/6 DI/4DO/AC**	**2313513**	1
SMS relay with six analog or digital configurable inputs and four relay outputs	12 V DC ... 48 V DC	**PSI-MODEM-SMS-REL/6ADI/4DO/DC**	**2313520**	1

Accessories

Multiband antenna for UMTS and quad-band GSM, with omnidirectional characteristic, 2 m antenna cable with SMA round connector, degree of protection: IP65, dimensions: 76 x 20 mm	**PSI-GSM/UMTS-QB-ANT**	**2313371**	1
Connecting cable, D-9-SUB to USB, with D-9-SUB to D-25-SUB adapter	**CM-KBL-RS232/USB**	**2881078**	1





Antennas and interface converters

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The PSI-GSM/UMTS-ANT-OMNI-2-5 and PSI-GSM/UMTS-QB-ANT multiband antenna are suitable for GSM networks operating at 850 MHz, 900 MHz, 1800 MHz, and 1900 MHz, as well as for UMTS networks.

The PSI-GSM/UMTS-ANT-OMNI-2-5 antenna is suitable for external panel and external mast mounting. The PSI-GSM/UMTS-QB-ANT antenna is ideal for mounting on a control cabinet or control box.

External antenna

Control cabinet antenna

Description	Ordering data			Ordering data		
	Type	Order No.	Pcs. / Pkt.	Type	Order No.	Pcs. / Pkt.
Multiband antenna for external panel and external mast mounting for UMTS and quad-band GSM, with omnidirectional characteristics, 5 m antenna cable with SMA round connector	PSI-GSM/UMTS-ANT-OMNI-2-5	2900982	1			
Multiband antenna for UMTS and quad-band GSM, with omnidirectional characteristic, 2 m antenna cable with SMA round connector, degree of protection: IP65, dimensions: 76 x 20 mm				PSI-GSM/UMTS-QB-ANT	2313371	1

Antenna extension cables and surge protection

N

The 5 m and 10 m long antenna extension cables allow greater flexibility when installing antennas. The surge protection is suitable for GSM networks operating at 850 MHz, 900 MHz, 1800 MHz, and 1900 MHz, as well as for UMTS networks.

Antenna extension cable

Protection adapter for coaxial cables

Description	Ordering data			Ordering data		
	Type	Order No.	Pcs. / Pkt.	Type	Order No.	Pcs. / Pkt.
Antenna extension cable for UMTS and quad-band GSM, 5 m long, antenna cable with SMA connector and SMA coupling	PSI-CAB-GSM/UMTS- 5M	2900980	1			
Antenna extension cable for UMTS and quad-band GSM, 10 m long, antenna cable with SMA connector and SMA coupling	PSI-CAB-GSM/UMTS-10M	2900981	1			
Surge protection for UMTS and quad-band GSM antenna, with SMA connector and SMA coupling				CSMA-LAMBDA/4-2.0-BS-SET	2800491	1

Programming adapter

The MPI adapter makes it possible to convert a V.24 (RS-232) interface for the MPI bus (19.2 or 187.5 kbps). It is used to couple modems, Bluetooth converters, and FL COM servers to the programming interface of a Siemens SIMATIC®S7 300/400 controller.

Programming adapter

Programming set

Description	Ordering data			Ordering data		
	Type	Order No.	Pcs. / Pkt.	Type	Order No.	Pcs. / Pkt.
MPI adapter for coupling to the programming interface of a Siemens SIMATIC® S7-300/400 controller	PSI-MPI/RS232-PC	2313148	1			
Programming set, for remote monitoring of Siemens-SIMATIC® S7-300/400 controllers, comprising pre-configured analog modem, V.24 (RS-232) cable, and MPI adapter				PSI-MODEM-MPI-SET1	2313261	1

Interface converter and SHDSL surge protection

Interface converter

Makes it possible to switch over to a second terminal device with a V.24 (RS-232) interface

SHDSL surge protection

Surge protection for broadband communication devices

Interface converter

SHDSL surge protection

Description	Ordering data			Ordering data		
	Type	Order No.	Pcs. / Pkt.	Type	Order No.	Pcs. / Pkt.
Interface converter for switching between two V.24 (RS-232) interfaces	PSI-MODEM-SPLITTER	2708766	1			
V.24 (RS-232) flat-ribbon connecting cable between the modem and the PSI-MODEM-SPLITTER	PSI-CA-MODEM-SPLITTER	2311425	1			
DATATRAB, surge protection for two signal pairs of the analog and digital (DSL) telecommunication interface				DT-TELE-RJ45	2882925	1

Bluetooth interface converter for V.24 (RS-232), RS-422, RS-485 2-wire

Bluetooth

Bluetooth converter, universal for V.24 (RS-232), RS-422, RS-485 2-wire

Applications:

The Bluetooth converter is used to convert V.24 (RS-232), RS-422, and RS-485 2-wire or USB interfaces to the license-free Bluetooth wireless standard. It serves as a straightforward and flexible substitute for a cable in order, for example, to perform programming/diagnostics tasks via a notebook or as a cost-effective alternative to slip rings, drag chains or fieldbus cables, such as Modbus, PROFIBUS, etc.

Topology:

– Point-to-point
– Multipoint with up to seven slaves

Features:

Flexible parameterization/application options:

– Suitable for worldwide use thanks to adjustable transmission power (-28 … 20 dBm)
– Can be used for V.24 (RS-232)/ RS-422/RS-485-2 2-wire interfaces up to 187.5 kbps
– Transceiver for distances of up to 150 m

High transmission reliability:

– Secure and tamper-proof data transmission thanks to password protection, encryption, plus fixed and invisible device pairing
– Coexistence with other wireless systems thanks to adaptive frequency hopping (AFH) method

Easy installation:

– Wireless path diagnostics based on integrated bar graphs and 2 digital outputs
– Installation of parallel wireless paths thanks to 24 V DC and RS-485 cross-wiring
– Local configuration via USB interface without separate power supply unit

Technical data

Supply	
Supply voltage	10 V DC ... 30 V DC (via COMBICON plug-in screw terminal block)
Supply voltage	19 V AC ... 29 V AC (via COMBICON plug-in screw terminal block)
Supply voltage	24 V DC ±20% (alternative or redundant, via backplane bus contact and system power supply)
Nominal current consumption	≤ 100 mA (24 V DC)
Serial port	
Interfaces	V.24 (RS-232), RS-422, RS-485 2-wire
Connection method	D-SUB-9 connector
Transmission speed	300, 1200, 2400, 4800, 7200, 9600, 19200, 31250, 38400, 57600, 75000, 93750, 115200, 136000, 187500 bps
Wireless interface	
Antenna connection	External
Transmission power	-28 dBm to 20 dBm (adjustable)
Receiver sensitivity	-83.00 dBm
Frequencies	2.402 GHz ... 2.48 GHz (ISM bandwidth)
Range depending on spatial conditions	20 dBm (100 mW) = 80 m to 150 m
Bluetooth multi-drop master/slave	1/7
General data	
Ambient temperature (operation)	-20°C ... 60°C
Electromagnetic compatibility	Conformance with R&TTE Directive 1999/5/EC
Dimensions W / H / D	22.5 mm / 99 mm / 114.5 mm

Ordering data

Description	Type	Order No.	Pcs. / Pkt.
PSI Bluetooth converter, MCX connection for external antenna, **supplied as standard**: PSI Bluetooth converter, CD containing configuration software			
- Device with 2x diagnostic outputs	**PSI-WL-RS232-RS485/BT/2DO**	**2313805**	1
- Device with HazLoc approval	**PSI-WL-RS232-RS485/BT/HL**	**2313795**	1
PSI Bluetooth PROFIBUS-SET,supplied as standard: 2x PSI Bluetooth converters, 2x omnidirectional antenna			
PSI Bluetooth MPI-SET, scope of supply: 1x PSI-Bluetooth converter, 1x omnidirectional antenna 1x PSI-MPI/V.24 (RS-232) adapter, 1x V.24 (RS-232) cable			
PSI Bluetooth V.24 (RS-232) adapter, internal antenna. **Supplied as standard:** PSI Bluetooth V.24 (RS-232) adapter, CD containing configuration software			
PSI Bluetooth USB adapter, internal antenna. **Supplied as standard:** PSI Bluetooth USB adapter, CD containing driver, configuration software			

Accessories

V.24 (RS-232) D-SUB cable, length: 2 m			
- 9-pole socket on 9-pole socket	**PSM-KA9SUB9/BB/2METER**	**2799474**	1
Omnidirectional antenna	**RAD-ISM-2400-ANT-OMNI-2-1**	**2867461**	1
PANEL directional wireless antenna (without cable)	**RAD-ISM-2400-ANT-PAN- 8-0**	**2867610**	1
Antenna adapter cable	**RAD-PIG-EF316-MCX-SMA**	**2867678**	1
System power supply unit, primary-switched	**MINI-SYS-PS-100-240AC/24DC/1.5**	**2866983**	1
TBUS DIN rail connector	**ME 22,5 TBUS 1,5/ 5-ST-3,81 GN**	**2707437**	50
1.5 m separate DC cable, to supply the PSI-Bluetooth V.24 (RS-232) adapter from an external 5 V DC source			
Adapter set with 0.5 m cable, to supply the PSI Bluetooth V.24 (RS-232) adapter from a USB or PS2 interface			

Bluetooth sets, pre-configured for PROFIBUS connections or access to MPI adapter

Bluetooth V.24 (RS-232) adapter

Bluetooth USB adapter

Technical data

10 V DC ... 30 V DC (via COMBICON plug-in screw terminal block)	4 V DC ... 6 V DC (via 3-pole device connector, using adapter set)	-
19 V AC ... 29 V AC (via COMBICON plug-in screw terminal block)	-	-
24 V DC ±20% (alternative or redundant, via backplane bus contact and system power supply)	5 V DC ±20% (via 3-pole device connector, using adapter set)	5 V DC (directly via the USB interface)
≤ 100 mA (24 V DC)	70 mA (5 V DC)	100 mA (5 V DC)
Pre-configured COMBICON screw terminal block Pre-configured	V.24 (RS-232) D-SUB-9 female connector 300, 1200, 2400, 4800, 7200, 9600, 19200, 31250, 38400, 57600, 75000, 93750, 115200 bps	USB 2.0 USB type A, male connector Up to 2.1 Mbps
External 20 dBm -83.00 dBm 2.402 GHz ... 2.48 GHz (ISM bandwidth) 20 dBm (100 mW) = 80 m to 150 m -	Internal 0 dBm -75.00 dBm 2.402 GHz ... 2.48 GHz (ISM bandwidth) 0 dBm (1 mW) = 10 m to 30 m 1/3	Internal 20 dBm -80.00 dBm 2.402 GHz ... 2.48 GHz (ISM bandwidth) 20 dBm (100 mW) = 80 m to 150 m -
-20°C ... 60°C Conformance with R&TTE Directive 1999/5/EC 22.5 mm / 99 mm / 114.5 mm	-20°C ... 60°C Conformance with R&TTE Directive 1999/5/EC 52 mm / 60.5 mm / 16 mm	0°C ... 70°C Conformance with R&TTE Directive 1999/5/EC 18 mm / 58 mm / 8 mm

Ordering data

Type	Order No.	Pcs. / Pkt.
PSI-WL-PROFIB/BT-SET/2DO	**2313876**	1
PSI-WL-MPI/BT-SET	**2313562**	1

Type	Order No.	Pcs. / Pkt.
PSI-WL-PLUG-RS232/BT	**2708494**	1

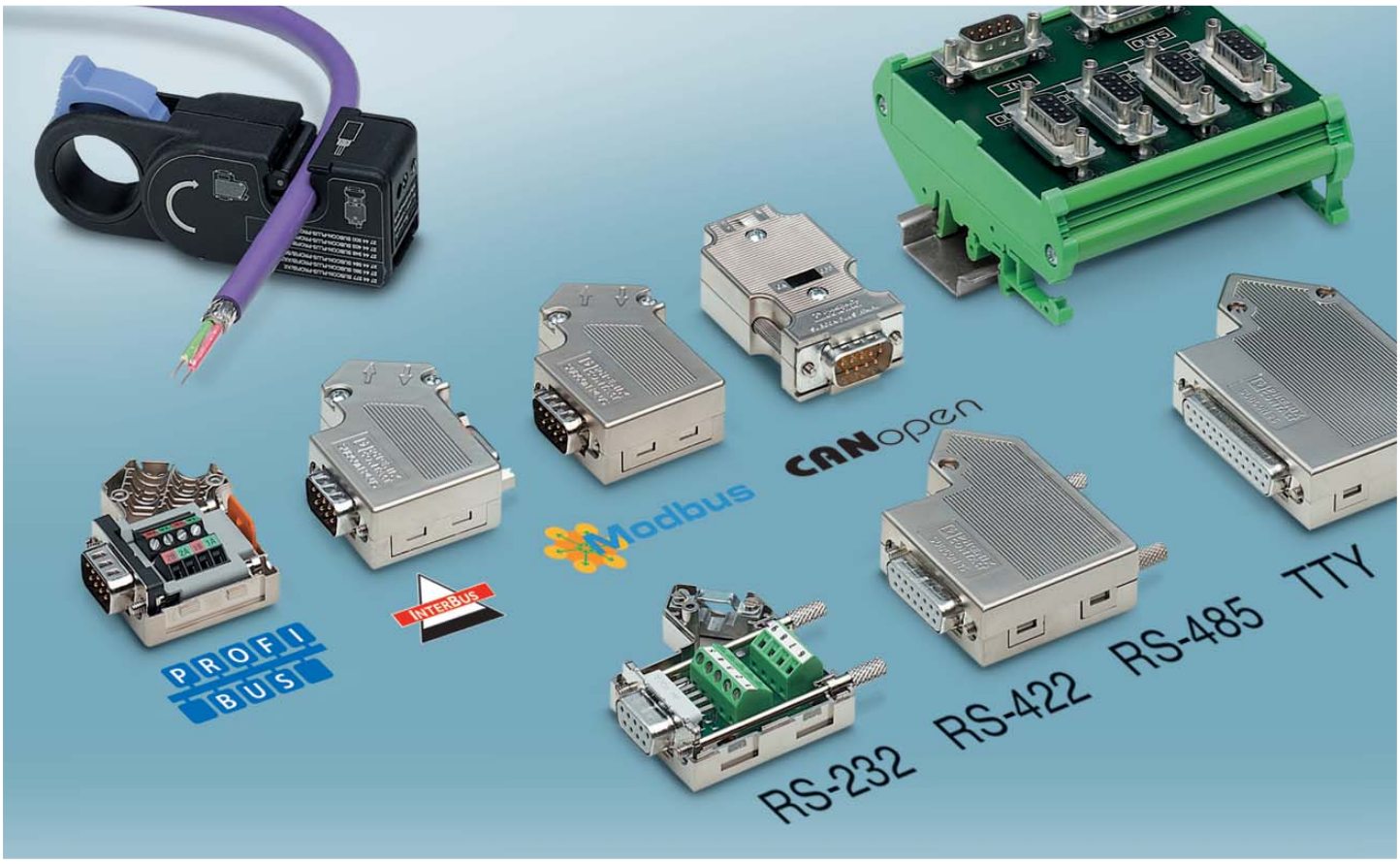
Type	Order No.	Pcs. / Pkt.
PSI-WL-PLUG-USB/BT	**2313083**	1

Accessories

MINI-SYS-PS-100-240AC/24DC/1.5	**2866983**	1
ME 22,5 TBUS 1,5/ 5-ST-3,81 GN	**2707437**	50

PSM-VLTG/1,5METER	**2787460**	1
PSM-VLTG-USB/PS2/0,5	**2708025**	1

SUBCON.../SUBCON-PLUS...
D-SUB fast connection connector



Convenient connection technology

An idea has taken hold - absolutely no soldering or crimping tools: The D-SUB connectors, SUBCON… can be connected quickly and conveniently in field conditions. The connector contacts are clearly routed onto consecutively numbered screw terminal blocks. This means clarity during wiring and it simplifies every startup.

High EMC shielding effect

The connector range SUBCON-…, trimmed to the smallest dimensions, provides excellent shielding against EMC influences in industrial environments by virtue of its metallic housing.

Optional cable infeed

The connection block can be inserted in either the upper or lower shell. This allows the cable to be fed in at 0° to 90° from right or left.

This allows on-site configuration of the cable infeed and requires only an order number with the order.

A wide product range

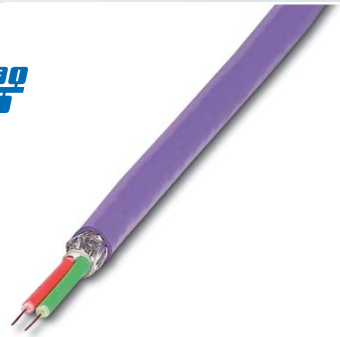
Irrespective of whether the application requires 9, 15 or 25-pole connectors with one or two cable entries for point-to-point or RS-485 bus connections, a suitable version is available for each and every application. Optimized designs for PROFIBUS, CANopen, and SafetyBUS p with the right cables and tools complete the comprehensive range.

Customer-specific solutions

Does your application need an exclusive solution? We would be pleased to provide you with an offer using our know-how. Of course, space can be made for your own company logo in the plastic parts.

PROFIBUS cables and fast connection tool for SUBCON-PLUS-PROFIBUS

If the Fast Connect cable PSM-CABLE-PPROFIB/FC is used, work is reduced to a minimum by using the quick stripping tool, **PSM-STRIP-FC/PROFIB**:
– Strip cables and individual wires
– Insert them into the connector, and
– Close the housing cover

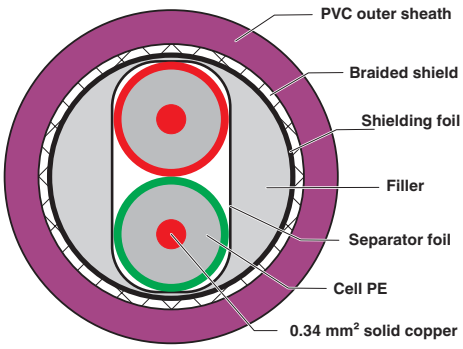


PROFIBUS cable, type Fast Connect

Quick stripping tool for SUBCON-PLUS-PROFIBUS connectors

	Technical data	Technical data
Cable cross section (max./min.)	8.4 mm / 7.6 mm	-
Ambient temperature (operation)	-40°C ... 60°C	-
Loop resistance	≤ 110 Ω (per kilometer)	-
Working capacitance	28.5 nF (per kilometer)	-
Wave impedance	150 Ω ±15%	-
Conductor	Solid copper wire, bare	-
Cross section	0.34 mm² / AWG 22	-
Outer sheath, material	PVC FR VI	-
External sheath, color	Violet	-
Behavior in fire	Flame-resistant as per IEEE and IEC 60 332-3 test type C	-
Resistance to oil	Limited resistance to mineral oils and greases	-
Cable type	PROFIBUS in acc. with IEC 61158, Type A	-
Operations per knife block	-	PVC cable: max. 3000 per knife block
	-	PUR cable: max. 300 per knife block

Description	Ordering data: Type	Order No.	Pcs. / Pkt.	Ordering data: Type	Order No.	Pcs. / Pkt.
PROFIBUS cable, Fast Connect type, up to 12 Mbps, for permanent connection (02YSY (ST)CY 1X2X22 AWG) (Length in meters as per customer specifications)	**PSM-CABLE-PROFIB/FC**	**2744652**	1			
Quick stripping tool for PROFIBUS cable, Fast Connect type				**PSM-STRIP-FC/PROFIB**	**2744623**	1
	Accessories			**Accessories**		
Spare knife block for quick stripping tool				**PSM-STRIP-KNIFEBLOCK**	**2744636**	1
Stripping tool, for conductors and cables black	**QUICK WIREFOX 6**	**1204384**	1	**QUICK WIREFOX 6**	**1204384**	1



SUBCON-PLUS-PROFIBUS
D-SUB fast connection

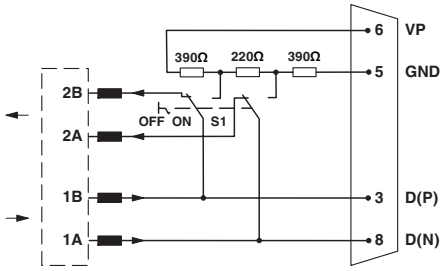
PROFIBUS connectors with fast connection

The D-SUB series SUBCON-PLUS-PROFIB/... and D-UFB-PB have been specially designed for use in PROFIBUS systems up to 12 Mbps. Under field conditions, they allow convenient and fast connection of the incoming and outgoing bus cable. The series includes six fast connection connectors - the perfect solution for every PROFIBUS application:

– 35° and 90° angled cable entry
– Axial cable entry
– With an additional programming interface
– Or with integrated surge protection

The connectors can be used for PROFIBUS cables with solid as well as with stranded copper wires (…FC 90 only for solid conductors. For permissible cable types, see the data sheet). The termination resistor is already integrated in all versions. It can be connected externally by means of a slide switch. At the same time, the outgoing bus segment is switched off. This makes it easy to start up segment by segment while incorrect terminations are avoided. In addition, the connector housing with high-quality shielding guarantees high immunity to interference even at maximum transmission speeds. A special feature of the 35° angled connector is that the internal connection unit can be turned round. Whether the cable is to be inserted from the right or left can therefore be decided on site. If it is not possible to use the angled version, the SUBCON-PLUS.../AX compact connector with axial cable entry can be used instead. The connectors have been designed for all standard PROFIBUS cables with an outside diameter of 8 mm (type A and B).

For details of a 35° connector with integrated surge protection, see designation D-UFB-PB in the TRABTECH catalog.



Functional diagram of the connector range SUBCON-PLUS-PROFIB/...

35° PROFIBUS connector, screw connection, reversible cable entry

Technical data

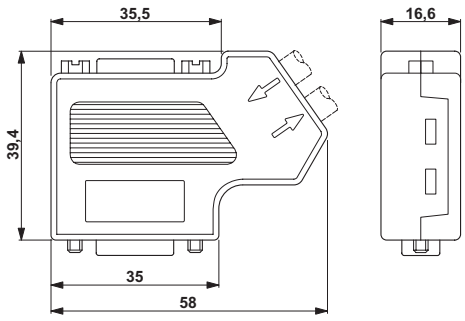
Cable entry	either left or right
Pin assignment	3, 5, 6, 8
Connection cross section solid / stranded / AWG	0.14 - 1.5 mm² / 0.14 - 1 mm² / 26 - 16
Insertion/withdrawal cycles	> 200
Cable cross section (max./min.)	8.4 mm / 7.6 mm
Ambient temperature (operation)	-20°C ... 75°C
Degree of protection	IP40
Housing material	ABS, metal-plated
Termination resistor	390 Ω - 220 Ω - 390 Ω (switchable)
SUBCON fixing	4-40 UNC 0.4 Nm

Ordering data

Description	Type	Order No.	Pcs. / Pkt.
PROFIBUS connector, up to 12 Mbps, integrated termination resistor which can be activated externally, 9-pole male connector, pin assignment 3, 5, 6, 8			
- Angled 35°, screw connection	**SUBCON-PLUS-PROFIB/SC2**	**2708232**	1
- Angled 35°, screw connection with second D-SUB female connector	**SUBCON-PLUS-PROFIB/PG/SC2**	**2708245**	1
- Angled 90°, screw or IDC connection			
- Angled 90°, screw or IDC connection with second 9-pole D-SUB female connector			
- Axial cable entry, screw connection			

Accessories

PROFIBUS cable, Fast Connect type, up to 12 Mbps, for permanent connection (02YSY (ST)CY 1X2X22 AWG) (Length in meters as per customer specifications)	**PSM-CABLE-PROFIB/FC**	**2744652**	1
Quick stripping tool for PROFIBUS cable, Fast Connect type	**PSM-STRIP-FC/PROFIB**	**2744623**	1
Stripping tool, for conductors and cables	**QUICK WIREFOX 6**	**1204384**	1
Screwdriver	**SZF 0-0,4X2,5**	**1204504**	10
Screwdriver	**SZK PH1 VDE**	**1205150**	10



90° PROFIBUS connector, screw connection

90° PROFIBUS connector, IDC insulation displacement connection method

Axial PROFIBUS connector, screw connection

Technical data

Left
3, 5, 6, 8
0.14 - 1.5 mm² / 0.14 - 1 mm² / 26 - 16
> 200
8.4 mm / 7.6 mm
-20°C ... 75°C
IP40
ABS, metal-plated
390 Ω - 220 Ω - 390 Ω (switchable)
4-40 UNC 0.4 Nm

Ordering data

Type	Order No.	Pcs. / Pkt.
SUBCON-PLUS-PROFIB/90/SC	2313698	1
SUBCON-PLUS-PROFIB/90/PG/SC	2313708	1

Accessories

PSM-CABLE-PROFIB/FC	2744652	1
PSM-STRIP-FC/PROFIB	2744623	1
QUICK WIREFOX 6	1204384	1
QUICK WIREFOX 6	1204384	1
SZF 0-0,4X2,5	1204504	10

Technical data

Left
3, 5, 6, 8
0.32 - 1 mm² / 0.32 - 1 mm² / 22 - 17
> 200
8.4 mm / 7.6 mm
-20°C ... 75°C
IP40
ABS, metal-plated
390 Ω - 220 Ω - 390 Ω (switchable)
4-40 UNC 0.4 Nm

Ordering data

Type	Order No.	Pcs. / Pkt.
SUBCON-PLUS-PROFIB/90/IDC	2313672	1
SUBCON-PLUS-PROFIB/90/PG/IDC	2313685	1

Accessories

PSM-CABLE-PROFIB/FC	2744652	1
PSM-STRIP-FC/PROFIB	2744623	1
QUICK WIREFOX 6	1204384	1
QUICK WIREFOX 6	1204384	1
SZK PH1 VDE	1205150	10

Technical data

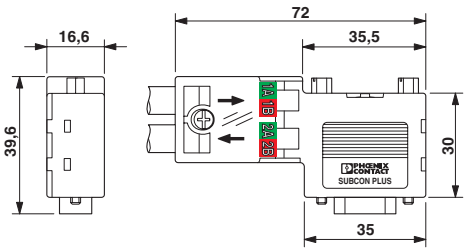
Axial
3, 5, 6, 8
0.14 - 1.5 mm² / 0.14 - 1 mm² / 26 - 16
> 200
8.4 mm / 7.6 mm
-20°C ... 75°C
IP40
ABS, metal-plated
390 Ω - 220 Ω - 390 Ω (switchable)
4-40 UNC 0.4 Nm

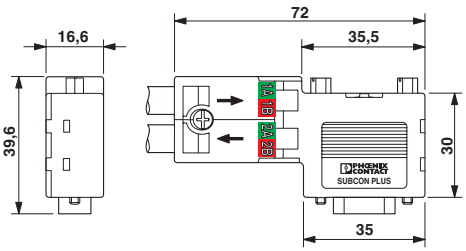
Ordering data

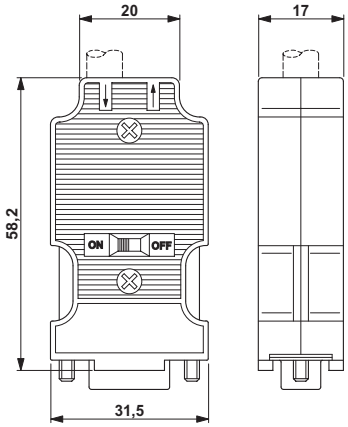
Type	Order No.	Pcs. / Pkt.
SUBCON-PLUS-PROFIB/AX/SC	2744380	1

Accessories

PSM-CABLE-PROFIB/FC	2744652	1
PSM-STRIP-FC/PROFIB	2744623	1
QUICK WIREFOX 6	1204384	1
SZF 0-0,4X2,5	1204504	10
SZK PH1 VDE	1205150	10







SUBCON-PLUS-CAN
D-SUB fast connection connector

The SUBCON-PLUS-CAN/... D-SUB series is specially designed for use in CAN systems. Under field conditions, it enables the quick and easy connection of the incoming and outgoing bus cable.

The termination resistor is already integrated in all versions. It can be connected externally by means of a slide switch. At the same time, the outgoing bus segment is switched off. This makes it easy to start up segment by segment while incorrect terminations are avoided. In addition, the connector housing with high-quality shielding guarantees high immunity to interference even at maximum transmission speeds.

A special feature of the angled plug is that the internal connection unit can be turned round. Whether the cable is to be inserted from the right or left can therefore be decided on site. If it is not possible to use the angled design, a compact connector with axial cable entry is available with the SUBCON-PLUS-CAN/AX type.

Features:
- Assembly under field conditions
- Separate terminal blocks for bus cables
- Termination resistor can be connected
- Segment-by-segment startup
- High transmission speed
- High level of EMC
- Flexibility in terms of cable entry selection
- Suitable for bus cables as per the CiA Draft Recommendation 303-1 with an outside diameter of 8 mm
- For special cables, there is a version with a variable cable entry

Versions:
- Angled with programming interface
- Angled without programming interface
- Axial cable entry

35° D-SUB connector (female), screw connection, two cable entries

Technical data

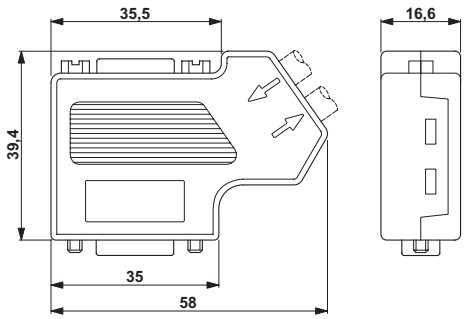
Cable entry	either left or right
Pin assignment	2, 3, 6, 7, 9
Nominal voltage U_N	60 V AC/DC
Nominal current I_N	1 A
Connection cross section solid / stranded / AWG	0.14 - 1.5 mm² / 0.14 - 1 mm² / 26 - 16
Insertion/withdrawal cycles	> 200
Cable cross section (max./min.)	8.4 mm / 7.6 mm
Ambient temperature (operation)	-20°C ... 75°C
Degree of protection	IP40
Housing material	ABS, metal-plated
Termination resistor	-
SUBCON fixing	4-40 UNC 0.4 Nm

Ordering data

Description	Type	Order No.	Pcs. / Pkt.
CAN, CANopen, SafetyBUS p connector, integrated termination resistor that can be activated from the outside, with screw connection, 9-pole, socket, pin assignment 2, 3, 6, 7, 9			
- 35° angled	**SUBCON-PLUS-CAN/SC2**	**2708999**	1
- Angled 35°, with second D-SUB connection	**SUBCON-PLUS-CAN/PG**	**2708119**	1
- Angled 35°, for variable cable diameters			
CAN, CANopen, SafetyBUS p connector, integrated termination resistor that can be activated from the outside, with screw connection, 9-pole, socket, pin assignment 2, 3, 7			
- axial cable entry			

Accessories

Screwdriver	**SZS 0,4X2,5 VDE**	**1205037**	10



35° D-SUB connector (female), variable cable diameter

Axial D-SUB connector (female), two cable entries

Technical data	
either left or right	-
2,3,7	2, 3, 7
60 V AC/DC	60 V AC/DC
1 A	1 A
0.14 - 1.5 mm² / 0.14 - 1 mm² / 26 - 16	0.14 - 1.5 mm² / 0.14 - 1 mm² / 26 - 16
> 200	> 200
10 mm / 6 mm	8.4 mm / 7.6 mm
-20°C ... 75°C	-20°C ... 75°C
IP40	IP40
ABS, metal-plated	ABS, metal-plated
-	-
4-40 UNC 0.4 Nm	4-40 UNC 0.4 Nm

Ordering data

Type	Order No.	Pcs. / Pkt.
SUBCON-PLUS-CAN	2744694	1

Ordering data

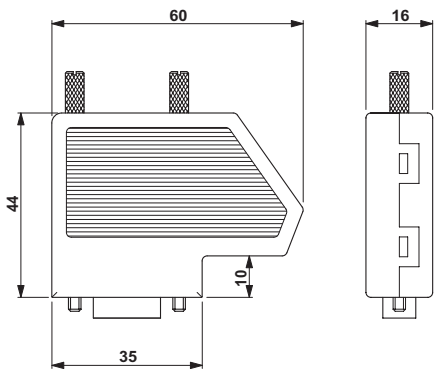
Type	Order No.	Pcs. / Pkt.
SUBCON-PLUS-CAN/AX	2306566	1

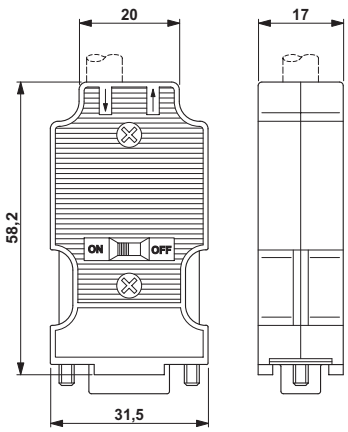
Accessories

SZS 0,4X2,5 VDE	1205037	10

Accessories

SZS 0,4X2,5 VDE	1205037	10





SUBCON-PLUS
D-SUB fast connection connector

Field bus connector with screw connection

Two cable infeeds are often required on the D-SUB connectors used in order to build fieldbus systems with RS-485 interfaces. The SUBCON-PLUS connectors range fulfills this requirement and routes the connection to screw terminal blocks – however, duplicated – for two cables. This means clarity during wiring and it simplifies every startup. These connectors are of course also shielded against EMC influences with a metallized housing. In addition, by placing the connection block in either the upper or lower shell, it is possible to select the cable infeed on site from the right or left .

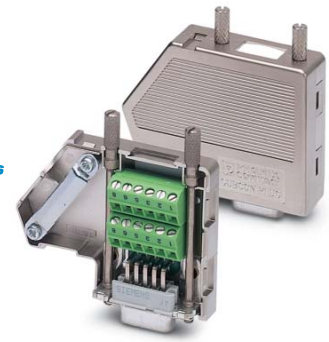
Features:

- For universal use
- Assembly under field conditions
- Separate terminal blocks for each cable
- High transmission speed
- High level of EMC
- Flexibility in terms of cable entry selection
- Straightforward assembly thanks to knurled screws

Versions:

- Bus-specific types with matching partial assignment
- Universal type with full assignment
- Short mounting screw as an accessory for when space is at a premium

RS-485



With two cable entries

Technical data

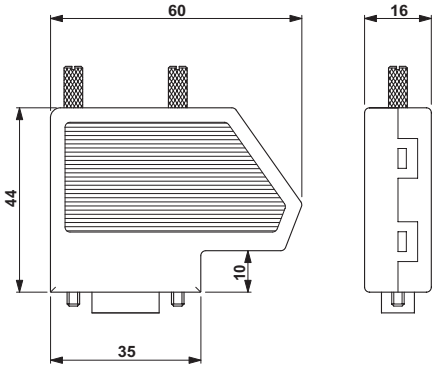
Cable entry	either left or right
Nominal voltage U_N	60 V AC/DC
Nominal current I_N	1 A
Connection cross section solid / stranded / AWG	0.14 - 1.5 mm² / 0.14 - 1 mm² / 26 - 16
Insertion/withdrawal cycles	> 200
Cable cross section (max./min.)	10 mm / 6 mm
Ambient temperature (operation)	-20°C ... 75°C
Degree of protection	IP20
Housing material	ABS, metal-plated
SUBCON fixing	4-40 UNC 0.4 Nm

Ordering data

Description	Type	Order No.	Pcs. / Pkt.
D-SUB connector, with **two** cable entries for MODBUS, MODBUS-PLUS, BITBUS, ARCNET, MULT/MININET (B&R), SYSTEM 2003 (B&R), P-NET, pin assignment 1,2,3,5,6,8			
- 9-pole, pin	**SUBCON-PLUS M1**	**2761826**	1
- 9-pole, socket	**SUBCON-PLUS F1**	**2744267**	1
D-SUB connector, with **two** cable entries for SUCONET K1, K2 (EATON/Moeller), S-BUS (Saia), J-BUS (Merlin Gerin), pin assignment 2, 3, 4, 5, 7, 9			
- 9-pole, pin	**SUBCON-PLUS M2**	**2761839**	1
- 9-pole, socket	**SUBCON-PLUS F2**	**2799490**	1
D-SUB connector, with **two** cable entries for MODBUS, CEGELEC, pin assignment 1,1,2,3,6,7			
- 9-pole, socket	**SUBCON-PLUS F5**	**2744102**	1
D-SUB connector, with **two** cable entries, **universal type**, pin assignment 1,2,3,4,5,6,7,8,9 on **every** screw terminal block			
- 9-pole, pin	**SUBCON-PLUS 9/M**	**2744018**	1
- 9-pole, socket	**SUBCON-PLUS 9/F**	**2744241**	1

Accessories

Optional mounting screw, short (without knurl)	**SUBCON-SHORT-SCREW**	**2799694**	1
Screwdriver	**SZS 0,4X2,5 VDE**	**1205037**	10



Dimensional drawing SUBCON-PLUS...

SUBCON
D-SUB fast connection connector

The 9-pole version of the SUBCON-... connector range is not just suitable for INTERBUS, but is positively ideal. A whole host of further applications are opened up by having all the connections assigned to their own 1 mm² screw terminal block.

The range covers SUBCON connectors for point-to-point connections with a cable infeed in 9, 15, and 25-pole male or female versions.

Installing the connection block either in the upper or lower shell makes it possible to introduce the cable at an angle of 0° to 90° from the right or the left. The completely metallized housing also ensures a high degree of shielding against EMC influences.

The optional fastening screw SUBCON-SHORT-SCREW is available as an accessory for narrow installation conditions. The screw is completely integrated into the housing by not having a knurl.

Features:
- For universal use
- Assembly under field conditions
- High level of EMC
- Flexibility in terms of cable entry selection
- Straightforward assembly thanks to knurled screws

Versions:
- 9-, 15-, and 25-pole versions
- Short mounting screw as an accessory for when space is at a premium

RS-232

RS-422

With one cable entry

Technical data

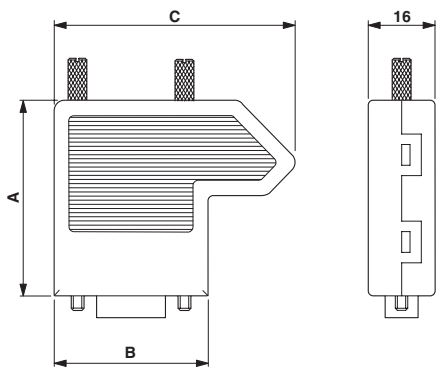
Cable entry	either left or right
Pin assignment	All connections are 1:1 on the screw terminal block
Nominal voltage U_N	60 V AC/DC
Nominal current I_N	1 A
Connection cross section solid / stranded / AWG	0.14 - 1.5 mm² / 0.14 - 1 mm² / 26 - 16
Insertion/withdrawal cycles	> 200
Cable cross section (max./min.)	10 mm / 4 mm
Ambient temperature (operation)	-20°C ... 75°C
Degree of protection	IP20
Housing material	ABS, metal-plated
SUBCON fixing	4-40 UNC 0.4 Nm

Ordering data

Description	Type	Order No.	Pcs. / Pkt.
D-SUB connector, with screw connection			
- 9-pole, socket	**SUBCON 9/F-SH**	**2761499**	1
- 9-pole, pin	**SUBCON 9/M-SH**	**2761509**	1
D-SUB connector, with screw connection			
- 15-pole, socket	**SUBCON 15/F-SH**	**2761596**	1
- 15-pole, pin	**SUBCON 15/M-SH**	**2761606**	1
D-SUB connector, with screw connection			
- 25-pole, socket	**SUBCON 25/F-SH**	**2761619**	1
- 25-pole, pin	**SUBCON 25/M-SH**	**2761622**	1

Accessories

Optional mounting screw, short (without knurl)	**SUBCON-SHORT-SCREW**	**2799694**	1
Screwdriver	**SZS 0,4X2,5 VDE**	**1205037**	10



Dimensional drawing SUBCON...-SH

Dimensions [mm] of the D-SUB connectors (SUBCON)

	A	B	C
9-pos.	44.5	36.0	56.4
15-pos.	44.5	44.3	64.7
25-pos.	49.5	58.0	78.7

V.24 (RS-232) cables

A permanent cause of annoyance are the two connection standards, 9 and 25-pole for the V.24 (RS-232) interface. The pluggable "9 to 25-pos." D-SUB adapters solve the problem without complicated resoldering of the cable connections.

The 0.5 and 2 meter standard V.24 (RS-232) cables can be used to connect the rail-mountable control cabinet modules. Individual lengths can be created quickly and simply with the screw-type D-SUB plug, SUBCON.

Null modem adapter

In order to connect two V.24 (RS-232) interfaces of the same type, the zero modem connector crosses the data and control lines.

Thanks to the small "Gender Changer" type, it can be plugged at any interface directly and thus does not change the existing connector design through the socket/connector combination.

V.24 (RS-232) connecting cable

Description	Ordering data: Type	Order No.	Pcs. / Pkt.
V.24 (RS-232) D-SUB cable, length: 0.5 m - 9-pole socket on 9-pole socket	PSM-KA9SUB9/BB/0,5METER	2708520	1
V.24 (RS-232) D-SUB cable, length: 2 m - 9-pole socket on 9-pole socket	PSM-KA9SUB9/BB/2METER	2799474	1
V.24 (RS-232) D-SUB cable, length: 2 m - 9-pole socket on 25-pole socket	PSM-KA 9 SUB 25/BB/2METER	2761059	1
Accessories			
V.24 (RS-232) null modem adapter - 9-pole female connector to 9-pole male connector	PSM-AD-D9-NULLMODEM	2708753	1
D-SUB gender changer			
- 9-pole, male/male	VS-09-GC-ST/ST	1652651	10
- 9-pole, female/female	VS-09-GC-BU/BU	1688722	10
- 25-pole, male/male	VS-25-GC-ST/ST	1652693	10
- 25-pole, female/female	VS-25-GC-BU/BU	1652680	10

USB cable adapter

Two adapter cables with a length of 1 m and 3 m are available for connecting controllers, PCs, and other automation devices with USB-A connections to devices with Mini-USB-B connections.

USB cable (USB-A to mini-USB)

Description	Ordering data: Type	Order No.	Pcs. / Pkt.
USB cable, from USB-A to Mini-USB-B, 5-pole - Length: 1 m	PSI-CA-USB A/MINI B/1METER	2313575	1
Connecting cable (single) for configuration of the PSR-TRISAFE system - Length: 3 m	CABLE-USB/MINI-USB-3,0M	2986135	1
Accessories			
V.24 (RS-232) null modem adapter - 9-pole female connector to 9-pole male connector	PSM-AD-D9-NULLMODEM	2708753	1

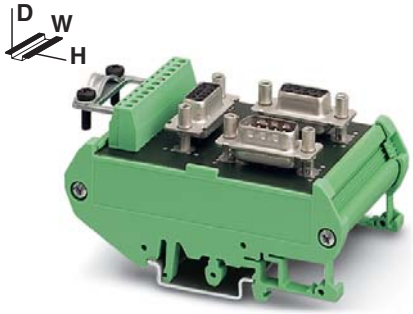
RS-485 connection distributor

If spur connections or a star distribution are to be made in a bus system, the RS-485 connection distributors come to your aid.

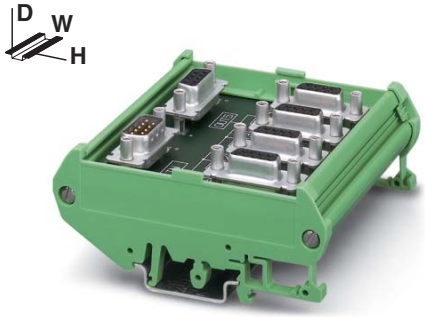
PSM-PTK, the DIN rail-mountable T-adapter equipped with three 9-pole 1:1 connected D-SUB connections, makes for clear and tidy wiring with just one spur connection.

As many as four branch lines can be picked off from one bus line in the PSM-PTK 4 version. Here too, all six D-SUB connections (9-pole) are connected through 1:1. Both versions are mounted by snapping them onto conventional EN DIN rails.

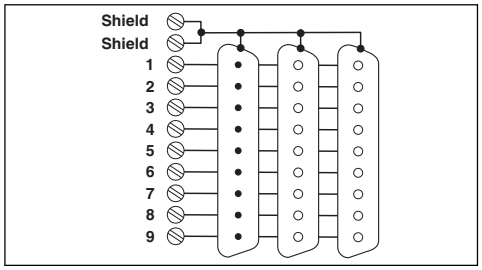
Maximum permissible branch lengths per segment, refer to page 472.

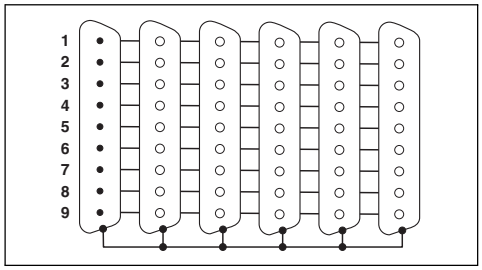


RS-485 T-distributor (4-way), D-SUB and screw connection



RS-485 T-distributor (6-way), D-SUB connection





		Technical data	Technical data
Plug connection	Incoming	D-SUB-9 male connector	D-SUB-9 male connector
	Outgoing	D-SUB-9 female connector	D-SUB-9 female connector
	Branching	D-SUB-9 female connector	4 x D-SUB-9 socket
		1 x 11-pos. PCB terminal block	-
Nominal voltage U_N		60 V AC/DC	60 V AC/DC
Nominal current I_N		1 A	1 A
Test voltage		500 V AC (50 Hz, 1 min, rms)	500 V AC (50 Hz, 1 min, rms)
Shield connection		D-SUB frame or shield connector	D-SUB frame
Screw connection	solid	0.14 mm² - 1 mm²	-
	stranded	0.14 mm² - 1.5 mm²	-
	AWG	26 - 16	-
Torque		0.4 Nm	-
Ambient temperature (operation)		-20°C ... 50°C	-20°C ... 50°C
Housing material		PVC	PVC
Pin assignment		all 1:1	all 1:1
Dimensions W / H / D		56 mm / 89.6 mm / 48 mm	89.8 mm / 89.6 mm / 39 mm

Ordering data

Description	Type	Order No.	Pcs. / Pkt.
Passive RS-485 T-distributor, fitted with a 9-pole D-SUB male connector and **two** 9-pole D-SUB female connectors, as well as a 9-pos. PCB terminal block with shield connector	**PSM PTK**	**2760623**	1
Passive RS-485 T-distributor, fitted with one 9-pole D-SUB male connector and **five** 9-pole D-SUB female connectors	**PSM PTK-4**	**2799364**	1

Accessories

Screwdriver	**SZS 0,4X2,5 VDE**	**1205037**	10

Output DC
24V 0.75A
PHOENIX CONTACT
DC OK
STEP POWER
OUT DC 24V 1.3A
MINI POWER
IN AC 100-240V
L(+) NC NC N(-)
Output DC
24V 2.5A
DC OK
Adjust
22.5-29.5V
PHOENIX CONTACT
TRIO POWER
Input AC
100-240V
Output DC 24V 3.5A
PHOENIX CONTACT
Boost
DC OK
18-29.5 V
QUINT POWER

INTERFACE Power Supply

Power supply units

QUINT POWER
For maximum availability in plant and special engineering contexts
TRIO POWER
Basic functionality at the highest level for standard machine production
MINI POWER
Modular electronic housing for MCR technology
STEP POWER
Maximum energy efficiency for building automation

QUINT POWER	TRIO POWER	MINI POWER	STEP POWER	Select your power supply unit here
✓	✓	✓	✓	**Worldwide application** thanks to wide-range input and international approval package
✓	✓	✓	✓	**High level of operational reliability** thanks to high MTBF > 500,000 h
✓	✓	✓	✓	**Parallel connection possible** for increased performance and redundancy
✓	✓	✓	✓	**Simplified startup** thanks to LED function monitoring
✓	✓	✓	✓	**Compensation of voltage drops** and recharging of batteries based on adjustable output voltage
✓	✓	✓	✓	**High level of operational reliability** thanks to long mains buffering times > 20 ms
✓	✓	✓	✓	**Outdoor installation permitted** thanks to wide temperature range
✓		✓		**Easy-to-maintain connection method** with COMBICON plug-in connectors (up to and including 10 A)
✓	✓			**Efficient function** of 3-phase devices even if one phase fails permanently
✓		✓		**Active function monitoring** by means of switching output for remote diagnostics
✓		✓		**Reliable starting of difficult loads** with POWER BOOST power reserve
✓				**Preventive function monitoring** warns against critical operating states before errors occur
✓				**Quick tripping of circuit breakers** thanks to SFB technology

Product range overview

Product overview 580

Power supply units

QUINT POWER
– 1 AC / 24 V DC 582
– 3 AC / 24 V DC 584
– 1 AC / 12 V DC, 48 V DC 586
– 3 AC / 48 V DC 588
– 1 AC / 24 V DC, dip-coated 624
– For AS-Interface systems 589

TRIO POWER
– 1 AC / 24 V DC 590
– 3 AC / 24 V DC 592
– 1 AC / 12 V DC, 48 V DC 594
– 600 V DC / 24 V DC 594

MINI POWER
– 1 AC / 24 V DC 596
– 1 AC / 5 V DC, 10-15 V DC, ±15 V DC 598
– 1 AC / 24 V DC, dip-coated 625

STEP POWER
– 1 AC / 24 V DC 600
– 1 AC / 12 V DC 605
– 1 AC / 5 V DC, 15 V DC, 48 V DC 604
– 48 V AC / 24 V DC 600

DC/DC converters
– QUINT POWER, 24 V DC / 24 V DC, 12 V DC, 48 V DC 608
– MINI POWER, AC power terminal block 611
– MINI POWER, 12-24 V DC / 24 V DC, 12 V DC, 48 V DC 610
– MINI POWER, 48-60 V DC / 24 V DC 611

Uninterruptible power supply (UPS) units 613

QUINT UPS IQ
– 24 V DC / 24 V DC 614
– 1 AC / 1 AC 616
– Power storage devices 618
– Buffer module 620

TRIO UPS
– 1 AC / 24 V DC 621

MINI UPS
– 1 AC / 24 V DC, 12 V DC 622

STEP UPS
– 24 V DC / 24 V DC 621

Redundancy modules
– QUINT ORING, 24 V DC 626
– QUINT DIODE, 12-24 V DC, 48 V DC 627
– TRIO DIODE, 12-24 V DC, 48 V DC 628
– STEP DIODE, 5-24 V DC 629

Power supply accessories 630

Rail-mountable sockets 632

Product overview of power supply units

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24 DC / 5 A
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24 DC / 10 A
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12 DC / 15 A
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48 DC / 5 A
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12 DC / 20 A
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48 DC / 10 A
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24 DC / 40 A
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48 DC / 20 A
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QUINT POWER 3~

24 DC / 5 A
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24 DC / 10 A
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24 DC / 40 A
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48 DC / 20 A
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QUINT ASI 1~

30 DC / 2.4 A
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30 DC / 4.8 A
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TRIO POWER 1~

24 DC / 2.5 A
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12 DC / 5 A
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24 DC / 5 A
Page 591
12 DC / 10 A
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24 DC / 10 A
Page 591
48 DC / 5 A
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24 DC / 20 A
Page 591
48 DC / 10 A
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MINI POWER 1~

24 DC / 1.3 A
Page 596
5 DC / 3 A
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24 DC / 1.5 A
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TRIO POWER 3~

24 DC / 5 A
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24 DC / 10 A
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24 DC / 20 A
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24 DC / 40 A
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MINI POWER 1~

24 DC / 2 A
Page 597
10-15 DC / 2 A
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±15 DC / 1 A
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24 DC / 4 A
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24 DC / 100 W
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10-15 DC / 8 A
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STEP POWER 1~

24 DC / 0.5 A
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48 AC / 24 DC / 0.5 A
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12 DC / 1 A
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24 DC / 0.75 A / FL
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12 DC / 1.5 A / FL
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24 DC / 0.75 A
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12 DC / 1.5 A
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24 DC / 1.75 A
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12 DC / 3 A
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5 DC / 6.5 A
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12 DC / 5 A
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15 DC / 4 A
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24 DC / 4.2 A
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24 DC / 100 W
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48 DC / 2 A
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QUINT DC/DC converters

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24 DC / 12 DC / 8 A
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24 DC / 24 DC / 10 A
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24 DC / 48 DC / 5 A
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24 DC / 24 DC / 20 A
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MINI DC/DC converters

12-24 DC/24 DC / 1 A
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48-60 DC/24 DC / 1 A
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12-24 DC/5-15 DC / 2 A
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12-24 DC/48 DC / 0.7 A
Page 611

AC power module
Page 611

TRIO POWER 600 V

600 DC/24 DC / 20 A
Page 594

QUINT AC-UPS

1 AC / 1 AC / 500 VA
Page 616

QUINT DC-UPS

24 DC / 24 DC / 5 A
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24 DC / 24 DC / 10 A
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24 DC / 24 DC / 20 A
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24 DC / 24 DC / 40 A
Page 615

QUINT Buffer

24 DC / 24 DC / 40 A
Page 620

TRIO DC-UPS

24 DC / 5 A
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MINI DC-UPS

24 DC / 2 A
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12 DC / 4 A
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STEP DC-UPS

24 DC / 24 DC / 3 A
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Redundancy modules - QUINT

Application submitted for: Ex

24 DC / 2x10 A
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Application submitted for: Ex

24 DC / 2x20 A
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12-24 DC / 2x20 A
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48 DC / 2x20 A
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- TRIO

12-24 DC / 2x10 A
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48 DC / 2x10 A
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- STEP

5-24 DC / 2x5 A
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POWER, dip-coated

Application submitted for: Ex

1 AC / 24 DC / 5 A CO
Page 624

Application submitted for: Ex

1 AC / 24 DC / 10 A CO
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1 AC / 24 DC / 20 A CO
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3 AC / 24 DC / 20 A CO
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1 AC / 24 DC / 1.5 A EX
Page 625

QUINT POWER power supply units – For maximum system availability

- Quick tripping of standard circuit breakers thanks to the dynamic power reserve SFB (selective fuse breaking) technology with up to 6x the nominal current for 12 ms
- Reliable starting of heavy loads with the static POWER BOOST power reserve with permanently up to 1.5 times the nominal current
- Preventive function monitoring
- Approved for DeviceNet: 24 V DC, 3.5 A, 5 A, and 10 A
- Approved according to SEMI F47: 24 V DC, 3.5 A, 5 A, 10 A, 20 A, and 40 A

Power supply, 1 AC, 24 V DC, 3.5 A

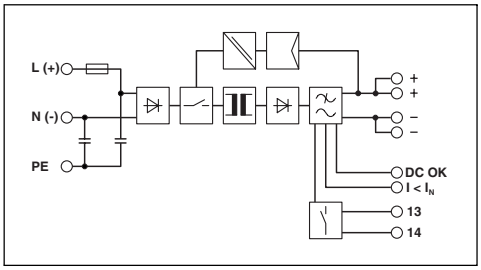
Ex:

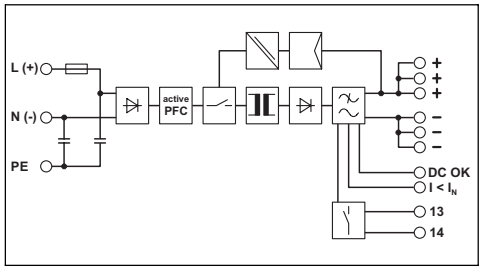
Power supply, 1 AC, 24 V DC, 5 A

Ex:

Spring-cage terminal block, optional for QUINT 5 A and 10 A (QUINT 3.5 A output only)

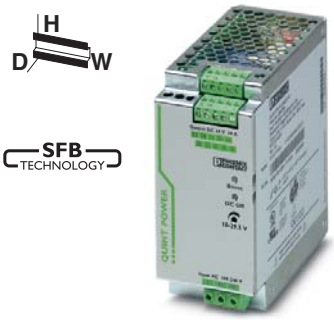
- Input side: GFKC 2,5/3-ST-7,62 (Order No. 1939646)
- Output side: FKC 2,5 HC/5-ST-5,08 (Order No. 1942400)





	Technical data	Technical data
Input data		
Nominal input voltage range	100 V AC ... 240 V AC	100 V AC ... 240 V AC
Input voltage range AC/DC	85 V AC ... 264 V AC / 90 V DC ... 350 V DC	85 V AC ... 264 V AC / 90 V DC ... 350 V DC
Frequency range	45 Hz ... 65 Hz / 0 Hz	45 Hz ... 65 Hz / 0 Hz
Current consumption (nominal load)	Approx. 1.4 A (120 V AC) / Approx. 0.8 A (230 V AC)	Approx. 1.2 A (120 V AC) / Approx. 0.6 A (230 V AC)
Inrush current limitation at 25°C (typ.) / I^2t	< 20 A / < 2 A^2s	< 15 A / < 1 A^2s
Mains buffering (I_N, typ.)	> 20 ms (120 V AC) / > 80 ms (230 V AC)	> 30 ms (120 V AC) / > 30 ms (230 V AC)
Input fuse	5 A (slow-blow, internal)	5 A (slow-blow, internal)
Recommended backup fuse, LS switch	B6, B10, B16	B6, B10, B16
Output data		
Nominal output voltage	24 V DC ±1%	24 V DC ±1%
Setting range of the output voltage	18 V DC ... 29.5 V DC (> 24 V constant capacitance)	18 V DC ... 29.5 V DC (> 24 V constant capacitance)
Output current / POWER BOOST / SFB (12 ms)	3.5 A / 4 A / 15 A	5 A / 7.5 A / 30 A
Magnetic fuse tripping	-	C2
Can be connected in parallel / series	Yes / Yes	Yes / Yes
Max. power dissipation (idling/nominal load)	3.5 W / 11 W	3 W / 15 W
Efficiency (typ.)	> 88% (for 230 V AC and nominal values)	> 90% (for 230 V AC and nominal values)
Residual ripple	< 50 mV_{PP}	< 40 mV_{PP}
Signaling		
Signaling DC OK	LED, active switching output, relay contact	LED, active switching output, relay contact
Boost signaling	LED, active switching output	LED, active switching output
General data		
Weight / Dimensions W x H x D	0.5 kg / 32 x 130 x 125 mm	0.7 kg / 40 x 130 x 125 mm
Installation position	horizontal DIN rail NS 35, EN 60715	horizontal DIN rail NS 35, EN 60715
Spacing when mounting	Can be aligned: 5 mm horizontally, 15 mm next to active components, 5 cm vertically	Can be aligned: 5 mm horizontally, 15 mm next to active components, 5 cm vertically
Connection method	Pluggable screw connection	Pluggable screw connection
Input connection data solid / stranded / AWG	0.2 - 2.5 mm^2 / 0.2 - 2.5 mm^2 / 20 - 12	0.2 - 2.5 mm^2 / 0.2 - 2.5 mm^2 / 20 - 12
Output connection data solid / stranded / AWG	0.2 - 2.5 mm^2 / 0.2 - 2.5 mm^2 / 20 - 12	0.2 - 2.5 mm^2 / 0.2 - 2.5 mm^2 / 20 - 12
Signal connection data solid / stranded / AWG	0.2 - 2.5 mm^2 / 0.2 - 2.5 mm^2 / 20 - 12	0.2 - 2.5 mm^2 / 0.2 - 2.5 mm^2 / 20 - 12
Degree of protection / Protection class	IP20 / I	IP20 / I
MTBF (at nominal load, 40°C)	> 500,000 h	> 500,000 h
Ambient temperature (operation)	-25°C ... 70°C (> 60°C derating)	-25°C ... 70°C (> 60°C derating)
Standards / regulations		
Insulation voltage input/output	2 kV AC (routine test) / 4 kV AC (type test)	2 kV AC (routine test) / 4 kV AC (type test)
Electromagnetic compatibility	Conformance with EMC Directive 2004/108/EC	Conformance with EMC Directive 2004/108/EC
Electrical safety, safety transformer	IEC 60950-1/VDE 0805 (SELV), IEC 61558-2-17	IEC 60950-1/VDE 0805 (SELV), IEC 61558-2-17
Electronic equipm. for electrical power installations	EN 50178/VDE 0160 (PELV)	EN 50178/VDE 0160 (PELV)
Safe isolation	DIN VDE 0100-410, DIN VDE 0106-1010	DIN VDE 0100-410, DIN VDE 0106-1010
Medical standard	IEC 60601	IEC 60601
UL approvals	UL listed UL 508, UL/C-UL recognized UL 60950, UL listed ANSI/ISA-12.12.01 Class I, Division 2, Groups A, B, C, D	UL listed UL 508, UL/C-UL recognized UL 60950, UL listed ANSI/ISA-12.12.01 Class I, Division 2, Groups A, B, C, D
Limitation of harmonic line currents	EN 61000-3-2	EN 61000-3-2

Description	Ordering data: Type	Order No.	Pcs. / Pkt.	Ordering data: Type	Order No.	Pcs. / Pkt.
Power supply unit, primary-switched						
	QUINT-PS/ 1AC/24DC/ 3.5	**2866747**	1	**QUINT-PS/ 1AC/24DC/ 5**	**2866750**	1



Power supply,
1 AC, 24 V DC, 10 A

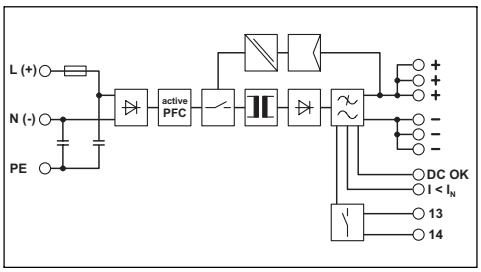
Ex:

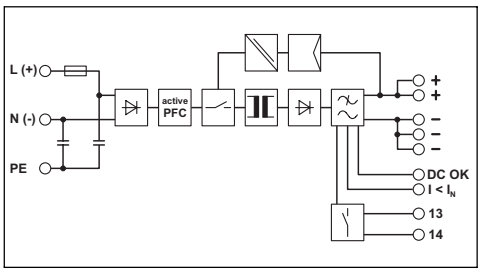
Power supply,
1 AC, 24 V DC, 20 A

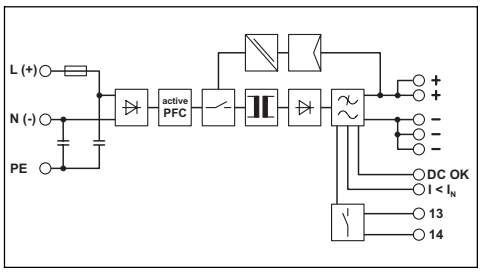
Ex:

Power supply unit,
1 AC, 24 V DC, 40 A

Applied for: GL / LR / NV / BV / NK / ABS







Technical data

100 V AC ... 240 V AC
85 V AC ... 264 V AC / 90 V DC ... 350 V DC
45 Hz ... 65 Hz / 0 Hz
Approx. 2.8 A (120 V AC) / Approx. 1.2 A (230 V AC)
< 15 A / < 1.5 A^2s
> 40 ms (120 V AC) / > 40 ms (230 V AC)
6.3 A (slow-blow, internal)
B10, B16

24 V DC ±1%
18 V DC ... 29.5 V DC (> 24 V constant capacitance)

10 A / 15 A / 60 A
B6, C4
Yes / Yes
7 W / 18 W
> 92.5% (for 230 V AC and nominal values)
< 50 mV_{PP}

LED, active switching output, relay contact
LED, active switching output

1.1 kg / 60 x 130 x 125 mm
horizontal DIN rail NS 35, EN 60715
Can be aligned: 5 mm horizontally, 15 mm next to active components, 5 cm vertically
Pluggable screw connection
0.2 - 2.5 mm^2 / 0.2 - 2.5 mm^2 / 16 - 12
0.2 - 2.5 mm^2 / 0.2 - 2.5 mm^2 / 16 - 12
0.2 - 2.5 mm^2 / 0.2 - 2.5 mm^2 / 16 - 12
IP20 / I
> 500,000 h
-25°C ... 70°C (> 60°C derating)

2 kV AC (routine test) / 4 kV AC (type test)
Conformance with EMC Directive 2004/108/EC
IEC 60950-1/VDE 0805 (SELV), IEC 61558-2-17
EN 50178/VDE 0160 (PELV)
DIN VDE 0100-410, DIN VDE 0106-1010
IEC 60601
UL listed UL 508, UL/C-UL recognized UL 60950, UL listed
ANSI/ISA-12.12.01 Class I, Division 2, Groups A, B, C, D

EN 61000-3-2

Ordering data

Type	Order No.	Pcs. / Pkt.
QUINT-PS/ 1AC/24DC/10	**2866763**	1

Technical data

100 V AC ... 240 V AC
85 V AC ... 264 V AC / 90 V DC ... 350 V DC
45 Hz ... 65 Hz / 0 Hz
Approx. 5.1 A (120 V AC) / Approx. 2.3 A (230 V AC)
< 20 A / < 3.2 A^2s
> 20 ms (120 V AC) / > 20 ms (230 V AC)
12 A (slow-blow, internal)
B10, B16

24 V DC ±1%
18 V DC ... 29.5 V DC (> 24 V constant capacitance)

20 A / 26 A / 120 A
B16, C6
Yes / Yes
8 W / 40 W
> 93% (for 230 V AC and nominal values)
< 30 mV_{PP}

LED, active switching output, relay contact
LED, active switching output

1.7 kg / 90 x 130 x 125 mm
horizontal DIN rail NS 35, EN 60715
Can be aligned: 5 mm horizontally, 15 mm next to active components, 5 cm vertically
Screw connection
0.2 - 6 mm^2 / 0.2 - 4 mm^2 / 18 - 10
0.2 - 6 mm^2 / 0.2 - 4 mm^2 / 12 - 10
0.2 - 6 mm^2 / 0.2 - 4 mm^2 / 18 - 10
IP20 / I
> 500,000 h
-25°C ... 70°C (> 60°C derating)

2 kV AC (routine test) / 4 kV AC (type test)
Conformance with EMC Directive 2004/108/EC
IEC 60950-1/VDE 0805 (SELV), IEC 61558-2-17
EN 50178/VDE 0160 (PELV)
DIN VDE 0100-410, DIN VDE 0106-1010
IEC 60601
UL listed UL 508, UL/C-UL recognized UL 60950, UL listed
ANSI/ISA-12.12.01 Class I, Division 2, Groups A, B, C, D

EN 61000-3-2

Ordering data

Type	Order No.	Pcs. / Pkt.
QUINT-PS/ 1AC/24DC/20	**2866776**	1

Technical data

100 V AC ... 240 V AC
85 V AC ... 264 V AC / 90 V DC ... 300 V DC
45 Hz ... 65 Hz / 0 Hz
Approx. 8.8 A (120 V AC) / Approx. 4.6 A (230 V AC)
< 15 A / < 1.7 A^2s
> 20 ms (120 V AC) / > 20 ms (230 V AC)
20 A (fast blow, internal)
B16, B25

24 V DC ±1%
18 V DC ... 29.5 V DC (> 24 V constant capacitance)

40 A / 45 A / 215 A
B25, C13
Yes / Yes
14 W / 80 W
> 92% (for 230 V AC and nominal values)
< 30 mV_{PP}

LED, active switching output, relay contact
LED, active switching output

3.3 kg / 180 x 130 x 125 mm
horizontal DIN rail NS 35, EN 60715
Can be aligned: 5 mm horizontally, 15 mm next to active components, 5 cm vertically
Screw connection
0.2 - 6 mm^2 / 0.2 - 4 mm^2 / 14 - 10
0.5 - 16 mm^2 / 0.5 - 16 mm^2 / 8 - 6
0.2 - 6 mm^2 / 0.2 - 4 mm^2 / 24 - 10
IP20 / I
> 500,000 h
-25°C ... 70°C (> 60°C derating)

2 kV AC (routine test) / 4 kV AC (type test)
Conformance with EMC Directive 2004/108/EC
IEC 60950-1/VDE 0805 (SELV), IEC 61558-2-17
EN 50178/VDE 0160 (PELV)
DIN VDE 0100-410, DIN VDE 0106-101
-
UL listed UL 508, UL/C-UL recognized UL 60950

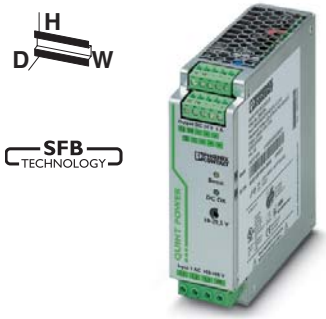
EN 61000-3-2

Ordering data

Type	Order No.	Pcs. / Pkt.
QUINT-PS/ 1AC/24DC/40	**2866789**	1

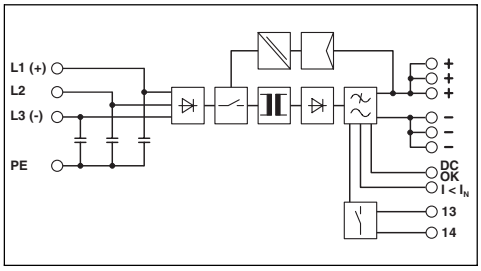
QUINT POWER power supply units – For maximum system availability

- High system availability even in the event of a permanent phase failure
- High surge strength of up to 6 kV thanks to integrated gas-filled arresters
- Quick tripping of standard circuit breakers thanks to the dynamic power reserve SFB (selective fuse breaking) technology with up to 6x the nominal current for 12 ms. (In order to be able to trip standard power circuit breakers magnetically and therefore quickly, power supply units must be able to supply several times the output current for a short period. Thanks to the SFB technology, this reserve is now available for the first time ever)
- Reliable starting of heavy loads with the static POWER BOOST power reserve with permanently up to 1.5 times the nominal current. (The POWER BOOST power reserve is required for loads with high inrush currents. For example, this starts capacitive loads without a voltage dip and is available permanently at an ambient temperature of +40°C and for approximately 10 minutes at +60°C)
- Preventive function monitoring warns against critical operating states before errors occur. (Critical operating states are visualized and reported to the controller thanks to the permanent monitoring of the output voltage and current. Remote monitoring is provided by an active switching output and a floating relay contact)
- Approved according to SEMI F47: 24 V DC, 5 A, 10 A, 20 A, and 40 A



Power supply, 3 AC, 24 V DC, 5 A

Ex:

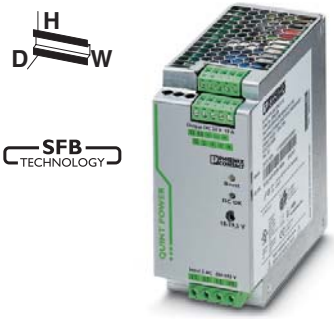


Technical data

Input data	
Nominal input voltage range	3x 400 V AC ... 500 V AC
Input voltage range AC/DC	320 V AC ... 575 V AC / 450 V DC ... 800 V DC
Frequency range	45 Hz ... 65 Hz / 0 Hz
Current consumption (nominal load)	3 x 0.8 A (400 V AC) / 3 x 0.7 A (500 V AC)
Inrush current limitation at 25°C (typ.) / I^2t	< 15 A / < 1 A^2s
Mains buffering (I_N, typ.)	> 20 ms (400 V AC) / > 30 ms (500 V AC)
Recommended backup fuse, LS switch	B6, B10, B16
Output data	
Nominal output voltage	24 V DC ±1%
Setting range of the output voltage	18 V DC ... 29.5 V DC (> 24 V constant capacitance)
Output current / POWER BOOST / SFB (12 ms)	5 A / 7.5 A / 30 A
Magnetic fuse tripping	C2
Can be connected in parallel / series	Yes / Yes
Max. power dissipation (idling/nominal load)	4 W / 14 W
Efficiency (typ.)	> 89% (at 400 V AC and nominal values)
Residual ripple	< 20 mV_{PP}
Signaling	
Signaling DC OK	LED, active switching output, relay contact
Boost signaling	LED, active switching output
General data	
Weight / Dimensions W x H x D	0.7 kg / 40 x 130 x 125 mm
Installation position	horizontal DIN rail NS 35, EN 60715
Spacing when mounting	Can be aligned: 5 mm horizontally, 15 mm next to active components, 5 cm vertically
Connection method	Pluggable screw connection
Input connection data solid / stranded / AWG	0.2 - 2.5 mm^2 / 0.2 - 2.5 mm^2 / 20 - 12
Output connection data solid / stranded / AWG	0.2 - 2.5 mm^2 / 0.2 - 2.5 mm^2 / 20 - 12
Signal connection data solid / stranded / AWG	0.2 - 2.5 mm^2 / 0.2 - 2.5 mm^2 / 20 - 12
Degree of protection / Protection class	IP20 / I
MTBF (at nominal load, 40°C)	> 500,000 h
Ambient temperature (operation)	-25°C ... 70°C (> 60°C derating)
Standards / regulations	
Insulation voltage input/output	2 kV AC (routine test) / 4 kV AC (type test)
Electromagnetic compatibility	Conformance with EMC Directive 2004/108/EC
Electrical safety, safety transformer	IEC 60950-1/VDE 0805 (SELV), IEC 61558-2-17
Electronic equipm. for electrical power installations	EN 50178/VDE 0160 (PELV)
Safe isolation	DIN VDE 0100-410, DIN VDE 0106-1010
UL approvals	UL listed UL 508, UL/C-UL recognized UL 60950 (3-wire + PE, star net), UL listed ANSI/ISA-12.12.01 Class I, Division 2, Groups A, B, C, D
Limitation of harmonic line currents	EN 61000-3-2

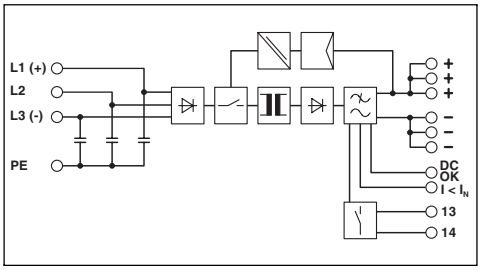
Ordering data

Description	Type	Order No.	Pcs. / Pkt.
Power supply unit, primary-switched	**QUINT-PS/ 3AC/24DC/ 5**	**2866734**	1



Power supply,
3 AC, 24 V DC, 10 A

Ex:



Technical data

3x 400 V AC ... 500 V AC
320 V AC ... 575 V AC / 450 V DC ... 800 V DC
45 Hz ... 65 Hz / 0 Hz
3 x 1.2 A (400 V AC) / 3 x 1 A (500 V AC)
< 15 A / < 1.5 A^2s
> 20 ms (400 V AC) / > 30 ms (500 V AC)
B6, B10, B16

24 V DC ±1%
18 V DC ... 29.5 V DC (> 24 V constant capacitance)

10 A / 15 A / 60 A
B6, C4
Yes / Yes
7 W / 19 W
> 93% (at 400 V AC and nominal values)
< 20 mV_{PP}

LED, active switching output, relay contact
LED, active switching output

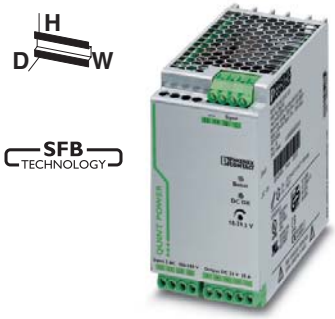
1.1 kg / 60 x 130 x 125 mm
horizontal DIN rail NS 35, EN 60715
Can be aligned: 5 mm horizontally, 15 mm next to active components, 5 cm vertically
Pluggable screw connection
0.2 - 2.5 mm^2 / 0.2 - 2.5 mm^2 / 16 - 12
0.2 - 2.5 mm^2 / 0.2 - 2.5 mm^2 / 16 - 12
0.2 - 2.5 mm^2 / 0.2 - 2.5 mm^2 / 16 - 12
IP20 / I
> 500,000 h
-25°C ... 70°C (> 60°C derating)

2 kV AC (routine test) / 4 kV AC (type test)
Conformance with EMC Directive 2004/108/EC
IEC 60950-1/VDE 0805 (SELV), IEC 61558-2-17
EN 50178/VDE 0160 (PELV)
DIN VDE 0100-410, DIN VDE 0106-1010
UL listed UL 508, UL/C-UL recognized UL 60950 (3-wire + PE, star net), UL listed ANSI/ISA-12.12.01 Class I, Division 2, Groups A, B, C, D

EN 61000-3-2

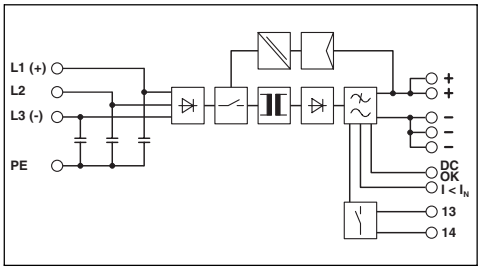
Ordering data

Type	Order No.	Pcs. / Pkt.
QUINT-PS/ 3AC/24DC/10	**2866705**	1



Power supply,
3 AC, 24 V DC, 20 A

Ex:



Technical data

3x 400 V AC ... 500 V AC
320 V AC ... 575 V AC / 450 V DC ... 800 V DC
45 Hz ... 65 Hz / 0 Hz
Approx. 3x 1.6 A (400 V AC) / Approx. 3x 1.3 A (500 V AC)
< 20 A / < 3.2 A^2s
> 20 ms (400 V AC) / > 30 ms (500 V AC)
B6, B10, B16

24 V DC ±1%
18 V DC ... 29.5 V DC (> 24 V constant capacitance)

20 A / 26 A / 120 A
B16, C6
Yes / Yes
11 W / 40 W
> 93% (at 400 V AC and nominal values)
< 40 mV_{PP}

LED, active switching output, relay contact
LED, active switching output

1.5 kg / 69 x 130 x 125 mm
horizontal DIN rail NS 35, EN 60715
Can be aligned: 5 mm horizontally, 15 mm next to active components, 5 cm vertically
Screw connection
0.2 - 6 mm^2 / 0.2 - 4 mm^2 / 18 - 10
0.2 - 6 mm^2 / 0.2 - 4 mm^2 / 12 - 10
0.2 - 6 mm^2 / 0.2 - 4 mm^2 / 18 - 10
IP20 / I
> 500,000 h
-25°C ... 70°C (> 60°C derating)

2 kV AC (routine test) / 4 kV AC (type test)
Conformance with EMC Directive 2004/108/EC
IEC 60950-1/VDE 0805 (SELV), IEC 61558-2-17
EN 50178/VDE 0160 (PELV)
DIN VDE 0100-410, DIN VDE 0106-1010
UL listed UL 508, UL/C-UL recognized UL 60950 (3-wire + PE, star net), UL listed ANSI/ISA-12.12.01 Class I, Division 2, Groups A, B, C, D

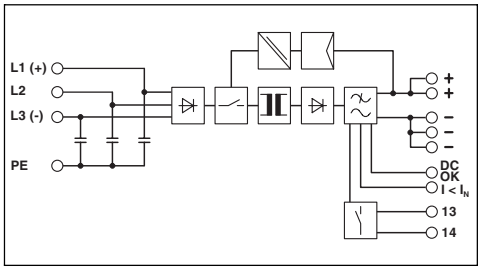
EN 61000-3-2

Ordering data

Type	Order No.	Pcs. / Pkt.
QUINT-PS/ 3AC/24DC/20	**2866792**	1

Power supply unit,
3 AC, 24 V DC, 40 A

Ex: // Applied for: GL / LR / NV / BV / NK / ABS



Technical data

3x 400 V AC ... 500 V AC
320 V AC ... 575 V AC / 450 V DC ... 800 V DC
45 Hz ... 65 Hz / 0 Hz
Approx. 3x 3.1 A (400 V AC) / Approx. 3x 2.7 A (500 V AC)
< 20 A / < 1 A^2s
> 25 ms (400 V AC) / > 35 ms (500 V AC)
B6, B10, B16

24 V DC ±1%
18 V DC ... 29.5 V DC (> 24 V constant capacitance)

40 A / 45 A / 215 A
B25, C13
Yes / Yes
18 W / 63 W
> 94% (at 400 V AC and nominal values)
< 40 mV_{PP}

LED, active switching output, relay contact
LED, active switching output

2.5 kg / 96 x 130 x 176 mm
horizontal DIN rail NS 35, EN 60715
Can be aligned: 5 mm horizontally, 15 mm next to active components, 5 cm vertically
Screw connection
0.2 - 6 mm^2 / 0.2 - 4 mm^2 / 18 - 10
0.5 - 16 mm^2 / 0.5 - 16 mm^2 / 8 - 6
0.2 - 6 mm^2 / 0.2 - 4 mm^2 / 18 - 10
IP20 / I
> 500,000 h
-25°C ... 70°C (> 60°C derating)

2 kV AC (routine test) / 4 kV AC (type test)
Conformance with EMC Directive 2004/108/EC
IEC 60950-1/VDE 0805 (SELV), IEC 61558-2-17
EN 50178/VDE 0160 (PELV)
DIN VDE 0100-410, DIN VDE 0106-101
UL listed UL 508, UL/C-UL recognized UL 60950 (3-wire + PE, star net), UL listed ANSI/ISA-12.12.01 Class I, Division 2, Groups A, B, C, D

EN 61000-3-2

Ordering data

Type	Order No.	Pcs. / Pkt.
QUINT-PS/ 3AC/24DC/40	**2866802**	1

QUINT POWER power supply units – For maximum system availability

- Quick tripping of the standard power circuit breakers
- Reliable starting of heavy loads
- Preventive function monitoring
- Approved according to SEMI F47: 12 V DC,15 A and 20 A, 48 V DC, 5 A, and 10 A

QUINT POWER, 12 V DC

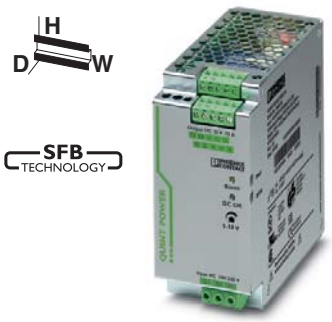
- Adjustable output voltage of 5 to 18 V DC

QUINT POWER, 48 V DC

- Adjustable output voltage of 30 to 56 V DC

Spring-cage terminal block, optional for QUINT-PS/1AC/12DC/15 and QUINT-PS/1AC/48DC/5

- Input side: GFKC 2,5/3-ST-7,62 (Order No. 1939646)
- Output side: FKC 2,5 HC/5-ST-5,08 (Order No. 1942400)

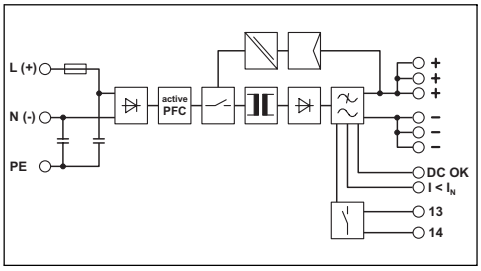


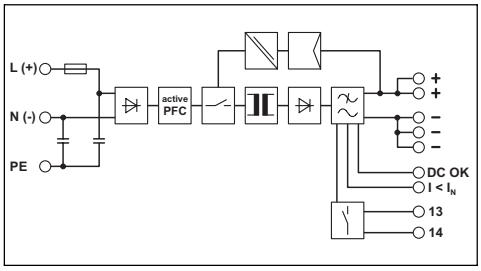
Power supply, 1 AC, 12 V DC, 15 A

Ex:

Power supply, 1 AC, 12 V DC, 20 A

Ex:

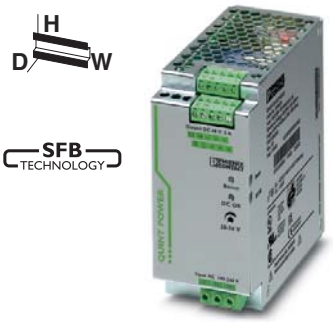




	Technical data	Technical data
Input data		
Nominal input voltage range	100 V AC ... 240 V AC	100 V AC ... 240 V AC
Input voltage range AC/DC	85 V AC ... 264 V AC / 90 V DC ... 350 V DC	85 V AC ... 264 V AC / 90 V DC ... 350 V DC
Frequency range	45 Hz ... 65 Hz / 0 Hz	45 Hz ... 65 Hz / 0 Hz
Current consumption (nominal load)	Approx. 1.9 A (120 V AC) / Approx. 0.9 A (230 V AC)	Approx. 2.4 A (120 V AC) / Approx. 1.4 A (230 V AC)
Inrush current limitation at 25°C (typ.) / I^2t	< 15 A / < 1.5 A^2s	< 20 A / < 3.2 A^2s
Mains buffering (I_N, typ.)	> 65 ms (120 V AC) / > 65 ms (230 V AC)	> 40 ms (120 V AC) / > 40 ms (230 V AC)
Input fuse	6.3 A (slow-blow, internal)	12 A (slow-blow, internal)
Recommended backup fuse, LS switch	B10, B16	B10, B16
Output data		
Nominal output voltage	12 V DC ±1%	12 V DC ±1%
Setting range of the output voltage	5 V DC ... 18 V DC (> 12 V constant capacitance)	5 V DC ... 18 V DC (> 12 V constant capacitance)
Output current / POWER BOOST / SFB (12 ms)	15 A / 16 A / 60 A	20 A / 26 A / 120 A
Magnetic fuse tripping	-	-
Can be connected in parallel / series	Yes / Yes	Yes / Yes
Max. power dissipation (idling/nominal load)	5 W / 21 W	6 W / 29 W
Efficiency (typ.)	> 89% (for 230 V AC and nominal values)	> 90% (for 230 V AC and nominal values)
Residual ripple	< 10 mV_{PP}	< 50 mV_{PP}
Signaling		
Signaling DC OK	LED, active switching output, relay contact	LED, active switching output, relay contact
Boost signaling	LED, active switching output	LED, active switching output
General data		
Weight / Dimensions W x H x D	1.1 kg / 60 x 130 x 125 mm	1.5 kg / 90 x 130 x 125 mm
Installation position	horizontal DIN rail NS 35, EN 60715	horizontal DIN rail NS 35, EN 60715
Spacing when mounting	Can be aligned: 5 mm horizontally, 15 mm next to active components, 5 cm vertically	Can be aligned: 5 mm horizontally, 15 mm next to active components, 5 cm vertically
Connection method	Pluggable screw connection	Screw connection
Input connection data solid / stranded / AWG	0.2 - 2.5 mm^2 / 0.2 - 2.5 mm^2 / 16 - 12	0.2 - 6 mm^2 / 0.2 - 4 mm^2 / 18 - 10
Output connection data solid / stranded / AWG	0.2 - 2.5 mm^2 / 0.2 - 2.5 mm^2 / 16 - 12	0.2 - 6 mm^2 / 0.2 - 4 mm^2 / 12 - 10
Signal connection data solid / stranded / AWG	0.2 - 2.5 mm^2 / 0.2 - 2.5 mm^2 / 16 - 12	0.2 - 6 mm^2 / 0.2 - 4 mm^2 / 18 - 10
Degree of protection / Protection class	IP20 / I	IP20 / I
MTBF (at nominal load, 40°C)	> 500,000 h	> 500,000 h
Ambient temperature (operation)	-25°C ... 70°C (> 60°C derating)	-25°C ... 70°C (> 60°C derating)
Standards / regulations		
Insulation voltage input/output	2 kV AC (routine test) / 4 kV AC (type test)	2 kV AC (routine test) / 4 kV AC (type test)
Electromagnetic compatibility	Conformance with EMC Directive 2004/108/EC	Conformance with EMC Directive 2004/108/EC
Electrical safety, safety transformer	IEC 60950-1/VDE 0805 (SELV), IEC 61558-2-17	IEC 60950-1/VDE 0805 (SELV), IEC 61558-2-17
Electronic equipm. for electrical power installations	EN 50178/VDE 0160 (PELV)	EN 50178/VDE 0160 (PELV)
Safe isolation	DIN VDE 0100-410, DIN VDE 0106-1010	DIN VDE 0100-410, DIN VDE 0106-1010
Medical standard	IEC 60601	IEC 60601
UL approvals	UL listed UL 508, UL/C-UL recognized UL 60950, UL listed ANSI/ISA-12.12.01 Class I, Division 2, Groups A, B, C, D	UL listed UL 508, UL/C-UL recognized UL 60950, UL listed ANSI/ISA-12.12.01 Class I, Division 2, Groups A, B, C, D
Limitation of harmonic line currents	EN 61000-3-2	EN 61000-3-2

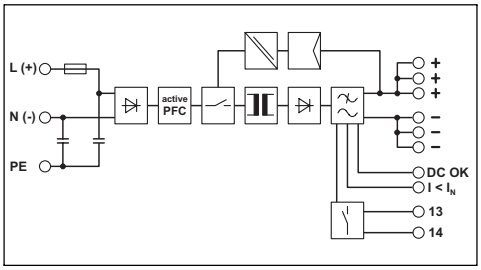
Description	Ordering data: Type	Order No.	Pcs. / Pkt.	Ordering data: Type	Order No.	Pcs. / Pkt.
Power supply unit, primary-switched						
	QUINT-PS/ 1AC/12DC/15	**2866718**	1	**QUINT-PS/ 1AC/12DC/20**	**2866721**	1

N



Power supply, 1 AC, 48 V DC, 5 A

Ex:



Technical data

100 V AC ... 240 V AC
85 V AC ... 264 V AC / 90 V DC ... 350 V DC
45 Hz ... 65 Hz / 0 Hz
Approx. 2.8 A (120 V AC) / Approx. 1.2 A (230 V AC)
< 15 A / < 1.5 A²s
> 40 ms (120 V AC) / > 40 ms (230 V AC)
6.3 A (slow-blow, internal)
B10, B16

48 V DC ±1%
30 V DC ... 56 V DC (> 48 V constant capacitance)

5 A / 7.5 A / 30 A
C2
Yes / Yes
7 W / 21 W
> 92.5% (for 230 V AC and nominal values)
< 50 mV_{PP}

LED, active switching output, relay contact
LED, active switching output

1.1 kg / 60 x 130 x 125 mm
horizontal DIN rail NS 35, EN 60715
Can be aligned: 5 mm horizontally, 15 mm next to active components, 5 cm vertically
Pluggable screw connection
0.2 - 2.5 mm^2 / 0.2 - 2.5 mm^2 / 16 - 12
0.2 - 2.5 mm^2 / 0.2 - 2.5 mm^2 / 16 - 12
0.2 - 2.5 mm^2 / 0.2 - 2.5 mm^2 / 16 - 12
IP20 / I
> 500,000 h
-25°C ... 70°C (> 60°C derating)

2 kV AC (routine test) / 4 kV AC (type test)
Conformance with EMC Directive 2004/108/EC
IEC 60950-1/VDE 0805 (SELV), IEC 61558-2-17
EN 50178/VDE 0160 (PELV)
DIN VDE 0100-410, DIN VDE 0106-1010
IEC 60601
UL listed UL 508, UL/C-UL recognized UL 60950, UL listed
ANSI/ISA-12.12.01 Class I, Division 2, Groups A, B, C, D

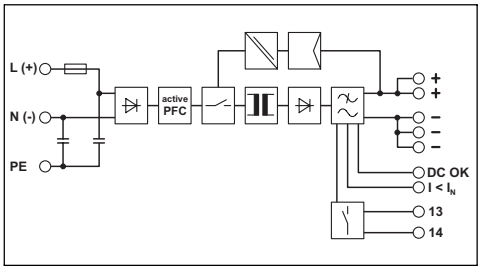
EN 61000-3-2

Ordering data

Type	Order No.	Pcs. / Pkt.
QUINT-PS/ 1AC/48DC/ 5	**2866679**	1

Power supply, 1 AC, 48 V DC, 10 A

Ex:



Technical data

100 V AC ... 240 V AC
85 V AC ... 264 V AC / 90 V DC ... 350 V DC
45 Hz ... 65 Hz / 0 Hz
Approx. 5.1 A (120 V AC) / Approx. 2.3 A (230 V AC)
< 20 A / < 3.2 A²s
> 20 ms (120 V AC) / > 20 ms (230 V AC)
12 A (slow-blow, internal)
B10, B16

48 V DC ±1%
30 V DC ... 56 V DC (> 48 V constant capacitance)

10 A / 13 A / 60 A
B6, C4
Yes / Yes
16 W / 41 W
> 93% (for 230 V AC and nominal values)
< 80 mV_{PP}

LED, active switching output, relay contact
LED, active switching output

1.7 kg / 90 x 130 x 125 mm
horizontal DIN rail NS 35, EN 60715
Can be aligned: 5 mm horizontally, 15 mm next to active components, 5 cm vertically
Screw connection
0.2 - 6 mm^2 / 0.2 - 4 mm^2 / 18 - 10
0.2 - 6 mm^2 / 0.2 - 4 mm^2 / 12 - 10
0.2 - 6 mm^2 / 0.2 - 4 mm^2 / 18 - 10
IP20 / I
> 500,000 h
-25°C ... 70°C (> 60°C derating)

2 kV AC (routine test) / 4 kV AC (type test)
Conformance with EMC Directive 2004/108/EC
IEC 60950-1/VDE 0805 (SELV), IEC 61558-2-17
EN 50178/VDE 0160 (PELV)
DIN VDE 0100-410, DIN VDE 0106-1010
IEC 60601
UL listed UL 508, UL/C-UL recognized UL 60950, UL listed
ANSI/ISA-12.12.01 Class I, Division 2, Groups A, B, C, D

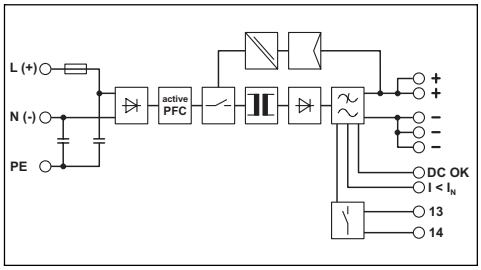
EN 61000-3-2

Ordering data

Type	Order No.	Pcs. / Pkt.
QUINT-PS/ 1AC/48DC/10	**2866682**	1

Power supply, 1 AC, 48 V DC, 20 A

Applied for: UL listed / UL / CSA



Technical data

100 V AC ... 240 V AC
85 V AC ... 264 V AC / 90 V DC ... 350 V DC
45 Hz ... 65 Hz / 0 Hz
Approx. 8.7 A (120 V AC) / Approx. 4.5 A (230 V AC)
< 15 A / < 1.6 A²s
> 22 ms (120 V AC) / > 25 ms (230 V AC)
20 A (fast blow, internal)
B16, B25

48 V DC ±1%
30 V DC ... 56 V DC (> 24 V constant capacitance)

20 A / 22.5 A / 100 A
B10, C6
Yes / Yes
12 W / 74 W
> 94% (for 230 V AC and nominal values)
< 50 mV_{PP}

LED, active switching output, relay contact
LED, active switching output

3.3 kg / 180 x 130 x 125 mm
horizontal DIN rail NS 35, EN 60715
Can be aligned: 5 mm horizontally, 15 mm next to active components, 5 cm vertically
Screw connection
0.2 - 6 mm^2 / 0.2 - 4 mm^2 / 14 - 10
0.5 - 16 mm^2 / 0.5 - 16 mm^2 / 8 - 6
0.2 - 6 mm^2 / 0.2 - 4 mm^2 / 24 - 10
IP20 / I
> 500,000 h
-25°C ... 70°C (> 60°C derating)

2 kV AC (routine test) / 4 kV AC (type test)
Conformance with EMC Directive 2004/108/EC
IEC 60950-1/VDE 0805 (SELV), IEC 61558-2-17
EN 50178/VDE 0160 (PELV)
DIN VDE 0100-410, DIN VDE 0106-1010
-
UL applied for

EN 61000-3-2

Ordering data

Type	Order No.	Pcs. / Pkt.
QUINT-PS/ 1AC/48DC/20	**2866695**	1

N

QUINT POWER power supply units – For maximum system availability

QUINT POWER, 3 AC, 48 V DC

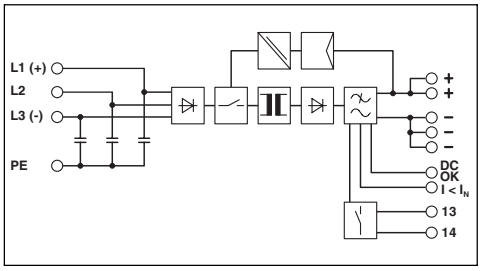
- Adjustable output voltage of 30 to 56 V DC
- Quick tripping of standard circuit breakers thanks to the dynamic power reserve SFB (selective fuse breaking) technology with up to 6x the nominal current for 12 ms
- Reliable starting of heavy loads with the static POWER BOOST power reserve with permanently up to 1.5 times the nominal current
- Preventive function monitoring warns against critical operating states before errors occur

QUINT POWER for all AS-Interface systems

- Integrated filters prevent effects on data streams that have been modulated upwards
- Integrated ground-fault monitoring signals short circuits on the secondary side

Power supply, 3 AC, 48 V DC, 20 A

CB Scheme
Applied for: UL listed / UL / CSA



Technical data

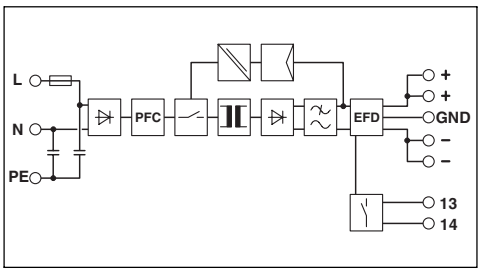
Input data	
Nominal input voltage range	3x 400 V AC ... 500 V AC
Input voltage range AC/DC	320 V AC ... 575 V AC / 450 V DC ... 800 V DC
Frequency range	45 Hz ... 65 Hz / 0 Hz
Current consumption (nominal load)	Approx. 3x 2.1 A (400 V AC) / Approx. 3x 1.7 A (500 V AC)
Inrush current limitation at 25°C (typ.) / I^2t	< 20 A / < 1 A^2s
Mains buffering (I_N, typ.)	> 25 ms (400 V AC) / > 35 ms (500 V AC)
Input fuse	-
Recommended backup fuse, LS switch	B6, B10, B16
Output data	
Nominal output voltage	48 V DC ±1%
Setting range of the output voltage	30 V DC ... 56 V DC (> 48 V constant capacitance)
Output current / POWER BOOST / SFB (12 ms)	20 A / 22.5 A / 100 A
Magnetic fuse tripping	B10, C6
Can be connected in parallel / series	Yes / Yes
Max. power dissipation (idling/nominal load)	24 W / 70 W
Efficiency (typ.)	≤ 93% (at 400 V AC and nominal values)
Residual ripple	< 50 mV_{PP}
Signaling	
Signaling DC OK	LED, active switching output, relay contact
Boost signaling	LED, active switching output
Signaling EFD	-
General data	
Weight / Dimensions W x H x D	2.5 kg / 96 x 130 x 176 mm
Installation position	horizontal DIN rail NS 35, EN 60715
Spacing when mounting	Can be aligned: 5 mm horizontally, 15 mm next to active components, 5 cm vertically
Connection method	Screw connection
Input connection data solid / stranded / AWG	0.2 - 6 mm^2 / 0.2 - 4 mm^2 / 18 - 10
Output connection data solid / stranded / AWG	0.5 - 16 mm^2 / 0.5 - 16 mm^2 / 8 - 6
Signal connection data solid / stranded / AWG	0.2 - 6 mm^2 / 0.2 - 4 mm^2 / 18 - 10
Degree of protection / Protection class	IP20 / I
MTBF (at nominal load, 40°C)	> 500,000 h
Ambient temperature (operation)	-25°C ... 70°C (> 60°C derating)
Standards / regulations	
Insulation voltage input/output	2 kV AC (routine test) / 4 kV AC (type test)
Electromagnetic compatibility	Conformance with EMC Directive 2004/108/EC
Electrical safety, safety transformer	IEC 60950-1/VDE 0805 (SELV), IEC 61558-2-17
Electronic equipm. for electrical power installations	EN 50178/VDE 0160 (PELV)
Safe isolation	DIN VDE 0100-410, DIN VDE 0106-1010
UL approvals	UL applied for
Limitation of harmonic line currents	EN 61000-3-2

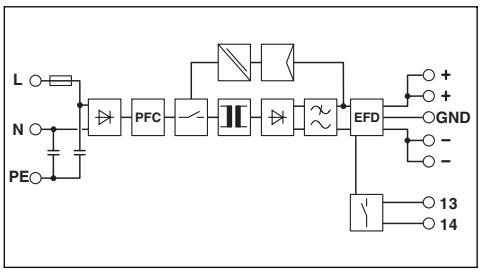
Ordering data

Description	Type	Order No.	Pcs. / Pkt.
Power supply unit, primary-switched	**QUINT-PS/ 3AC/48DC/20**	**2320827**	1

Power supply unit for AS-Interface systems, 1 AC, 30 V DC, 2.4 A

Power supply unit for AS-Interface systems, 1 AC, 30 V DC, 4.8 A





Technical data

100 V AC ... 240 V AC
85 V AC ... 264 V AC / 90 V DC ... 350 V DC
45 Hz ... 65 Hz / 0 Hz
Approx. 1 A (120 V AC) / 0.5 A (230 V AC)
< 15 A / 2.2 A²s
> 20 ms (120 V AC) / > 80 ms (230 V AC)
5 A (slow-blow, internal)
B6, B10, B16

30.1 V DC ±1.5%
-

2.4 A / 3 A
-
No / Yes
3 W / 11 W
> 86% (at 230 V AC and nominal values)
< 30 mV_{PP}

LED
-
LED, relay contact

0.75 kg / 55 x 145 x 125 mm
horizontal DIN rail NS 35, EN 60715
Can be aligned: Horizontal 0 cm, vertical 5 cm

Pluggable spring-cage connection
0.2 - 2.5 mm^2 / 0.2 - 2.5 mm^2 / 24 - 14
0.2 - 2.5 mm^2 / 0.2 - 2.5 mm^2 / 24 - 12
0.2 - 2.5 mm^2 / 0.2 - 2.5 mm^2 / 24 - 12
IP20 / I, IEC 61140, EN 61140, VDE 0140-1
> 500,000 h
-25°C ... 70°C (> 60°C derating)

2 kV AC (routine test) / 4 kV AC (type test)
Conformance with EMC Directive 2004/108/EC
EN 60950-1/VDE 0805 (SELV), EN 61558-2-17
EN 50178/VDE 0160 (PELV)
DIN VDE 0100-410, DIN VDE 0106-1010
UL/C-UL listed UL 508, UL/C-UL recognized UL 60950

EN 61000-3-2

Ordering data

Type	Order No.	Pcs. / Pkt.
ASI QUINT 100-240/2.4 EFD	**2736686**	1

Technical data

100 V AC ... 240 V AC
85 V AC ... 264 V AC / 90 V DC ... 350 V DC
45 Hz ... 65 Hz / 0 Hz
Approx. 1.8 A (120 V AC) / 1 A (230 V AC)
< 15 A / 2.2 A²s
> 60 ms (120 V AC) / > 100 ms (230 V AC)
5 A (slow-blow, internal)
B6, B10, B16

30.1 V DC ±1.5%
-

4.8 A / 6 A
-
No / Yes
4 W / 16 W
> 89% (at 230 V AC and nominal values)
< 30 mV_{PP}

LED
-
LED, relay contact

0.9 kg / 70 x 145 x 125 mm
horizontal DIN rail NS 35, EN 60715
Can be aligned: Horizontal 0 cm, vertical 5 cm

Pluggable spring-cage connection
0.2 - 2.5 mm^2 / 0.2 - 2.5 mm^2 / 24 - 12
0.2 - 2.5 mm^2 / 0.2 - 2.5 mm^2 / 24 - 12
0.2 - 2.5 mm^2 / 0.2 - 2.5 mm^2 / 24 - 12
IP20 / I, IEC 61140, EN 61140, VDE 0140-1
> 500,000 h
-25°C ... 70°C (> 60°C derating)

2 kV AC (routine test) / 4 kV AC (type test)
Conformance with EMC Directive 2004/108/EC
EN 60950-1/VDE 0805 (SELV), EN 61558-2-17
EN 50178/VDE 0160 (PELV)
DIN VDE 0100-410, DIN VDE 0106-1010
UL/C-UL listed UL 508, UL/C-UL recognized UL 60950

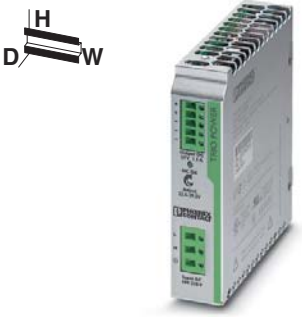
EN 61000-3-2

Ordering data

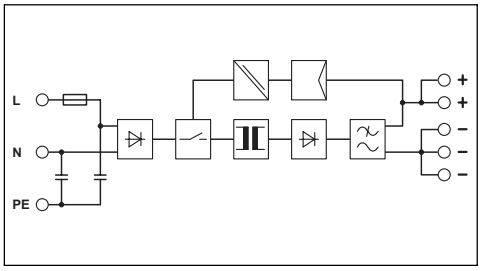
Type	Order No.	Pcs. / Pkt.
ASI QUINT 100-240/4.8 EFD	**2736699**	1

TRIO POWER power supply units – Basic functionality at the highest level

- Maximum operational reliability thanks to the high MTBF (mean time between failures) of more than 500,000 hours and high dielectric strength of up to 300 V AC
- Rugged design with metal housing and wide temperature range of -25 to +70°C
- Compensation of voltage drops by means of output voltage that can be set on the front side
- Use the third negative terminal as a grounding terminal block and minimize installation costs



Power supply, 1 AC, 24 V DC, 2.5 A



Technical data

Input data	
Nominal input voltage range	100 V AC ... 240 V AC
Input voltage range	85 V AC ... 264 V AC
Frequency range	45 Hz ... 65 Hz
Current consumption (nominal load)	0.95 A (120 V AC) / 0.5 A (230 V AC)
Inrush current limitation at 25°C (typ.) / I^2t	< 15 A / 0.5 A^2s
Mains buffering (I_N, typ.)	> 20 ms (120 V AC) / > 100 ms (230 V AC)
Input fuse	2 A (slow-blow, internal)
Recommended backup fuse, LS switch	B6, B10, B16
Output data	
Nominal output voltage	24 V DC ±1%
Setting range of the output voltage	22.5 V DC ... 29.5 V DC (> 24 V constant capacitance)
Output current	2.5 A
Can be connected in parallel / series	Yes / Yes
Max. power dissipation (idling/nominal load)	0.8 W / 10 W
Efficiency (typ.)	> 86% (at 230 V AC and nominal values)
Residual ripple	< 30 mV_{PP}
Signaling	
Signaling DC OK	LED
General data	
Weight / Dimensions W x H x D	0.5 kg / 32 x 130 x 115 mm
Installation position	horizontal DIN rail NS 35, EN 60715
Spacing when mounting	Can be aligned: Horizontal 0 cm, vertical 5 cm
Connection method	Screw connection
Input connection data solid / stranded / AWG	0.2 - 2.5 mm^2 / 0.2 - 2.5 mm^2 / 24 - 14
Output connection data solid / stranded / AWG	0.2 - 2.5 mm^2 / 0.2 - 2.5 mm^2 / 24 - 14
Degree of protection / Protection class	IP20 / I, with PE connection
MTBF (at nominal load, 40°C)	> 500,000 h
Ambient temperature (operation)	-25°C ... 70°C (> 55°C derating)
Ambient temperature (storage / transport)	-40°C ... 85°C
Max. permissible relative humidity (operation)	≤ 95% (at 25°C, no condensation)
Standards / regulations	
Insulation voltage input/output	2 kV AC (routine test) / 4 kV AC (type test)
Electromagnetic compatibility	Conformance with EMC Directive 2004/108/EC
Electrical safety, safety transformer	EN 60950-1/VDE 0805 (SELV), EN 61558-2-17
Electronic equipm. for electrical power installations	EN 50178/VDE 0160 (PELV)
Safe isolation	DIN VDE 0100-410, DIN VDE 0106-1010
UL approvals	UL/C-UL listed UL 508, UL/C-UL recognized UL 60950
Limitation of harmonic line currents	EN 61000-3-2

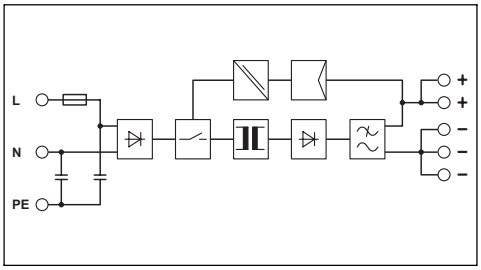
Ordering data

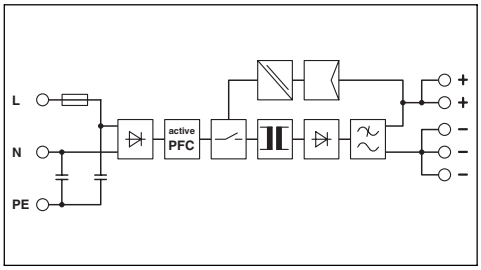
Description	Type	Order No.	Pcs. / Pkt.
Power supply unit, primary-switched	**TRIO-PS/ 1AC/24DC/ 2.5**	**2866268**	1

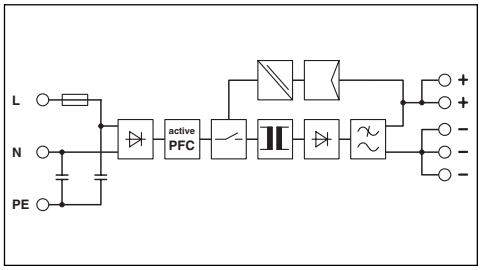
Power supply, 1 AC, 24 V DC, 5 A

Power supply, 1 AC, 24 V DC, 10 A

Power supply, 1 AC, 24 V DC, 20 A







Technical data

100 V AC ... 240 V AC
85 V AC ... 264 V AC
45 Hz ... 65 Hz
1.65 A (120 V AC) / 0.9 A (230 V AC)
< 15 A / 1.1 A²s
> 20 ms (120 V AC) / > 110 ms (230 V AC)
3.15 A (slow-blow, internal)
B6, B10, B16

24 V DC ±1%
22.5 V DC ... 29.5 V DC (> 24 V constant capacitance)

5 A
Yes / Yes
1.1 W / 18 W
> 89% (at 230 V AC and nominal values)
< 20 mV_{PP}

LED

0.6 kg / 40 x 130 x 115 mm
horizontal DIN rail NS 35, EN 60715
Can be aligned: Horizontal 0 cm, vertical 5 cm
Screw connection
0.2 - 2.5 mm^2 / 0.2 - 2.5 mm^2 / 24 - 14
0.2 - 2.5 mm^2 / 0.2 - 2.5 mm^2 / 24 - 14
IP20 / I, with PE connection
> 500,000 h
-25°C ... 70°C (> 55°C derating)
-40°C ... 85°C
95% (at 25°C, no condensation)

2 kV AC (routine test) / 4 kV AC (type test)
Conformance with EMC Directive 2004/108/EC
EN 60950-1/VDE 0805 (SELV), EN 61558-2-17
EN 50178/VDE 0160 (PELV)
DIN VDE 0100-410, DIN VDE 0106-1010
UL/C-UL listed UL 508, UL/C-UL recognized UL 60950

EN 61000-3-2

Ordering data

Type	Order No.	Pcs. / Pkt.
TRIO-PS/ 1AC/24DC/ 5	**2866310**	1

Technical data

100 V AC ... 240 V AC
85 V AC ... 264 V AC
45 Hz ... 65 Hz
3 A (100 V AC) / 1.5 A (240 V AC)
< 15 A / 0.7 A²s
> 24 ms (120 V AC) / > 24 ms (230 V AC)
6.3 A (slow-blow, internal)
B10, B16

24 V DC ±1%
22.5 V DC ... 29.5 V DC (> 24 V constant capacitance)

10 A
Yes / Yes
6.7 W / 30 W
> 89% (at 230 V AC and nominal values)
< 10 mV_{PP}

LED

1.4 kg / 60 x 130 x 152.5 mm
horizontal DIN rail NS 35, EN 60715
Can be aligned: Horizontal 0 cm, vertical 5 cm
Screw connection
0.2 - 2.5 mm^2 / 0.2 - 2.5 mm^2 / 24 - 14
0.2 - 2.5 mm^2 / 0.2 - 2.5 mm^2 / 24 - 14
IP20 / I, with PE connection
> 500,000 h
-25°C ... 70°C (> 55°C derating)
-40°C ... 85°C
95% (at 25°C, no condensation)

2 kV AC (routine test) / 4 kV AC (type test)
Conformance with EMC Directive 2004/108/EC
EN 60950-1/VDE 0805 (SELV), EN 61558-2-17
EN 50178/VDE 0160 (PELV)
DIN VDE 0100-410, DIN VDE 0106-1010
UL/C-UL listed UL 508, UL/C-UL recognized UL 60950

EN 61000-3-2

Ordering data

Type	Order No.	Pcs. / Pkt.
TRIO-PS/ 1AC/24DC/10	**2866323**	1

Technical data

100 V AC ... 240 V AC
85 V AC ... 264 V AC
45 Hz ... 65 Hz
4.6 A (120 V AC) / 2.4 A (230 V AC)
< 15 A / 1.4 A²s
> 13 ms (120 V AC) / > 13 ms (230 V AC)
10 A (slow-blow, internal)
B16

24 V DC ±1%
22.5 V DC ... 29.5 V DC (> 24 V constant capacitance)

20 A
Yes / Yes
4 W / 46 W
> 91% (at 230 V AC and nominal values)
< 10 mV_{PP}

LED

2.2 kg / 115 x 130 x 152.5 mm
horizontal DIN rail NS 35, EN 60715
Can be aligned: Horizontal 0 cm, vertical 5 cm
Screw connection
0.2 - 2.5 mm^2 / 0.2 - 2.5 mm^2 / 24 - 14
0.5 - 6 mm^2 / 0.5 - 4 mm^2 / 20 - 10
IP20 / I, with PE connection
> 500,000 h
-25°C ... 70°C (> 55°C derating)
-40°C ... 85°C
95% (at 25°C, no condensation)

2 kV AC (routine test) / 4 kV AC (type test)
Conformance with EMC Directive 2004/108/EC
EN 60950-1/VDE 0805 (SELV), EN 61558-2-17
EN 50178/VDE 0160 (PELV)
DIN VDE 0100-410, DIN VDE 0106-1010
UL/C-UL listed UL 508, UL/C-UL recognized UL 60950

EN 61000-3-2

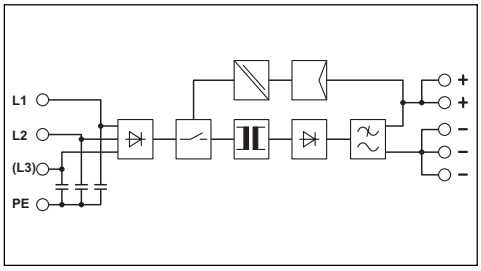
Ordering data

Type	Order No.	Pcs. / Pkt.
TRIO-PS/ 1AC/24DC/20	**2866381**	1

TRIO POWER power supply units – Basic functionality at the highest level

- Maximum operational reliability thanks to the high MTBF (mean time between failures) of more than 500,000 hours
- Rugged design with metal housing and wide temperature range of -25 to +70°C
- Compensation of voltage drops by means of output voltage that can be set on the front side
- Use the third negative terminal as a grounding terminal block and minimize installation costs

Power supply, 3 AC, 24 V DC, 5 A



Technical data

Input data	
Nominal input voltage range	2x / 3x 400 V AC ... 500 V AC
Input voltage range	320 V AC ... 575 V AC
Frequency range	45 Hz ... 65 Hz
Current consumption (nominal load)	Approx. 3x 0.3 A (400 V AC) / Approx. 3x 0.25 A (500 V AC)
Inrush current limitation at 25°C (typ.) / I^2t	< 15 A / 0.2 A^2s
Mains buffering (I_N, typ.)	> 20 ms (400 V AC) / > 30 ms (480 V AC)
Recommended backup fuse, LS switch	B6, B10, B16
Output data	
Nominal output voltage	24 V DC ±1%
Setting range of the output voltage	22.5 V DC ... 29.5 V DC (> 24 V constant capacitance)
Output current	5 A
Can be connected in parallel / series	Yes / Yes
Max. power dissipation (idling/nominal load)	4 W / 15 W
Efficiency (typ.)	> 89% (at 400 V AC and nominal values)
Residual ripple	< 30 mV_{PP}
Signaling	
Signaling DC OK	LED
General data	
Weight / Dimensions W x H x D	0.6 kg / 40 x 130 x 115 mm
Installation position	horizontal DIN rail NS 35, EN 60715
Spacing when mounting	Can be aligned: Horizontal 0 cm, vertical 5 cm
Connection method	Screw connection
Input connection data solid / stranded / AWG	0.2 - 2.5 mm^2 / 0.2 - 2.5 mm^2 / 24 - 14
Output connection data solid / stranded / AWG	0.2 - 2.5 mm^2 / 0.2 - 2.5 mm^2 / 16 - 12
Degree of protection / Protection class	IP20 / I, with PE connection
MTBF (at nominal load, 40°C)	> 500,000 h
Ambient temperature (operation)	-25°C ... 70°C (> 55°C derating)
Ambient temperature (storage / transport)	-40°C ... 85°C
Max. permissible relative humidity (operation)	95% (at 25°C, no condensation)
Standards / regulations	
Insulation voltage input/output	2 kV AC (routine test) / 4 kV AC (type test)
Electromagnetic compatibility	Conformance with EMC Directive 2004/108/EC
Electrical safety, safety transformer	EN 60950-1/VDE 0805 (SELV), EN 61558-2-17
Electronic equipm. for electrical power installations	EN 50178/VDE 0160 (PELV)
Safe isolation	DIN VDE 0100-410, DIN VDE 0106-1010
UL approvals	UL/C-UL listed UL 508, UL/C-UL recognized UL 60950
Limitation of harmonic line currents	EN 61000-3-2

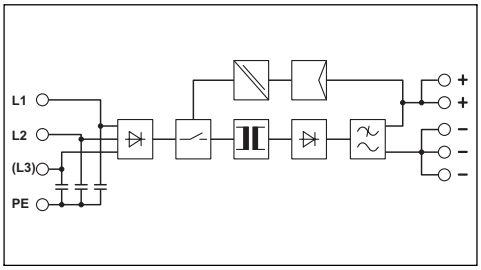
Ordering data

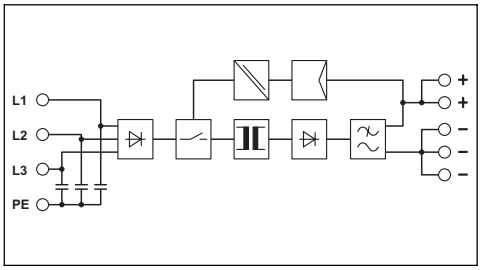
Description	Type	Order No.	Pcs. / Pkt.
Power supply unit, primary-switched	**TRIO-PS/ 3AC/24DC/ 5**	**2866462**	1

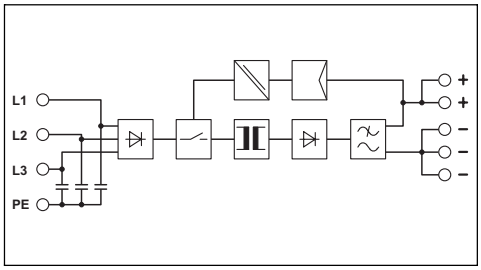
Power supply,
3 AC, 24 V DC, 10 A

Power supply,
3 AC, 24 V DC, 20 A

Power supply unit,
3 AC, 24 V DC, 40 A







Technical data

2x / 3x 400 V AC ... 500 V AC
320 V AC ... 575 V AC
45 Hz ... 65 Hz
Approx. 3x 0.6 A (400 V AC) / 3x 0.5 A (480 V AC)
< 15 A / 0.2 A²s
> 20 ms (400 V AC) / > 25 ms (480 V AC)
B6, B10, B16

24 V DC ±1%
22.5 V DC ... 29.5 V DC (> 24 V constant capacitance)

10 A
Yes / Yes
6 W / 28 W
> 89% (at 400 V AC and nominal values)
< 10 mV_{PP}

LED

1.3 kg / 60 x 130 x 152.5 mm
horizontal DIN rail NS 35, EN 60715
Can be aligned: Horizontal 0 cm, vertical 5 cm
Screw connection
0.2 - 2.5 mm^2 / 0.2 - 2.5 mm^2 / 24 - 14
0.2 - 2.5 mm^2 / 0.2 - 2.5 mm^2 / 16 - 12
IP20 / I, with PE connection
> 500,000 h
-25°C ... 70°C (> 55°C derating)
-40°C ... 85°C
95% (at 25°C, no condensation)

2 kV AC (routine test) / 4 kV AC (type test)
Conformance with EMC Directive 2004/108/EC
EN 60950-1/VDE 0805 (SELV), EN 61558-2-17
EN 50178/VDE 0160 (PELV)
DIN VDE 0100-410, DIN VDE 0106-1010
UL/C-UL listed UL 508, UL/C-UL recognized UL 60950

EN 61000-3-2

Ordering data

Type	Order No.	Pcs. / Pkt.
TRIO-PS/ 3AC/24DC/10	**2866459**	1

Technical data

3x 400 V AC ... 500 V AC
320 V AC ... 575 V AC
45 Hz ... 65 Hz
Approx. 3x 1.1 A (400 V AC) / 3x 0.8 A (480 V AC)
< 15 A / 0.5 A²s
> 17 ms (400 V AC) / > 20 ms (480 V AC)
B6, B10, B16

24 V DC ±1%
22.5 V DC ... 29.5 V DC (> 24 V constant capacitance)

20 A
Yes / Yes
< 6 W / < 48 W
> 91% (at 400 V AC and nominal values)
< 10 mV_{PP}

LED

2 kg / 115 x 130 x 152.5 mm
horizontal DIN rail NS 35, EN 60715
Can be aligned: Horizontal 0 cm, vertical 5 cm
Screw connection
0.2 - 2.5 mm^2 / 0.2 - 2.5 mm^2 / 24 - 14
0.5 - 6 mm^2 / 0.5 - 4 mm^2 / 12 - 10
IP20 / I, with PE connection
> 500,000 h
-25°C ... 70°C (> 55°C derating)
-40°C ... 85°C
95% (at 25°C, no condensation)

2 kV AC (routine test) / 4 kV AC (type test)
Conformance with EMC Directive 2004/108/EC
EN 60950-1/VDE 0805 (SELV), EN 61558-2-17
EN 50178/VDE 0160 (PELV)
DIN VDE 0100-410, DIN VDE 0106-1010
UL/C-UL listed UL 508, UL/C-UL recognized UL 60950

EN 61000-3-2

Ordering data

Type	Order No.	Pcs. / Pkt.
TRIO-PS/ 3AC/24DC/20	**2866394**	1

Technical data

3x 400 V AC ... 500 V AC
320 V AC ... 575 V AC
45 Hz ... 65 Hz
Approx. 3x 2 A (400 V AC) / 3x 1.6 A (480 V AC)
< 20 A / 1.3 A²s
> 16 ms (400 V AC) / > 20 ms (480 V AC)
B10, B16

24 V DC ±1%
22.5 V DC ... 29.5 V DC (> 24 V constant capacitance)

40 A
Yes / Yes
16 W / 91 W
> 91.5% (at 400 V AC and nominal values)
< 20 mV_{PP}

LED

2.9 kg / 139 x 130 x 190 mm
horizontal DIN rail NS 35, EN 60715
Can be aligned: Horizontal 0 cm, vertical 5 cm
Screw connection
0.2 - 6 mm^2 / 0.2 - 4 mm^2 / 22 - 10
0.5 - 16 mm^2 / 0.5 - 10 mm^2 / 8 - 6
IP20 / I, with PE connection
> 500,000 h
-25°C ... 70°C (> 55°C derating)
-40°C ... 85°C
95% (at 25°C, no condensation)

2 kV AC (routine test) / 4 kV AC (type test)
Conformance with EMC Directive 2004/108/EC
EN 60950-1/VDE 0805 (SELV), EN 61558-2-17
EN 50178/VDE 0160 (PELV)
DIN VDE 0100-410, DIN VDE 0106-1010
UL/C-UL listed UL 508, UL/C-UL recognized UL 60950

EN 61000-3-2

Ordering data

Type	Order No.	Pcs. / Pkt.
TRIO-PS/ 3AC/24DC/40	**2866404**	1

TRIO POWER power supply units – Basic functionality at the highest level

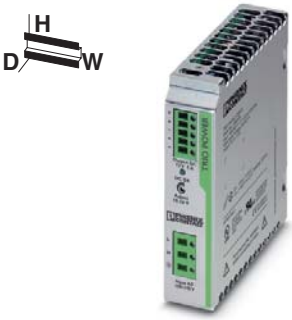
TRIO POWER, 600 V DC, 24 V DC
– Connection to 600 V DC intermediate circuits of frequency inverters: In the event of a line supply failure, 24 V loads are supplied using the kinetic energy of the motor

TRIO POWER, 1 AC, 12 V DC
– Adjustable output voltage of 10 to 18 V DC

TRIO POWER, 1 AC, 48 V DC
– Adjustable output voltage of 30 to 56 V DC

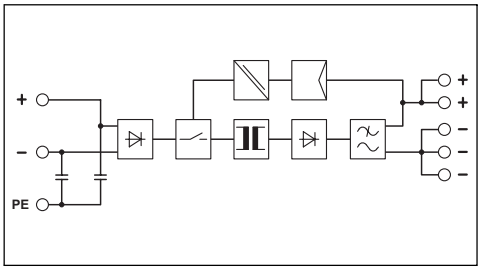
N

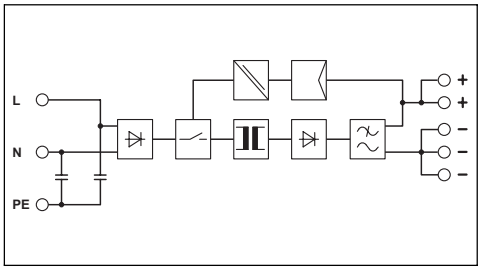
Power supply, 600 V DC, 24 V DC, 20 A



Power supply, 1 AC, 12 V DC, 5 A

Applied for:
UL listed / CUL listed / UL / CUL





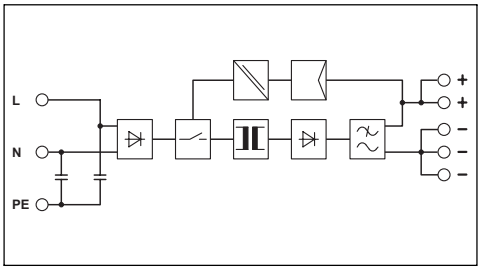
	Technical data	Technical data
Input data		
Nominal input voltage range	600 V DC	100 V AC ... 240 V AC
Input voltage range AC/DC	- / 450 V DC ... 840 V DC	85 V AC ... 264 V AC
Frequency range	- / 0 Hz	45 Hz ... 65 Hz
Current consumption (nominal load)	Typ. 0.9 A / -	Approx. 1.1 A (100 V AC) / Approx. 0.5 A (240 V AC)
Inrush current limitation at 25°C (typ.) / I^2t	< 26 A / 0.8 A^2s	< 15 A / < 0.5 A^2s
Mains buffering (I_N, typ.)	> 15 ms (600 V DC) / -	> 26 ms (120 V AC) / > 100 ms (230 V AC)
Recommended backup fuse, LS switch	4 A, 6 A	B6, B10, B16
Output data		
Nominal output voltage	24 V DC ±1%	12 V DC ±1%
Setting range of the output voltage	22.5 V DC ... 29.5 V DC (U_{IN} > 475 V DC)	10 V DC ... 18 V DC (> 12 V constant capacitance)
Output current	20 A	5 A
Can be connected in parallel / series	Yes / Yes	Yes / Yes
Max. power dissipation (idling/nominal load)	Typ. 3.8 W / Typ. 45 W	0.9 W / 11 W
Efficiency (typ.)	> 91% (with 600 V DC and nominal values)	> 83% (at 230 V AC and nominal values)
Residual ripple	< 40 mV_{PP}	< 20 mV_{PP}
Signaling		
Signaling DC OK	LED	LED
General data		
Weight / Dimensions W x H x D	2 kg / 115 x 130 x 152.5 mm	0.5 kg / 32 x 130 x 115 mm
Installation position	horizontal DIN rail NS 35, EN 60715	horizontal DIN rail NS 35, EN 60715
Spacing when mounting	Can be aligned: Horizontal 0 cm, vertical 5 cm	Can be aligned: Horizontal 0 cm, vertical 5 cm
Connection method	Screw connection	Screw connection
Input connection data solid / stranded / AWG	0.2 - 2.5 mm^2 / 0.2 - 2.5 mm^2 / 24 - 14	0.2 - 2.5 mm^2 / 0.2 - 2.5 mm^2 / 24 - 14
Output connection data solid / stranded / AWG	0.5 - 6 mm^2 / 0.5 - 4 mm^2 / 12 - 10	0.2 - 2.5 mm^2 / 0.2 - 2.5 mm^2 / 24 - 14
Degree of protection / Protection class	IP20 / I, with PE connection	IP20 / I, with PE connection
MTBF (at nominal load, 40°C)	> 500,000 h	> 500,000 h
Ambient temperature (operation)	-25°C ... 70°C (> 55°C derating)	-25°C ... 70°C (> 55°C derating)
Ambient temperature (storage / transport)	-40°C ... 85°C	-40°C ... 85°C
Max. permissible relative humidity (operation)	≤ 95% (at 25°C, no condensation)	95% (at 25°C, no condensation)
Standards / regulations		
Insulation voltage input/output	2 kV AC (routine test) / 4 kV AC (type test)	2 kV AC (routine test) / 4 kV AC (type test)
Electromagnetic compatibility	Conformance with EMC Directive 2004/108/EC	Conformance with EMC Directive 2004/108/EC
Electrical safety, safety transformer	EN 60950-1/VDE 0805 (SELV), EN 61558-2-17	EN 60950-1/VDE 0805 (SELV), EN 61558-2-17
Electronic equipm. for electrical power installations	EN 50178/VDE 0160 (PELV)	EN 50178/VDE 0160 (PELV)
Safe isolation	DIN VDE 0100-410, DIN VDE 0106-1010	DIN VDE 0100-410, DIN VDE 0106-1010
UL approvals	UL applied for	UL/C-UL listed UL 508, UL/C-UL recognized UL 60950
Limitation of harmonic line currents	EN 61000-3-2	EN 61000-3-2

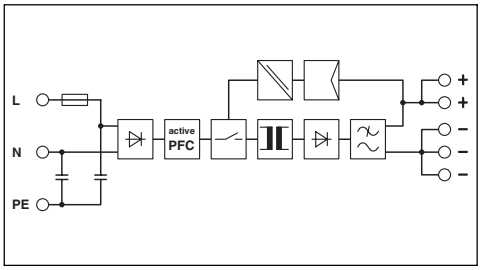
Description	Ordering data: Type	Order No.	Pcs. / Pkt.	Ordering data: Type	Order No.	Pcs. / Pkt.
Power supply unit, primary-switched	**TRIO-PS/600DC/24DC/20**	**2866530**	1	**TRIO-PS/ 1AC/12DC/ 5**	**2866475**	1

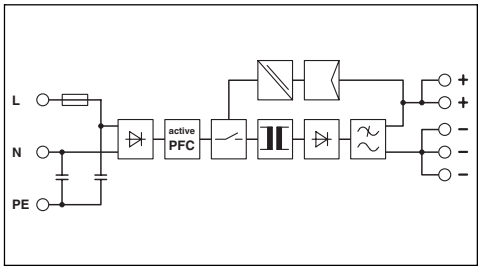
Power supply,
1 AC, 12 V DC, 10 A

Power supply,
1 AC, 48 V DC, 5 A

Power supply,
1 AC, 48 V DC, 10 A







Technical data

100 V AC ... 240 V AC
85 V AC ... 264 V AC
45 Hz ... 65 Hz
Approx. 1.7 A (120 V AC) / Approx. 0.9 A (230 V AC)
< 15 A / < 1.1 A^2s
> 20 ms (120 V AC) / > 86 ms (230 V AC)
B6, B10, B16

12 V DC ±1%
10 V DC ... 18 V DC (> 12 V constant capacitance)

10 A
Yes / Yes
1.1 W / 18 W
> 86% (at 230 V AC and nominal values)
< 20 mV_{PP}

LED

0.6 kg / 40 x 130 x 115 mm
horizontal DIN rail NS 35, EN 60715
Can be aligned: Horizontal 0 cm, vertical 5 cm
Screw connection
0.2 - 2.5 mm^2 / 0.2 - 2.5 mm^2 / 24 - 14
0.2 - 2.5 mm^2 / 0.2 - 2.5 mm^2 / 24 - 14
IP20 / I, with PE connection
> 500,000 h
-25°C ... 70°C (> 55°C derating)
-40°C ... 85°C
95% (at 25°C, no condensation)

2 kV AC (routine test) / 4 kV AC (type test)
Conformance with EMC Directive 2004/108/EC
EN 60950-1/VDE 0805 (SELV), EN 61558-2-17
EN 50178/VDE 0160 (PELV)
DIN VDE 0100-410, DIN VDE 0106-1010
UL/C-UL listed UL 508, UL/C-UL recognized UL 60950

EN 61000-3-2

Ordering data

Type	Order No.	Pcs. / Pkt.
TRIO-PS/ 1AC/12DC/10	**2866488**	1

Technical data

100 V AC ... 240 V AC
85 V AC ... 264 V AC
45 Hz ... 65 Hz
Approx. 2.5 A (120 V AC) / Approx. 1.3 A (230 V AC)
< 15 A / < 0.7 A^2s
> 15 ms (120 V AC) / > 16 ms (230 V AC)
B10, B16

48 V DC ±1%
30 V DC ... 56 V DC (> 48 V constant capacitance)

5 A
Yes / Yes
7 W / 28 W
> 89% (at 230 V AC and nominal values)
< 50 mV_{PP}

LED

1.4 kg / 60 x 130 x 152.5 mm
horizontal DIN rail NS 35, EN 60715
Can be aligned: Horizontal 0 cm, vertical 5 cm
Screw connection
0.2 - 2.5 mm^2 / 0.2 - 2.5 mm^2 / 24 - 14
0.2 - 2.5 mm^2 / 0.2 - 2.5 mm^2 / 24 - 14
IP20 / I, with PE connection
> 500,000 h
-25°C ... 70°C (> 55°C derating)
-40°C ... 85°C
95% (at 25°C, no condensation)

2 kV AC (routine test) / 4 kV AC (type test)
Conformance with EMC Directive 2004/108/EC
EN 60950-1/VDE 0805 (SELV), EN 61558-2-17
EN 50178/VDE 0160 (PELV)
DIN VDE 0100-410, DIN VDE 0106-1010
UL/C-UL listed UL 508, UL/C-UL recognized UL 60950

EN 61000-3-2

Ordering data

Type	Order No.	Pcs. / Pkt.
TRIO-PS/ 1AC/48DC/ 5	**2866491**	1

Technical data

100 V AC ... 240 V AC
85 V AC ... 264 V AC
45 Hz ... 65 Hz
Approx. 4.6 A (120 V AC) / Approx. 2.4 A (230 V AC)
< 15 A / < 1.4 A^2s
> 13 ms (120 V AC) / > 18 ms (230 V AC)
B16

48 V DC ±1%
30 V DC ... 56 V DC (> 48 V constant capacitance)

10 A
Yes / Yes
8 W / 49 W
> 91% (at 230 V AC and nominal values)
< 50 mV_{PP}

LED

1.9 kg / 115 x 130 x 152.5 mm
horizontal DIN rail NS 35, EN 60715
Can be aligned: Horizontal 0 cm, vertical 5 cm
Screw connection
0.2 - 2.5 mm^2 / 0.2 - 2.5 mm^2 / 24 - 14
0.5 - 0.6 mm^2 / 0.5 - 4 mm^2 / 20 - 10
IP20 / I, with PE connection
> 500,000 h
-25°C ... 70°C (> 55°C derating)
-40°C ... 85°C
95% (at 25°C, no condensation)

2 kV AC (routine test) / 4 kV AC (type test)
Conformance with EMC Directive 2004/108/EC
EN 60950-1/VDE 0805 (SELV), EN 61558-2-17
EN 50178/VDE 0160 (PELV)
DIN VDE 0100-410, DIN VDE 0106-1010
UL listed UL 508, UL/C-UL recognized UL 60950

EN 61000-3-2

Ordering data

Type	Order No.	Pcs. / Pkt.
TRIO-PS/ 1AC/48DC/10	**2866501**	1

MINI POWER power supply units – For MCR technology

- Easy-to-maintain connection method thanks to keyed COMBICON connector
- Remote monitoring of output voltage via switching output

MINI POWER, 1.5 A

- Flat power supply units with a depth of just 95 mm
- Optional: DIN rail connector for supplying other modules
  Per power supply:
  2 x ME 17,5 TBUS 1,5/5-ST-3,82 GN
  (Order No. 2709561)

MINI POWER, 100 W

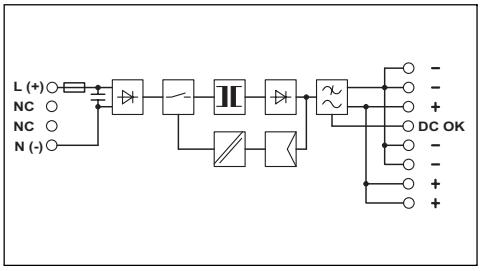
- Output power limited to 100 W: Specifically for applications that require certification according to UL 1310/508 listed Class 2

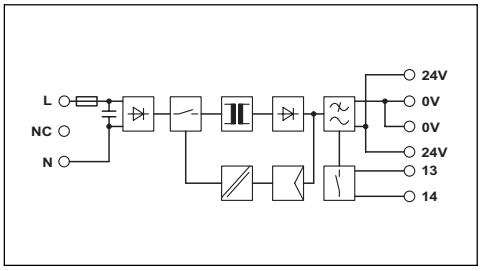
Power supply,
1 AC, 24 V DC, 1.3 A

Ex:

Power supply,
1 AC, 24 V DC, 1.5 A,
DIN rail connector optional

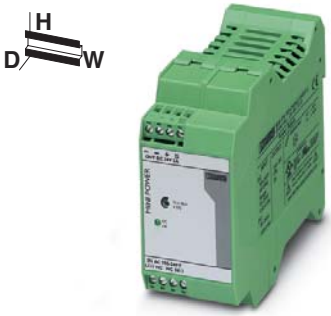
Ex:





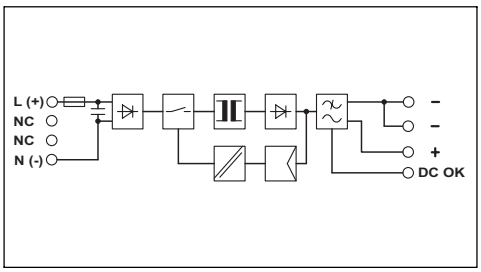
	Technical data	Technical data
Input data		
Nominal input voltage range	100 V AC ... 240 V AC	100 V AC ... 240 V AC
Input voltage range AC/DC	85 V AC ... 264 V AC / 90 V DC ... 350 V DC	85 V AC ... 264 V AC
Frequency range	45 Hz ... 65 Hz / 0 Hz	45 Hz ... 65 Hz
Current consumption (nominal load)	Approx. 0.65 A (120 V AC) / 0.25 A (230 V AC)	Approx. 0.75 A (120 V AC) / 0.45 A (230 V AC)
Inrush current limitation at 25°C (typ.) / I^2t	< 15 A / 0.6 A^2s	< 15 A / 0.6 A^2s
Mains buffering (I_N, typ.)	> 20 ms (120 V AC) / > 110 ms (230 V AC)	> 35 ms (120 V AC) / > 150 ms (230 V AC)
Input fuse	1.25 A (slow-blow, internal)	3.15 A (slow-blow, internal)
Recommended backup fuse, LS switch	B6, B10, B16	B6, B10, B16
Output data		
Nominal output voltage	24 V DC ±1%	24 V DC ±1%
Setting range of the output voltage	22.5 V DC ... 28.5 V DC (> 24 V constant capacitance)	-
Output current / POWER BOOST	1.3 A / 1.6 A	1.5 A / 2 A
Can be connected in parallel / series	Yes / Yes	Yes / No
Max. power dissipation (idling/nominal load)	0.9 W / 4.5 W	1.5 W / 6.5 W
Efficiency (typ.)	> 85% (at 230 V AC and nominal values)	> 84% (at 230 V AC and nominal values)
Residual ripple	< 20 mV_{PP}	< 40 mV_{PP}
Signaling		
Signaling DC OK	LED, active switching output	LED, relay contact
General data		
Weight / Dimensions W x H x D	0.2 kg / 22.5 x 99 x 107 mm	0.25 kg / 35 x 99 x 95 mm
Installation position	horizontal DIN rail NS 35, EN 60715	horizontal DIN rail NS 35, EN 60715
Spacing when mounting	Can be aligned: Horizontal 0 cm, vertical 5 cm	Can be aligned: Horizontal 0 cm, vertical 5 cm
Connection method	Pluggable screw connection	Pluggable screw connection
Input connection data solid / stranded / AWG	0.2 - 2.5 mm^2 / 0.2 - 2.5 mm^2 / 24 - 12	0.2 - 2.5 mm^2 / 0.2 - 2.5 mm^2 / 24 - 12
Output connection data solid / stranded / AWG	0.2 - 2.5 mm^2 / 0.2 - 2.5 mm^2 / 24 - 12	0.2 - 2.5 mm^2 / 0.2 - 2.5 mm^2 / 24 - 12
Signal connection data solid / stranded / AWG	0.2 - 2.5 mm^2 / 0.2 - 2.5 mm^2 / 24 - 12	0.2 - 2.5 mm^2 / 0.2 - 2.5 mm^2 / 24 - 12
Degree of protection / Protection class	IP20 / II (in an enclosed control cabinet)	IP20 / II (in an enclosed control cabinet)
MTBF (at nominal load, 40°C)	> 500,000 h	> 500,000 h
Ambient temperature (operation)	-25°C ... 70°C (> 60°C derating)	-25°C ... 70°C (> 60°C derating)
Ambient temperature (storage / transport)	-40°C ... 85°C	-40°C ... 85°C
Max. permissible relative humidity (operation)	95% (at 25°C, no condensation)	95% (at 25°C, no condensation)
Standards / regulations		
Insulation voltage input/output	4 kV (type test) / 3 kV (routine test)	4 kV (type test) / 3 kV (routine test)
Electromagnetic compatibility	Conformance with EMC Directive 2004/108/EC	Conformance with EMC Directive 2004/108/EC
Electrical safety, safety transformer	EN 60950-1/VDE 0805 (SELV), EN 61558-2-17	EN 60950-1/VDE 0805 (SELV), EN 61558-2-17
Electronic equipm. for electrical power installations	EN 50178/VDE 0160 (PELV)	EN 50178/VDE 0160 (PELV)
Safe isolation	DIN VDE 0100-410, DIN VDE 0106-1010	DIN VDE 0100-410, DIN VDE 0106-1010
UL approvals	UL/C-UL listed UL 508, UL/C-UL recognized UL 60950, UL/C-UL listed UL 1604 Class I, Division 2, Groups A, B, C, D, NEC Class 2 as per UL 1310	UL/C-UL listed UL 508, UL/C-UL recognized UL 60950, UL/C-UL listed UL 1604 Class I, Division 2, Groups A, B, C, D
Limitation of harmonic line currents	EN 61000-3-2	EN 61000-3-2

	Ordering data			Ordering data		
Description	Type	Order No.	Pcs. / Pkt.	Type	Order No.	Pcs. / Pkt.
Power supply unit, primary-switched						
	MINI-PS-100-240AC/24DC/1.3	**2866446**	1	**MINI-SYS-PS-100-240AC/24DC/1.5**	**2866983**	1



Power supply,
1 AC, 24 V DC, 2 A

Ex:



Technical data

100 V AC ... 240 V AC
85 V AC ... 264 V AC / 90 V DC ... 350 V DC
45 Hz ... 65 Hz / 0 Hz
Approx. 0.7 A (120 V AC) / 0.4 A (230 V AC)
< 15 A / 4.1 A^2s
> 35 ms (120 V AC) / > 170 ms (230 V AC)
2.5 A (slow-blow, internal)
B6, B10, B16

24 V DC ±1%
22.5 V DC ... 28.5 V DC (> 24 V constant capacitance)

2 A / 2.9 A
Yes / Yes
2 W / 7 W
> 88% (at 230 V AC and nominal values)
< 20 mV_{PP}

LED, active switching output

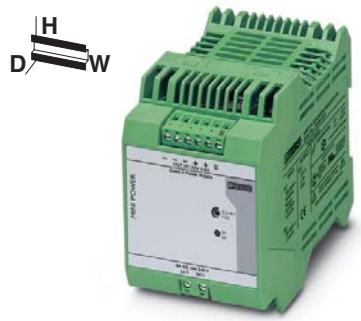
0.25 kg / 45 x 99 x 107 mm
horizontal DIN rail NS 35, EN 60715
Can be aligned: Horizontal 0 cm, vertical 5 cm
Pluggable screw connection
0.2 - 2.5 mm^2 / 0.2 - 2.5 mm^2 / 24 - 12
0.2 - 2.5 mm^2 / 0.2 - 2.5 mm^2 / 24 - 12
0.2 - 2.5 mm^2 / 0.2 - 2.5 mm^2 / 24 - 12
IP20 / II (in an enclosed control cabinet)
> 500,000 h
-25°C ... 70°C (> 60°C derating)
-40°C ... 85°C
95% (at 25°C, no condensation)

4 kV (type test) / 3 kV (routine test)
Conformance with EMC Directive 2004/108/EC
EN 60950-1/VDE 0805 (SELV), EN 61558-2-17
EN 50178/VDE 0160 (PELV)
DIN VDE 0100-410, DIN VDE 0106-1010
UL/C-UL listed UL 508, UL/C-UL recognized UL 60950, UL/C-UL listed UL 1604 Class I, Division 2, Groups A, B, C, D, NEC Class 2 as per UL 1310

EN 61000-3-2

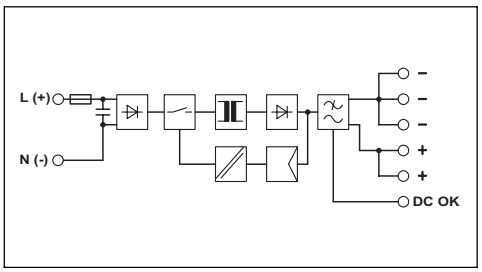
Ordering data

Type	Order No.	Pcs. / Pkt.
MINI-PS-100-240AC/24DC/2	**2938730**	1



Power supply,
1 AC, 24 V DC, 100 W
NEC Class 2

Ex:



Technical data

100 V AC ... 240 V AC
85 V AC ... 264 V AC / 90 V DC ... 350 V DC
45 Hz ... 65 Hz / 0 Hz
Approx. 1.3 A (120 V AC) / 0.8 A (230 V AC)
< 15 A / 2.1 A^2s
> 20 ms (120 V AC) / > 100 ms (230 V AC)
3.15 A (slow-blow, internal)
B6, B10, B16

24 V DC ±1%
22.5 V DC ... 26 V DC (> 24 V constant capacitance)

3.8 A
Yes / Yes
2.5 W / 12 W
> 88% (at 230 V AC and nominal values)
< 40 mV_{PP}

LED, active switching output

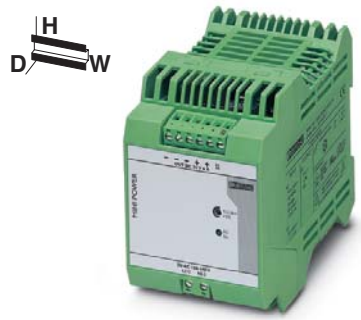
0.4 kg / 67.5 x 99 x 107 mm
horizontal DIN rail NS 35, EN 60715
Can be aligned: Horizontal 0 cm, vertical 5 cm
Pluggable screw connection
0.2 - 2.5 mm^2 / 0.2 - 2.5 mm^2 / 24 - 12
0.2 - 2.5 mm^2 / 0.2 - 2.5 mm^2 / 24 - 12
0.2 - 2.5 mm^2 / 0.2 - 2.5 mm^2 / 24 - 12
IP20 / II (in an enclosed control cabinet)
> 500,000 h
-25°C ... 70°C (> 60°C derating)
-40°C ... 85°C
95% (at 25°C, no condensation)

3 kV (type test) / 3 kV (routine test)
Conformance with EMC Directive 2004/108/EC
EN 60950-1/VDE 0805 (SELV), EN 61558-2-17
EN 50178/VDE 0160 (PELV)
DIN VDE 0100-410, DIN VDE 0106-1010
UL/C-UL listed UL 508, UL/C-UL recognized UL 60950, UL/C-UL listed UL 1604 Class I, Division 2, Groups A, B, C, D, NEC Class 2 as per UL 1310

EN 61000-3-2

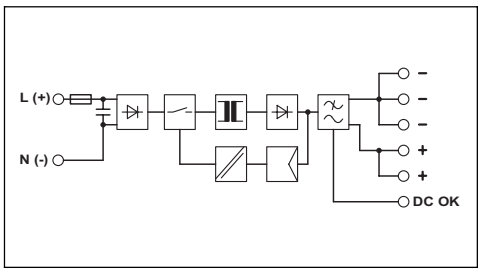
Ordering data

Type	Order No.	Pcs. / Pkt.
MINI-PS-100-240AC/24DC/C2LPS	**2866336**	1



Power supply,
1 AC, 24 V DC, 4 A

Ex:



Technical data

100 V AC ... 240 V AC
85 V AC ... 264 V AC / 90 V DC ... 350 V DC
45 Hz ... 65 Hz / 0 Hz
Approx. 1.3 A (120 V AC) / 0.8 A (230 V AC)
< 15 A / 2.1 A^2s
> 20 ms (120 V AC) / > 100 ms (230 V AC)
3.15 A (slow-blow, internal)
B6, B10, B16

24 V DC ±1%
22.5 V DC ... 28.5 V DC (> 24 V constant capacitance)

4 A / 5 A
Yes / Yes
2.5 W / 12 W
> 88% (at 230 V AC and nominal values)
< 20 mV_{PP}

LED, active switching output

0.4 kg / 67.5 x 99 x 107 mm
horizontal DIN rail NS 35, EN 60715
Can be aligned: Horizontal 0 cm, vertical 5 cm
Pluggable screw connection
0.2 - 2.5 mm^2 / 0.2 - 2.5 mm^2 / 24 - 12
0.2 - 2.5 mm^2 / 0.2 - 2.5 mm^2 / 24 - 12
0.2 - 2.5 mm^2 / 0.2 - 2.5 mm^2 / 24 - 12
IP20 / II (in an enclosed control cabinet)
> 500,000 h
-25°C ... 70°C (> 60°C derating)
-40°C ... 85°C
95% (at 25°C, no condensation)

3 kV (type test) / 3 kV (routine test)
Conformance with EMC Directive 2004/108/EC
EN 60950-1/VDE 0805 (SELV), EN 61558-2-17
EN 50178/VDE 0160 (PELV)
DIN VDE 0100-410, DIN VDE 0106-1010
UL/C-UL listed UL 508, UL/C-UL recognized UL 60950, UL/C-UL listed UL 1604 Class I, Division 2, Groups A, B, C, D

EN 61000-3-2

Ordering data

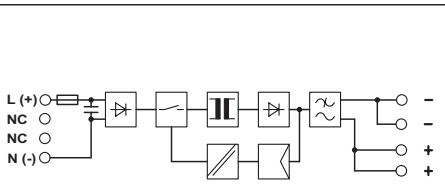
Type	Order No.	Pcs. / Pkt.
MINI-PS-100-240AC/24DC/4	**2938837**	1

MINI POWER power supply units – For MCR technology

- Easy-to-maintain connection method thanks to keyed COMBICON connector
- Remote monitoring of output voltage via switching output

Power supply, 1 AC, 5 V DC, 3 A

Ex:

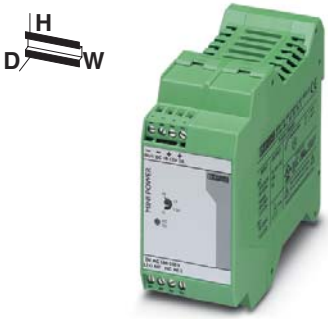


Technical data

Input data	
Nominal input voltage range	100 V AC ... 240 V AC
Input voltage range AC/DC	85 V AC ... 264 V AC / 90 V DC ... 350 V DC
Frequency range	45 Hz ... 65 Hz / 0 Hz
Current consumption (nominal load)	Approx. 0.4 A (120 V AC) / 0.2 A (230 V AC)
Inrush current limitation at 25°C (typ.) / I^2t	< 15 A / 1.5 A^2s
Mains buffering (I_N, typ.)	> 30 ms (120 V AC) / > 140 ms (230 V AC)
Input fuse	2 A (slow-blow, internal)
Recommended backup fuse, LS switch	B6, B10, B16
Output data	
Nominal output voltage	5 V DC ±1%
Setting range of the output voltage	4.5 V DC ... 5.5 V DC (> 5 V constant capacitance)
Output current / POWER BOOST	3 A / 5 A
Can be connected in parallel / series	Yes / Yes
Max. power dissipation (idling/nominal load)	1 W / 5 W
Efficiency (typ.)	> 73% (at 230 V AC and nominal values)
Residual ripple	< 40 mV_{PP}
Signaling	
Signaling DC OK	LED
General data	
Weight / Dimensions W x H x D	0.17 kg / 22.5 x 99 x 107 mm
Installation position	horizontal DIN rail NS 35, EN 60715
Spacing when mounting	Can be aligned: Horizontal 0 cm, vertical 5 cm
Connection method	Pluggable screw connection
Input connection data solid / stranded / AWG	0.2 - 2.5 mm^2 / 0.2 - 2.5 mm^2 / 24 - 12
Output connection data solid / stranded / AWG	0.2 - 2.5 mm^2 / 0.2 - 2.5 mm^2 / 24 - 12
Signal connection data solid / stranded / AWG	0.2 - 2.5 mm^2 / 0.2 - 2.5 mm^2 / 24 - 12
Degree of protection / Protection class	IP20 / II (in an enclosed control cabinet)
MTBF (at nominal load, 40°C)	> 500,000 h
Ambient temperature (operation)	-25°C ... 70°C (> 60°C derating)
Ambient temperature (storage / transport)	-40°C ... 85°C
Max. permissible relative humidity (operation)	95% (at 25°C, no condensation)
Standards / regulations	
Insulation voltage input/output	4 kV (type test) / 3 kV (routine test)
Electromagnetic compatibility	Conformance with EMC Directive 2004/108/EC
Electrical safety, safety transformer	EN 60950-1/VDE 0805 (SELV), EN 61558-2-17
Electronic equipm. for electrical power installations	EN 50178/VDE 0160 (PELV)
Safe isolation	DIN VDE 0100-410, DIN VDE 0106-1010
UL approvals	UL/C-UL listed UL 508, UL/C-UL recognized UL 60950, UL/C-UL listed UL 1604 Class I, Division 2, Groups A, B, C, D
Limitation of harmonic line currents	EN 61000-3-2

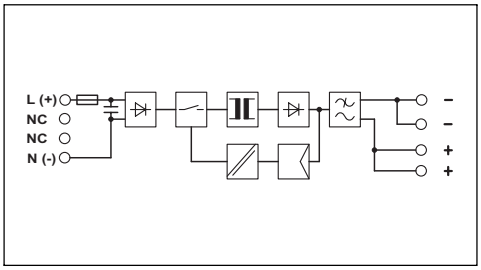
Ordering data

Description	Type	Order No.	Pcs. / Pkt.
Power supply unit, primary-switched			
	MINI-PS-100-240AC/ 5DC/3	**2938714**	1



Power supply,
1 AC, 10 - 15 V DC, 2 A

Ex:



Technical data

100 V AC ... 240 V AC
85 V AC ... 264 V AC / 90 V DC ... 350 V DC
45 Hz ... 65 Hz / 0 Hz
Approx. 0.4 A (120 V AC) / 0.2 A (230 V AC)
< 15 A / 1.7 A²s
> 20 ms (120 V AC) / > 120 ms (230 V AC)
2 A (slow-blow, internal)
B6, B10, B16

12 V DC ±1%
10 V DC ... 15 V DC (> 12 V constant capacitance)

2 A / 2.3 A
Yes / Yes
< 1 W / < 7 W
> 86% (at 230 V AC and nominal values)
< 20 mV_{PP}

LED

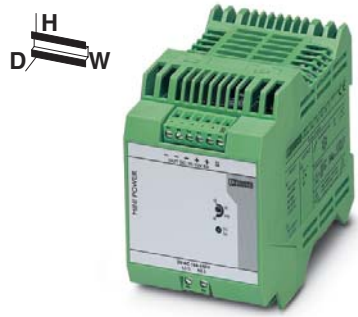
0.25 kg / 45 x 99 x 107 mm
horizontal DIN rail NS 35, EN 60715
Can be aligned: Horizontal 0 cm, vertical 5 cm
Pluggable screw connection
0.2 - 2.5 mm^2 / 0.2 - 2.5 mm^2 / 24 - 12
0.2 - 2.5 mm^2 / 0.2 - 2.5 mm^2 / 24 - 12
0.2 - 2.5 mm^2 / 0.2 - 2.5 mm^2 / 24 - 12
IP20 / II (in an enclosed control cabinet)
> 500,000 h
-25°C ... 70°C (> 60°C derating)
-40°C ... 85°C
95% (at 25°C, no condensation)

4 kV (type test) / 3 kV (routine test)
Conformance with EMC Directive 2004/108/EC
EN 60950-1/VDE 0805 (SELV), EN 61558-2-17
EN 50178/VDE 0160 (PELV)
DIN VDE 0100-410, DIN VDE 0106-1010
UL/C-UL listed UL 508, UL/C-UL recognized UL 60950, UL/C-UL listed UL 1604 Class I, Division 2, Groups A, B, C, D

EN 61000-3-2

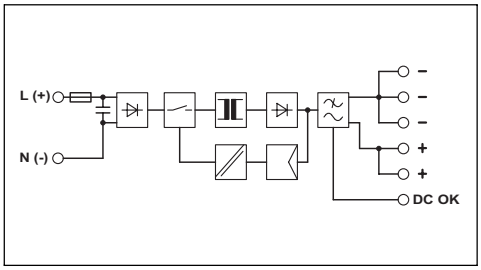
Ordering data

Type	Order No.	Pcs. / Pkt.
MINI-PS-100-240AC/10-15DC/2	**2938756**	1



Power supply,
1 AC, 10 - 15 V DC, 8 A

Ex:



Technical data

100 V AC ... 240 V AC
85 V AC ... 264 V AC / 90 V DC ... 350 V DC
45 Hz ... 65 Hz / 0 Hz
Approx. 1.3 A (120 V AC) / 0.8 A (230 V AC)
< 15 A / 2.1 A²s
> 20 ms (120 V AC) / > 20 ms (230 V AC)
3.15 A (slow-blow, internal)
B6, B10, B16

12 V DC ±1%
10 V DC ... 15 V DC (> 12 V constant capacitance)

8 A / 6.6 A
Yes / Yes
< 2.5 W / < 12 W
> 88% (at 230 V AC and nominal values)
< 40 mV_{PP}

LED, active switching output

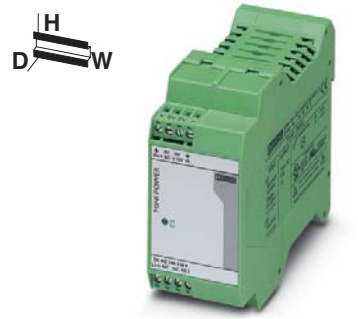
0.4 kg / 67.5 x 99 x 107 mm
horizontal DIN rail NS 35, EN 60715
Can be aligned: Horizontal 0 cm, vertical 5 cm
Pluggable screw connection
0.2 - 2.5 mm^2 / 0.2 - 2.5 mm^2 / 24 - 12
0.2 - 2.5 mm^2 / 0.2 - 2.5 mm^2 / 24 - 12
0.2 - 2.5 mm^2 / 0.2 - 2.5 mm^2 / 24 - 12
IP20 / II (in an enclosed control cabinet)
> 500,000 h
-25°C ... 70°C (> 60°C derating)
-40°C ... 85°C
95% (at 25°C, no condensation)

3 kV (type test) / 3 kV (routine test)
Conformance with EMC Directive 2004/108/EC
EN 60950-1/VDE 0805 (SELV), EN 61558-2-17
EN 50178/VDE 0160 (PELV)
DIN VDE 0100-410, DIN VDE 0106-1010
UL/C-UL listed UL 508, UL/C-UL recognized UL 60950, UL/C-UL listed UL 1604 Class I, Division 2, Groups A, B, C, D

EN 61000-3-2

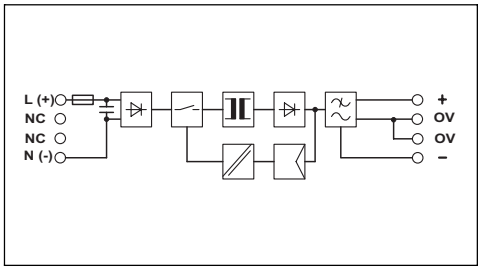
Ordering data

Type	Order No.	Pcs. / Pkt.
MINI-PS-100-240AC/10-15DC/8	**2866297**	1



Power supply,
1 AC, ±15 V DC, 1 A

Ex:



Technical data

100 V AC ... 240 V AC
85 V AC ... 264 V AC / 90 V DC ... 350 V DC
45 Hz ... 65 Hz / 0 Hz
Approx. 0.6 A (120 V AC) / Approx. 0.4 A (230 V AC)
< 35 A / 4 A²s
> 30 ms (120 V AC) / > 150 ms (230 V AC)
2.5 A (slow-blow, internal)
6 A, 10 A, 16 A

±15 V DC ±1%
-

1 A / 1.5 A
Yes / Yes
2 W / 8 W
> 80% (at 230 V AC and nominal values)
< 30 mV_{PP}

LED

0.25 kg / 45 x 99 x 107 mm
horizontal DIN rail NS 35, EN 60715
Can be aligned: Horizontal 0 cm, vertical 5 cm
Pluggable screw connection
0.2 - 2.5 mm^2 / 0.2 - 2.5 mm^2 / 24 - 12
0.2 - 2.5 mm^2 / 0.2 - 2.5 mm^2 / 24 - 12
0.2 - 2.5 mm^2 / 0.2 - 2.5 mm^2 / 24 - 12
IP20 / II (in an enclosed control cabinet)
> 500,000 h
-25°C ... 70°C (> 60°C derating)
-40°C ... 85°C
95% (at 25°C, no condensation)

4 kV (type test) / 3 kV (routine test)
Conformance with EMC Directive 2004/108/EC
EN 60950-1/VDE 0805 (SELV), EN 61558-2-17
EN 50178/VDE 0160 (PELV)
DIN VDE 0100-410, DIN VDE 0106-1010
UL/C-UL listed UL 508, UL/C-UL recognized UL 60950, UL/C-UL listed UL 1604 Class I, Division 2, Groups A, B, C, D

EN 61000-3-2

Ordering data

Type	Order No.	Pcs. / Pkt.
MINI-PS-100-240AC/2X15DC/1	**2938743**	1

N

STEP POWER - Power supply units for distributor boards and flat control panels

- Energy savings thanks to maximum energy efficiency and incredibly low no-load losses
- Flexible assembly by simply snapping the product onto the DIN rail or screwing it onto an even surface
- Reliable power supply thanks to the high MTBF (mean time between failures) of more than 500,000 hours and the UI characteristic curve

STEP POWER, 48 V AC, 0.5 A

- Connection to input voltages of 43 V AC to 52 V AC or 60 V DC to 80 V DC

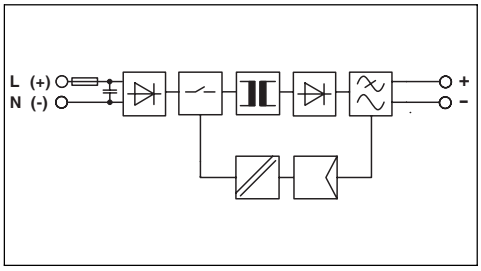
STEP POWER, 24 V DC, 0.5 A

- Slim design with a design width of just 18 mm (1 pitch)

STEP POWER, 24 V DC, 0.75 A

- Flat design with a depth of just 43 mm

Power supply, 48 V AC, 24 V DC, 0.5 A, slim design



Technical data

Input data	
Nominal input voltage range	48 V AC
Input voltage range AC/DC	43 V AC ... 52 V AC / 60 V DC ... 80 V DC
Frequency range	45 Hz ... 65 Hz / 0 Hz
Current consumption (nominal load)	Approx. 0.5 A (43 V AC) / Approx. 0.45 A (48 V AC)
Inrush current limitation at 25°C (typ.) / I^2t	< 10 A / < 0.1 A^2s
Mains buffering (I_N, typ.)	> 15 ms (48 V AC) / > 20 ms (52 V AC)
Input fuse	1.25 A (slow-blow, internal)
Recommended backup fuse, LS switch	B6, B10, B16
Output data	
Nominal output voltage	24 V DC ±1%
Output current	0.5 A
Can be connected in parallel / series	Yes / Yes
Max. power dissipation (idling/nominal load)	< 0.3 W / < 14.75 W
Efficiency (typ.)	> 81% (for 48 V AC and nominal values)
Residual ripple	< 30 mV_{PP}
Signaling	
Signaling DC OK	LED
General data	
Weight / Dimensions W x H x D	0.1 kg / 18 x 90 x 61 mm
Installation position	horizontal DIN rail NS 35, EN 60715
Spacing when mounting	Can be aligned: horizontal 0 cm, vertical 3 cm
Connection method	Screw connection
Input connection data solid / stranded / AWG	0.2 - 2.5 mm^2 / 0.2 - 2.5 mm^2 / 24 - 12
Output connection data solid / stranded / AWG	0.2 - 2.5 mm^2 / 0.2 - 2.5 mm^2 / 24 - 12
Degree of protection / Protection class	IP20 / II
MTBF (at nominal load, 40°C)	> 500,000 h
Ambient temperature (operation)	-25°C ... 70°C (> 55°C derating)
Standards / regulations	
Insulation voltage input/output	2 kV AC (routine test) / 4 kV AC (type test)
Electromagnetic compatibility	Conformance with EMC Directive 2004/108/EC
Electrical safety, safety transformer	IEC 60950-1/VDE 0805 (SELV), IEC 61558-2-17
Electronic equipm. for electrical power installations	EN 50178/VDE 0160 (PELV)
Safe isolation	DIN VDE 0100-410, DIN VDE 0106-1010
UL approvals	UL/C-UL listed UL 508, UL/C-UL recognized UL 60950, NEC Class 2 as per UL 1310
Limitation of harmonic line currents	EN 61000-3-2

Ordering data

Description	Type	Order No.	Pcs. / Pkt.
Power supply unit, primary-switched	**STEP-PS/48AC/24DC/0.5**	**2868716**	1

Power supply unit, 1 AC, 24 V DC, 0.5 A, slim design

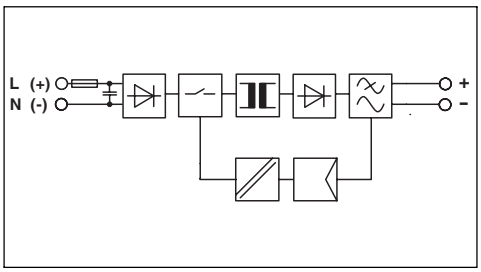
Applied for: UL-EX LIS / CUL-EX LIS

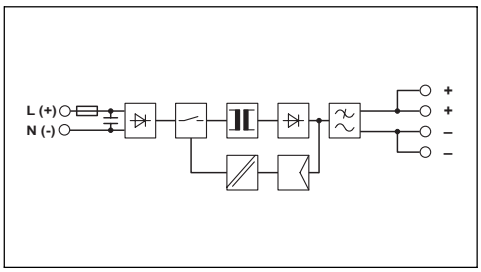
Power supply unit, 1 AC, 24 V DC, 0.75 A, flat design

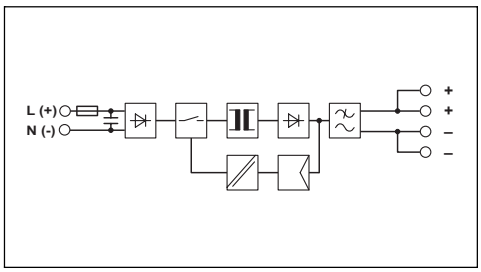
Ex:

Power supply, 1 AC, 24 V DC, 0.75 A

Ex:







Technical data

100 V AC ... 240 V AC
85 V AC ... 264 V AC / 95 V DC ... 250 V DC
45 Hz ... 65 Hz / 0 Hz
Approx. 0.28 A (120 V AC) / Approx. 0.13 A (230 V AC)
< 15 A / < 0.1 A^2s
> 15 ms (120 V AC) / > 90 ms (230 V AC)
1.25 A (slow-blow, internal)
B6, B10, B16

24 V DC ±1%
0.5 A
Yes / Yes
< 0.3 W / < 2.2 W
> 84% (for 230 V AC and nominal values)
< 20 mV_{PP}

LED

0.1 kg / 18 x 90 x 61 mm
horizontal DIN rail NS 35, EN 60715
Can be aligned: horizontal 0 cm, vertical 3 cm
Screw connection
0.2 - 2.5 mm^2 / 0.2 - 2.5 mm^2 / 24 - 12
0.2 - 2.5 mm^2 / 0.2 - 2.5 mm^2 / 24 - 12
IP20 / II
> 500,000 h
-25°C ... 70°C (> 55°C derating)

2 kV AC (routine test) / 4 kV AC (type test)
Conformance with EMC Directive 2004/108/EC
IEC 60950-1/VDE 0805 (SELV), IEC 61558-2-17
EN 50178/VDE 0160 (PELV)
DIN VDE 0100-410, DIN VDE 0106-1010
UL/C-UL listed UL 508, UL/C-UL recognized UL 60950, NEC Class 2 as per UL 1310, UL/C-UL listed ANSI/ISA-12.12.01 Class I, Division 2, Groups A, B, C, D

EN 61000-3-2

Ordering data

Type	Order No.	Pcs. / Pkt.
STEP-PS/ 1AC/24DC/0.5	**2868596**	1

Technical data

100 V AC ... 240 V AC
85 V AC ... 264 V AC / 95 V DC ... 250 V DC
45 Hz ... 65 Hz / 0 Hz
Approx. 0.3 A (120 V AC) / Approx. 0.25 A (230 V AC)
< 15 A / < 0.1 A^2s
> 15 ms (120 V AC) / > 70 ms (230 V AC)
1.25 A (slow-blow, internal)
B6, B10, B16

24 V DC ±1%
0.75 A
Yes / Yes
< 0.5 W / < 3.6 W
> 84% (for 230 V AC and nominal values)
< 75 mV_{PP}

LED

0.1 kg / 36 x 90 x 43 mm
horizontal DIN rail NS 35, EN 60715
Can be aligned: horizontal 0 cm, vertical 3 cm
Screw connection
0.2 - 2.5 mm^2 / 0.2 - 2.5 mm^2 / 24 - 12
0.2 - 2.5 mm^2 / 0.2 - 2.5 mm^2 / 24 - 12
IP20 / II
> 500,000 h
-25°C ... 70°C (> 55°C derating)

2 kV AC (routine test) / 4 kV AC (type test)
Conformance with EMC Directive 2004/108/EC
IEC 60950-1/VDE 0805 (SELV), IEC 61558-2-17
EN 50178/VDE 0160 (PELV)
DIN VDE 0100-410, DIN VDE 0106-1010
UL/C-UL listed UL 508, UL/C-UL recognized UL 60950, NEC Class 2 as per UL 1310, UL/C-UL listed ANSI/ISA-12.12.01 Class I, Division 2, Groups A, B, C, D

EN 61000-3-2

Ordering data

Type	Order No.	Pcs. / Pkt.
STEP-PS/ 1AC/24DC/0.75/FL	**2868622**	1

Technical data

100 V AC ... 240 V AC
85 V AC ... 264 V AC / 95 V DC ... 250 V DC
45 Hz ... 65 Hz / 0 Hz
Approx. 0.3 A (120 V AC) / Approx. 0.2 A (230 V AC)
< 15 A / < 0.1 A^2s
> 15 ms (120 V AC) / > 70 ms (230 V AC)
1.25 A (slow-blow, internal)
B6, B10, B16

24 V DC ±1%
0.75 A
Yes / Yes
< 0.5 W / 3.6 W
> 84% (for 230 V AC and nominal values)
< 75 mV_{PP}

LED

0.1 kg / 36 x 90 x 61 mm
horizontal DIN rail NS 35, EN 60715
Can be aligned: horizontal 0 cm, vertical 3 cm
Screw connection
0.2 - 2.5 mm^2 / 0.2 - 2.5 mm^2 / 24 - 12
0.2 - 2.5 mm^2 / 0.2 - 2.5 mm^2 / 24 - 12
IP20 / II
> 500,000 h
-25°C ... 70°C (> 55°C derating)

2 kV AC (routine test) / 4 kV AC (type test)
Conformance with EMC Directive 2004/108/EC
IEC 60950-1/VDE 0805 (SELV), IEC 61558-2-17
EN 50178/VDE 0160 (PELV)
DIN VDE 0100-410, DIN VDE 0106-1010
UL/C-UL listed UL 508, UL/C-UL recognized UL 60950, NEC Class 2 as per UL 1310, UL/C-UL listed ANSI/ISA-12.12.01 Class I, Division 2, Groups A, B, C, D

EN 61000-3-2

Ordering data

Type	Order No.	Pcs. / Pkt.
STEP-PS/ 1AC/24DC/0.75	**2868635**	1

STEP POWER - Power supply units for distributor boards and flat control panels

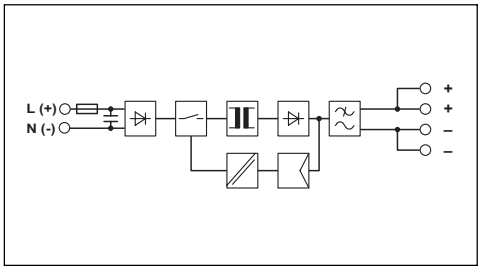
- Energy savings thanks to maximum energy efficiency and incredibly low no-load losses
- Flexible assembly by simply snapping the product onto the DIN rail or screwing it onto an even surface
- Reliable power supply thanks to the high MTBF (mean time between failures) of more than 500,000 hours and the UI characteristic curve
- Approved for DeviceNet: 24 V DC, 100 W (NEC Class 2)

STEP POWER, 100 W

- Output power limited to 100 W: Specifically for applications that require certification according to UL 1310/508 listed Class 2

Power supply, 1 AC, 24 V DC, 1.75 A

Ex:



Technical data

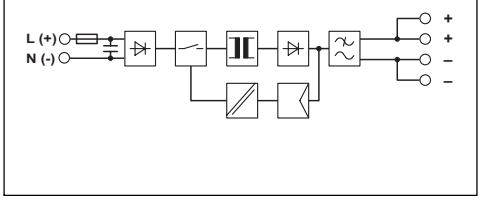
Input data	
Nominal input voltage range	100 V AC ... 240 V AC
Input voltage range AC/DC	85 V AC ... 264 V AC / 95 V DC ... 250 V DC
Frequency range	45 Hz ... 65 Hz / 0 Hz
Current consumption (nominal load)	Approx. 0.6 A (120 V AC) / Approx. 0.3 A (230 V AC)
Inrush current limitation at 25°C (typ.) / I^2t	< 15 A / < 0.6 A^2s
Mains buffering (I_N, typ.)	> 25 ms (120 V AC) / > 150 ms (230 V AC)
Input fuse	3.15 A (slow-blow, internal)
Recommended backup fuse, LS switch	B6, B10, B16
Output data	
Nominal output voltage	24 V DC ±1%
Setting range of the output voltage	22.5 V DC ... 29.5 V DC (> 24 V constant capacitance)
Output current	1.75 A
Can be connected in parallel / series	Yes / Yes
Max. power dissipation (idling/nominal load)	< 0.7 W / 5 W
Efficiency (typ.)	> 89% (for 230 V AC and nominal values)
Residual ripple	< 60 mV_{PP}
Signaling	
Signaling DC OK	LED
General data	
Weight / Dimensions W x H x D	0.2 kg / 54 x 90 x 61 mm
Installation position	horizontal DIN rail NS 35, EN 60715
Spacing when mounting	Can be aligned: horizontal 0 cm, vertical 3 cm
Connection method	Screw connection
Input connection data solid / stranded / AWG	0.2 - 2.5 mm^2 / 0.2 - 2.5 mm^2 / 24 - 12
Output connection data solid / stranded / AWG	0.2 - 2.5 mm^2 / 0.2 - 2.5 mm^2 / 24 - 12
Degree of protection / Protection class	IP20 / II
MTBF (at nominal load, 40°C)	> 500,000 h
Ambient temperature (operation)	-25°C ... 70°C (> 55°C derating)
Standards / regulations	
Insulation voltage input/output	2 kV AC (routine test) / 4 kV AC (type test)
Electromagnetic compatibility	Conformance with EMC Directive 2004/108/EC
Electrical safety, safety transformer	IEC 60950-1/VDE 0805 (SELV), IEC 61558-2-17
Electronic equipm. for electrical power installations	EN 50178/VDE 0160 (PELV)
Safe isolation	DIN VDE 0100-410, DIN VDE 0106-1010
UL approvals	UL/C-UL listed UL 508, UL/C-UL recognized UL 60950, NEC Class 2 as per UL 1310, UL/C-UL listed ANSI/ISA-12.12.01 Class I, Division 2, Groups A, B, C, D
Limitation of harmonic line currents	EN 61000-3-2

Ordering data

Description	Type	Order No.	Pcs. / Pkt.
Power supply unit, primary-switched	**STEP-PS/ 1AC/24DC/1.75**	**2868648**	1

Power supply,
1 AC, 24 V DC, 2.5 A

Ex:



Technical data

100 V AC ... 240 V AC
85 V AC ... 264 V AC / 95 V DC ... 250 V DC
45 Hz ... 65 Hz / 0 Hz
Approx. 0.8 A (120 V AC) / Approx. 0.4 A (230 V AC)
< 15 A / < 0.6 A²s
> 20 ms (120 V AC) / > 100 ms (230 V AC)
3.15 A (slow-blow, internal)
B6, B10, B16

24 V DC ±1%
22.5 V DC ... 29.5 V DC (> 24 V constant capacitance)

2.5 A
Yes / Yes
< 0.7 W / 9.9 W
> 86% (for 230 V AC and nominal values)
< 80 mV_{PP}

LED

0.3 kg / 72 x 90 x 61 mm
horizontal DIN rail NS 35, EN 60715
Can be aligned: horizontal 0 cm, vertical 3 cm
Screw connection
0.2 - 2.5 mm² / 0.2 - 2.5 mm² / 24 - 12
0.2 - 2.5 mm² / 0.2 - 2.5 mm² / 24 - 12
IP20 / II
> 500,000 h
-25°C ... 70°C (> 55°C derating)

2 kV AC (routine test) / 4 kV AC (type test)
Conformance with EMC Directive 2004/108/EC
IEC 60950-1/VDE 0805 (SELV), IEC 61558-2-17
EN 50178/VDE 0160 (PELV)
DIN VDE 0100-410, DIN VDE 0106-1010
UL/C-UL listed UL 508, UL/C-UL recognized UL 60950, NEC Class 2 as per UL 1310, UL/C-UL listed ANSI/ISA-12.12.01 Class I, Division 2, Groups A, B, C, D

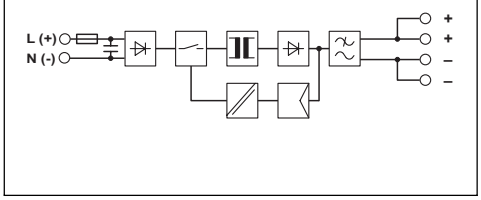
EN 61000-3-2

Ordering data

Type	Order No.	Pcs. / Pkt.
STEP-PS/ 1AC/24DC/2.5	**2868651**	1

Power supply,
1 AC, 24 V DC, 100 W
NEC Class 2

Ex:



Technical data

100 V AC ... 240 V AC
85 V AC ... 264 V AC / 95 V DC ... 250 V DC
45 Hz ... 65 Hz / 0 Hz
Approx. 1.3 A (120 V AC) / Approx. 0.8 A (230 V AC)
< 15 A / < 1 A²s
> 25 ms (120 V AC) / > 120 ms (230 V AC)
4 A (slow-blow, internal)
B6, B10, B16

24 V DC ±1%
22.5 V DC ... 25 V DC (> 24 V constant capacitance)

3.8 A
No / No
< 0.7 W / 11.8 W
> 88% (for 230 V AC and nominal values)
< 80 mV_{PP}

LED

0.4 kg / 90 x 90 x 61 mm
horizontal DIN rail NS 35, EN 60715
Can be aligned: horizontal 0 cm, vertical 3 cm
Screw connection
0.2 - 2.5 mm² / 0.2 - 2.5 mm² / 24 - 12
0.2 - 2.5 mm² / 0.2 - 2.5 mm² / 24 - 12
IP20 / II
> 500,000 h
-25°C ... 70°C (> 55°C derating)

2 kV AC (routine test) / 4 kV AC (type test)
Conformance with EMC Directive 2004/108/EC
IEC 60950-1/VDE 0805 (SELV), IEC 61558-2-17
EN 50178/VDE 0160 (PELV)
DIN VDE 0100-410, DIN VDE 0106-1010
UL/C-UL listed UL 508, UL/C-UL recognized UL 60950, NEC Class 2 as per UL 1310, UL/C-UL listed ANSI/ISA-12.12.01 Class I, Division 2, Groups A, B, C, D

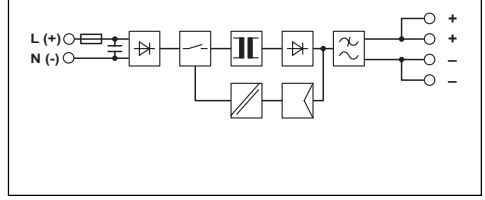
EN 61000-3-2

Ordering data

Type	Order No.	Pcs. / Pkt.
STEP-PS/ 1AC/24DC/3.8/C2LPS	**2868677**	1

Power supply,
1 AC, 24 V DC, 4.2 A

Ex:



Technical data

100 V AC ... 240 V AC
85 V AC ... 264 V AC / 95 V DC ... 250 V DC
45 Hz ... 65 Hz / 0 Hz
Approx. 1.3 A (120 V AC) / Approx. 0.8 A (230 V AC)
< 15 A / < 1 A²s
> 20 ms (120 V AC) / > 100 ms (230 V AC)
4 A (slow-blow, internal)
B6, B10, B16

24 V DC ±1%
22.5 V DC ... 29.5 V DC (> 24 V constant capacitance)

4.2 A
Yes / Yes
< 0.7 W / 13.2 W
> 88% (for 230 V AC and nominal values)
< 40 mV_{PP}

LED

0.4 kg / 90 x 90 x 61 mm
horizontal DIN rail NS 35, EN 60715
Can be aligned: horizontal 0 cm, vertical 3 cm
Screw connection
0.2 - 2.5 mm² / 0.2 - 2.5 mm² / 24 - 12
0.2 - 2.5 mm² / 0.2 - 2.5 mm² / 24 - 12
IP20 / II
> 500,000 h
-25°C ... 70°C (> 55°C derating)

2 kV AC (routine test) / 4 kV AC (type test)
Conformance with EMC Directive 2004/108/EC
IEC 60950-1/VDE 0805 (SELV), IEC 61558-2-17
EN 50178/VDE 0160 (PELV)
DIN VDE 0100-410, DIN VDE 0106-1010
UL/C-UL listed UL 508, UL/C-UL recognized UL 60950, UL/C-UL listed ANSI/ISA-12.12.01 Class I, Division 2, Groups A, B, C, D

EN 61000-3-2

Ordering data

Type	Order No.	Pcs. / Pkt.
STEP-PS/ 1AC/24DC/4.2	**2868664**	1

STEP POWER - Power supply units for distributor boards and flat control panels

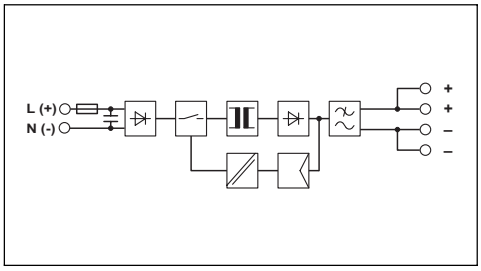
- Energy savings thanks to maximum energy efficiency and incredibly low no-load losses
- Flexible assembly by simply snapping the product onto the DIN rail or screwing it onto an even surface
- Reliable power supply thanks to the high MTBF (mean time between failures) of more than 500,000 hours and the UI characteristic curve

STEP POWER, 12 V DC, 1 A

- Slim design with a design width of just 18 mm (1 pitch)

Power supply, 1 AC, 5 V DC, 6.5 A

Ex:



Technical data

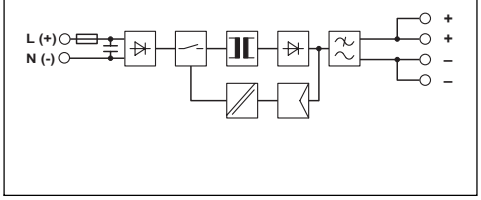
Input data	
Nominal input voltage range	100 V AC ... 240 V AC
Input voltage range AC/DC	85 V AC ... 264 V AC / 95 V DC ... 250 V DC
Frequency range	45 Hz ... 65 Hz / 0 Hz
Current consumption (nominal load)	Approx. 0.5 A (120 V AC) / Approx. 0.3 A (230 V AC)
Inrush current limitation at 25°C (typ.) / I^2t	< 15 A / < 0.6 A^2s
Mains buffering (I_N, typ.)	> 25 ms (120 V AC) / > 140 ms (230 V AC)
Input fuse	3.15 A (slow-blow, internal)
Recommended backup fuse, LS switch	B6, B10, B16
Output data	
Nominal output voltage	5 V DC ±1%
Setting range of the output voltage	4 V DC ... 6.5 V DC (> 5 V constant capacitance)
Output current	6.5 A
Can be connected in parallel / series	Yes / Yes
Max. power dissipation (idling/nominal load)	< 0.4 W / 8.1 W
Efficiency (typ.)	> 80% (for 230 V AC and nominal values)
Residual ripple	< 50 mV_{PP}
Signaling	
Signaling DC OK	LED
General data	
Weight / Dimensions W x H x D	0.3 kg / 72 x 90 x 61 mm
Installation position	horizontal DIN rail NS 35, EN 60715
Spacing when mounting	Can be aligned: horizontal 0 cm, vertical 3 cm
Connection method	Screw connection
Input connection data solid / stranded / AWG	0.2 - 2.5 mm^2 / 0.2 - 2.5 mm^2 / 24 - 12
Output connection data solid / stranded / AWG	0.2 - 2.5 mm^2 / 0.2 - 2.5 mm^2 / 24 - 12
Degree of protection / Protection class	IP20 / II
MTBF (at nominal load, 40°C)	> 500,000 h
Ambient temperature (operation)	-25°C ... 70°C (> 55°C derating)
Standards / regulations	
Insulation voltage input/output	2 kV AC (routine test) / 4 kV AC (type test)
Electromagnetic compatibility	Conformance with EMC Directive 2004/108/EC
Electrical safety, safety transformer	IEC 60950-1/VDE 0805 (SELV), IEC 61558-2-17
Electronic equipm. for electrical power installations	EN 50178/VDE 0160 (PELV)
Safe isolation	DIN VDE 0100-410, DIN VDE 0106-1010
UL approvals	UL/C-UL listed UL 508, UL/C-UL recognized UL 60950, UL/C-UL listed ANSI/ISA-12.12.01 Class I, Division 2, Groups A, B, C, D
Limitation of harmonic line currents	EN 61000-3-2

Ordering data

Description	Type	Order No.	Pcs. / Pkt.
Power supply unit, primary-switched			
	STEP-PS/ 1AC/ 5DC/6.5	**2868541**	1

Power supply, 1 AC, 15 V DC, 4 A

Ex:



Technical data

100 V AC ... 240 V AC
85 V AC ... 264 V AC / 95 V DC ... 250 V DC
45 Hz ... 65 Hz / 0 Hz
Approx. 0.8 A (120 V AC) / Approx. 0.5 A (230 V AC)
< 15 A / < 0.6 A^2s
> 27 ms (120 V AC) / > 120 ms (230 V AC)
3.15 A (slow-blow, internal)
B6, B10, B16

15 V DC ±1%
10 V DC ... 16.5 V DC (> 15 V constant capacitance)

4 A
Yes / Yes
< 0.5 W / 8.6 W
> 87% (for 230 V AC and nominal values)
< 55 mV_{PP}

LED

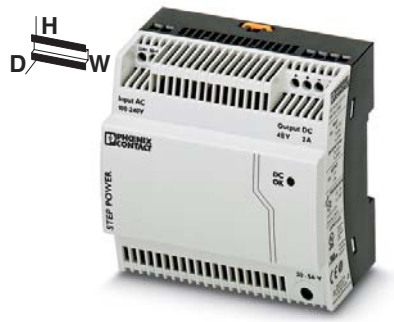
0.3 kg / 72 x 90 x 61 mm
horizontal DIN rail NS 35, EN 60715
Can be aligned: horizontal 0 cm, vertical 3 cm
Screw connection
0.2 - 2.5 mm^2 / 0.2 - 2.5 mm^2 / 24 - 12
0.2 - 2.5 mm^2 / 0.2 - 2.5 mm^2 / 24 - 12
IP20 / II
> 500,000 h
-25°C ... 70°C (> 55°C derating)

2 kV AC (routine test) / 4 kV AC (type test)
Conformance with EMC Directive 2004/108/EC
IEC 60950-1/VDE 0805 (SELV), IEC 61558-2-17
EN 50178/VDE 0160 (PELV)
DIN VDE 0100-410, DIN VDE 0106-1010
UL/C-UL listed UL 508, UL/C-UL recognized UL 60950, UL/C-UL listed ANSI/ISA-12.12.01 Class I, Division 2, Groups A, B, C, D

EN 61000-3-2

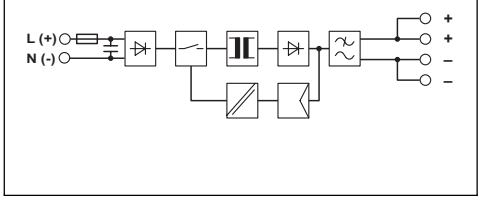
Ordering data

Type	Order No.	Pcs. / Pkt.
STEP-PS/ 1AC/15DC/4	**2868619**	1



Power supply, 1 AC, 48 V DC, 2 A

Ex:



Technical data

100 V AC ... 240 V AC
85 V AC ... 264 V AC / 95 V DC ... 250 V DC
45 Hz ... 65 Hz / 0 Hz
Approx. 1.3 A (120 V AC) / Approx. 0.8 A (230 V AC)
< 15 A / < 1.4 A^2s
> 20 ms (120 V AC) / > 120 ms (230 V AC)
4 A (slow-blow, internal)
B6, B10, B16

48 V DC ±1%
30 V DC ... 56 V DC (> 48 V constant capacitance)

2 A
Yes / Yes
< 0.9 W / 9.6 W
> 90% (for 230 V AC and nominal values)
< 30 mV_{PP}

LED

0.4 kg / 90 x 90 x 61 mm
horizontal DIN rail NS 35, EN 60715
Can be aligned: horizontal 0 cm, vertical 3 cm
Screw connection
0.2 - 2.5 mm^2 / 0.2 - 2.5 mm^2 / 24 - 12
0.2 - 2.5 mm^2 / 0.2 - 2.5 mm^2 / 24 - 12
IP20 / II
> 500,000 h
-25°C ... 70°C (> 55°C derating)

2 kV AC (routine test) / 4 kV AC (type test)
Conformance with EMC Directive 2004/108/EC
IEC 60950-1/VDE 0805 (SELV), IEC 61558-2-17
EN 50178/VDE 0160 (PELV)
DIN VDE 0100-410, DIN VDE 0106-1010
UL/C-UL listed UL 508, UL/C-UL recognized UL 60950, UL/C-UL listed ANSI/ISA-12.12.01 Class I, Division 2, Groups A, B, C, D

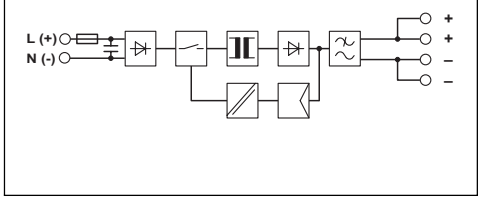
EN 61000-3-2

Ordering data

Type	Order No.	Pcs. / Pkt.
STEP-PS/ 1AC/48DC/2	**2868680**	1

Power supply unit, 1 AC, 12 V DC, 1 A, slim design

Applied for: UL-EX LIS / CUL-EX LIS



Technical data

100 V AC ... 240 V AC
85 V AC ... 264 V AC / 95 V DC ... 250 V DC
45 Hz ... 65 Hz / 0 Hz
Approx. 0.26 A (120 V AC) / Approx. 0.13 A (230 V AC)
< 15 A / < 0.1 A^2s
> 15 ms (120 V AC) / > 90 ms (230 V AC)
1.25 A (slow-blow, internal)
B6, B10, B16

12 V DC ±1%
-

1 A
Yes / Yes
< 0.4 W / < 2.8 W
> 83% (for 230 V AC and nominal values)
< 20 mV_{PP}

LED

0.1 kg / 18 x 90 x 61 mm
horizontal DIN rail NS 35, EN 60715
Can be aligned: horizontal 0 cm, vertical 3 cm
Screw connection
0.2 - 2.5 mm^2 / 0.2 - 2.5 mm^2 / 24 - 12
0.2 - 2.5 mm^2 / 0.2 - 2.5 mm^2 / 24 - 12
IP20 / II
> 500,000 h
-25°C ... 70°C (> 55°C derating)

2 kV AC (routine test) / 4 kV AC (type test)
Conformance with EMC Directive 2004/108/EC
IEC 60950-1/VDE 0805 (SELV), IEC 61558-2-17
EN 50178/VDE 0160 (PELV)
DIN VDE 0100-410, DIN VDE 0106-1010
UL/C-UL listed UL 508, UL/C-UL recognized UL 60950, NEC Class 2 as per UL 1310, UL/C-UL listed ANSI/ISA-12.12.01 Class I, Division 2, Groups A, B, C, D

EN 61000-3-2

Ordering data

Type	Order No.	Pcs. / Pkt.
STEP-PS/ 1AC/12DC/1	**2868538**	1

STEP POWER - Power supply units for distributor boards and flat control panels

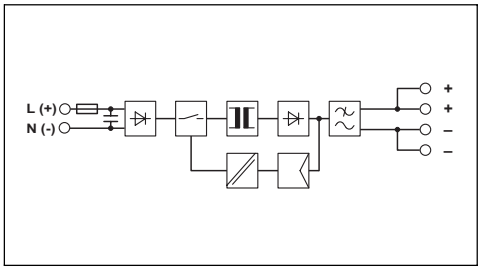
- Energy savings thanks to maximum energy efficiency and incredibly low no-load losses
- Flexible assembly by simply snapping the product onto the DIN rail or screwing it onto an even surface
- Reliable power supply thanks to the high MTBF (mean time between failures) of more than 500,000 hours and the UI characteristic curve

STEP POWER, 12 V DC, 1.5 A, flat design

- Flat design with a depth of just 43 mm

Power supply unit, 1 AC, 12 V DC, 1.5 A, flat design

Ex:



Technical data

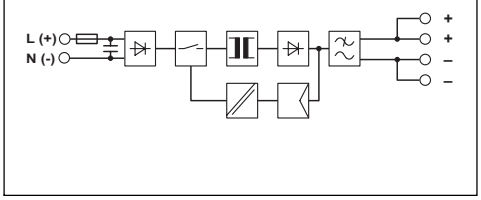
Input data	
Nominal input voltage range	100 V AC ... 240 V AC
Input voltage range AC/DC	85 V AC ... 264 V AC / 95 V DC ... 250 V DC
Frequency range	45 Hz ... 65 Hz / 0 Hz
Current consumption (nominal load)	Approx. 0.33 A (120 V AC) / Approx. 0.18 A (230 V AC)
Inrush current limitation at 25°C (typ.) / I^2t	< 15 A / < 0.1 A^2s
Mains buffering (I_N, typ.)	> 15 ms (120 V AC) / > 70 ms (230 V AC)
Input fuse	1.25 A (slow-blow, internal)
Recommended backup fuse, LS switch	B6, B10, B16
Output data	
Nominal output voltage	12 V DC ±1%
Setting range of the output voltage	-
Output current	1.5 A
Can be connected in parallel / series	Yes / Yes
Max. power dissipation (idling/nominal load)	< 0.4 W / < 3.2 W
Efficiency (typ.)	> 84% (for 230 V AC and nominal values)
Residual ripple	< 75 mV_{PP}
Signaling	
Signaling DC OK	LED
General data	
Weight / Dimensions W x H x D	0.1 kg / 36 x 90 x 43 mm
Installation position	horizontal DIN rail NS 35, EN 60715
Spacing when mounting	Can be aligned: horizontal 0 cm, vertical 3 cm
Connection method	Screw connection
Input connection data solid / stranded / AWG	0.2 - 2.5 mm^2 / 0.2 - 2.5 mm^2 / 24 - 12
Output connection data solid / stranded / AWG	0.2 - 2.5 mm^2 / 0.2 - 2.5 mm^2 / 24 - 12
Degree of protection / Protection class	IP20 / II
MTBF (at nominal load, 40°C)	> 500,000 h
Ambient temperature (operation)	-25°C ... 70°C (> 55°C derating)
Standards / regulations	
Insulation voltage input/output	2 kV AC (routine test) / 4 kV AC (type test)
Electromagnetic compatibility	Conformance with EMC Directive 2004/108/EC
Electrical safety, safety transformer	IEC 60950-1/VDE 0805 (SELV), IEC 61558-2-17
Electronic equipm. for electrical power installations	EN 50178/VDE 0160 (PELV)
Safe isolation	DIN VDE 0100-410, DIN VDE 0106-1010
UL approvals	UL/C-UL listed UL 508, UL/C-UL recognized UL 60950, NEC Class 2 as per UL 1310, UL/C-UL listed ANSI/ISA-12.12.01 Class I, Division 2, Groups A, B, C, D
Limitation of harmonic line currents	EN 61000-3-2

Ordering data

Description	Type	Order No.	Pcs. / Pkt.
Power supply unit, primary-switched	**STEP-PS/ 1AC/12DC/1.5/FL**	**2868554**	1

Power supply, 1 AC, 12 V DC, 1.5 A

Ex:



Technical data

100 V AC ... 240 V AC
85 V AC ... 264 V AC / 95 V DC ... 250 V DC
45 Hz ... 65 Hz / 0 Hz
Approx. 0.3 A (120 V AC) / Approx. 0.2 A (230 V AC)
< 15 A / < 0.1 A^2s
> 15 ms (120 V AC) / > 70 ms (230 V AC)
1.25 A (slow-blow, internal)
B6, B10, B16

12 V DC ±1%
-

1.5 A
Yes / Yes
< 0.4 W / < 3.2 W
> 84% (for 230 V AC and nominal values)
< 75 mV_{PP}

LED

0.1 kg / 36 x 90 x 61 mm
horizontal DIN rail NS 35, EN 60715
Can be aligned: horizontal 0 cm, vertical 3 cm
Screw connection
0.2 - 2.5 mm^2 / 0.2 - 2.5 mm^2 / 24 - 12
0.2 - 2.5 mm^2 / 0.2 - 2.5 mm^2 / 24 - 12
IP20 / II
> 500,000 h
-25°C ... 70°C (> 55°C derating)

2 kV AC (routine test) / 4 kV AC (type test)
Conformance with EMC Directive 2004/108/EC
IEC 60950-1/VDE 0805 (SELV), IEC 61558-2-17
EN 50178/VDE 0160 (PELV)
DIN VDE 0100-410, DIN VDE 0106-1010
UL/C-UL listed UL 508, UL/C-UL recognized UL 60950, NEC Class 2 as per UL 1310, UL/C-UL listed ANSI/ISA-12.12.01 Class I, Division 2, Groups A, B, C, D

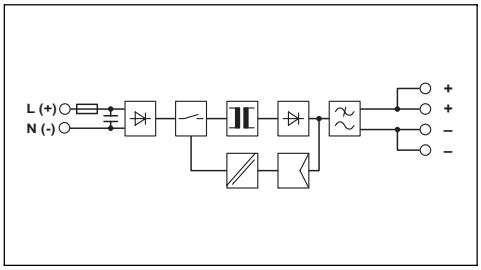
EN 61000-3-2

Ordering data

Type	Order No.	Pcs. / Pkt.
STEP-PS/ 1AC/12DC/1.5	**2868567**	1

Power supply, 1 AC, 12 V DC, 3 A

Ex:



Technical data

100 V AC ... 240 V AC
85 V AC ... 264 V AC / 95 V DC ... 250 V DC
45 Hz ... 65 Hz / 0 Hz
Approx. 0.6 A (120 V AC) / Approx. 0.3 A (230 V AC)
< 15 A / < 0.6 A^2s
> 26 ms (120 V AC) / > 160 ms (230 V AC)
3.15 A (slow-blow, internal)
B6, B10, B16

12 V DC ±1%
10 V DC ... 16.5 V DC (> 12 V constant capacitance)

3 A
Yes / Yes
< 0.5 W / 6.4 W
> 85% (for 230 V AC and nominal values)
< 40 mV_{PP}

LED

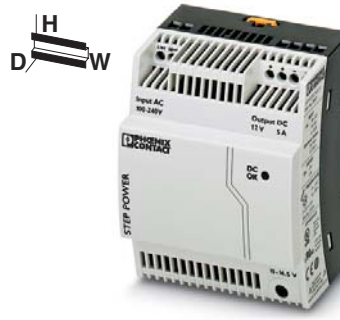
0.2 kg / 54 x 90 x 61 mm
horizontal DIN rail NS 35, EN 60715
Can be aligned: horizontal 0 cm, vertical 3 cm
Screw connection
0.2 - 2.5 mm^2 / 0.2 - 2.5 mm^2 / 24 - 12
0.2 - 2.5 mm^2 / 0.2 - 2.5 mm^2 / 24 - 12
IP20 / II
> 500,000 h
-25°C ... 70°C (> 55°C derating)

2 kV AC (routine test) / 4 kV AC (type test)
Conformance with EMC Directive 2004/108/EC
IEC 60950-1/VDE 0805 (SELV), IEC 61558-2-17
EN 50178/VDE 0160 (PELV)
DIN VDE 0100-410, DIN VDE 0106-1010
UL/C-UL listed UL 508, UL/C-UL recognized UL 60950, NEC Class 2 as per UL 1310, UL/C-UL listed ANSI/ISA-12.12.01 Class I, Division 2, Groups A, B, C, D

EN 61000-3-2

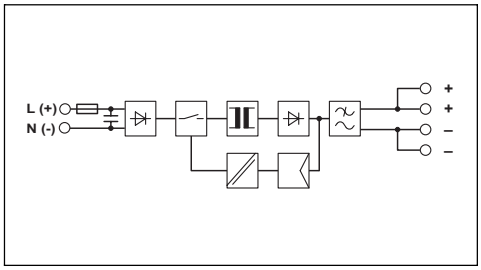
Ordering data

Type	Order No.	Pcs. / Pkt.
STEP-PS/ 1AC/12DC/3	**2868570**	1



Power supply, 1 AC, 12 V DC, 5 A

Ex:



Technical data

100 V AC ... 240 V AC
85 V AC ... 264 V AC / 95 V DC ... 250 V DC
45 Hz ... 65 Hz / 0 Hz
Approx. 0.8 A (120 V AC) / Approx. 0.5 A (230 V AC)
< 15 A / < 0.6 A^2s
> 27 ms (120 V AC) / > 120 ms (230 V AC)
3.15 A (slow-blow, internal)
B6, B10, B16

12 V DC ±1%
10 V DC ... 16.5 V DC (> 12 V constant capacitance)

5 A
Yes / Yes
< 0.5 W / 8.6 W
> 87% (for 230 V AC and nominal values)
< 70 mV_{PP}

LED

0.3 kg / 72 x 90 x 61 mm
horizontal DIN rail NS 35, EN 60715
Can be aligned: horizontal 0 cm, vertical 3 cm
Screw connection
0.2 - 2.5 mm^2 / 0.2 - 2.5 mm^2 / 24 - 12
0.2 - 2.5 mm^2 / 0.2 - 2.5 mm^2 / 24 - 12
IP20 / II
> 500,000 h
-25°C ... 70°C (> 55°C derating)

2 kV AC (routine test) / 4 kV AC (type test)
Conformance with EMC Directive 2004/108/EC
IEC 60950-1/VDE 0805 (SELV), IEC 61558-2-17
EN 50178/VDE 0160 (PELV)
DIN VDE 0100-410, DIN VDE 0106-1010
UL/C-UL listed UL 508, UL/C-UL recognized UL 60950, UL/C-UL listed ANSI/ISA-12.12.01 Class I, Division 2, Groups A, B, C, D

EN 61000-3-2

Ordering data

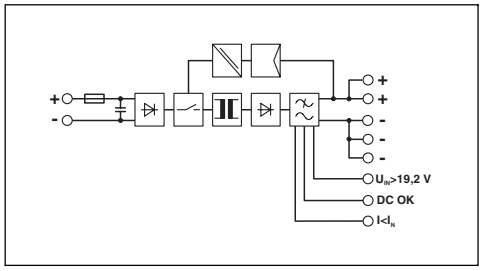
Type	Order No.	Pcs. / Pkt.
STEP-PS/ 1AC/12DC/5	**2868583**	1

QUINT DC/DC converters

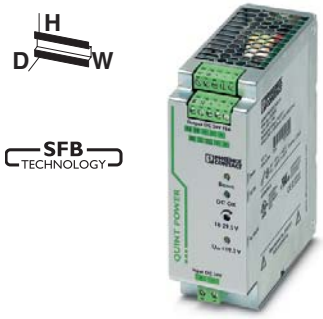
- Support conversion to various voltage levels
- Constant voltage: Output voltage regenerated even at the end of long cables
- Electrical isolation: For setting up independent supply systems
- SFB technology: Quick tripping of standard circuit breakers thanks to the dynamic power reserve with up to 6x the nominal current for 12 ms
- Reliable starting of heavy loads thanks to the static POWER BOOST power reserve with permanently up to 125% of the nominal current
- Preventive function monitoring warns against critical operating states before errors occur

N

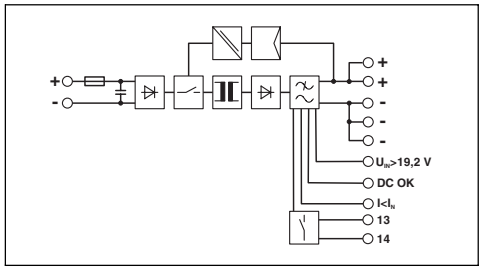
DC/DC converter, 24 V DC / 24 V DC, 5 A



N



DC/DC converter, 24 V DC / 24 V DC, 10 A



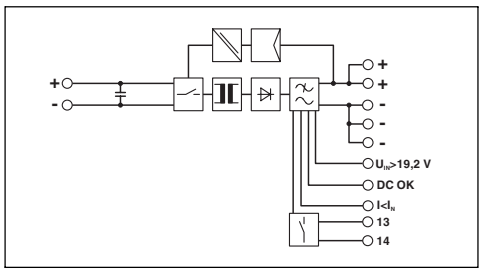
	Technical data	Technical data
Input data		
Nominal input voltage	24 V DC	24 V DC
DC input voltage range	18 V DC ... 32 V DC	18 V DC ... 32 V DC
Current consumption (nominal load)	Typ. 7 A (24 V DC) / -	Typ. 14 A (24 V DC) / -
Inrush current limitation at 25°C (typ.) / I^2t	< 15 A / < 0.5 A^2s	< 15 A / < 2.7 A^2s
Mains buffering (I_N, typ.)	> 10 ms (24 V DC) / -	> 12 ms (24 V DC) / -
Input fuse	15 A (internal (device protection))	25 A (internal (device protection))
Output data		
Nominal output voltage	24 V DC ±1%	24 V DC ±1%
Setting range of the output voltage	18 V DC ... 29.5 V DC (> 24 V constant capacitance)	18 V DC ... 29.5 V DC (> 24 V constant capacitance)
Output current / POWER BOOST / SFB (12 ms)	5 A / 6.25 A / 30 A	10 A / 12.5 A / 60 A
Magnetic fuse tripping	C2	C2
Can be connected in parallel / series	Yes / Yes	Yes / Yes
Max. power dissipation (idling/nominal load)	2.4 W / 11.4 W	1.6 W / 24 W
Efficiency (typ.)	> 92%	> 92%
Residual ripple	< 20 mV_{PP}	< 20 mV_{PP}
Signaling		
Signaling DC OK	LED, active switching output, relay contact	LED, active switching output, relay contact
Boost signaling	LED, active switching output, relay contact	LED, active switching output, relay contact
U_{IN} signaling	LED, active switching output, relay contact	LED, active switching output, relay contact
General data		
Weight / Dimensions W x H x D	0.7 kg / 32 x 130 x 125 mm	0.9 kg / 48 x 130 x 125 mm
Installation position	horizontal DIN rail NS 35, EN 60715	horizontal DIN rail NS 35, EN 60715
Spacing when mounting	Can be aligned: Horizontal 0 cm, vertical 5 cm	Can be aligned: Horizontal 0 cm, vertical 5 cm
Connection method	Pluggable screw connection	Pluggable screw connection
Input connection data solid / stranded / AWG	0.2 - 2.5 mm^2 / 0.2 - 2.5 mm^2 / 24 - 12	0.2 - 2.5 mm^2 / 0.2 - 2.5 mm^2 / 24 - 12
Output connection data solid / stranded / AWG	0.2 - 2.5 mm^2 / 0.2 - 2.5 mm^2 / 24 - 12	0.2 - 2.5 mm^2 / 0.2 - 2.5 mm^2 / 24 - 12
Signal connection data solid / stranded / AWG	0.2 - 2.5 mm^2 / 0.2 - 2.5 mm^2 / 24 - 12	0.2 - 2.5 mm^2 / 0.2 - 2.5 mm^2 / 24 - 12
Degree of protection / Protection class	IP20 / III	IP20 / III
MTBF (at nominal load, 40°C)	> 500,000 h	> 500,000 h
Ambient temperature (operation)	-25°C ... 70°C (> 60°C derating)	-25°C ... 70°C (> 60°C derating)
Ambient temperature (storage / transport)	-40°C ... 85°C	-40°C ... 85°C
Max. permissible relative humidity (operation)	≤ 95% (at 25°C, no condensation)	≤ 95% (at 25°C, no condensation)
Standards / regulations		
Insulation voltage input/output	1.5 kV (type test) / 1 kV (routine test)	1.5 kV (type test) / 1 kV (routine test)
Electromagnetic compatibility	Conformance with EMC Directive 2004/108/EC	Conformance with EMC Directive 2004/108/EC
Electrical safety, safety transformer	EN 60950-1/VDE 0805 (SELV), EN 61558-2-17	EN 60950-1/VDE 0805 (SELV), EN 61558-2-17
Electronic equipm. for electrical power installations	EN 50178/VDE 0160 (PELV)	EN 50178/VDE 0160 (PELV)
Safe isolation	DIN VDE 0100-410, DIN VDE 0106-1010	DIN VDE 0100-410, DIN VDE 0106-1010
UL approvals	UL/C-UL listed UL 508, UL/C-UL recognized UL 60950	UL/C-UL listed UL 508, UL/C-UL recognized UL 60950

	Ordering data			Ordering data		
Description	Type	Order No.	Pcs. / Pkt.	Type	Order No.	Pcs. / Pkt.
DC/DC converter, primary switched mode						
	QUINT-PS/24DC/24DC/ 5	**2320034**	1	**QUINT-PS/24DC/24DC/10**	**2320092**	1

N

DC/DC converter,
24 V DC / 24 V DC, 20 A

Applied for:
UL listed / CUL listed / UL / CUL



Technical data

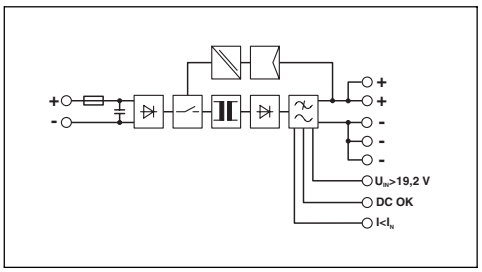
24 V DC 18 V DC ... 32 V DC Typ. 28 A (24 V DC) / - < 29 A / < 13.8 A²s > 10 ms (24 V DC) / - -
24 V DC ±1% 18 V DC ... 29.5 V DC (> 24 V constant capacitance) 20 A / 25 A / 120 A C2 Yes / Yes 2.5 W / 40 W > 93% < 20 mV_{PP}
LED, active switching output, relay contact LED, active switching output, relay contact LED, active switching output, relay contact
1.7 kg / 82 x 130 x 125 mm horizontal DIN rail NS 35, EN 60715 Can be aligned: Horizontal 0 cm, vertical 5 cm Pluggable screw connection 0.2 - 2.5 mm² / 0.2 - 2.5 mm² / 24 - 12 0.2 - 2.5 mm² / 0.2 - 2.5 mm² / 24 - 12 0.2 - 2.5 mm² / 0.2 - 2.5 mm² / 24 - 12 IP20 / III > 500,000 h -25°C ... 70°C (> 60°C derating) -40°C ... 85°C ≤ 95% (at 25°C, no condensation)
1.5 kV (type test) / 1 kV (routine test) Conformance with EMC Directive 2004/108/EC EN 60950-1/VDE 0805 (SELV), EN 61558-2-17 EN 50178/VDE 0160 (PELV) DIN VDE 0100-410, DIN VDE 0106-1010 UL applied for

Ordering data

Type	Order No.	Pcs. / Pkt.
QUINT-PS/24DC/24DC/20	**2320102**	1

N

DC/DC converter,
24 V DC / 12 V DC, 8 A



Technical data

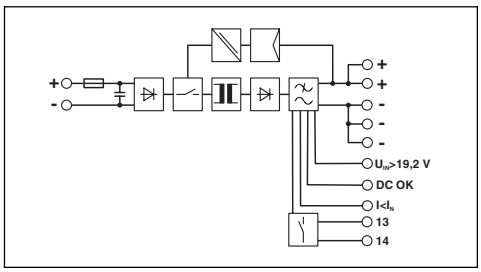
24 V DC 18 V DC ... 32 V DC Typ. 6 A (24 V DC) / - < 15 A / < 0.5 A²s > 10 ms (24 V DC) / - 15 A (internal (device protection))
12 V DC ±1% 5 V DC ... 18 V DC (> 12 V constant capacitance) 8 A / 10 A / 48 A C2 Yes / Yes 2 W / 10.5 W > 90% < 20 mV_{PP}
LED, active switching output, relay contact LED, active switching output, relay contact LED, active switching output, relay contact
0.7 kg / 32 x 130 x 125 mm horizontal DIN rail NS 35, EN 60715 Can be aligned: Horizontal 0 cm, vertical 5 cm Pluggable screw connection 0.2 - 2.5 mm² / 0.2 - 2.5 mm² / 24 - 12 0.2 - 2.5 mm² / 0.2 - 2.5 mm² / 24 - 12 0.2 - 2.5 mm² / 0.2 - 2.5 mm² / 24 - 12 IP20 / III > 500,000 h -25°C ... 70°C (> 60°C derating) -40°C ... 85°C ≤ 95% (at 25°C, no condensation)
1.5 kV (type test) / 1 kV (routine test) Conformance with EMC Directive 2004/108/EC EN 60950-1/VDE 0805 (SELV), EN 61558-2-17 EN 50178/VDE 0160 (PELV) DIN VDE 0100-410, DIN VDE 0106-1010 UL/C-UL listed UL 508, UL/C-UL recognized UL 60950

Ordering data

Type	Order No.	Pcs. / Pkt.
QUINT-PS/24DC/12DC/ 8	**2320115**	1

N

DC/DC converter,
24 V DC / 48 V DC, 5 A



Technical data

24 V DC 18 V DC ... 32 V DC Typ. 14 A (24 V DC) / - < 15 A / 3 A²s > 12 ms (24 V DC) / - 25 A (internal (device protection))
48 V DC ±1% 30 V DC ... 56 V DC (> 24 V constant capacitance) 5 A / 6.25 A / 30 A C2 Yes / Yes 4.3 W / 19.3 W > 92.5% < 20 mV_{PP}
LED, active switching output, relay contact LED, active switching output, relay contact LED, active switching output, relay contact
0.9 kg / 48 x 130 x 125 mm horizontal DIN rail NS 35, EN 60715 Can be aligned: Horizontal 0 cm, vertical 5 cm Pluggable screw connection 0.2 - 2.5 mm² / 0.2 - 2.5 mm² / 24 - 12 0.2 - 2.5 mm² / 0.2 - 2.5 mm² / 24 - 12 0.2 - 2.5 mm² / 0.2 - 2.5 mm² / 24 - 12 IP20 / III > 500,000 h -25°C ... 70°C (> 60°C derating) -40°C ... 85°C ≤ 95% (at 25°C, no condensation)
1.5 kV (type test) / 1 kV (routine test) Conformance with EMC Directive 2004/108/EC EN 60950-1/VDE 0805 (SELV), EN 61558-2-17 EN 50178/VDE 0160 (PELV) DIN VDE 0100-410, DIN VDE 0106-1010 UL/C-UL listed UL 508, UL/C-UL recognized UL 60950

Ordering data

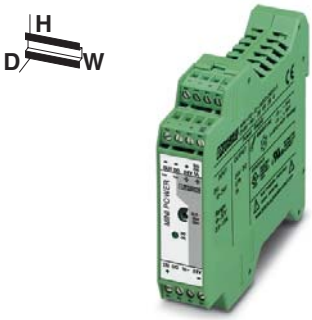
Type	Order No.	Pcs. / Pkt.
QUINT-PS/24DC/48DC/ 5	**2320128**	1

MINI DC/DC converters

- Support conversion to various voltage levels
- Constant voltage: Output voltage regenerated even at the end of long cables
- Electrical isolation: For setting up independent supply systems

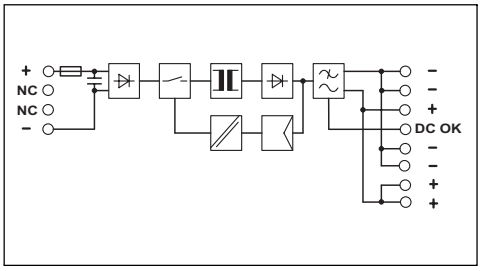
AC power terminal

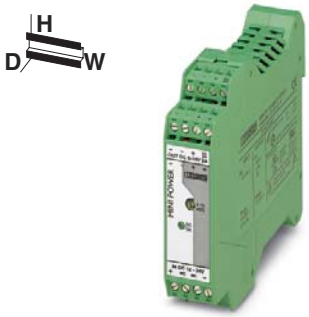
- For supplying MINI DC/DC converters
- A transformer's AC voltage is rectified and filtered



DC/DC converter,
12 - 24 V DC / 24 V DC, 1 A

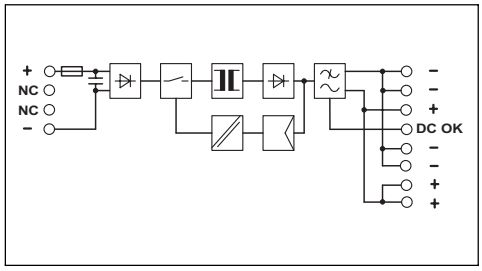
Ex:





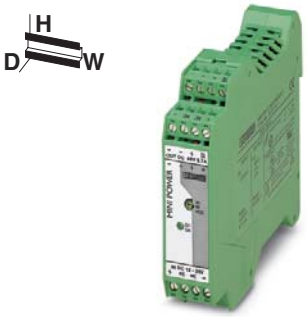
DC/DC converter,
12 - 24 V DC / 5 - 15 V DC, 2 A

Applied for: UL-EX LIS / CUL-EX LIS



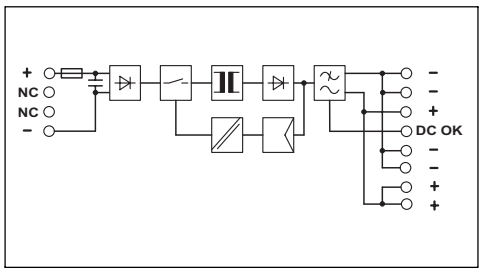
	Technical data	Technical data
Input data		
Nominal input voltage range	12 V DC ... 24 V DC	12 V DC ... 24 V DC
Input voltage range AC/DC	- / 10 V DC ... 32 V DC	- / 10 V DC ... 32 V DC
Current consumption (nominal load)	Approx. 2.6 A (12 V DC) / Approx. 1.3 A (24 V DC)	Approx. 2.3 A (12 V DC) / Approx. 1.1 A (24 V DC)
Inrush current limitation at 25°C (typ.) / I^2t	< 15 A / 1.8 A^2s	< 10 A / 0.2 A^2s
Input fuse	6.3 A (slow-blow, internal)	6.3 A (slow-blow, internal)
Output data		
Nominal output voltage	24 V DC ±1%	12 V DC ±1%
Setting range of the output voltage	22.5 V DC ... 28.5 V DC (> 24 V constant capacitance)	5 V DC ... 15 V DC
Output current	1 A	2 A
Can be connected in parallel / series	Yes / Yes	Yes / Yes
Max. power dissipation (idling/nominal load)	< 1.2 W / < 5 W	< 1 W / < 4.2 W
Efficiency (typ.)	> 83% (at 24 V DC and nominal values)	> 88% (at 24 V DC and nominal values)
Residual ripple	< 30 mV_{PP}	< 20 mV_{PP}
Signaling		
Signaling DC OK	LED, active switching output	LED, active switching output
General data		
Weight / Dimensions W x H x D	0.2 kg / 22.5 x 99 x 107 mm	0.2 kg / 22.5 x 99 x 107 mm
Installation position	horizontal DIN rail NS 35, EN 60715	horizontal DIN rail NS 35, EN 60715
Spacing when mounting	Can be aligned: Horizontal 0 cm, vertical 5 cm	Can be aligned: Horizontal 0 cm, vertical 5 cm
Connection method	Pluggable screw connection	Pluggable screw connection
Input connection data solid / stranded / AWG	0.2 - 2.5 mm^2 / 0.2 - 2.5 mm^2 / 24 - 14	0.2 - 2.5 mm^2 / 0.2 - 2.5 mm^2 / 24 - 14
Output connection data solid / stranded / AWG	0.2 - 2.5 mm^2 / 0.2 - 2.5 mm^2 / 24 - 14	0.2 - 2.5 mm^2 / 0.2 - 2.5 mm^2 / 24 - 14
Signal connection data solid / stranded / AWG	0.2 - 2.5 mm^2 / 0.2 - 2.5 mm^2 / 24 - 14	0.2 - 2.5 mm^2 / 0.2 - 2.5 mm^2 / 24 - 14
Degree of protection / Protection class	IP20 / III	IP20 / III
MTBF (at nominal load, 40°C)	> 500,000 h	> 500,000 h
Ambient temperature (operation)	-25°C ... 70°C (> 60°C derating)	-25°C ... 70°C (> +60°C derating)
Ambient temperature (storage / transport)	-40°C ... 85°C	-40°C ... 85°C
Max. permissible relative humidity (operation)	≤ 95% (at 25°C, no condensation)	≤ 95% (at +25°C, no condensation)
Standards / regulations		
Insulation voltage input/output	1.5 kV (type test) / 1 kV (routine test)	1.5 kV (type test) / 1 kV (routine test)
Electromagnetic compatibility	Conformance with EMC Directive 2004/108/EC	Conformance with EMC Directive 2004/108/EC
Electrical safety, safety transformer	EN 60950-1/VDE 0805 (SELV), EN 61558-2-17	EN 60950-1/VDE 0805 (SELV), EN 61558-2-17
Electronic equipm. for electrical power installations	EN 50178/VDE 0160 (PELV)	EN 50178/VDE 0160 (PELV)
Safe isolation	DIN VDE 0100-410, DIN VDE 0106-101	DIN VDE 0100-410, DIN VDE 0106-101
UL approvals	UL/C-UL listed UL 508, UL/C-UL recognized UL 60950, UL/C-UL listed UL 1604 Class I, Division 2, Groups A, B, C, D	UL/C-UL listed UL 508, UL/C-UL recognized UL 60950

Description	Ordering data: Type	Order No.	Pcs. / Pkt.	Ordering data: Type	Order No.	Pcs. / Pkt.
DC/DC converter, primary switched mode	**MINI-PS- 12- 24DC/24DC/1**	**2866284**	1	**MINI-PS- 12- 24DC/ 5-15DC/2**	**2320018**	1



DC/DC converter,
12 - 24 V DC / 48 V DC, 0.7 A

Applied for: UL-EX LIS / CUL-EX LIS



Technical data

12 V DC ... 24 V DC
- / 10 V DC ... 32 V DC
Approx. 3.2 A (12 V DC) / Approx. 1.6 A (24 V DC)
< 10 A / 0.3 A²s
6.3 A (slow-blow, internal)

48 V DC ±1%
30 V DC ... 56 V DC (> 48 V constant capacitance)

0.7 A
Yes / Yes
< 1.5 W / < 4.5 W
> 87% (at 24 V DC and nominal values)
< 20 mV_{PP}

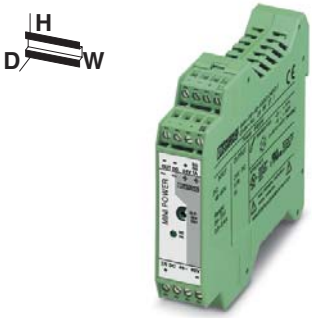
LED, active switching output

0.2 kg / 22.5 x 99 x 107 mm
horizontal DIN rail NS 35, EN 60715
Can be aligned: Horizontal 0 cm, vertical 5 cm
Pluggable screw connection
0.2 - 2.5 mm² / 0.2 - 2.5 mm² / 24 - 14
0.2 - 2.5 mm² / 0.2 - 2.5 mm² / 24 - 14
0.2 - 2.5 mm² / 0.2 - 2.5 mm² / 24 - 14
IP20 / III
> 500,000 h
-25°C ... 70°C (> +60°C derating)
-40°C ... 85°C
≤ 95% (at +25°C, no condensation)

1.5 kV (type test) / 1 kV (routine test)
Conformance with EMC Directive 2004/108/EC
EN 60950-1/VDE 0805 (SELV), EN 61558-2-17
EN 50178/VDE 0160 (PELV)
DIN VDE 0100-410, DIN VDE 0106-101
UL/C-UL listed UL 508, UL/C-UL recognized UL 60950

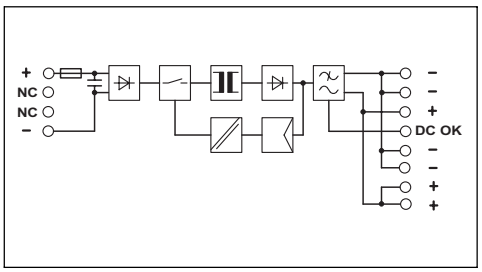
Ordering data

Type	Order No.	Pcs. / Pkt.
MINI-PS- 12- 24DC/48DC/0.7	**2320021**	1



DC/DC converter,
48 - 60 V DC / 24 V DC, 1 A

Ex:



Technical data

48 V DC ... 60 V DC
- / 36 V DC ... 75 V DC
Approx. 0.6 A (48 V DC) / Approx. 0.5 A (60 V DC)
< 15 A / 1.8 A²s
3.15 A (slow-blow, internal)

24 V DC ±1%
22.5 V DC ... 28.5 V DC (> 24 V constant capacitance)

1 A
Yes / Yes
< 1.2 W / < 5 W
> 85% (at 60 V DC and nominal values)
< 40 mV_{PP}

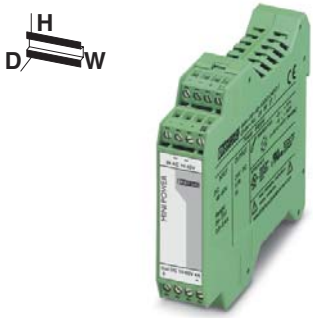
LED, active switching output

0.2 kg / 22.5 x 99 x 107 mm
horizontal DIN rail NS 35, EN 60715
Can be aligned: Horizontal 0 cm, vertical 5 cm
Pluggable screw connection
0.2 - 2.5 mm² / 0.2 - 2.5 mm² / 24 - 14
0.2 - 2.5 mm² / 0.2 - 2.5 mm² / 24 - 14
0.2 - 2.5 mm² / 0.2 - 2.5 mm² / 24 - 14
IP20 / II
> 500,000 h
-25°C ... 70°C (> 60°C derating)
-40°C ... 85°C
≤ 95% (at 25°C, no condensation)

1.5 kV (type test) / 1 kV (routine test)
Conformance with EMC Directive 2004/108/EC
EN 60950-1/VDE 0805 (SELV), EN 61558-2-17
EN 50178/VDE 0160 (PELV)
DIN VDE 0100-410, DIN VDE 0106-101
UL/C-UL listed UL 508, UL/C-UL recognized UL 60950, UL/C-UL listed UL 1604 Class I, Division 2, Groups A, B, C, D

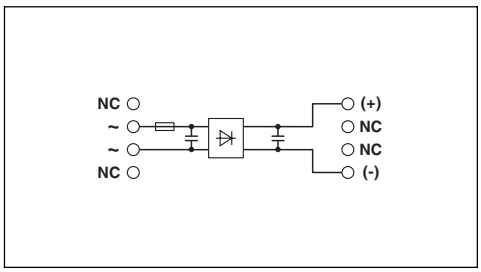
Ordering data

Type	Order No.	Pcs. / Pkt.
MINI-PS- 48- 60DC/24DC/1	**2866271**	1



AC power terminal for
MINI DC/DC converter

Applied for:
UL listed / CUL listed



Technical data

10 V AC ... 42 V AC
0 V AC ... 42 V AC
Approx. 5.22 A (42 V AC) / -
< 25 A / 1.3 A²s
25 A (slow-blow, internal)

15 V DC
-

3 A
Yes / No
< 0.04 W / < 6.9 W
> 95.7% (for 42 V AC and nominal values)
< 3.6 V_{PP}

-

0.16 kg / 22.5 x 99 x 107 mm
horizontal DIN rail NS 35, EN 60715
Can be aligned: Horizontal 0 cm, vertical 5 cm
Pluggable screw connection
0.2 - 2.5 mm² / 0.2 - 2.5 mm² / 24 - 14
0.2 - 2.5 mm² / 0.2 - 2.5 mm² / 24 - 14
- / - / -
IP20 / III
> 500,000 h
-25°C ... 70°C (> 60°C derating)
-40°C ... 85°C
≤ 95% (at 25°C, no condensation)

1.5 kV (type test) / 1 kV (routine test)
Conformance with EMC Directive 2004/108/EC
EN 60950-1/VDE 0805 (SELV)
EN 50178/VDE 0160 (PELV)
-
UL applied for

Ordering data

Type	Order No.	Pcs. / Pkt.
MINI-PS- 10- 42AC/15-60DC/3	**2320199**	1

The optimum solution in the event of power failures

Uninterruptible power supply (UPS) units continue to deliver power even if the supply network goes down. An uninterruptible solution consists of three function units:

- Power supply unit
- Electronic switchover unit
- Power storage device

QUINT UPS IQ

IQ technology is the key to an intelligent power supply solution.

The uninterruptible power supply monitors and optimizes the power storage device. Avoid interruptions when working by using the intelligent UPS for non-stop power.

What is it about the QUINT UPS IQ that makes it an intelligent UPS?

- **SOC (State Of Charge)** lets you know at any time how much charge is left in your battery and how much longer it will last
- **SOH (State Of Health)** indicates the remaining life expectancy of your battery and provides early warnings of failure
- **SOF (State Of Function)** indicates battery performance
- **Intelligent Battery Control** automatically detects which type of battery is connected. This is the key to optimum charging and increases the battery's life expectancy
- **Intelligent Charging** adapts the charging current to the circumstances so that the battery can be recharged as quickly as possible. This means the UPS is available to you faster
- **Data Port** transmits all relevant information from the UPS to your computer. Alternatively, you can use the Data Port feature to tell your UPS what you expect from it

Selecting uninterruptible power supply (UPS) units

Select the required buffer time and load current.

Example:
A 20 A load current needs to be buffered for 10 minutes.

QUINT-UPS/24DC/24DC/20 and UPS-BAT/VRLA/24DC/7.2AH

Here you can select the UPS you need for 24 V DC applications

	Buffer time																					
	Seconds				Minutes													Hours				
Load current	0.2	0.4	2	8	2	3	5	6	7	8	9	10	20	30	40	45	50	1	2	3	5	8
1 A																						
2 A																						
3 A																						
5 A																						
7 A																						1+1
10 A																					1+1	1+1
15 A																			1+1	1+1		
20 A																			1+1			
25 A																	1+1	1+1	1+1			
30 A																1+1	1+1	1+1				
35 A															1+1	1+1	1+1	1+1				
40 A															1+1	1+1	1+1	1+1				

1+1 In this case, two rechargeable battery modules of the same capacitance are required.

- QUINT-BUFFER/24DC/24DC/40
- MINI-BAT/24DC/0.8AH
- UPS-BAT/VRLA/24DC/1.3AH
- UPS-BAT/VRLA/24DC/3.4AH
- UPS-BAT/VRLA/24DC/7.2AH
- UPS-BAT/VRLA/24DC/12AH
- UPS-BAT/VRLA/24DC/38AH
- UPS-BAT/LI-ION/24DC/60WH

Note:
The information provided here assumes an ambient temperature of 20°C.

Here you can select the QUINT UPS IQ UPS you need for 120 V AC/230 V AC applications

	Buffer time																					
	Seconds				Minutes													Hours				
Power	0.2	0.4	2	8	2	3	5	6	7	8	9	10	20	30	40	45	50	1	2	3	5	8
15 W																						
35 W																						
55 W																						
90 W																						
125 W																						1+1
180 W																					1+1	1+1
275 W																			1+1	1+1		
400 W																			1+1			

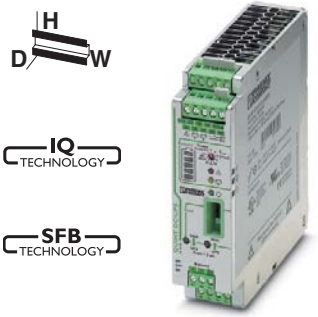
1+1 In this case, two rechargeable battery modules of the same capacitance are required.

- UPS-BAT/VRLA/24DC/3.4AH
- UPS-BAT/VRLA/24DC/7.2AH
- UPS-BAT/VRLA/24DC/12AH
- UPS-BAT/VRLA/24DC/38AH
- UPS-BAT/LI-ION/24DC/60WH

Note:
The information provided here assumes an ambient temperature of 20°C.

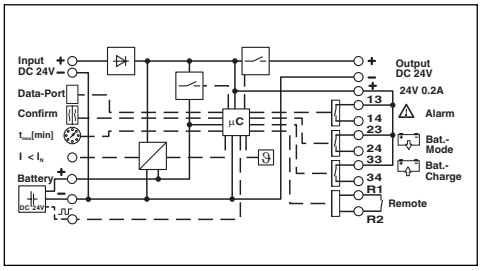
QUINT UPS-IQ

N



Uninterruptible power supply, 24 V DC / 24 V DC, 5 A

Applied for: UL-EX LIS / CUL-EX LIS



Uninterruptible power supplies for 24 V DC applications

Maximum system availability thanks to IQ technology (SOC, SOH, SOF, automatic battery detection, and communication interface), see page 612.

- Quick tripping of standard circuit breakers with SFB technology (selective fuse breaking technology): Dynamic power reserve with up to 6 times the nominal current for 12 ms, even in buffer operation
- Reliable starting of heavy loads with the static POWER BOOST power reserve with permanently up to 1.5 times the nominal current
- Easy handling thanks to automatic battery detection, the ability to change the battery without tools during actual operation, and communication via the IFS interface
- Device suitable for universal use thanks to comprehensive license package, and extensive parameterization and diagnostic options

Stranded:

Modular combination comprising electronic switchover unit and power storage device: QUINT-UPS/24DC/24DC/5 A, 10 A, 20 A, 40 A combined with UPS-BAT/VRLA/24DC/1.3 AH, 3.4 AH, 7.2 AH, 12 AH, 38 AH or UPS-BAT/LI-ION/24DC/60WH

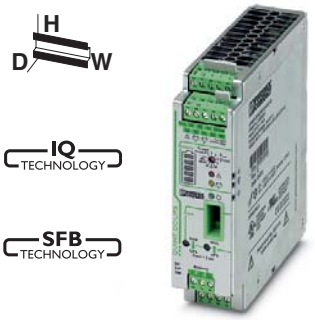
Technical data

Input data	
Nominal input voltage	24 V DC
DC input voltage range	18 V DC ... 30 V DC
Max. current consumption	9.6 A
Output data (mains operation)	
Nominal output voltage	24 V DC
Output voltage range	18 V DC ... 30 V DC
Efficiency (typ.)	> 98.7%
Output current with convection cooling	
- Nominal output current I_N (continual)	5 A (-25°C ... +60°C)
- SFB technology (12 ms)	30 A (-25°C ... +60°C)
- POWER BOOST I_{BOOST} (continual)	7.5 A (-25°C ... +40°C)
Output data (battery operation)	
Nominal output voltage	24 V DC
Output voltage range	19.2 V DC ... 27.6 V DC ($U_{OUT} = U_{BAT}$ - 0.5 V DC)
Output current with convection cooling	
- Nominal output current I_N (continual)	5 A (-25°C ... +60°C)
- SFB technology (15 ms)	32.5 A (-25°C ... +60°C)
- POWER BOOST I_{BOOST} (continual)	7.5 A (-25°C ... +40°C)
Power storage device	
Nominal voltage U_N	24 V DC
End-of-charge voltage	24 V DC ... 29 V DC (temperature compensated)
Nominal capacitance range	0.8 Ah ... 140 Ah
Max. charging current	1.36 A
Signaling	
Signaling	LED, relay contact, interface/software
Interfaces	IFS
General data	
Weight / Dimensions W x H x D	0.5 kg / 35 x 130 x 125 mm
Connection method	Pluggable screw connection
Input connection data solid / stranded / AWG	0.2 - 2.5 mm² / 0.2 - 2.5 mm² / 20 - 12
Output connection data solid / stranded / AWG	0.2 - 2.5 mm² / 0.2 - 2.5 mm² / 20 - 12
Signal connection data solid / stranded / AWG	0.2 - 2.5 mm² / 0.2 - 2.5 mm² / 24 - 12
Degree of protection / Protection class	IP20 / III
Ambient temperature (operation)	-25°C ... 70°C
Ambient temperature (storage / transport)	-40°C ... 85°C
Derating	60°C ... 70°C (2.5%/K)
Max. permissible relative humidity (operation)	≤ 95% (25°C, no condensation)
Standards / regulations	
UL approvals	UL/C-UL recognized UL 60950, UL listed UL 508

Ordering data

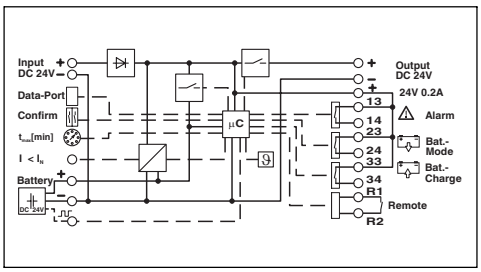
Description	Type	Order No.	Pcs. / Pkt.
Power supply, uninterruptible			
	QUINT-UPS/ 24DC/ 24DC/ 5	**2320212**	1

N



Uninterruptible power supply, 24 V DC / 24 V DC, 10 A

Applied for: UL-EX LIS / CUL-EX LIS



Technical data

24 V DC
18 V DC ... 30 V DC
21 A

24 V DC
18 V DC ... 30 V DC
> 98.4%

10 A (-25°C ... +60°C)
60 A (-25°C ... +60°C)
15 A (-25°C ... +40°C)

24 V DC
19.2 V DC ... 27.6 V DC ($U_{OUT} = U_{BAT}$ - 0.5 V DC)

10 A (-25°C ... +60°C)
65 A (-25°C ... +60°C)
15 A (-25°C ... +40°C)

24 V DC
24 V DC ... 29 V DC (temperature compensated)
1.3 Ah ... 140 Ah
2.88 A

LED, relay contact, interface/software
IFS

0.5 kg / 35 x 130 x 125 mm
Pluggable screw connection
0.2 - 2.5 mm² / 0.2 - 2.5 mm² / 16 - 12
0.2 - 2.5 mm² / 0.2 - 2.5 mm² / 16 - 12
0.2 - 2.5 mm² / 0.2 - 2.5 mm² / 24 - 12
IP20 / III
-25°C ... 70°C
-40°C ... 80°C
60°C ... 70°C (2.5%/K)
≤ 95% (25°C, no condensation)

UL/C-UL recognized UL 60950, UL listed UL 508

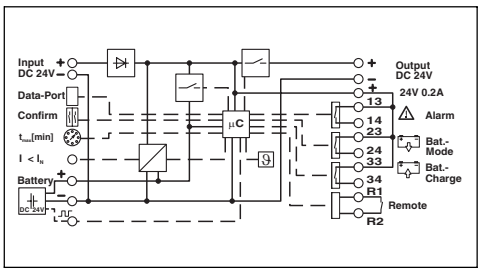
Ordering data

Type	Order No.	Pcs. / Pkt.
QUINT-UPS/ 24DC/ 24DC/10	**2320225**	1

N

Uninterruptible power supply, 24 V DC / 24 V DC, 20 A

Applied for: UL-EX LIS / CUL-EX LIS



Technical data

24 V DC
18 V DC ... 30 V DC
31 A

24 V DC
18 V DC ... 30 V DC
> 98.2%

20 A (-25°C ... +60°C)
120 A (-25°C ... +60°C)
26 A (-25°C ... +40°C)

24 V DC
19.2 V DC ... 27.6 V DC ($U_{OUT} = U_{BAT}$ - 0.5 V DC)

20 A (-25°C ... +60°C)
120 A (-25°C ... +60°C)
27 A (-25°C ... +40°C)

24 V DC
24 V DC ... 29 V DC (temperature compensated)
3 Ah ... 200 Ah
5 A

LED, relay contact, interface/software
IFS

0.6 kg / 40 x 130 x 125 mm
Screw connection
0.2 - 6 mm² / 0.2 - 4 mm² / 12 - 10
0.2 - 6 mm² / 0.2 - 4 mm² / 12 - 10
0.2 - 4 mm² / 0.2 - 2.5 mm² / 24 - 12
IP20 / III
-25°C ... 70°C
-40°C ... 85°C
60°C ... 70°C (2.5%/K)
≤ 95% (25°C, no condensation)

UL/C-UL recognized UL 60950, UL listed UL 508

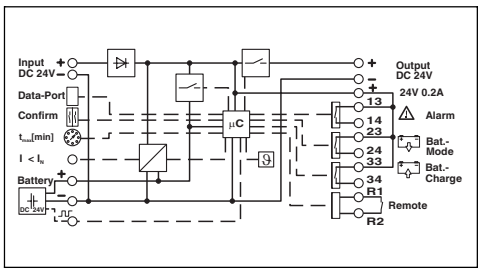
Ordering data

Type	Order No.	Pcs. / Pkt.
QUINT-UPS/ 24DC/ 24DC/20	**2320238**	1

N

Uninterruptible power supply, 24 V DC / 24 V DC, 40 A

Applied for: UL-EX LIS / CUL-EX LIS



Technical data

24 V DC
18 V DC ... 30 V DC
53 A

24 V DC
18 V DC ... 30 V DC
> 98.7%

40 A (-25°C ... +60°C)
215 A (-25°C ... +60°C)
45 A (-25°C ... +40°C)

24 V DC
19.2 V DC ... 27.6 V DC ($U_{OUT} = U_{BAT}$ - 0.5 V DC)

40 A (-25°C ... +60°C)
215 A (-25°C ... +60°C)
45 A (-25°C ... +40°C)

24 V DC
24 V DC ... 29 V DC (temperature compensated)
7 Ah ... 200 Ah
5 A

LED, relay contact, interface/software
IFS

0.7 kg / 47 x 130 x 125 mm
Screw connection
0.5 - 16 mm² / 0.5 - 16 mm² / 8 - 6
0.5 - 16 mm² / 0.5 - 16 mm² / 8 - 6
0.2 - 4 mm² / 0.2 - 2.5 mm² / 24 - 12
IP20 / III
-25°C ... 70°C
-40°C ... 85°C
60°C ... 70°C (2.5%/K)
≤ 95% (25°C, no condensation)

UL/C-UL recognized UL 60950, UL listed UL 508

Ordering data

Type	Order No.	Pcs. / Pkt.
QUINT-UPS/ 24DC/ 24DC/40	**2320241**	1

QUINT UPS-IQ

N

Uninterruptible power supply, 1 AC / 1 AC, 500 VA

Applied for:
UL / UL-EX

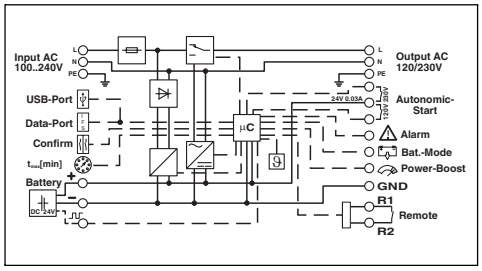
Uninterruptible power supplies for 120 V AC / 230 V AC applications

Maximum system availability thanks to IQ technology (SOC, SOH, SOF, automatic battery detection, and communication interface), see page 612.

- Easy handling thanks to automatic battery detection, the ability to change the battery without tools during actual operation, and communication via the USB or IFS interfaces
- Device suitable for universal use thanks to wide-range input, comprehensive license package, and extensive parameterization and diagnostic options
- Reliable starting of heavy loads with the static POWER BOOST power reserve with permanent current of 2.7 A

Stranded:

Modular combination comprising electronic switchover unit and power storage device: QUINT-UPS/1AC/1AC/400W/500VA combined with UPS-BAT/VRLA/24DC/3.4 AH, 7.2 AH, 12 AH, 38 AH or UPS-BAT/LI-ION/24DC/60WH



Technical data

Input data	
Nominal input voltage	120 V AC / 230 V AC
Input voltage range	96 V AC ... 264 V AC
Frequency range	45 Hz ... 65 Hz
Current consumption	4.3 A (120 V AC) / 2.2 A (230 V AC) / 6.8 A (max.)
Output data	
Nominal output voltage	120 V AC / 230 V AC
Output voltage range	96 V AC ... 144 V AC / 184 V AC ... 264 V AC
Output current with convection cooling	
- Nominal output current I_N (continual)	2.2 A (-25°C ... +50°C)
- POWER BOOST I_{BOOST} (5 s)	2.7 A (-25°C ... +40°C)
Efficiency (typ.)	> 99%
Output power	500 VA / 400 W
Power factor (cos phi)	0.8
Power storage device	
Nominal voltage U_N	24 V DC
End-of-charge voltage	24 V DC ... 29 V DC (temperature compensated)
Nominal capacitance range	3 Ah ... 200 Ah
Max. charging current	2 A
Signaling	
Signaling	LED, Active switching outputs, interface/software
Interfaces	IFS, USB
General data	
Weight / Dimensions W x H x D	2.2 kg / 125 x 130 x 125 mm
Connection method	Screw connection
Input connection data solid / stranded / AWG	0.2 - 6 mm² / 0.2 - 4 mm² / 24 - 10
Output connection data solid / stranded / AWG	0.2 - 6 mm² / 0.2 - 4 mm² / 24 - 10
Signal connection data solid / stranded / AWG	0.2 - 6 mm² / 0.2 - 4 mm² / 24 - 10
Degree of protection / Protection class	IP20 / III
Ambient temperature (operation)	-25°C ... 70°C
Ambient temperature (storage / transport)	-40°C ... 85°C
Derating	50°C ... 70°C (2.5%/K)
Max. permissible relative humidity (operation)	≤ 95% (25°C, no condensation)
Standards / regulations	
UL approvals	UL applied for

Ordering data

Description	Type	Order No.	Pcs. / Pkt.
Power supply, uninterruptible	**QUINT-UPS/1AC/1AC/500VA**	**2320270**	1

Configuration software for QUINT UPS-IQ and TRIO UPS

The UPS CONF configuration software can be downloaded free of charge from our homepage. Remember to order the IFS-USB-DATACABLE as well in order to use the software.

Supported operating systems:
– Windows 7 (32- and 64-bit)
– Windows Vista
– Windows XP

Minimum requirements:
– Display: 800 x 600, 256 colors
– Processor: 400 MHz, Pentium processor or similar
– RAM: 96 MB

Description	Ordering data		
	Type	Order No.	Pcs. / Pkt.
Configuration software for QUINT UPS IQ and TRIO UPS	UPS-CONF	2320403	1

Accessories for QUINT UPS-IQ and TRIO UPS

N

IFS-USB-DATACABLE is required for communication between the uninterruptible power supply and the UPS CONF configuration software.

IFS-CONFSTICK for storing the values you have configured and transferring them to other uninterruptible power supplies.

Description	Ordering data			Ordering data		
	Type	Order No.	Pcs. / Pkt.	Type	Order No.	Pcs. / Pkt.
Used for communication between the UPS CONF configuration software and the QUINT UPS IQ or TRIO UPS uninterruptible power supply	IFS-USB-DATACABLE	2320500	1			
Multifunctional memory block for the INTERFACE system - Flat design				IFS-CONFSTICK	2986122	1

Power storage devices

The maintenance-free lead AGM rechargeable batteries ensure a long service life and a high degree of quality and reliability.
– Battery can be changed without tools
– Communication with QUINT UPS IQ

Notes:

The buffer time associated with your solution is dependent on the load current. Exact details for each uninterruptible power supply can be found on page 613.

N

1.3 Ah

N

3.4 Ah

	Technical data	Technical data
Input data/output data		
Nominal voltage	24 V DC	24 V DC
Nominal capacitance	1.3 Ah	3.4 Ah
Output current	15 A	25 A
Output fuse	1x 15 A	1x 25 A
Can be connected in parallel / series	Yes / No	Yes / No
General data		
Weight / Dimensions W x H x D	1.7 kg / 54 x 157 x 113 mm	3.3 kg / 85 x 191 x 110 mm
Degree of protection / Protection class	IP20 / III	IP20 / III
Ambient temperature (operation)	0°C ... 40°C	0°C ... 40°C
Service life of the rechargeable battery (Eurobat)	6 years ... 9 years (20°C)	6 years ... 9 years (20°C)
Latest startup date (battery only)	9 months (20°C ... 30°C) 6 months (30°C ... 40°C)	9 months (20°C ... 30°C) 6 months (30°C ... 40°C)

	Ordering data			Ordering data		
Description	Type	Order No.	Pcs. / Pkt.	Type	Order No.	Pcs. / Pkt.
Battery module						
	UPS-BAT/VRLA/ 24DC/ 1.3AH	**2320296**	1	**UPS-BAT/VRLA/ 24DC/ 3.4AH**	**2320306**	1

Power storage devices

The maintenance-free lead AGM rechargeable batteries ensure a long service life and a high degree of quality and reliability.
– Consists of 2x 12 V battery blocks and an electronic monitoring unit
– Communication with QUINT UPS IQ

Notes:

The buffer time associated with your solution is dependent on the load current. Exact details for each uninterruptible power supply can be found on page 613.

UPS-BAT/VRLA/24DC/38AH is supplied together with an external control module.

N

38 Ah

	Technical data
Input data/output data	
Nominal voltage	24 V DC
Nominal capacitance	38 Ah
Output current	50 A
Output fuse	2x 25 A
Can be connected in parallel / series	Yes / No
General data	
Weight / Dimensions W x H x D	26 kg / 330 x 210 x 197 mm
Degree of protection / Protection class	IP20 / III
Ambient temperature (operation)	0°C ... 40°C
Service life of the rechargeable battery (Eurobat)	10 years ... 12 years (20°C)
Latest startup date (battery only)	9 months (20°C ... 30°C) 6 months (30°C ... 40°C)

	Ordering data		
Description	Type	Order No.	Pcs. / Pkt.
Battery module			
	UPS-BAT/VRLA/ 24DC/38AH	**2320335**	1

Power storage devices

The maintenance-free lead AGM rechargeable batteries ensure a long service life and a high degree of quality and reliability.
– Battery can be changed without tools
– Communication with QUINT UPS IQ

Notes:
The buffer time associated with your solution is dependent on the load current. Exact details for each uninterruptible power supply can be found on page 613

N

7.2 Ah

N

12 Ah

	Technical data	Technical data
Input data/output data		
Nominal voltage	24 V DC	24 V DC
Nominal capacitance	7.2 Ah	12 Ah
Output current	50 A	50 A
Output fuse	2x 25 A	2x 25 A
Can be connected in parallel / series	Yes / No	Yes / No
General data		
Weight / Dimensions W x H x D	5.9 kg / 153 x 202 x 110 mm	8.9 kg / 202 x 202 x 110 mm
Degree of protection / Protection class	IP20 / III	IP20 / III
Ambient temperature (operation)	0°C ... 40°C	0°C ... 40°C
Service life of the rechargeable battery (Eurobat)	6 years ... 9 years (20°C)	6 years ... 9 years (20°C)
Latest startup date (battery only)	9 months (20°C ... 30°C) 6 months (30°C ... 40°C)	9 months (20°C ... 30°C) 6 months (30°C ... 40°C)

	Ordering data			Ordering data		
Description	Type	Order No.	Pcs. / Pkt.	Type	Order No.	Pcs. / Pkt.
Battery module						
	UPS-BAT/VRLA/ 24DC/ 7.2AH	2320319	1	UPS-BAT/VRLA/ 24DC/12AH	2320322	1

Power storage devices

The maintenance-free LI-ION rechargeable batteries also perform reliably at extreme ambient temperatures. They can be used at temperatures of between -20°C and +60°C.
– Battery can be changed without tools
– Communication with QUINT UPS IQ
– High energy density

Notes:
The buffer time associated with your solution is dependent on the load current. Exact details for each uninterruptible power supply can be found on page 613.

N

60 Wh

	Technical data
Input data/output data	
Nominal voltage	24 V DC
Nominal capacitance	60 Wh
Output current	50 A
Output fuse	2x 25 A
Can be connected in parallel / series	Yes / No
General data	
Weight / Dimensions W x H x D	2.9 kg / 135 x 202 x 110 mm
Degree of protection / Protection class	IP20 / III
Ambient temperature (operation)	-20°C ... 60°C
Service life of the rechargeable battery (Eurobat)	15 years (20°C)
Latest startup date (battery only)	36 months (20°C ... 40°C)

	Ordering data		
Description	Type	Order No.	Pcs. / Pkt.
Battery module			
	UPS-BAT/LI-ION/24DC/60WH	2320351	1

Maintenance-free buffer module

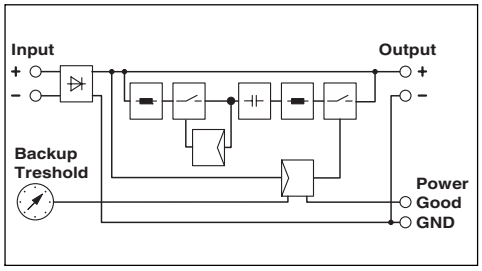
N

The buffer module can accommodate failures lasting several seconds.

It combines an electronic switchover unit and a capacitor-based power storage device in the same housing.

Buffer module,
24 V DC / 24 V DC, 40 A

Applied for:
CUL listed / UL / UL-EX



Technical data

Input data	
Nominal input voltage	24 V DC
DC input voltage range	18 V DC ... 30 V DC
Current consumption (idling/charging process/max.)	Approx. 0.1 A / 0.7 A / 44.7 A
Connect threshold (fixed, variable)	< 20 V DC (< 22 V; < 24 V; < 26 V), (U_{IN} - 1 V)/0.1 s
Buffer period	0.2 s (40 A) / 8 s (1 A)
Input fuse	-
Output data	
Nominal output voltage	24 V DC (depending on the input voltage)
Output current	40 A
Can be connected in parallel / series	Yes / No
Max. power dissipation (normal mode / buffer mode)	15 W / 48 W
Efficiency (typ.)	> 95%
Signaling	
Signaling DC OK	LED, active switching output
General data	
Storage medium	internal, capacitor
Weight / Dimensions W x H x D	1.1 kg / 64 x 130 x 125 mm
Installation position	horizontal DIN rail NS 35, EN 60715
Spacing when mounting	Can be aligned: Horizontal 0 cm, vertical 5 cm
Connection method	Screw connection
Input connection data solid / stranded / AWG	0.5 - 16 mm^2 / 0.5 - 16 mm^2 / 8 - 6
Output connection data solid / stranded / AWG	0.5 - 16 mm^2 / 0.5 - 16 mm^2 / 8 - 6
Signal connection data solid / stranded / AWG	0.2 - 4 mm^2 / 0.2 - 2.5 mm^2 / 24 - 12
Degree of protection / Protection class	IP20 / III
MTBF (at nominal load, 40°C)	> 500,000 h
Ambient temperature (operation)	-25°C ... 80°C
Standards / regulations	
Insulation voltage: input, output/housing	500 V
Electromagnetic compatibility	Conformance with EMC Directive 2004/108/EC
Electrical safety	EN 60950-1/VDE 0805 (SELV)
Electronic equipm. for electrical power installations	EN 50178/VDE 0160 (PELV)
UL approvals	UL applied for

Ordering data

Description	Type	Order No.	Pcs. / Pkt.
Power supply, uninterruptible	**QUINT-BUFFER/24DC/24DC/40**	**2320393**	1

Uninterruptible primary switched-mode power supply units

TRIO UPS

Specifically for supplying industrial PCs. Configuration port: Freely parameterizable with the UPS CONF configuration software. Configuration stick: Parameterize stick once and transfer to any number of TRIO UPS units. The highly compact UPS combines a power supply unit and an electronic switchover unit in the same housing.

STEP UPS

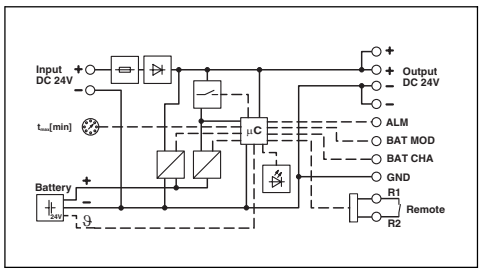
The STEP BAT rechargeable battery module is included as part of the STEP UPS order. The STEP BAT can be reordered separately.

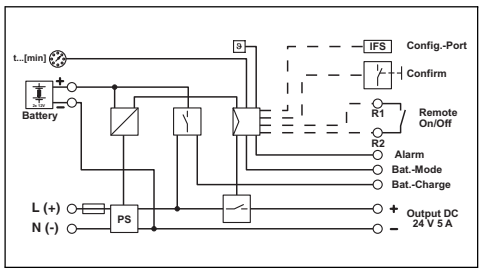
N

Uninterruptible power supply, 24 V DC / 24 V DC, 3 A

UPS with integrated power supply, 100 - 240 V AC / 24 V DC, 5 A

Applied for: GL





	Technical data	Technical data
Input data		
Nominal input voltage range	24 V DC	100 V AC ... 240 V AC
Input voltage range AC/DC	- / 22.5 V DC ... 29.5 V DC	85 V AC ... 264 V AC / 100 V DC ... 350 V DC
Max. current consumption in normal mode	Approx. 4.1 A (24 V DC) / Approx. 4.5 A (24 V DC), - / -	Approx. 0.95 A / 1.1 A (230 V AC), Approx. 1.7 A / 1.8 A (120 V AC)
Buffer period	Approx. 11 min (3 A)	(Depends on the storage medium, e.g., 20 min / 5 A)
Input fuse	7 A (slow-blow, internal)	6.3 A (slow-blow, internal)
Recommended backup fuse, LS switch	-	B6, B10, B16
Output data		
Nominal output voltage	24 V DC	24 V DC
Output current	3 A	5 A
Can be connected in parallel / series	No / No	No / No
Max. power dissipation (normal mode / buffer mode)	3.5 W / 3.6 W	16 W / 4 W
Efficiency (typ.)	> 97% (24 V DC, normal operation)	> 88% (230 V AC, network operation)
Signaling		
Signaling power OK	LED	LED
Signaling alarm	LED, active transistor switching output	LED, active relay output
Signaling battery charge	LED, active transistor switching output	LED, active switching output
Signaling battery mode	LED, active transistor switching output	LED, active relay output
General data		
Storage medium	Lithium polymer, 1.4 Ah	External, battery 1.3 Ah / 3.4 Ah / 7.2 Ah / 12 Ah
Weight / Dimensions W x H x D	0.4 kg / 108 x 90 x 61 mm	1.1 kg / 60 x 130 x 118 mm
Installation position	horizontal DIN rail NS 35, EN 60715	horizontal DIN rail NS 35, EN 60715
Spacing when mounting	Can be aligned: Horizontal 0 cm, vertical 5 cm	Can be aligned: Horizontal 0 cm, vertical 5 cm
Connection method	Screw connection	Screw connection
Input connection data solid / stranded / AWG	0.2 - 2.5 mm^2 / 0.2 - 2.5 mm^2 / 24 - 12	0.2 - 2.5 mm^2 / 0.2 - 2.5 mm^2 / 24 - 12
Output connection data solid / stranded / AWG	0.2 - 2.5 mm^2 / 0.2 - 2.5 mm^2 / 24 - 12	0.2 - 2.5 mm^2 / 0.2 - 2.5 mm^2 / 24 - 12
Signal connection data solid / stranded / AWG	0.2 - 2.5 mm^2 / 0.2 - 2.5 mm^2 / 24 - 12	0.2 - 2.5 mm^2 / 0.2 - 2.5 mm^2 / 24 - 12
Degree of protection / Protection class	IP20 / III	IP20 / I
MTBF (at nominal load, 40°C)	> 500,000 h	> 500,000 h
Ambient temperature (operation)	0°C ... 40°C (> 55°C derating)	-25°C ... 70°C (> 55°C derating)
Standards / regulations		
Insulation voltage input/output	- / -	4 kV (type test) / 2 kV (routine test)
Electromagnetic compatibility	Conformance with EMC Directive 2004/108/EC	Conformance with EMC Directive 2004/108/EC
Electrical safety, safety transformer	EN 60950-1/VDE 0805 (SELV)	EN 60950-1/VDE 0805 (SELV), EN 61558-2-17
Electronic equipm. for electrical power installations	EN 50178/VDE 0160 (PELV)	EN 50178/VDE 0160 (PELV)
UL approvals	UL applied for	UL/C-UL listed UL 508, UL/C-UL recognized UL 60950

Ordering data

Description	Type	Order No.	Pcs. / Pkt.
Power supply, uninterruptible			
	STEP-UPS/24DC/24DC/3	2868703	1
Accessories			
Battery module	STEP-BAT/LIPO/18.5DC/1.4AH	2320364	1

Ordering data

Type	Order No.	Pcs. / Pkt.
TRIO-UPS/1AC/24DC/ 5	2866611	1
Accessories		

MINI UPS

MINI-DC-UPS 24 V DC and 12 V DC

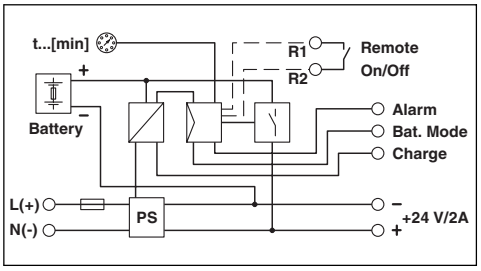
The highly compact MINI UPS combines a power supply unit and an electronic switch-over unit in the same housing.

Notes:

With the MINI-DC-UPS/12DC/4, buffer times are double those of the MINI-DC-UPS/24DC/2.

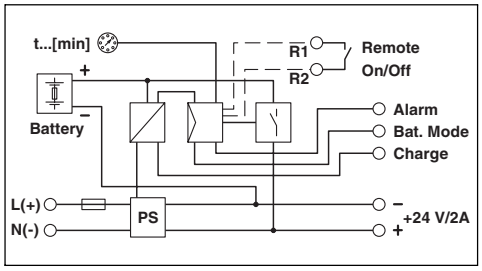
UPS with integrated power supply, 100 - 240 V AC / 24 V DC, 2 A

Applied for: UL-EX LIS / CUL-EX LIS



UPS with integrated power supply, 100 - 240 V AC / 12 V DC, 4 A

Applied for: UL-EX LIS / CUL-EX LIS



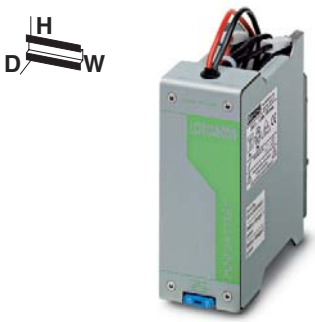
	Technical data	Technical data
Input data		
Nominal input voltage range	100 V AC ... 240 V AC	100 V AC ... 240 V AC
Input voltage range AC/DC	85 V AC ... 264 V AC / 100 V DC ... 350 V DC	85 V AC ... 264 V AC / 100 V DC ... 350 V DC
Max. current consumption in normal mode	Approx. 0.6 A / 0.85 A (230 V AC), Approx. 1.1 A / 1.5 A (120 V AC)	Approx. 0.5 A / 0.65 A (for 230 V AC), Approx. 1.15 A / 1.35 A (for 120 V AC)
Buffer period	(depends on the storage medium, e.g., 20 min / 2 A)	(Depending on the storage medium, e.g., 20 min / 4A)
Input fuse	3.15 A (slow-blow, internal)	3.15 A (slow-blow, internal)
Recommended backup fuse, LS switch	B6, B10, B16	B6, B10, B16
Output data		
Nominal output voltage	24 V DC (AC input voltage available: 22.5 to 29.5 V DC, AC input voltage not available: 27.9 to 19.2 V DC)	12 V DC (AC input voltage available: 10 to 16 V DC, AC input voltage not available: 13.6 to 9.6 V DC)
Output current	2 A	4 A
Can be connected in parallel / series	No / Yes	No / Yes
Max. power dissipation (idling / normal mode / buffer mode)	3.8 W / 10.1 W / 2.1 W	1.6 W / 10.5 W / 2.6 W
Efficiency (typ.)	> 83%	> 82%
Signaling		
Signaling power OK	LED	LED
Signaling alarm	LED, active switching output	LED, active switching output
Signaling battery charge	LED, active switching output	LED, active switching output
Signaling battery mode	LED, active switching output	LED, active switching output
General data		
Storage medium	External, battery 0.8 Ah / 1.3 Ah	External, rechargeable battery 1.6 Ah / 2.6 Ah
Weight / Dimensions W x H x D	0.45 kg / 67.5 x 99 x 107 mm	0.45 kg / 67.5 x 99 x 115 mm
Installation position	horizontal DIN rail NS 35, EN 60715	horizontal DIN rail NS 35, EN 60715
Spacing when mounting	Can be aligned: Horizontal 0 cm, vertical 5 cm	Can be aligned: Horizontal 0 cm, vertical 5 cm
Connection method	Pluggable COMBICON screw connections	Pluggable COMBICON screw connections
Input connection data solid / stranded / AWG	0.2 - 2.5 mm^2 / 0.2 - 2.5 mm^2 / 24 - 12	0.2 - 2.5 mm^2 / 0.2 - 2.5 mm^2 / 24 - 12
Output connection data solid / stranded / AWG	0.2 - 2.5 mm^2 / 0.2 - 2.5 mm^2 / 24 - 12	0.2 - 2.5 mm^2 / 0.2 - 2.5 mm^2 / 24 - 12
Signal connection data solid / stranded / AWG	0.2 - 2.5 mm^2 / 0.2 - 2.5 mm^2 / 24 - 12	0.2 - 2.5 mm^2 / 0.2 - 2.5 mm^2 / 24 - 12
Degree of protection / Protection class	IP20 / II (in an enclosed control cabinet)	IP20 / II (in an enclosed control cabinet)
MTBF (at nominal load, 40°C)	> 500,000 h	> 500,000 h
Ambient temperature (operation)	-25°C ... 70°C (> 60°C derating)	-25°C ... 70°C (> 60°C derating)
Standards / regulations		
Insulation voltage input/output	4 kV (type test) / 2 kV (routine test)	4 kV (type test) / 2 kV (routine test)
Electromagnetic compatibility	Conformance with EMC Directive 2004/108/EC	Conformance with EMC Directive 2004/108/EC
Electrical safety, safety transformer	EN 60950-1/VDE 0805 (SELV), EN 61558-2-17	EN 60950-1/VDE 0805 (SELV), EN 61558-2-17
Electronic equipm. for electrical power installations	EN 50178/VDE 0160 (PELV)	EN 50178/VDE 0160 (PELV)
UL approvals	UL listed UL 508, UL/C-UL recognized UL 60950	UL listed UL 508, UL/C-UL recognized UL 60950

	Ordering data			Ordering data		
Description	Type	Order No.	Pcs. / Pkt.	Type	Order No.	Pcs. / Pkt.
Power supply, uninterruptible						
	MINI-DC-UPS/24DC/2	**2866640**	1	**MINI-DC-UPS/12DC/4**	**2866598**	1

Rechargeable battery modules for MINI UPS, 24 V DC

Notes:

The buffer time associated with your solution is dependent on the load current. Exact details for each uninterruptible power supply can be found on page 613.



	Battery module, 24 V DC, 0.8 Ah for DC-UPS/2 A	Battery module, 24 V DC, 1.3 Ah for DC-UPS/2 A
Technical data		
Input data/output data		
Nominal input voltage	24 V DC	24 V DC
Nominal capacitance	0.8 Ah	1.3 Ah
Nominal output voltage	24 V DC	24 V DC
Output current	5 A	15 A
Output fuse	5 A	15 A
Can be connected in parallel / series	Yes / No	Yes / No
General data		
Weight / Dimensions W x H x D	0.9 kg / 67.5 x 99 x 107 mm	1.7 kg / 52 x 130 x 110 mm
Degree of protection / Protection class	IP20 / III	IP20 / III
Ambient temperature (operation)	0°C ... 40°C	0°C ... 40°C
Service life of the rechargeable battery (Eurobat)	4 years (20°C)	6 years ... 9 years (20°C)
Latest startup date (battery only)	6 months (20°C - 30°C) 3 months (30°C - 40°C)	9 months (20°C - 30°C) 6 months (30°C - 40°C)

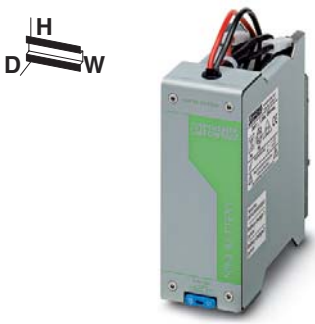
Ordering data

Description	Type	Order No.	Pcs. / Pkt.	Type	Order No.	Pcs. / Pkt.
Battery module	**MINI-BAT/24DC/0.8AH**	**2866666**	1	**MINI-BAT/24DC/1.3AH**	**2866417**	1

Rechargeable battery modules for MINI UPS, 12 V DC

Notes:

The buffer time associated with your solution is dependent on the load current. Exact details for each uninterruptible power supply can be found on page 613.



	Rechargeable battery module, 12 V DC, 1.6 Ah for MINI DC-UPS/4 A	Rechargeable battery module, 12 V DC, 2.6 Ah for MINI DC-UPS/4 A
Technical data		
Input data/output data		
Nominal input voltage	12 V DC	12 V DC
Nominal capacitance	1.6 Ah	2.6 Ah
Nominal output voltage	12 V DC	12 V DC
Output current	10 A	15 A
Output fuse	10 A	25 A
Can be connected in parallel / series	Yes / No	Yes / No
General data		
Weight / Dimensions W x H x D	0.9 kg / 67.5 x 99 x 107 mm	1.7 kg / 52 x 130 x 110 mm
Degree of protection / Protection class	IP20 / III	IP20 / III
Ambient temperature (operation)	0°C ... 40°C	0°C ... 40°C
Service life of the rechargeable battery (Eurobat)	4 years (20°C)	6 years ... 9 years (20°C)
Latest startup date (battery only)	6 months (20°C - 30°C) 3 months (30°C - 40°C)	9 months (20°C - 30°C) 6 months (30°C - 40°C)

Ordering data

Description	Type	Order No.	Pcs. / Pkt.	Type	Order No.	Pcs. / Pkt.
Battery module	**MINI-BAT/12DC/1.6AH**	**2866572**	1	**MINI-BAT/12DC/2.6AH**	**2866569**	1

Power supply units

QUINT POWER, dip-coated

The dip-coated power supply units in the QUINT POWER series with ATEX approval comply with standard EN 60079-15 and may be installed within the potentially hazardous area requiring category 3G operating equipment (Ex II 3G). They are also suitable for use in Class I, Division 2, Groups A, B, C, D.

MINI POWER EX

The power supply unit complies with standard EN 60079-15 and may be installed within the potentially explosive area in which category 3G items are necessary.

Notes:

DIN rail connector (optional), for routing through of supply voltage and data signal, two are required per device (ME 17,5 TBUS 1,5/5-ST-3,81 GN, 2709561).

N

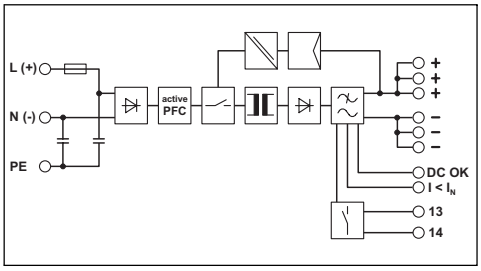
H D W

SFB TECHNOLOGY

Power supply, dip-coated, 1 AC, 24 V DC, 5 A

CB scheme

Applied for: TUEV-N-EX



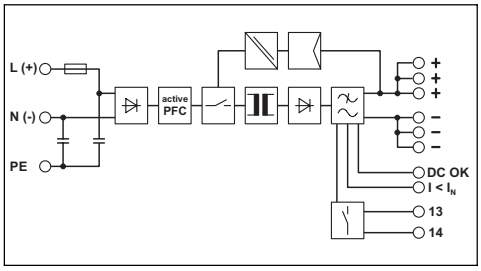
N

H D W

SFB TECHNOLOGY

Power supply, dip-coated, 1 AC, 24 V DC, 10 A

Applied for: CB / TUEV-N-EX



	Technical data	Technical data
Input data		
Nominal input voltage range	100 V AC ... 240 V AC	100 V AC ... 240 V AC
Input voltage range AC/DC	85 V AC ... 264 V AC / 90 V DC ... 350 V DC	85 V AC ... 264 V AC / 90 V DC ... 350 V DC
Frequency range	45 Hz ... 65 Hz / 0 Hz	45 Hz ... 65 Hz / 0 Hz
Current consumption (nominal load)	Approx. 1.2 A (120 V AC) / Approx. 0.6 A (230 V AC)	Approx. 2.24 A (120 V AC) / Approx. 1.33 A (230 V AC)
Inrush current limitation at 25°C (typ.) / I^2t	< 15 A / < 1 A^2s	< 15 A / < 1.5 A^2s
Mains buffering (I_N, typ.)	> 30 ms (120 V AC) / > 30 ms (230 V AC)	> 32 ms (120 V AC) / > 36 ms (230 V AC)
Input fuse	5 A (slow-blow, internal)	6.3 A (slow-blow, internal)
Recommended backup fuse, LS switch	B6, B10, B16	B10, B16
Output data		
Nominal output voltage	24 V DC ±1%	24 V DC ±1%
Setting range of the output voltage	18 V DC ... 29.5 V DC (> 24 V constant capacitance)	18 V DC ... 29.5 V DC (> 24 V constant capacitance)
Output current / POWER BOOST / SFB (12 ms)	5 A / 7.5 A / 30 A	10 A / 15 A / 60 A
Magnetic fuse tripping	C2	B6, C4
Can be connected in parallel / series	Yes / Yes	Yes / Yes
Max. power dissipation (idling/nominal load)	3 W / 15 W	9.1 W / 22 W
Efficiency (typ.)	> 90% (for 230 V AC and nominal values)	> 92.5% (for 230 V AC and nominal values)
Residual ripple	< 40 mV_{PP}	< 50 mV_{PP}
Signaling		
Signaling DC OK	LED, active switching output, relay contact	LED, active switching output, relay contact
Boost signaling	LED, active switching output	LED, active switching output
General data		
Weight / Dimensions W x H x D	0.7 kg / 40 x 130 x 125 mm	1.1 kg / 60 x 130 x 125 mm
Installation position	horizontal DIN rail NS 35, EN 60715	horizontal DIN rail NS 35, EN 60715
Spacing when mounting	Can be aligned: 5 mm horizontally, 15 mm next to active components, 5 cm vertically	Can be aligned: 5 mm horizontally, 15 mm next to active components, 5 cm vertically
Connection method	Pluggable screw connection	Pluggable screw connection
Input connection data solid / stranded / AWG	0.2 - 2.5 mm^2 / 0.2 - 2.5 mm^2 / 20 - 12	0.2 - 2.5 mm^2 / 0.2 - 2.5 mm^2 / 16 - 12
Output connection data solid / stranded / AWG	0.2 - 2.5 mm^2 / 0.2 - 2.5 mm^2 / 20 - 12	0.2 - 2.5 mm^2 / 0.2 - 2.5 mm^2 / 16 - 12
Signal connection data solid / stranded / AWG	0.2 - 2.5 mm^2 / 0.2 - 2.5 mm^2 / 20 - 12	0.2 - 2.5 mm^2 / 0.2 - 2.5 mm^2 / 16 - 12
Degree of protection / Protection class	IP20 / I	IP20 / I
MTBF (at nominal load, 40°C)	> 500,000 h	> 500,000 h
Ambient temperature (operation)	-25°C ... 70°C (> 60°C derating)	-25°C ... 70°C (> 60°C derating)
Standards / regulations		
Insulation voltage input/output	2 kV AC (routine test) / 4 kV AC (type test)	2 kV AC (routine test) / 4 kV AC (type test)
Electromagnetic compatibility	Conformance with EMC Directive 2004/108/EC	Conformance with EMC Directive 2004/108/EC
Electrical safety, safety transformer	IEC 60950-1/VDE 0805 (SELV), IEC 61558-2-17	IEC 60950-1/VDE 0805 (SELV), IEC 61558-2-17
Electronic equipm. for electrical power installations	EN 50178/VDE 0160 (PELV)	EN 50178/VDE 0160 (PELV)
Safe isolation	DIN VDE 0100-410, DIN VDE 0106-1010	DIN VDE 0100-410, DIN VDE 0106-1010
UL approvals	UL applied for	UL applied for
Limitation of harmonic line currents	EN 61000-3-2	EN 61000-3-2

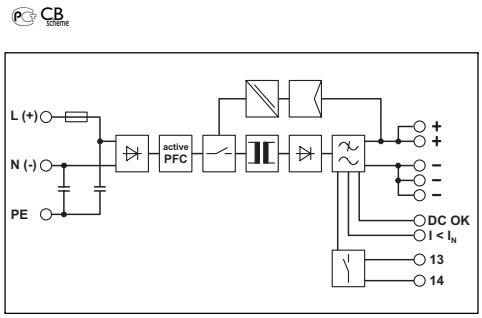
Description	Ordering data: Type	Order No.	Pcs. / Pkt.	Ordering data: Type	Order No.	Pcs. / Pkt.
Power supply unit, primary-switched						
	QUINT-PS/ 1AC/24DC/ 5/CO	**2320908**	1	**QUINT-PS/ 1AC/24DC/10/CO**	**2320911**	1

N

H D W

SFB TECHNOLOGY

Power supply, dip-coated, 1 AC, 24 V DC, 20 A



Technical data

100 V AC ... 240 V AC
85 V AC ... 264 V AC / 90 V DC ... 350 V DC
45 Hz ... 65 Hz / 0 Hz
Approx. 5.1 A (120 V AC) / Approx. 2.3 A (230 V AC)
< 20 A / < 3.2 A²s
> 20 ms (120 V AC) / > 20 ms (230 V AC)
12 A (slow-blow, internal)
B10, B16

24 V DC ±1%
18 V DC ... 29.5 V DC (> 24 V constant capacitance)

20 A / 26 A / 120 A
B16, C6
Yes / Yes
8 W / 40 W
> 93% (for 230 V AC and nominal values)
< 30 mV_{PP}

LED, active switching output, relay contact
LED, active switching output

1.7 kg / 90 x 130 x 125 mm
horizontal DIN rail NS 35, EN 60715
Can be aligned: 5 mm horizontally, 15 mm next to active components, 5 cm vertically
Pluggable screw connection
0.2 - 6 mm² / 0.2 - 4 mm² / 18 - 10
0.2 - 6 mm² / 0.2 - 4 mm² / 12 - 10
0.2 - 6 mm² / 0.2 - 4 mm² / 18 - 10
IP20 / I
> 500,000 h
-25°C ... 70°C (> 60°C derating)

2 kV AC (routine test) / 4 kV AC (type test)
Conformance with EMC Directive 2004/108/EC
IEC 60950-1/VDE 0805 (SELV), IEC 61558-2-17
EN 50178/VDE 0160 (PELV)
DIN VDE 0100-410, DIN VDE 0106-1010
UL applied for

EN 61000-3-2

Ordering data

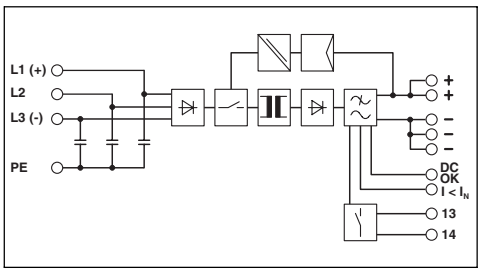
Type	Order No.	Pcs. / Pkt.
QUINT-PS/ 1AC/24DC/20/CO	2320898	1

N

H D W

SFB TECHNOLOGY

Power supply, dip-coated, 3 AC, 24 V DC, 20 A



Technical data

3x 400 V AC ... 500 V AC
320 V AC ... 575 V AC / 450 V DC ... 800 V DC
45 Hz ... 65 Hz / 0 Hz
3x 1.6 A (400 V AC) / 3x 1.3 A (500 V AC)
< 20 A / < 3.2 A²s
> 20 ms (400 V AC) / > 30 ms (500 V AC)
-
B6, B10, B16

24 V DC ±1%
18 V DC ... 29.5 V DC (> 24 V constant capacitance)

20 A / 26 A / 120 A
B16, C6
Yes / Yes
11 W / 40 W
> 93% (at 400 V AC and nominal values)
< 40 mV_{PP}

LED, active switching output, relay contact
LED, active switching output

1.5 kg / 69 x 130 x 125 mm
horizontal DIN rail NS 35, EN 60715
Can be aligned: 5 mm horizontally, 15 mm next to active components, 5 cm vertically
Screw connection
0.2 - 6 mm² / 0.2 - 4 mm² / 18 - 10
0.2 - 6 mm² / 0.2 - 4 mm² / 12 - 10
0.2 - 6 mm² / 0.2 - 4 mm² / 18 - 10
IP20 / I
> 500,000 h
-25°C ... 70°C (> 60°C derating)

2 kV AC (routine test) / 4 kV AC (type test)
Conformance with EMC Directive 2004/108/EC
IEC 60950-1/VDE 0805 (SELV), IEC 61558-2-17
EN 50178/VDE 0160 (PELV)
DIN VDE 0100-410, DIN VDE 0106-1010
UL applied for

EN 61000-3-2

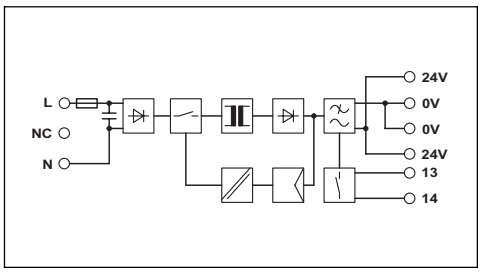
Ordering data

Type	Order No.	Pcs. / Pkt.
QUINT-PS/ 3AC/24DC/20/CO	2320924	1

H D W

Ex n

For supply via the foot element (T-connector)



Technical data

100 V AC ... 240 V AC
85 V AC ... 264 V AC
45 Hz ... 65 Hz
Approx. 0.75 A (120 V AC) / 0.45 A (230 V AC)
< 15 A / 0.6 A²s
> 20 ms (120 V AC) / > 100 ms (230 V AC)
3.15 A (slow-blow, internal)
B6, B10, B16

24 V DC ±1%
-

1.5 A / 2 A
-
Yes / Yes
2.5 W / 12 W
> 84% (at 230 V AC and nominal values)
< 40 mV_{PP}

LED, relay contact
-

0.25 kg / 35 x 99 x 95 mm
horizontal DIN rail NS 35, EN 60715
Can be aligned: Horizontal 0 cm, vertical 5 cm

Pluggable screw connection
0.2 - 2.5 mm² / 0.2 - 2.5 mm² / 24 - 12
0.2 - 2.5 mm² / 0.2 - 2.5 mm² / 24 - 12
0.5 - 16 mm² / 0.5 - 10 mm² / 20 - 6
IP20 / II (in an enclosed control cabinet)
> 500,000 h
-25°C ... 70°C (> 60°C derating)

4 kV AC (type test) / 3 kV AC (routine test)
Conformance with EMC Directive 2004/108/EC
EN 60950-1/VDE 0805 (SELV), EN 61558-2-17
EN 50178/VDE 0160 (PELV)
DIN VDE 0100-410, DIN VDE 0106-1010
UL/C-UL listed UL 508, UL/C-UL recognized UL 60950, UL/C-UL listed UL 1604 Class I, Division 2, Groups A, B, C, D

EN 61000-3-2

Ordering data

Type	Order No.	Pcs. / Pkt.
MINI-PS-100-240AC/24DC/1.5/EX	2866653	1

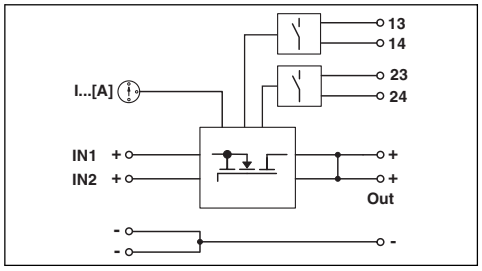
QUINT ORING redundancy modules

- The service life of the redundant solution can be increased by anything up to two times thanks to even load distribution: The ACB technology (auto current balancing) automatically distributes the load current symmetrically between two power supplies operating in parallel
- Permanent redundancy monitoring: Checking of input voltage, output current, and decoupling section
- Save energy: Decoupling is achieved with MOSFETs and results in energy savings of up to 70% compared with conventional diodes
- Continuous redundancy right through to the load: The use of two Plus output terminal blocks makes it possible to devise a redundant wiring concept that runs right through to the load

N

Active redundancy module
24 V DC, 2x 10 A, 1x 20 A

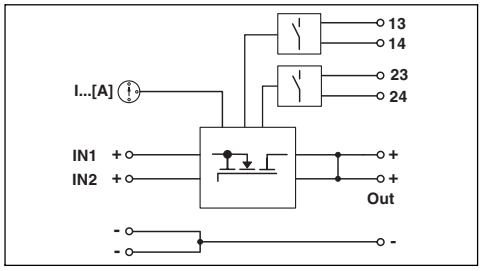
Applied for:
UL listed / UL / UL-EX LIS / IECEx



N

Active redundancy module
24 V DC, 2x 20 A, 1x 40 A

Applied for:
UL listed / UL / UL-EX LIS / IECEx



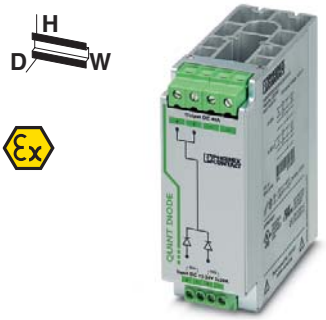
	Technical data	Technical data
Input data		
Nominal input voltage range	24 V DC	24 V DC
DC input voltage range	18 V DC ... 30 V DC	18 V DC ... 30 V DC
Nominal current	2x 10 A (-25°C ... 60°C) 1x 20 A (-25°C ... 60°C)	2x 20 A (-25°C ... 60°C) 1x 40 A (-25°C ... 60°C)
Maximum current	2x 15 A (-25°C ... 40°C) 1x 30 A (-25°C ... 40°C)	2x 26 A (-25°C ... 40°C) 1x 52 A (-25°C ... 40°C)
Transient surge protection	Varistor	Varistor
Voltage drop, input/output	0.1 V (I_{OUT} = 10 A)	0.2 V (I_{OUT} = 20 A)
Max. power dissipation (nominal load)	2 W (I_{OUT} = 10 A)	4 W (I_{OUT} = 20 A)
General data		
Weight / Dimensions W x H x D	0.37 kg / 32 x 130 x 125 mm	0.37 kg / 38 x 130 x 125 mm
Installation position	horizontal DIN rail NS 35, EN 60715	horizontal DIN rail NS 35, EN 60715
Spacing when mounting	Can be aligned: 5 mm horizontally, 15 mm next to active components, 5 cm vertically	Can be aligned: 5 mm horizontally, 15 mm next to active components, 5 cm vertically
Connection method	Screw connection	Screw connection
Input connection data solid / stranded / AWG	0.2 - 4 mm² / 0.2 - 2.5 mm² / 16 - 12	0.2 - 6 mm² / 0.2 - 4 mm² / 12 - 10
Output connection data solid / stranded / AWG	0.2 - 6 mm² / 0.2 - 4 mm² / 12 - 10	0.5 - 16 mm² / 0.5 - 16 mm² / 8 - 6
Degree of protection / Protection class	IP20 / III	IP20 / III
Ambient temperature (operation)	-25°C ... 70°C (> 60°C derating)	-25°C ... 70°C (> 60°C derating)
Ambient temperature (storage / transport)	-40°C ... 85°C	-40°C ... 85°C
Max. permissible relative humidity (operation)	≤ 95% (at 25°C, no condensation)	≤ 95% (at 25°C, no condensation)
Standards / regulations		
Insulation voltage: input, output/housing	500 V	500 V
Electromagnetic compatibility	Conformance with EMC Directive 2004/108/EC	Conformance with EMC Directive 2004/108/EC
Electrical safety, safety transformer	EN 60950-1/VDE 0805 (SELV)	EN 60950-1/VDE 0805 (SELV)
Electronic equipm. for electrical power installations	EN 50178/VDE 0160 (PELV)	EN 50178/VDE 0160 (PELV)
UL approvals	UL applied for	UL applied for

	Ordering data			Ordering data		
Description	Type	Order No.	Pcs. / Pkt.	Type	Order No.	Pcs. / Pkt.
Active redundancy module						
	QUINT-ORING/24DC/2X10/1X20	**2320173**	1	**QUINT-ORING/24DC/2X20/1X40**	**2320186**	1

QUINT DIODE diode module

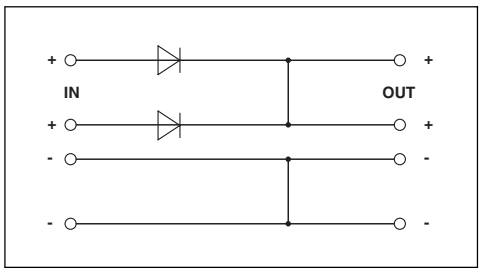
- Rugged design for currents of up to 60 A
- Continuous redundancy right through to the load: The use of two Plus output terminal blocks makes it possible to devise a redundant wiring concept that runs right through to the load
- Flexible: Nominal voltages of 12 V DC to 48 V DC

N

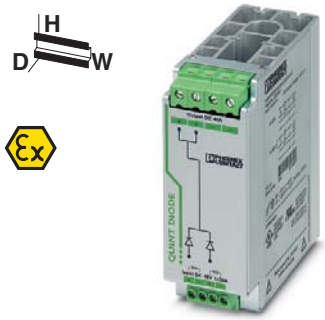


Diode module
12 - 24 V DC, 2x 20 A, 1x 40 A

Ex: // Applied for: UL-EX LIS

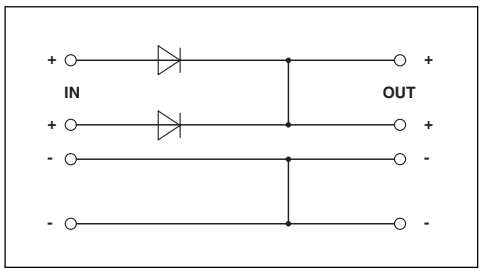


N



Diode module
48 V DC, 2x 20 A, 1x 40 A

Ex: // Applied for: UL-EX LIS



	Technical data	Technical data
Input data		
Nominal input voltage range	12 V DC ... 24 V DC	48 V DC
DC input voltage range	10 V DC ... 30 V DC	30 V DC ... 56 V DC
Nominal current	2x 20 A (-25°C ... 60°C) 1x 40 A (-25°C ... 60°C)	2x 20 A (-25°C ... 60°C) 1x 40 A (-25°C ... 60°C)
Maximum current	2x 30 A (-25°C ... 40°C) 1x 60 A (-25°C ... 40°C)	2x 30 A (-25°C ... 40°C) 1x 60 A (-25°C ... 40°C)
Transient surge protection	Varistor	Varistor
Voltage drop, input/output	0.5 V	0.7 V
Max. power dissipation (nominal load)	10 W (I_{OUT} = 20 A)	14 W (I_{OUT} = 20 A)
General data		
Weight / Dimensions W x H x D	0.75 kg / 50 x 130 x 125 mm	0.75 kg / 50 x 130 x 125 mm
Installation position	horizontal DIN rail NS 35, EN 60715	horizontal DIN rail NS 35, EN 60715
Spacing when mounting	Can be aligned: 5 mm horizontally, 15 mm next to active components, 5 cm vertically	Can be aligned: 5 mm horizontally, 15 mm next to active components, 5 cm vertically
Connection method	Screw connection	Screw connection
Input connection data solid / stranded / AWG	0.2 - 6 mm² / 0.2 - 4 mm² / 12 - 10	0.2 - 6 mm² / 0.2 - 4 mm² / 12 - 10
Output connection data solid / stranded / AWG	0.5 - 16 mm² / 0.5 - 16 mm² / 8 - 6	0.5 - 16 mm² / 0.5 - 16 mm² / 8 - 6
Degree of protection / Protection class	IP20 / III	IP20 / III
Ambient temperature (operation)	-40°C ... 70°C	-40°C ... 70°C
Ambient temperature (storage / transport)	-40°C ... 85°C	-40°C ... 85°C
Max. permissible relative humidity (operation)	≤ 95% (at 25°C, no condensation)	≤ 95% (at 25°C, no condensation)
Standards / regulations		
Insulation voltage: input, output/housing	500 V	500 V
Electromagnetic compatibility	Conformance with EMC Directive 2004/108/EC	Conformance with EMC Directive 2004/108/EC
Electrical safety, safety transformer	EN 60950-1/VDE 0805 (SELV)	EN 60950-1/VDE 0805 (SELV)
Electronic equipm. for electrical power installations	EN 50178/VDE 0160 (PELV)	EN 50178/VDE 0160 (PELV)
UL approvals	UL/C-UL listed UL 508, UL/C-UL recognized UL 60950	UL/C-UL listed UL 508, UL/C-UL recognized UL 60950

	Ordering data			Ordering data		
Description	Type	Order No.	Pcs. / Pkt.	Type	Order No.	Pcs. / Pkt.
Diode module						
	QUINT-DIODE/12-24DC/2X20/1X40	**2320157**	1	**QUINT-DIODE/48DC/2X20/1X40**	**2320160**	1

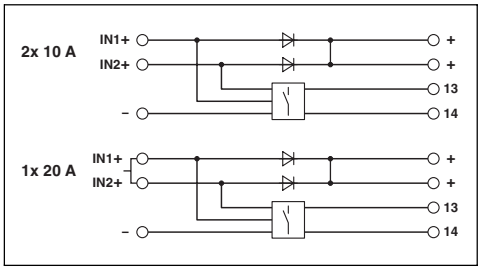
TRIO DIODE redundancy modules

- Permanent redundancy monitoring: Checking of output voltages of parallel-connected power supplies and of wiring running to the redundancy module
- Continuous redundancy right through to the load: The use of two Plus output terminal blocks makes it possible to devise a redundant wiring concept that runs right through to the load
- Flexible: Nominal voltages of 12 V DC to 48 V DC

Redundancy module, 12 - 24 V DC, 2 x 10 A, 1 x 20 A

STEP DIODE diode module

- Space-saving: Design width of just 18 mm
- Continuous redundancy right through to the load: The use of two Plus output terminal blocks makes it possible to devise a redundant wiring concept that runs right through to the load
- Flexible: Nominal voltages of 5 V DC to 24 V DC



Technical data

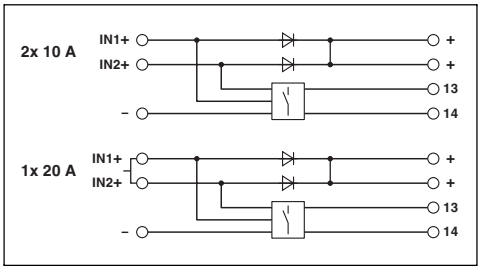
Input data	
Nominal input voltage range	12 V DC ... 24 V DC
DC input voltage range	10 V DC ... 30 V DC
Nominal current	2x 10 A (-25°C to +55°C) 1x 20 A (-25°C to +55°C)
Maximum current	2x 15 A (-25°C to +40°C) 1x 30 A (-25°C to +40°C)
Transient surge protection	Varistor
Voltage drop, input/output	Approx. 0.5 V
Max. power dissipation (nominal load)	7 W (I_{OUT} = 10 A)
General data	
Weight / Dimensions W x H x D	0.37 kg / 32 x 130 x 115 mm
Installation position	horizontal DIN rail NS 35, EN 60715
Spacing when mounting	Can be aligned: Horizontal 0 cm, vertical 5 cm
Connection method	Screw connection
Input connection data solid / stranded / AWG	0.2 - 2.5 mm^2 / 0.2 - 2.5 mm^2 / 24 - 14
Output connection data solid / stranded / AWG	0.5 - 6 mm^2 / 0.5 - 4 mm^2 / 20 - 10
Degree of protection / Protection class	IP20 / III
Ambient temperature (operation)	-25°C ... 70°C (> 55°C derating)
Ambient temperature (storage / transport)	-40°C ... 85°C
Max. permissible relative humidity (operation)	≤ 95% (at 25°C, no condensation)
Standards / regulations	
Insulation voltage: input, output/housing	500 V
Electromagnetic compatibility	Conformance with EMC Directive 2004/108/EC
Electrical safety, safety transformer	EN 60950-1/VDE 0805 (SELV)
Electronic equipm. for electrical power installations	EN 50178/VDE 0160 (PELV)
UL approvals	UL/C-UL listed UL 508, UL/C-UL recognized UL 60950

Ordering data

Description	Type	Order No.	Pcs. / Pkt.
Redundancy module			
	TRIO-DIODE/12-24DC/2X10/1X20	**2866514**	1

N

Redundancy module
48 V DC, 2x 10 A, 1x 20 A



Technical data

48 V DC
30 V AC ... 60 V AC
2x 10 A (-25°C to +55°C)
1x 20 A (-25°C to +55°C)
2x 15 A (-25°C to +40°C)
1x 30 A (-25°C to +40°C)
Varistor
Approx. 0.65 V
8.5 W (I_{OUT} = 10 A)
0.37 kg / 32 x 130 x 115 mm
horizontal DIN rail NS 35, EN 60715
Can be aligned: Horizontal 0 cm, vertical 5 cm
Screw connection
0.2 - 2.5 mm^2 / 0.2 - 2.5 mm^2 / 24 - 14
0.5 - 6 mm^2 / 0.5 - 4 mm^2 / 20 - 10
IP20 / III
-25°C ... 70°C (> 55°C derating)
-40°C ... 85°C
≤ 95% (at 25°C, no condensation)
500 V
Conformance with EMC Directive 2004/108/EC
EN 60950-1/VDE 0805 (SELV)
EN 50178/VDE 0160 (PELV)
UL/C-UL listed UL 508, UL/C-UL recognized UL 60950

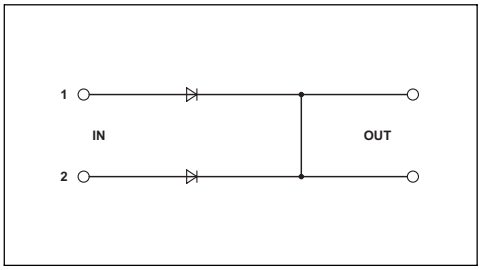
Ordering data

Type	Order No.	Pcs. / Pkt.
TRIO-DIODE/48DC/2X10/1X20	**2866527**	1

N

Diode module
5 - 24 V DC, 2x 5 A, 1x 10 A

Applied for:
UL listed / UL



Technical data

5 V DC ... 24 V DC
4.5 V DC ... 30 V DC
2x 5 A (-25°C ... 55°C)
1x 10 A (-25°C ... 55°C)
-
-
Transil diode
0.5 V
2.5 W (I_{OUT} = 5 A)
0.1 kg / 18 x 90 x 61 mm
horizontal DIN rail NS 35, EN 60715
Can be aligned: horizontal 0 cm, vertical 3 cm
Screw connection
0.2 - 2.5 mm^2 / 0.2 - 2.5 mm^2 / 24 - 12
0.2 - 2.5 mm^2 / 0.2 - 2.5 mm^2 / 24 - 12
IP20 / III
-25°C ... 70°C (> 55°C derating)
-40°C ... 85°C
≤ 95% (at 25°C, no condensation)
500 V
Conformance with EMC Directive 2004/108/EC
IEC 60950-1/VDE 0805 (SELV)
EN 50178/VDE 0160 (PELV)
UL applied for

Ordering data

Type	Order No.	Pcs. / Pkt.
STEP-DIODE/5-24DC/2X5/1X10	**2868606**	1

Mounting on S7-300 rail

To supply a SIMATIC® S7-300 control unit, QUINT POWER 2.5 A, 5 A, and 10 A are mounted on the S7 rail using a QUINT-PS-ADAPTER-S7.

No further accessories are required for fastening.

	Technical data	Technical data
Dimensions W x H x D	74 / 130 / 11 mm	104 / 130 / 11 mm
Material	Aluminum	Aluminum

	Ordering data			Ordering data		
Description	Type	Order No.	Pcs. / Pkt.	Type	Order No.	Pcs. / Pkt.
Adapter for S7-300 rail mounting, for: QUINT-PS/1AC/24DC/3.5 QUINT-PS/1AC/24DC/5 QUINT-PS/3AC/24DC/5	**QUINT-PS-ADAPTERS7/1**	**2938196**	1			
Adapter for S7-300 rail mounting, for: QUINT-PS/1AC/24DC/10 QUINT-PS/3AC/24DC/10 QUINT-PS/3AC/24DC/20				**QUINT-PS-ADAPTERS7/2**	**2938206**	1

Fans

With the standard power supply mounting position, the temperature range increases by 10 K (max. ambient temperature of 70°C), when the mounting position is rotated, position-dependent derating no longer applies.

– Assembly without tools

	Technical data
Dimensions W x H x D	41 / 27 / 42.2 mm
Material	V0 (UL 94)

	Ordering data		
Description	Type	Order No.	Pcs. / Pkt.
Fan for QUINT POWER SFB, 24 V DC	**QUINT-PS/FAN/4**	**2320076**	1

Universal wall adapter

Adapter for mounting on even surfaces

	Technical data	Technical data
Dimensions W x H x D	52 / 182 / 9 mm	25 / 130 / 17 mm
Material	Steel	Steel

	Ordering data			Ordering data		
Description	Type	Order No.	Pcs. / Pkt.	Type	Order No.	Pcs. / Pkt.
Universal panel adapter, for direct panel mounting of the TRIO-PS (from 10 A), QUINT-PS, QUINT-DC-UPS, QUINT-BUFFER power supply units	**UWA 182/52**	**2938235**	1			
Universal wall adapter, for mounting the QUINT-PS/1AC/24DC/40 and QUINT-UPS/1AC/1AC/500VA power supply units directly on the wall				**UWA 130**	**2901664**	1

DC protection

Depending on the line length and cross section, the SFB technology can reach its physical limits and electronic fuses are then used instead of line circuit breakers.

Plug-in

With N/O signal contact

		Technical data	Technical data
Width / length / height	[mm]	12.5 / 60 / 70	12.5 / 80 / 80

		Ordering data			Ordering data			
Description	Nominal current	Type	Order No.	Pcs. / Pkt.	Type	I_{max}	Order No.	Pcs. / Pkt.
Selective circuit breaker, can be plugged into TMCP base, signaling using two-color LED, floating signal contact, on/off push button	2 A	**ECP 2**	**0911034**	5				
	3 A	**ECP 3**	**0911047**	5				
	4 A	**ECP 4**	**0912034**	5				
	6 A	**ECP 6**	**0912033**	5				
	8 A	**ECP 8**	**0912019**	5				
	10 A	**ECP 10**	**0912020**	5				
Electronic circuit breaker, signal contact: 1 N/O contact	0.5 A				**EC-E1 0,5A**		**0903022**	6
	4 A				**EC-E1 4A**		**0903026**	6
	6 A				**EC-E1 6A**		**0903028**	6
	8 A				**EC-E1 8A**		**0903029**	6
	10 A				**EC-E1 10A**		**0903030**	6
	12 A				**EC-E1 12A**		**0903031**	6

Sockets with 45 mm standard pitch

It is just as important in modern switchgears as in simple distributions: The rail-mountable socket in standard format.

The socket is mounted in an exposed position to allow mounting tools, service devices, and other electrical equipment to be installed comfortably.

The mains connecting terminal blocks (L1, N, and PE) are arranged on one side of the socket for easy connection. All SD sockets are supplied with equipment marker tags. Additional equipment marker tags are available for the EMG housings.

The 45 mm socket is available with or without a miniature fuse. There is a 6.3 A fine fuse (5 x 20 mm) for protection.

System parts, in which items are still live even after the main switch has been turned off, must be marked in accordance with DIN VDE 0105-1 and IEC 60204-1/EN 60204-1/DIN VDE 0113-1 as well as the Accident Prevention Regulation VBG 4. In this case, a socket version in a yellow housing is available.

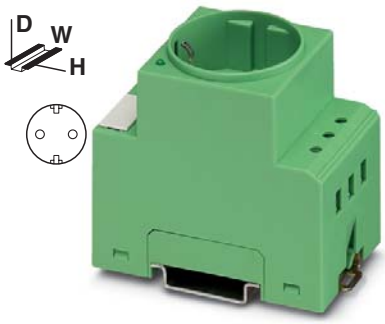
The sockets with a 45 mm standard pitch and with 90 mm double housings can be quickly snapped onto the 35 mm DIN rail in accordance with EN 60715.

For the sockets, you can choose between the following versions:

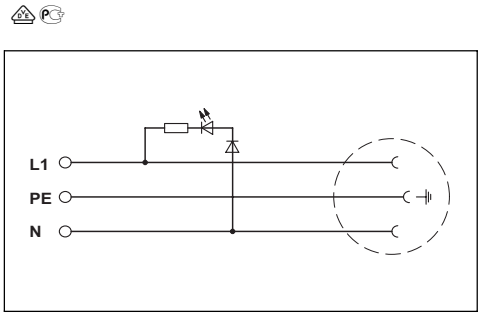
– Screw or spring-cage connection
– With or without light indicator
– Grounding connector, Belgian, French or USA version
– Housing: green, yellow or light gray

Notes:

Type of housing:
SD-... Polyamide non-reinforced PA
EMG...-SD polycarbonate fiber reinforced PCF
EM-DUO... PVC 94 V0
Socket insert Aminoplast type 131



Germany



Technical data

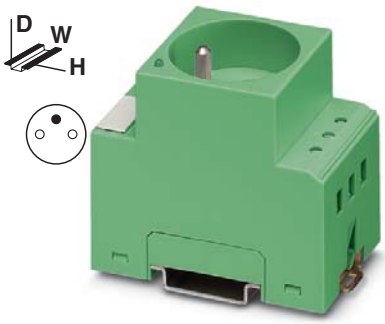
Nominal voltage		250 V AC	
Max. continuous current		16 A AC	
General data		SD-D... and EMG 45...	EMG 90...
Dimensions	W / H / D	45 mm / 75 mm / 70.5 mm	90 mm / 75 mm / 70.5 mm
Connection data solid / stranded / AWG		0.2 - 4 mm² / 0.2 - 2.5 mm² / 24 - 12	
Standards / regulations		IP20	
Contact material		CuZn37	
Ambient temperature range		-20°C ... 60°C	
Standards / regulations		IEC 83, DIN 49440-1	

Ordering data

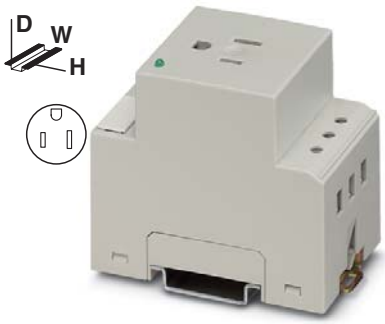
Description	Type	Order No.	Pcs. / Pkt.
Socket for the DIN rail			
Screw connection, light indicator, green	**SD-D/SC/LA**	**2964898**	5
Screw connection, light indicator, gray	**SD-D/SC/LA/GY**	**2963491**	5
Screw connection, light indicator, yellow	**SD-D/SC/LA/YE**	**2963404**	5
Screw connection, green	**SD-D/SC**	**2963310**	5
Screw connection, gray	**SD-D/SC/GY**	**2963815**	5
Screw connection, yellow	**SD-D/SC/YE**	**2963459**	5
Spring-cage connection, light indicator, green	**SD-D/SP/LA**	**2963307**	5
Spring-cage connection, light indicator, gray	**SD-D/SP/LA/GY**	**2963488**	5
Spring-cage connection, light indicator, yellow	**SD-D/SP/LA/YE**	**2963475**	5
Spring-cage connection, green	**SD-D/SP**	**2963323**	5
Spring-cage connection, gray	**SD-D/SP/GY**	**2963501**	5
Spring-cage connection, yellow	**SD-D/SP/YE**	**2963462**	5
Socket for the DIN rail with device fuse (5 x 20 mm, 6.3 A)			
Screw connection, light indicator, green	**EMG 45-SD-D/LA/SI**	**2943738**	5
Screw connection, light indicator, yellow	**EMG 45-SD-D/LA/SI YE**	**2940825**	5
Double socket for the DIN rail			
Screw connection, light indicator, green	**EMG 90-2SD-D/LA**	**2941523**	2
Screw connection, gray			
Screw connection, residual current circuit breaker, gray			

Accessories

Marker tags, 5-section, unprinted, labeling with X-PEN, M-PEN, plotter or BMKT 20 x 8 label				
Lettering field size: 20 x 8 mm	white	**SS-ZB WH**	**5031171**	50
Lettering field size: 20 x 8 mm	yellow	**SS-ZB YE**	**5031650**	50
labeled according to customer specifications	white	**SS-ZB WH CUS**	**0824470**	1

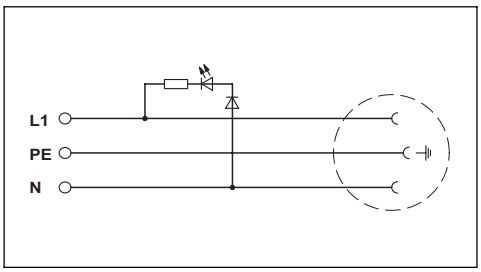


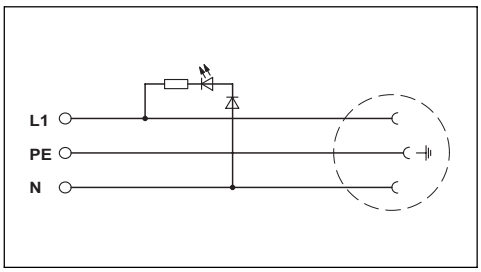
France/Belgium

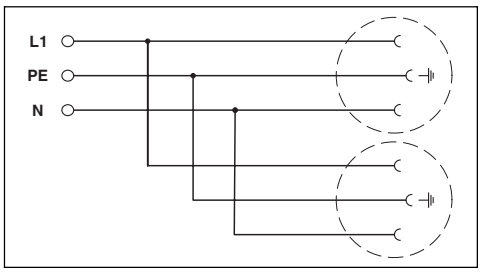


USA

USA







Technical data

250 V AC
10 A DC
SD-F...
45 mm / 75 mm / 70.5 mm
0.2 - 4 mm² / 0.2 - 2.5 mm² / 24 - 12
IP20
CuZn37
-20°C ... 60°C
IEC 83, DIN 49440-1

Ordering data

Type	Order No.	Pcs. / Pkt.
SD-F/SC/LA	**2963336**	5
SD-F/SC/LA/GY	**2963844**	5
SD-F/SC/LA/YE	**2963909**	5
SD-F/SC	**2963352**	5
SD-F/SC/GY	**2963828**	5
SD-F/SP/LA	**2963349**	5
SD-F/SP/LA/GY	**2963857**	5

Accessories

SS-ZB WH	**5031171**	50
SS-ZB YE	**5031650**	50
SS-ZB WH CUS	**0824470**	1

Technical data

125 V AC
15 A AC
SD-US...
45 mm / 75 mm / 70.5 mm
0.2 - 4 mm² / 0.2 - 2.5 mm² / 30 - 12
IP20
CuZn37
-20°C ... 60°C
IEC 83, DIN 49440-1

Ordering data

Type	Order No.	Pcs. / Pkt.
SD-US/SC/LA/GY	**2963860**	10

Accessories

SS-ZB WH	**5031171**	50
SS-ZB YE	**5031650**	50
SS-ZB WH CUS	**0824470**	1

Technical data

120 V AC
15 A

EM-DUO...	EM-DUO.../GFI
83 mm / 134 mm / 49 mm	83 mm / 134 mm / 52 mm

0.2 - 6 mm² / 0.2 - 4 mm² / 24 - 10
IP20
-
-40°C ... 70°C
UL 508

Ordering data

Type	Order No.	Pcs. / Pkt.
EM-DUO 120/15	**5600461**	1
EM-DUO/120/15/GFI	**5600462**	1

Accessories

INTERFACE Wireless

Industrial wireless communication

The INTERFACE product range of wireless signal transmission systems from Phoenix Contact can be used for easy and secure wireless transmission of analog and digital signals or serial data.

If you are a planner or user, these products provide you with access to a very straightforward transmission path for industrial applications. Signals that could previously only be acquired with a great deal of effort, if at all, can now be acquired quickly and easily.

Depending on requirements, various wireless technologies are available:

Trusted Wireless

Trusted Wireless is a form of wireless technology that has been developed specifically for industrial applications. The FHSS method is used for band spreading, which guarantees a high degree of immunity to interference. Trusted Wireless is characterized by the following features:

– Long ranges* from a few hundred meters to several kilometers
– Rugged and reliable communication in an industrial environment
– License-free industrial, scientific, and medical band
– Excellent diagnostic options
– High local system density of several hundred networks supported
– Can be operated in parallel with WLAN 802.11 and Bluetooth systems without interference

Bluetooth

With Bluetooth, which also operates according to the FHSS principle, you can set up local wireless networks with up to seven devices. Thanks to a variety of application profiles, this standard can be used flexibly for different tasks. Its features include:

– Typical range* of up to 100 m in industrial halls and up to 200 m outdoors
– Cyclical and fast transmission of small data packets
– High local system density, i.e., a large number of Bluetooth networks can be operated in parallel without interference
– Interference-free parallel operation of WLAN 802.11 networks
– High level of data integrity thanks to 128-bit data encryption and device authentication

* The range may be considerably above or below that stated, and depends on the environment, antenna technology, and the product used.

Product range overview

Product overview	**635**
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RAD Line (900 MHz)	
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GPRS

GPRS (**G**eneral **P**acket **R**adio **S**ervice) is an additional service for exchanging data using the mobile GSM telephone network (**G**lobal **S**ystem for **M**obile Communications). The TCP/IP-based GPRS connections have the following advantages:

– Invoicing is based on data volumes and not on the connection time
– Permanent connection, i.e., no need for time-consuming dial-in procedures
– Available worldwide in over 200 countries
– Transmission speeds of up to 85,600 bps

WirelessHART

WirelessHART (part of the HART 7 specification) is a transmission technology intended for process automation contexts.

This wireless standard has been developed to help you make more effective use of your HART-capable devices. It allows you to install new systems in a fraction of the time that would be required to install a wired network.

WirelessHART also allows you to expand your wired HART systems without having to replace older devices.

The features include:

– Wireless module according to IEEE 802.15.4
– Time-synchronized communication
– Supports fully meshed networks
– Secure data transfer

Wireless IO (2400 MHz)

	RAD Line IO bidirectional	RAD Line IO extension modules			
Type	**RAD-ISM-2400-...-BD...**	**RAD-IN-4A-I** **RAD-OUT-4A-I**	**RAD-IN-8D** **RAD-OUT-8D-REL**	**RAD-IN+OUT-2D-1A-I**	**RAD-IN-2D-CNT** **RAD-OUT-2D-CNT**
Description	**Bidirectional wireless system,** with Trusted Wireless, can be extended with IO extension modules	**Analog module,** for four inputs or four outputs	**Digital module,** for eight inputs or eight outputs	**Analog/digital module,** for two digital I/Os and one analog I/O	**Digital module,** for two counter/frequency inputs or two counter/frequency outputs
Page	639	640	640	641	641

Wireless IO (2400 MHz) / WirelessHART

	RAD Line IO unidirectional				
Type	**RAD-ISM-2400-SET-UD-ANT**	**RAD-ISM-2400-...-UD...**	**RAD-ISM-2400-SET-UD-RPS...EX**	**RAD-WHG/WLAN-XD**	**RAD-WHA-1/2NPT**
Description	**Unidirectional wireless system,** with Trusted Wireless, transmitter and receiver in IP20 housing	**Unidirectional wireless system,** with Trusted Wireless, transmitter and receiver in either IP20 or IP65 housing	**Unidirectional wireless system,** with Trusted Wireless, for Ex Zone 1	**WirelessHART gateway**	**WirelessHART adapter**
Page	642	643	644	656	657

Wireless Serial (2400 MHz/GPRS/GSM)

	RAD Line Serial IO		RAD Line Serial	PSI-WL-...Bluetooth	PSI Modem Line
Type	**RAD-ISM-2400-DATA-BD-BUS**	**RAD-ISM-TW-PB-GATEWAY**	**RAD-ISM-2400-DATA-BD**	**PSI-WL-...**	**PSM-Modem...**
Description	**Wireless transceiver,** with Trusted Wireless, for serial interfaces (V.24 (RS-232), RS-422/RS-485), can be extended with IO extension modules	**PROFIBUS interface implementor,** for RAD-ISM-2400-DATA-BD-BUS wireless transceiver	**Wireless transceiver,** with Trusted Wireless, for serial interfaces (V.24 (RS-232), RS-422/RS-485)	**Bluetooth converters,** for converting from RS-232 (V.24), RS-422 or RS-485 2-wire to Bluetooth wireless transmission, e.g., Modbus, PROFIBUS	**Industrial GPRS/GSM modems,** for all GMS networks (850/900/1800/1900), switching inputs and outputs, password protection
Page	646	647	648	658	660

Wireless accessories (2400 MHz)

	Omnidirectional antennas	Panel antennas	Adapters/splitters	Adapter/extension cables	Autonomous power supply
Type	**RAD-ISM-2400-ANT...**	**RAD-ISM-2400-ANT...**	**RAD-ADP..., CN-LAMBDA..., RAD-ISM-2400_SPL...**	**RAD-PIG...** **RAD-CAB...**	**RAD-SOL-SET...**
Description	**Omnidirectional antennas,** for the 2.4 GHz industrial, scientific, and medical band	**Panel antennas,** for the 2.4 GHz industrial, scientific, and medical band	**Adapters/splitters,** for the 2.4 GHz industrial, scientific, and medical band	**Adapter/extension cables,** for the 2.4 GHz industrial, scientific, and medical band	**Solar systems,** for an autonomous power supply
Page	650	651	652	653	654

Wireless IO (900 MHz)

RAD Line IO bidirectional	RAD Line IO extension modules			
RAD-ISM-900-...-BD...	**RAD-IN-4A-I** **RAD-OUT-4A-I**	**RAD-IN-8D** **RAD-OUT-8D-REL**	**RAD-IN+OUT-2D-1A-I**	**RAD-IN-2D-CNT** **RAD-OUT-2D-CNT**
Bidirectional wireless system, with Trusted Wireless, can be extended with IO extension modules	**Analog module,** for four inputs or four outputs	**Digital module,** for eight inputs or eight outputs	**Analog/digital module,** for two digital I/Os and one analog I/O	**Digital module,** for two counter/frequency inputs or two counter/frequency outputs
665	666	666	666	666

Wireless IO (900 MHz)

RAD Line IO unidirectional			RAD Line IO XD	
RAD-ISM-900-SET-UD-ANT	**RAD-ISM-900-SET-...UD**		**RAD-ISM-900-XD-BUS**	
Unidirectional wireless system, with Trusted Wireless, transmitter and receiver in IP20 housing	**Unidirectional wireless system,** with Trusted Wireless, transmitter (IP65) and receiver (IP20)		**XD wireless system,** with Trusted Wireless, can be extended with IO extension modules	
668	669		670	

Wireless Serial (900 MHz) / Wireless Ethernet (900 MHz/2400 MHz)

RAD Line Serial IO	RAD Line Serial		RAD Line Ethernet	
RAD-ISM-900-DATA-BD-BUS	**RAD-ISM-900-DATA-BD**	**RAD-ISM-900-RS232-BD**	**RAD-ISM-900-EN-BD(-BUS)**	**RAD-80211-XD-HP(-BUS)**
Wireless transceiver, with Trusted Wireless for serial interfaces (V.24 (RS-232), RS-422/RS-485), can be extended with IO extension modules	**Wireless transceiver,** with Trusted Wireless, for serial interfaces (V.24 (RS-232), RS-422/RS-485)	**Wireless transceiver,** with Trusted Wireless, for serial interfaces (V.24 (RS-232))	**Wireless transceiver,** with Trusted Wireless, for Ethernet (900 MHz), can be extended with IO extension modules	**Wireless transceiver,** with WLAN 802.11b/g, for Ethernet (2400 MHz), can be extended with IO extension modules
671	672	673	674	675

Wireless accessories (900 MHz)

Omnidirectional antennas	Panel antennas	Adapters/splitters	Adapter/extension cables	Autonomous power supply
RAD-ISM-900-ANT...	**RAD-ISM-900-ANT...**	**CN-UB...,** **RAD-ISM-900-ANT-4**	**RAD-CON...** **RAD-CAB...**	**RAD-SOL-SET...**
Omnidirectional antennas, for the 900 MHz industrial, scientific, and medical band	**Panel antennas,** for the 900 MHz industrial, scientific, and medical band	**Adapters/splitters,** for the 900 MHz industrial, scientific, and medical band	**Adapter/extension cables,** for the 900 MHz industrial, scientific, and medical band	**Solar systems,** for an autonomous power supply
676	677	678	679	680

Country-specific registrations

The 2400 MHz wireless systems with Trusted Wireless are currently approved in the following countries:

Belgium | Bulgaria [1] | Denmark | Germany

Estonia | Finland | France | Greece | Great Britain | Ireland

Iceland | Israel | Italy | Latvia | Lithuania | Luxembourg

Malta | The Netherlands | Norway | Austria | Poland | Portugal

Romania [1] | Sweden | Switzerland | Slovakia | Slovenia | Spain

Czech Republic | Turkey [1] | Hungary | Cyprus | Peru [1]

China [1] | India [1] | Singapore | Egypt | South Africa [1]

[1] The registration is limited to individual systems.
(The current system registrations as well as additional country registrations can be found at www.phoenixcontact.com or are available upon request.)

RAD Line IO - Bidirectional wireless system

The bidirectional wireless system allows you to transmit up to 33 analog signals (4 ... 20 mA) or 66 digital signals (5 ... 30 V AC/DC) wirelessly in both directions.

- License-free 2.4 GHz ISM bandwidth
- Trusted Wireless technology with frequency hopping method
- Up to eight I/O extension modules can be connected via bus foot
- No parameterization or programming required

Applications

- Point-to-point connection
- Repeater
- Point-to-multipoint (unidirectional)
- Can be used in Ex Zone 2

Diagnostics

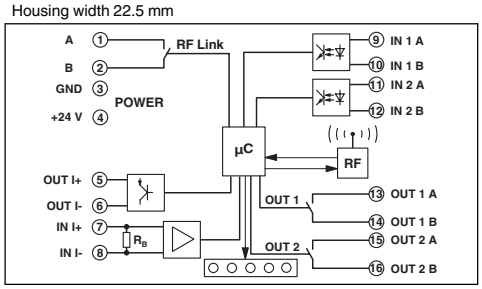
- RF link LED for indicating wireless connection status
- RF link relay (floating relay contact)
- RSSI test socket

Notes:

In order to use a point-to-multipoint system, please order special hopkeys for the master (PMM) and slaves (PMS). Further information can be found in the data sheet or at www.phoenixcontact.com.

Set comprising 2 transceivers (transmitter and receiver) and two antennas with connecting cables

Ex: Ex
Housing width 22.5 mm



Technical data

Wireless path		
Direction		Bidirectional
Frequency range		2.4032 GHz ... 2.4799 GHz
Transmission power		10 mW
Analog input		
Number of inputs		1
Signal range		4 mA ... 20 mA
Input resistance		< 170 Ω
Digital input		
Number of inputs		2
Signal range		5 V AC/DC ... 30 V AC/DC
Switching level	1 signal ("H")	Min. 5 V DC
	0 signal ("L")	Max. 1.5 V DC
Analog output		
Number of outputs		1
Signal range		4 mA ... 20 mA
Load R_B		700 Ω (at U_B = 24 V, R_B = [U_B-10 V] / 20 mA)
Digital output		
Contact type		3 floating N/O contacts
Switching voltage		30 V DC / 30 V AC
Switching current		0.5 A
General data		
Supply voltage		12 V DC ... 30 V DC
Current consumption	typ. / max.	75 mA / 150 mA
Degree of protection		IP20
Ambient temperature range		-20°C ... 65°C
Housing material		Polyamide PA non-reinforced
Dimensions W / H / D		22.5 / 99 / 114.5 mm
Screw connection solid / stranded / AWG		0.2 ... 4 mm² / 0.2 ... 2.5 mm² / 24 - 14
Conformance/approvals		
Conformance		CE-compliant (R&TTE Directive 1999/5/EC)
ATEX		Ex II 3 G EEx nL IIC
IECEx		Ex nL IIC T4

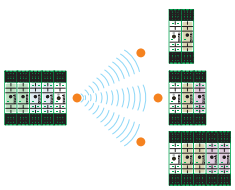
Ordering data

Description	Type	Order No.	Pcs. / Pkt.
Wireless set (2 transceivers, 2 antennas)	**RAD-ISM-2400-SET-BD-BUS-ANT**	**2867733**	1
Repeater set (3 transceivers)	**RAD-ISM-2400-REP-SET-BD-BUS**	**2885650**	1
Transceiver (individual)	**RAD-ISM-2400-BD-BUS**	**2867746**	1
Hopkey	**RAD-ISM-2400-HOP-EU-10**	**2867898**	1

Repeater (bidirectional)

Point-to-point (bidirectional)

Point-to-multipoint (unidirectional)



Extension modules

Extension modules for bidirectional wireless systems

- RAD-ISM-2400-SET-BD-BUS-ANT
- RAD-ISM-2400-REP-SET-BD-BUS
- RAD-ISM-2400-DATA-BD-BUS

Versions

- 4 ... 20 mA analog module; four I/Os
- 5 ... 30 V AC/DC digital module; eight I/Os
- Analog/digital module for two digital I/Os and one analog I/O
- Counter pulse/frequency measured value block for two I/Os

D W H

Ex n

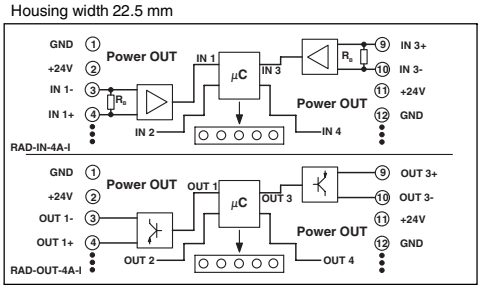
Analog components for 4 inputs or 4 outputs

D W H

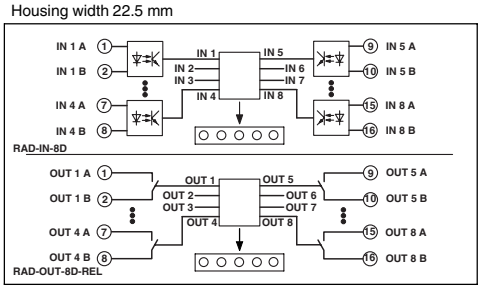
Ex n

Digital components for 8 inputs or 8 outputs

Ex: Housing width 22.5 mm



Ex: Housing width 22.5 mm



		Technical data		Technical data	
Analog input		RAD-IN-4A-I	RAD-OUT-4A-I	RAD-IN-8D	RAD-OUT-8D-REL
Number of inputs		4	-	-	-
Signal range		4 mA ... 20 mA	-	-	-
Input resistance		< 170 Ω	-	-	-
Digital input					
Number of inputs		-	-	8	-
Signal range		-	-	5 V AC/DC ... 30 V AC/DC	-
Switching level	1 signal ("H")	-	-	Min. 5 V DC	-
	0 signal ("L")	-	-	Max. 1.5 V DC	-
Input frequency		-	-	-	-
Pulse length		-	-	-	-
Analog output					
Number of outputs		-	4	-	-
Signal range		-	4 mA ... 20 mA	-	-
Load R_B		-	700 Ω (at U_B = 24 V, R_B = [U_B-10 V] / 20 mA)	-	-
Digital output					
Contact type		-	-	-	Relay output
Switching voltage		-	-	-	30 V AC/DC (EC declaration of conformity) 30 V DC (with UL approval) 250 V AC (with UL approval)
Switching current		-	-	-	0.5 A (EC declaration of conformity) 2 A (with UL approval)
Clock frequency		-	-	-	-
Frequency output		-	-	-	-
General data					
Supply voltage		9 V DC ... 30 V DC (via bus foot)	9 V DC ... 30 V DC (via bus foot)	9 V DC ... 30 V DC (via bus foot)	9 V DC ... 30 V DC (via bus foot)
Current consumption	typ. / max.	100 mA / 130 mA	100 mA / 130 mA	25 mA / 30 mA	100 mA / 160 mA
Degree of protection		IP20	IP20	IP20	IP20
Ambient temperature range		-20°C ... 65°C	-20°C ... 65°C	-20°C ... 65°C	-20°C ... 65°C
Housing material		Polyamide PA non-reinforced	Polyamide PA non-reinforced	Polyamide PA non-reinforced	Polyamide PA non-reinforced
Dimensions W / H / D		22.5 / 99 / 114.5 mm	22.5 / 99 / 114.5 mm	22.5 / 99 / 114.5 mm	22.5 / 99 / 114.5 mm
Conformance/approvals					
Conformance		CE-compliant		CE-compliant	
ATEX		Ex II 3 G EEx nL IIC		Ex II 3 G EEx nL IIC	
IECEx		Ex nL IIC		Ex nL IIC	
UL, USA/Canada		Class I, Div. 2, Groups A, B, C, D		Class I, Div. 2, Groups A, B, C, D	

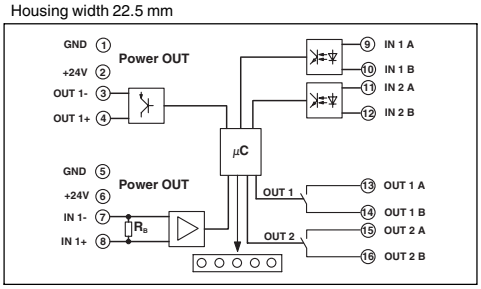
		Ordering data			Ordering data		
Description		Type	Order No.	Pcs. / Pkt.	Type	Order No.	Pcs. / Pkt.
Extension module	Analog IN	**RAD-IN-4A-I**	**2867115**	1			
Extension module	Analog OUT	**RAD-OUT-4A-I**	**2867128**	1			
Extension module	Digital IN				**RAD-IN-8D**	**2867144**	1
Extension module	Digital OUT				**RAD-OUT-8D-REL**	**2867157**	1
Extension module	Mixed I/O						

D W H

Ex n

Analog/digital module
for 2 digital I/Os and 1 analog I/O

Ex: Housing width 22.5 mm



Technical data	
1	
4 mA ... 20 mA	
< 170 Ω	
2	
5 V AC/DC ... 30 V AC/DC	
Min. 5 V DC	
Max. 1.5 V DC	
-	
-	
1	
4 mA ... 20 mA	
700 Ω (at U_B = 24 V, R_B = [U_B-10 V] / 20 mA)	
Relay output	
30 V AC/DC (EC declaration of conformity)	
30 V DC (with UL approval)	
250 V AC (with UL approval)	
0.5 A (EC declaration of conformity)	
2 A (with UL approval)	
-	
-	
9 V DC ... 30 V DC (via bus foot)	
70 mA / 110 mA	
IP20	
-20°C ... 65°C	
Polyamide PA non-reinforced	
22.5 / 99 / 114.5 mm	
CE-compliant	
II 3 G EEx nL IIC	
Ex nL IIC T5	
Class I, Div. 2, Groups A, B, C, D	

Ordering data

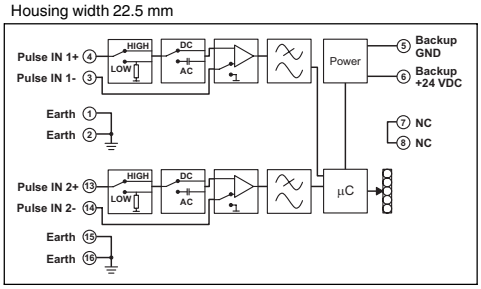
Type	Order No.	Pcs. / Pkt.
RAD-IN+OUT-2D-1A-I	**2867322**	1

D W H

Ex n

Digital module
for two counter/frequency inputs

Ex: Housing width 22.5 mm



Technical data	
-	
-	
-	
2	
0.1 V AC/DC ... 30 V AC/DC	
(Common mode 3.6 V DC) / (Differential mode 100 mV_{PP})	
-	
(0.1 Hz ... 10 kHz (50% duty cycle))	
(High time 50 µs)	
-	
-	
-	
-	
-	
Relay output	
30 V AC/DC (EC declaration of conformity)	
30 V DC (with UL approval)	
250 V AC (with UL approval)	
-	
-	
9 V DC ... 30 V DC (via bus foot)	
35 mA / 45 mA	
IP20	
-20°C ... 65°C	
Polyamide PA non-reinforced	
22.5 / 99 / 114.5 mm	
CE-compliant	
II 3 G EEx nL IIC	
-	
Class I, Div. 2, Groups A, B, C, D	

Ordering data

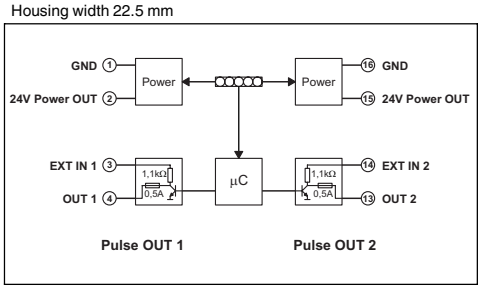
Type	Order No.	Pcs. / Pkt.
RAD-IN-2D-CNT	**2885223**	1

D W H

Ex n

Digital module
for two counter/frequency outputs

Ex: Housing width 22.5 mm



Technical data	
-	
-	
-	
-	
-	
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-	
-	
-	
-	
-	
-	
Transistor output, passive	
-	
Approx. 27 mA (terminal 3/14)	
Approx. 25 mA (terminal 4/13)	
(High speed 10 kHz with 50% duty cycle)	
(Low speed 10 Hz with 50% duty cycle)	
(0.1 Hz ... 10 kHz (50% duty cycle))	
9 V DC ... 30 V DC (via bus foot)	
90 mA / 115 mA	
IP20	
-20°C ... 65°C	
Polyamide PA non-reinforced	
22.5 / 99 / 114.5 mm	
CE-compliant	
II 3 G EEx nL IIC	
-	
Class I, Div. 2, Groups A, B, C, D	

Ordering data

Type	Order No.	Pcs. / Pkt.
RAD-OUT-2D-CNT	**2885236**	1

RAD-Line IO - Unidirectional wireless system

- License-free 2.4 GHz ISM bandwidth
- Trusted Wireless technology with frequency hopping method
- Transmits two digital signals (5 ... 30 V AC/DC) and one analog signal (4 ... 20 mA)
- No parameterization or programming required

The following versions are available:

RAD-ISM-2400-SET-UD-ANT
- Transmitter and receiver in IP20 housing
- 12 ... 30 V DC supply voltage

Applications
- Point-to-point connection
- Point-to-multipoint
- Can be used in Ex Zone 2

RAD-ISM-2400-PIPE...
- Devices in IP65 outdoor housing
- 12 ... 30 V DC or 85 ... 250 V AC supply voltage
- Can be supplied via solar system
- M12 connector for connecting power supply, sensors or actuators

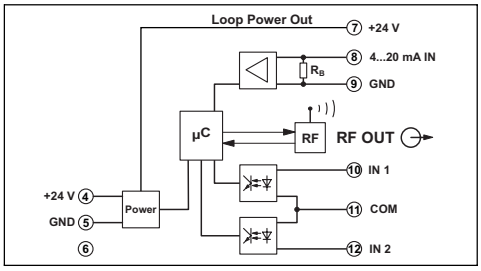
Diagnostics
- RF link LED for indicating wireless connection status
- RF link relay (floating relay contact)
- RSSI test socket

Notes:

You can use the RAD-PIG-EF142-PIPE adapter cable (Order No. 2885922) to connect antennas from the extensive range of RAD-Line accessories.

Set comprising transmitter, receiver, and two antennas with connecting cables

Ex:



Technical data

Wireless path			
Direction		Unidirectional	
Frequency range		2.4032 GHz ... 2.4799 GHz	
Transmission power		10 mW	
Number of channels		9 x 63	
Analog input			
Number of inputs/signal range		1 x 4 mA ... 20 mA	
Input resistance		< 170 Ω	
Digital input			
Number of inputs/signal range		2 x 5 V AC/DC ... 30 V AC/DC	
Switching level	1 signal ("H")	Min. 5 V DC	
	0 signal ("L")	Max. 1.5 V DC	
Analog output			
Number of outputs/signal range		1 x 4 mA ... 20 mA	
Load R_B		700 Ω (at U_B = 24 V, R_B = [U_B-10 V] / 20 mA)	
Digital output		3 floating PDT contacts	
Switching voltage		30 V DC / 30 V AC	
Switching current		0.5 A	
General data		Transmitter (TX)	Receiver (RX)
Supply voltage		12 V DC ... 30 V DC	12 V DC ... 30 V DC
Current consumption	typ. / max.	35 mA / 45 mA	54 mA / 120 mA
Degree of protection		IP20	IP20
Ambient temperature range		-20°C ... 65°C	-20°C ... 65°C
Housing material		Polyamide PA non-reinforced	Polyamide PA non-reinforced
Dimensions W / H / D		17.5 / 99 / 114.5 mm	17.5 / 99 / 114.5 mm
Conformance/approvals			
Conformance		CE-compliant (R&TTE Directive 1999/5/EC)	
ATEX		Ex II 3 G EEx nL IIC	
IECEx		Ex nL IIC T4	

Ordering data

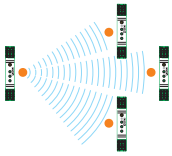
Description	Type	Order No.	Pcs. / Pkt.
Wireless set (transmitter, receiver, including antennas)	**RAD-ISM-2400-SET-UD-ANT**	**2867283**	1
Transmitter (individual)	**RAD-ISM-2400-TX**	**2867319**	1
Receiver (individual)	**RAD-ISM-2400-RX**	**2867306**	1

Order key RAD-ISM-2400-PIPE-TX-ME-RX-UD
(Configuration entered as example)

Order No.	Supply Transmitter (TX)	Transmission mode (Three times can be programmed)
2885854 /	TXLV	HET
	TXHV ≙ 85...250 V AC TXLV ≙ 12 ... 30 V DC	HCT ≙ Continuous transmission HET ≙ Transmitting at an event H005 ≙ 1 transmitting cycle every 5 min. H060 ≙ 1 transmitting cycle every 60 min. H120 ≙ 1 transmitting cycle every 120 min.

Point-to-point

Point-to-multipoint

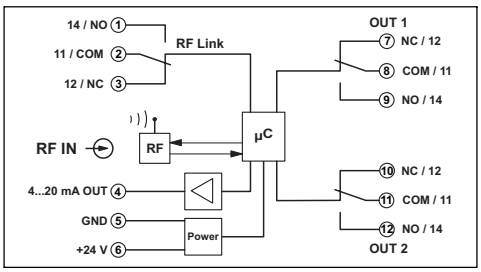


Set comprising transmitter (IP65) and receiver (IP20) including antennas

Set comprising transmitter (IP65) and receiver (IP65) including antennas

Set comprising transmitter (IP20) and receiver (IP65) including antennas

Ex:



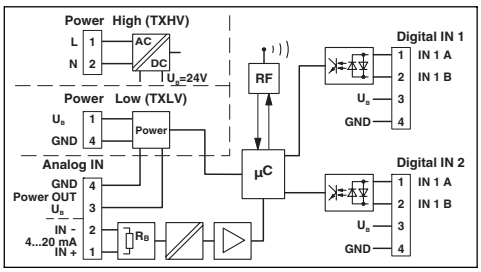
Technical data

Unidirectional	
2.4032 GHz ... 2.4799 GHz	
10 mW	
9 x 63	
1 x 4 mA ... 20 mA	
< 170 Ω	
2 x 5 V AC/DC ... 30 V AC/DC	
Min. 5 V DC	
Max. 1.5 V DC	
1 x 4 mA ... 20 mA	
700 Ω (at U_B = 24 V, R_B = [U_B-10 V] / 20 mA)	
3 floating PDT contacts	
30 V AC/DC	
0.5 A	
Transmitter (TX)	Receiver (RX)
See order key	12 V DC ... 30 V DC
50 mA / 65 mA (at 24 V DC)	54 mA / 120 mA
IP65	IP20
-20°C ... 65°C	-20°C ... 65°C
Aluminum/PBT	Polyamide PA non-reinforced
92 / 98 / 340 mm	17.5 / 114.5 / 99 mm
CE-compliant (R&TTE Directive 1999/5/EC)	
Ex II 3 G Ex nL IIC T4	
Ex nL IIC T4	

Ordering data

Type	Order No.	Pcs. / Pkt.
RAD-ISM-2400-PIPE-TX-ME-RX-UD	**2885854**	1
RAD-ISM-2400-PIPE-TX	**2885647**	1
RAD-ISM-2400-PIPE-TX-HV	**2885333**	1
RAD-ISM-2400-RX	**2867306**	1

Ex:



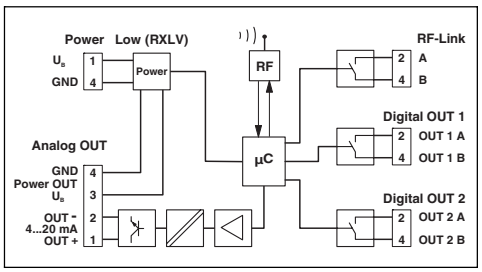
Technical data

Unidirectional	
2.4032 GHz ... 2.4799 GHz	
10 mW	
9 x 63	
1 x 4 mA ... 20 mA	
< 170 Ω	
2 x 5 V AC/DC ... 30 V AC/DC	
Min. 5 V DC	
Max. 1.5 V DC	
1 x 4 mA ... 20 mA	
700 Ω (at U_B = 24 V, R_B = [U_B-10 V] / 20 mA)	
3 floating PDT contacts	
250 V AC/DC	
0.5 A	
Transmitter (TX)	Receiver (RX)
See order key	See order key
50 mA / 65 mA (at 24 V DC)	115 mA / 145 mA (at 24 V DC)
IP65	IP65
-20°C ... 65°C	-20°C ... 65°C
Aluminum/PBT	Aluminum/PBT
92 / 98 / 340 mm	92 / 98 / 340 mm
CE-compliant (R&TTE Directive 1999/5/EC)	
Ex II 3 G Ex nL IIC T4	
Ex nL IIC T4	

Ordering data

Type	Order No.	Pcs. / Pkt.
RAD-ISM-2400-PIPE-SET-UD-ANT	**2885935**	1
RAD-ISM-2400-PIPE-TX	**2885647**	1
RAD-ISM-2400-PIPE-TX-HV	**2885333**	1
RAD-ISM-2400-PIPE-RX	**2885689**	1
RAD-ISM-2400-PIPE-RX-HV	**2885320**	1

Ex:



Technical data

Unidirectional	
2.4032 GHz ... 2.4799 GHz	
10 mW	
9 x 63	
1 x 4 mA ... 20 mA	
< 170 Ω	
2 x 5 V AC/DC ... 30 V AC/DC	
Min. 5 V DC	
Max. 1.5 V DC	
1 x 4 mA ... 20 mA	
700 Ω (at U_B = 24 V, R_B = [U_B-10 V] / 20 mA)	
3 floating PDT contacts	
250 V AC/DC	
0.5 A	
Transmitter (TX)	Receiver (RX)
12 V DC ... 30 V DC	See order key
35 mA / 45 mA	115 mA / 145 mA (at 24 V DC)
IP20	IP65
-20°C ... 65°C	-20°C ... 65°C
Polyamide PA non-reinforced	Aluminum/PBT
17.5 / 99 / 11.5 mm	92 / 98 / 340 mm
CE-compliant (R&TTE Directive 1999/5/EC)	
Ex II 3 G Ex nL IIC T4	
Ex nL IIC T4	

Ordering data

Type	Order No.	Pcs. / Pkt.
RAD-ISM-2400-ME-TX-PIPE-RX-UD	**2885896**	1
RAD-ISM-2400-TX	**2867319**	1
RAD-ISM-2400-PIPE-RX	**2885689**	1
RAD-ISM-2400-PIPE-RX-HV	**2885320**	1

Order key RAD-ISM-2400-PIPE-SET-UD-ANT
(Configuration entered as example)

Order No.	Supply Transmitter (TX)	Transmission mode (Three times can be programmed)	Supply Receiver (RX)
2885935	**TXLV**	**HET**	**RXHV**
	TXHV ≙85...250 V AC TXLV ≙12 ... 30 V DC	HCT ≙Continuous transmission HET ≙Transmitting at an event H005 ≙1 transmitting cycle every 5 min. H060 ≙1 transmitting cycle every 60 min. H120 ≙1 transmitting cycle every 120 min.	RXHV ≙85...250 V AC RXLV ≙12 ... 30 V DC

Order key RAD-ISM-2400-ME-TX-PIPE-RX-UD
(Configuration entered as example)

Order No.	Supply Receiver (RX)
2885896	**RXHV**
	RXHV ≙85...250 V AC RXLV ≙12 ... 30 V DC

RAD-Line IO - Unidirectional wireless system for Ex Zone 1

The unidirectional wireless system for Ex Zone 1 can be used to receive signals from Ex zones 0, 1, and 2, and to transmit them to the receiver in the safe area or Ex Zone 2.

- Trusted Wireless technology with frequency hopping method
- No parameterization or programming required

The following versions are available:

RAD-ISM-2400-SET-UD-RPS-NAM-EX

- Transmits two digital signals (5 ... 30 V AC/DC) and one analog signal (4 ... 20 mA)
- With NAMUR isolation amplifier for operating proximity sensors and switches in the Ex area

RAD-ISM-2400-SET-UD-RPS-EX

- Transmits an analog signal (4 ... 20 mA)

Applications

- Point-to-point connection
- Point-to-multipoint
- Installation of transmitter in Ex Zone 1

Diagnostics

- RF link LED for indicating wireless connection status
- RF link relay (floating relay contact)
- RSSI test socket

Notes:

Further information about the wireless set as well as the repeater power supplies and the NAMUR isolation amplifiers can be found in the relevant data sheet at www.phoenixcontact.com.

Set comprising a UD transmitter in Ex housing (IP66) and receiver (IP20), without antennas

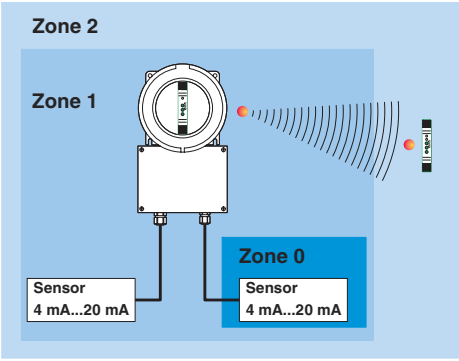
Ex:

Technical data

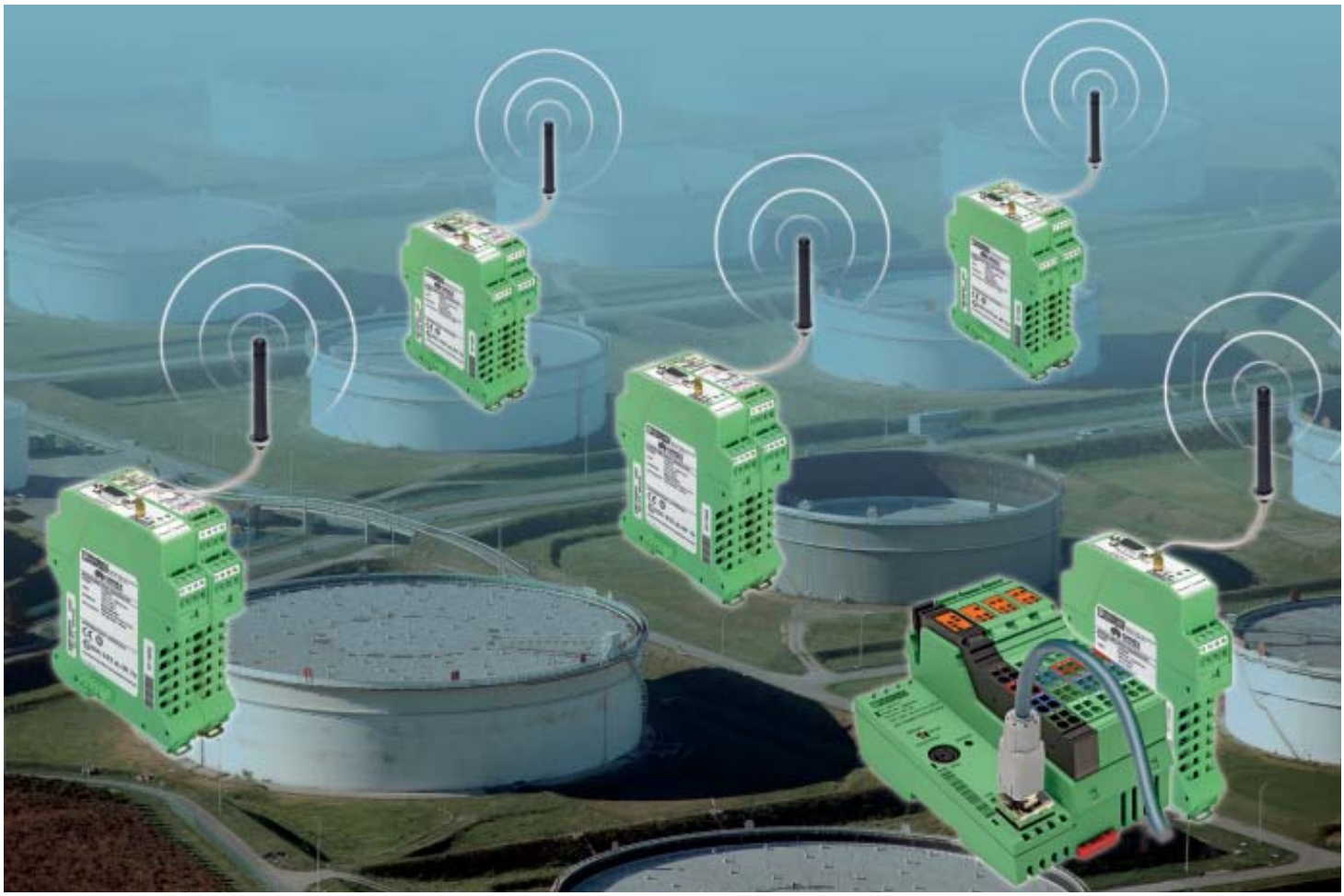
Wireless path		
Direction	Unidirectional	
Frequency range	2.4032 GHz ... 2.4799 GHz	
Transmission power	10 mW	
Number of channels	9 x 63	
Analog input		
Available input sources	2-wire measuring transducers, 4...20 mA Active, fed from the field side, 0/4...20 mA signals	
Number of inputs/signal range	1 x 4 mA ... 20 mA	
Digital input		
Available input sources	NAMUR proximity sensors (EN 60947-5-6) Switch contacts with open circuit Switch contacts with resistance circuit	
Analog output		
Number of outputs/signal range	1 x 4 mA ... 20 mA	
Load R_B	700 Ω (at U_B = 24 V, R_B = [U_B-10 V] / 20 mA)	
Digital output	3 floating PDT contacts	
Switching voltage	30 V AC/DC	
Switching current	0.5 A	
General data	Transmitter (TX)	Receiver (RX)
Supply voltage	100 V AC ... 240 V AC	12 V DC ... 30 V DC
Degree of protection	IP66	IP20
Ambient temperature range	-20°C ... 50°C	-20°C ... 65°C
Housing material	Aluminum	Polyamide PA non-reinforced
Dimensions W / H / D	236.5 / 172 / 371.5 mm	17.5 / 114.5 / 99 mm
Conformance/approvals		
Conformance	CE-compliant (R&TTE Directive 1999/5/EC)	
ATEX	II 2 (1) G Ex de ib [ia] IIC T4	

Ordering data

Description	Type	Order No.	Pcs. / Pkt.
Wireless set (UD transmitter with an intrinsically safe repeater power supply, intrinsically safe NAMUR isolation amplifier and power supply unit in Ex housing, UD receiver, without antennas)	**RAD-ISM-2400-SET-UD-RPS-NAM-EX**	**2917272**	1
Wireless set (UD transmitter with an intrinsically safe repeater power supply and power supply unit in Ex housing, UD receiver, without antennas)	**RAD-ISM-2400-SET-UD-RPS-EX**	**2917081**	1



RAD-Line Serial IO / RAD-Line Serial



Self-organized network

High system availability is of great importance in industrial environments - from simple point-to-point transmission to high-performance meshed networks.

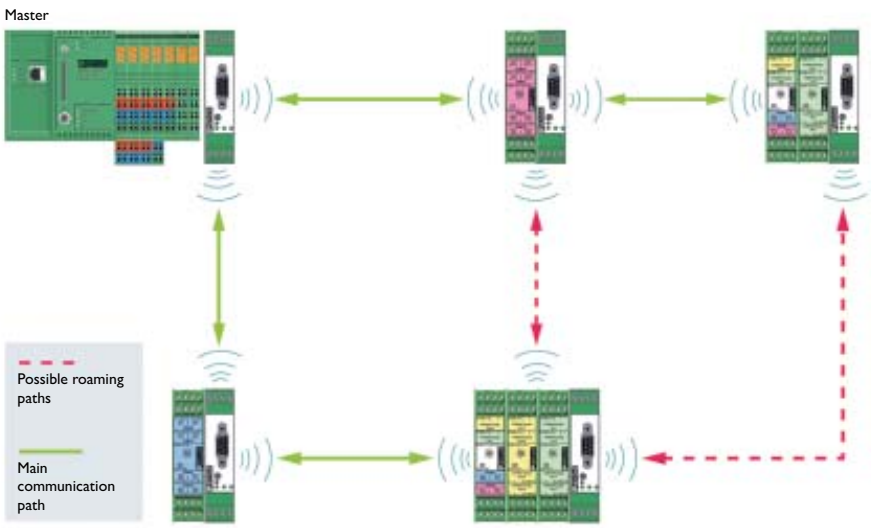
Slaves are connected either directly or via repeater slave intermediate stations. Up to 254 repeater slaves can be switched one after the other here in order to extend the wireless path or to integrate several (repeater) slaves.

Serial peripheral devices or IO extension modules can also be connected to the repeater slave intermediate stations.

In the event of a connection failure within the network, data communication can be continued by diverting the data via other network nodes (roaming).

The RAD-Line Serial modules convince with the following properties:

– Wide ranges from a few hundred meters to several kilometers
– Rugged and reliable communication in an industrial environment
– Complex network structures with up to 254 devices
– Easy remote diagnostics of the system
– A software tool is used to determine whether the module is used as a master, a slave or a repeater intermediate station
– Roaming function



RAD-Line Serial IO - Bidirectional wireless system

The **RAD-ISM-2400-DATA-BD-BUS** bidirectional data transmission system allows wireless connection of several distributed controllers and the reception and output of I/O signals from the field to a central location (controller).

- License-free 2.4 GHz ISM bandwidth
- Trusted Wireless technology with frequency hopping method
- Transmission power of up to 100 mW (adjustable)
- Can be configured as a MODBUS slave
- Up to eight I/O extension modules can be connected via bus foot
- Mesh network with up to 254 repeaters/slaves
- Configuration via RAD-Link software

Serial interfaces

- V.24 (RS-232)/RS-422 or RS-485

Applications

- Point-to-point connection
- Point-to-multipoint
- Multipoint-to-point

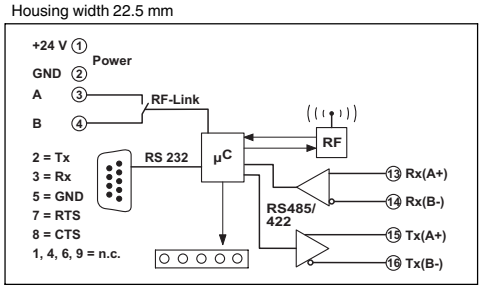
Diagnostics

- RF link LED for indicating wireless connection status
- RF link relay (floating relay contact)
- RSSI test socket
- RAD-Link diagnostics software

Notes:
You can download the basic software for configuration and diagnostics free of charge from the download area at www.phoenixcontact.com. A software license is required for diagnostics on more than two network devices.
More information about the configuration software is provided on page 649
The RS-485/RS-422 interface shield connection is established through the grounded DIN rail. You can find shield terminal blocks in the Phoenix Contact CLIPLINE catalog.
You can find other wireless systems as well as comprehensive accessories (e.g., antennas, connecting cables) on the Internet at www.phoenixcontact.net/catalog.

Wireless transceiver for serial interfaces (V.24 (RS-232), RS-422/RS-485), can be extended with IO extension modules

Ex: Ⓔx
Housing width 22.5 mm

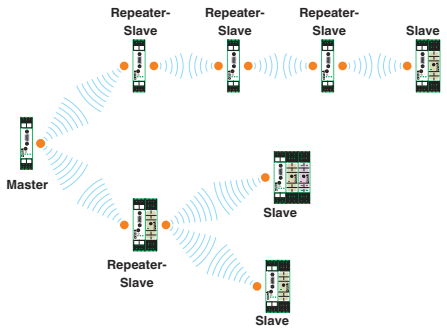


Technical data

Wireless path		
Direction	Bidirectional	
Frequency range	2.4032 GHz ... 2.4799 GHz	
Transmission power	100 mW (adjustable)	
Number of channels	3 x 27	
Serial port	V.24 (RS-232)	RS-485/RS-422
Connection method	9-pole D-SUB (female connector)	COMBICON plug-in screw terminal block
Serial transmission speed	300 ... 57,6 kbps	300 ... 57,6 kbps
Data format/encoding	Asynchronous	
Data flow control/protocols	RTS/CTS	
Size of packet	32 / 98 / 240 bytes	
General data		
Supply voltage	12 V DC ... 30 V DC	
Current consumption typ. / max.	70 mA / 115 mA	
Degree of protection	IP20	
Ambient temperature range	-20°C ... 65°C	
Housing material	Polyamide PA non-reinforced	
Dimensions W / H / D	22.5 / 99 / 114.5 mm	
Screw connection solid / stranded / AWG	0.2 ... 4 mm² / 0.2 ... 2.5 mm² / 24 - 14	
Conformance/approvals		
Conformance	CE-compliant (R&TTE Directive 1999/5/EC)	
ATEX	Ⓔx II 3 G Ex nL IIC	
IECEx	Ex nL IIC T4	

Ordering data

Description	Type	Order No.	Pcs. / Pkt.
Wireless module with serial interface	**RAD-ISM-2400-DATA-BD-BUS**	**2867872**	1



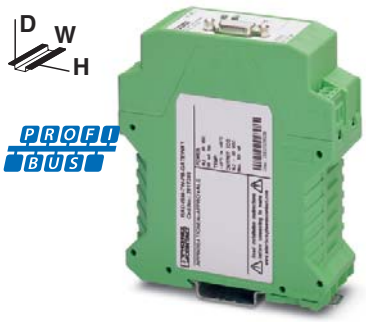
RAD-Line Serial IO - PROFIBUS gateway

The **RAD-ISM-TW-PB-GATEWAY** PROFIBUS gateway makes it possible to integrate I/O signals into PROFIBUS DP directly over a wireless network.

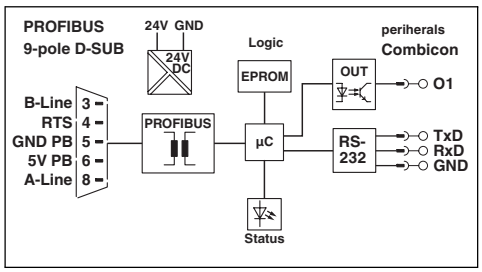
- Can only be used in conjunction with the RAD-ISM-2400-DATA-BD-BUS wireless module
- Cyclic data exchange of non-time-critical I/O signals
- Top PROFIBUS speed of up to 12 Mbps
- Connection of up to ten wireless stations
- GSD file with predefined software modules
- Straightforward diagnostics of the wireless network in PROFIBUS

Notes:

The GSD file (containing the communication characteristics of a PROFIBUS DP device) can be found in the download area at www.phoenixcontact.net/catalog.



PROFIBUS gateway



Technical data

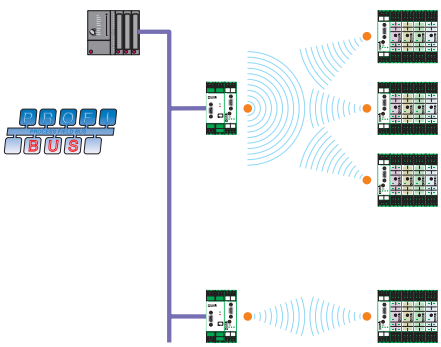
Input data		
Operating voltage U_B		24 V DC ±20%
Nominal input current at U_{IN}		Typ. 50 mA (plus load current of an output)
Input circuit		Polarity protection, surge protection
Digital outputs		
Maximum switching voltage		24 V DC ±20% (U_B - $U_{Resid.}$ of output)
Max. switching current		150 mA
Residual voltage		< 0.5 V DC (U_{Rest} at I_N)
Output protection		Polarity protection, surge protection
V.24 (RS-232) interface		
Data rate		57,6 kbps
Connection method		COMBICON
PROFIBUS interface		
Data rate		12 Mbps
Connection method		D-SUB-9
General data		
Test voltage data interface/power supply		500 V AC
Ambient temperature (operation)		-20°C ... 65°C
Nominal operating mode		100% operating factor
Standards / regulations		
Degree of protection		IP20
Mounting position / mounting		Any/can be aligned without spacing
Connection data solid / stranded / AWG		0.2 ... 2.5 mm² / 0.2 ... 2.5 mm² / 24 - 14
Dimensions	W / H / D	35 mm / 114.5 mm / 99 mm

Ordering data

Description	Type	Order No.	Pcs. / Pkt.
PROFIBUS gateway, for connecting a wireless network to PROFIBUS DP	**RAD-ISM-TW-PB-GATEWAY**	**2917366**	1

Accessories

Connecting cable	**RAD-ISM-TW-RS232**	**2917159**	1



RAD-Line Serial IO - Bidirectional wireless system

The **RAD-ISM-2400-DATA-BD** bidirectional data transmission system enables multiple distributed serial peripherals to be connected wirelessly to a central location (controller).

- License-free 2.4 GHz ISM bandwidth
- Trusted Wireless technology with frequency hopping method
- Transmission power of up to 100 mW (adjustable)
- Mesh network with up to 254 repeaters/slaves
- Transparent data transmission independent of a particular protocol
- Configuration via RAD-Link software

Serial interfaces

- V.24 (RS-232)/RS-422 or RS-485

Applications

- Point-to-point connection
- Point-to-multipoint
- Multipoint-to-point

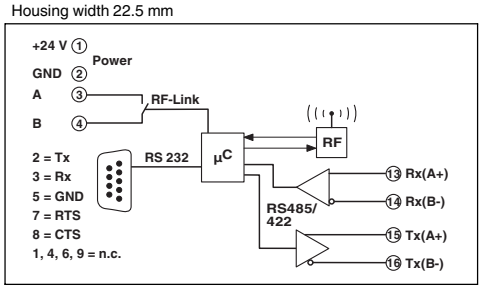
Diagnostics

- RF link LED for indicating wireless connection status
- RF link relay (floating relay contact)
- RSSI test socket
- RAD-Link diagnostics software

Notes:
You can download the basic software for configuration and diagnostics free of charge from the download area at www.phoenixcontact.com. A software license is required for diagnostics on more than two network devices.
More information about the configuration software is provided on page 649
The RS-485/RS-422 interface shield connection is established through the grounded DIN rail. You can find shield terminal blocks in the Phoenix Contact CLIPLINE catalog.
Accessories: For master and repeater stations, we recommend the RAD-ISM-2400-ANT-OMNI-6-0 omnidirectional antenna (Order No. 2885919).

Wireless transceiver for serial interfaces (V.24 (RS-232), RS-422/RS-485)

Housing width 22.5 mm

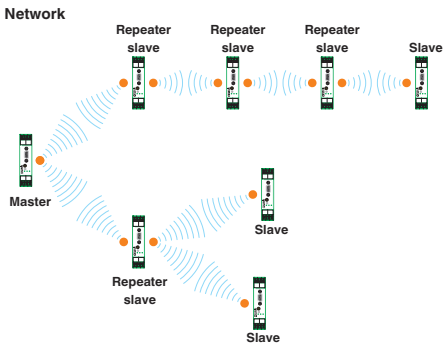


Technical data

Wireless path			
Direction		Bidirectional	
Frequency range		2.4015 GHz ... 2.4815 GHz	
Transmission power		100 mW (adjustable)	
Number of channels		3 x 27	
Serial port		V.24 (RS-232)	RS-485/RS-422
Connection method		9-pole D-SUB (female connector)	COMBICON plug-in screw terminal block
Serial transmission speed		300 bps ... 115,2 kbps	300 bps ... 115,2 kbps
Data format/encoding		Asynchronous	
Data flow control/protocols		RTS/CTS	
Size of packet		32 / 98 / 240 bytes	
General data			
Supply voltage		12 V DC ... 30 V DC	
Current consumption	typ. / max.	50 mA / 100 mA	
Degree of protection		IP20	
Ambient temperature range		-20°C ... 65°C	
Housing material		Polyamide PA non-reinforced	
Dimensions W / H / D		22.5 / 99 / 114.5 mm	
Screw connection solid / stranded / AWG		0.2 ... 4 mm² / 0.2 ... 2.5 mm² / 24 - 12	
Conformance/approvals			
Conformance		CE-compliant (R&TTE Directive 1999/5/EC)	
ATEX		Ex II 3 G Ex nL IIC	
IECEx		Ex nL IIC T4	

Ordering data

Description	Type	Order No.	Pcs. / Pkt.
Wireless module with serial interface	**RAD-ISM-2400-DATA-BD**	**2867869**	1



RAD-Line Serial - Configuration accessories

The **RAD-ISM-DATA-2400-CONFIG-KIT** configuration package comprises the basic equipment for starting up the RAD-ISM-2400-DATA-BD(-BUS) wireless transceiver.

Configuration software

- Configuration and diagnostics of the wireless network
- Straightforward startup thanks to self-explanatory startup wizard
- Configuration of up to 255 wireless devices (without license)
- Diagnostics for two wireless devices (without license)
- Diagnostics for more than two wireless devices with additional license

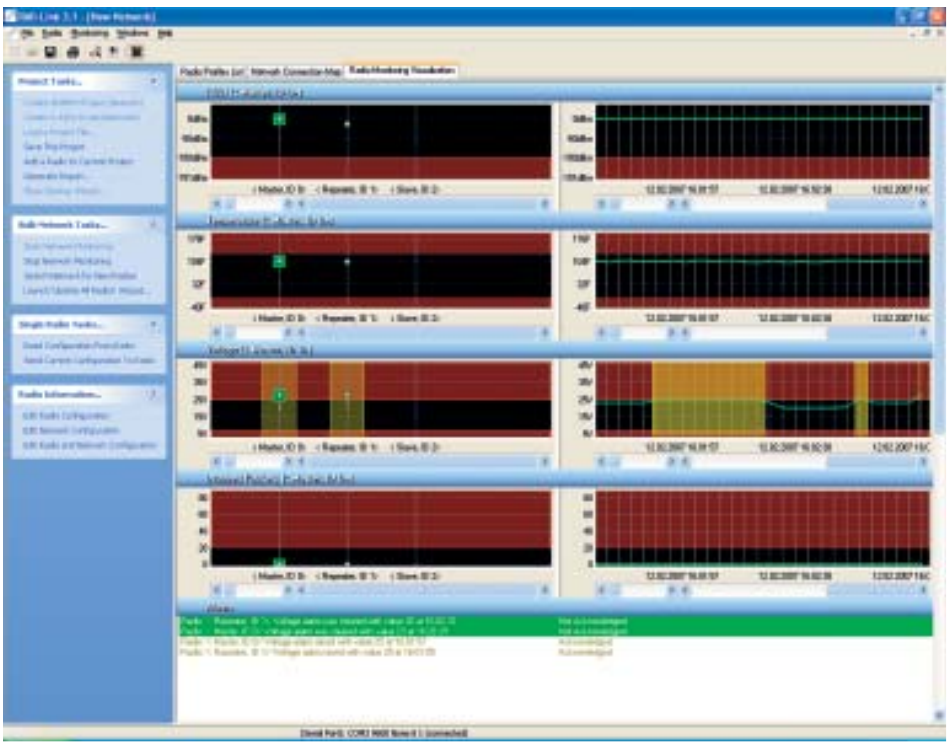
Notes:

You can download the basic software for configuration and diagnostics free of charge from the download area at www.phoenixcontact.com. A software license is required for diagnostics on more than two network devices.

The software runs under the following operating systems: Windows 98™, 2000™, and XP™.

Ordering data

Description	Type	Order No.	Pcs. / Pkt.
Configuration kit, comprising CD with RAD-Link configuration software RAD-link, Quick Start Guide, user manual, interface cable (D-SUB9/USB)	RAD-ISM-2400-DATA-CONFIG-KIT	2885838	1
V.24 (RS-232) cable, for connecting the wireless transceiver to a 9-pole device interface			
2 m long	CABLE-D 9SUB/B/S/200/KONFEK/S	2302010	1
50 cm long	CABLE-D 9SUB/B/S/ 50/KONFEK/S	2299987	1
Connecting cable, D-9-SUB to USB, with D-9-SUB to D-25-SUB adapter	CM-KBL-RS232/USB	2881078	1
License for activating additional diagnostic functions			
For up to 8 network devices	RAD-LINK-LIC- 8	2885964	1
For up to 15 network devices	RAD-LINK-LIC- 15	2885977	1
For up to 25 network devices	RAD-LINK-LIC- 25	2885980	1
For up to 100 network devices	RAD-LINK-LIC-100	2885993	1
For up to 255 network devices	RAD-LINK-LIC-255	2886002	1



Monitoring

RAD-Line accessories
Omnidirectional antennas

- For mobile or point-to-multipoint applications with a small range
- Version with higher impact strength that is not immediately recognizable as an antenna

2 dBi gain

3 dBi gain, higher impact strength

		Technical data	Technical data	
General data			RAD-...VAN-3-1-MCX	RAD-...VAN-3-0-SMA
Ambient temperature range		-20°C ... 65°C	-40°C ... 80°C	-40°C ... 80°C
Degree of protection		IP65	IP55	IP55
Impact strength		-	IK08	IK08
Gain		2 dBi	3 dBi	3 dBi
Impedance		50 Ω	50 Ω	50 Ω
Connection method		MCX (male) with cable (1.5 m)	MCX (male) with cable (1.5 m)	SMA (male) with cable (1.5 m)
Apex angle	Vertical / Horizontal	75° / 360°	85° / 360°	85° / 360°
Dimensions W / H		7.8 / 82.5 mm	86 / 43 mm	86 / 43 mm
Frequency range		2.4 GHz	2.4 GHz	2.4 GHz
Scope of supply		Incl. mounting material	-	-

Description	Ordering data: Type	Order No.	Pcs. / Pkt.	Ordering data: Type	Order No.	Pcs. / Pkt.
Omnidirectional antenna						
With connection MCX (male)	**RAD-ISM-2400-ANT-OMNI-2-1**	**2867461**	1	**RAD-ISM-2400-ANT-VAN- 3-1-MCX**	**2885702**	1
With SMA connection (male)				**RAD-ISM-2400-ANT-VAN- 3-0-SMA**	**2885867**	1
Mounting material				**RAD-ANT-VAN-MKT**	**2885870**	1

Omnidirectional antennas

- For mobile applications with a longer range

5 dBi gain, suitable for PIPE wireless module (IP65)

6 dBi gain

		Technical data	Technical data
General data			
Ambient temperature range		-20°C ... 65°C	-40°C ... 75°C
Degree of protection		IP55	IP55
Gain		5 dBi	6 dBi
Impedance		50 Ω	50 Ω
Connection method		SMA (male)	N (female)
Apex angle	Vertical / Horizontal	45° / 360°	30° / 360°
Dimensions W / H		13 / 187 mm	22 / 250 mm
Frequency range		2.4 GHz	2.4 GHz
Scope of supply		-	Incl. mounting material

Description	Ordering data: Type	Order No.	Pcs. / Pkt.	Ordering data: Type	Order No.	Pcs. / Pkt.
Omnidirectional antenna						
2.4 GHz, 5 dBi gain	**RAD-ISM-2400-ANT-OMNI-5-0**	**2884923**	1			
2.4 GHz, 6 dBi gain				**RAD-ISM-2400-ANT-OMNI-6-0**	**2885919**	1

RAD-Line accessories
Panel antennas

– For large distances with line of sight

Notes:

The parabolic antenna may only be used on a unidirectional transmitter and on bidirectional transceivers in conjunction with the 15 mm RAD-CAB-EF393-15M antenna extension cable. Otherwise, the maximum permissible value for emitted power of 20 dB is exceeded.

8 dBi gain

19 dBi gain

		Technical data		Technical data
General data		RAD-...PAN-8-0	RAD-...CIR-8-0	
Ambient temperature range		-40°C ... 75°C	-40°C ... 80°C	-40°C ... 70°C
Degree of protection		IP55	IP55	IP65
Gain		8 dBi	8 dBi	19 dBi
Impedance		50 Ω	50 Ω	50 Ω
Connection method		SMA (female)	SMA (female)	N (female)
Apex angle	Vertical / Horizontal	70° / 75°	65° / 70°	11° / 17°
Dimensions W / H		80 / 100 mm	95 / 101 mm	610 / 419 mm
Frequency range		2.3 GHz	2.4 GHz	2.4 GHz
Scope of supply		Incl. mounting material	Incl. mounting material	Incl. mounting material

Description	Ordering data: Type	Order No.	Pcs. / Pkt.	Ordering data: Type	Order No.	Pcs. / Pkt.
Panel directional wireless antenna (without cable)						
8 dBi, linear polarized	**RAD-ISM-2400-ANT-PAN- 8-0**	**2867610**	1			
8 dBi, circular polarized, clockwise	**RAD-ISM-2400-ANT-CIR-8-0**	**2884936**	1			
Parabolic antenna				**RAD-ISM-2400-ANT-PAR-19-0**	**2867885**	1

Connecting cable/ weather protection

Adapter cable
– For connecting the panel antenna to PIPE wireless modules
– With gasket sleeve for weather protection

Sealing tape
– Provides additional weather protection for adapters, splitters, cable connections, etc.
– Vulcanizing

Adapter cable, suitable for PIPE wireless module (IP65)

Sealing tape

	Technical data	Technical data
General data		
Ambient temperature range (cable/gasket sleeve)	-30°C ... 70°C / -30°C ... 70°C	-40°C ... 120°C
Attenuation	Approx. 0.93 dB/m	-
Impedance	50 Ω	-
Reusability	Can be opened up to 20 times	-
Cable diameter	3.5 mm ... 7 mm	-
Properties	-	Vulcanizing
Width	-	25 mm
Length	-	10 m
Thickness	-	0.75 mm

Description	Ordering data: Type	Order No.	Pcs. / Pkt.	Ordering data: Type	Order No.	Pcs. / Pkt.
Adapter cable with gasket sleeve, to connect the panel directional antenna to RAD-ISM-2400-...-PIPE... wireless modules						
50 cm long, SMA (male) -> SMA (male)	**RAD-PIG-EF142-PIPE**	**2885922**	1			
Weather protection tape				**RAD-TAPE-SV-25-10**	**2885812**	1

RAD-Line accessories
Antenna splitters

- For connecting multiple antennas to one transmitter
- For connecting multiple receivers to one antenna

Antenna splitter, 4-way

Antenna splitter, 2-way

		Technical data	Technical data
General data			
Ambient temperature range		-40°C ... 85°C	-40°C ... 85°C
Degree of protection		IP20	IP20
Attenuation per branch	(at 2400 MHz)	6 dB	3 dB
Impedance		50 Ω	50 Ω
Connection method		4x SMA (female), 1x SMA (male)	2x SMA (female), 1x SMA (male)
Frequency range		2.3 GHz ... 2.5 GHz	2.3 GHz ... 2.5 GHz
Scope of supply		4-way splitter, N (male) to SMA (female) adapter, 2 SMA termination resistors	2-way splitter, adapter from N (female) to SMA (female), 4 strips of vulcanizing weather protection tape

	Ordering data			Ordering data		
Description	Type	Order No.	Pcs. / Pkt.	Type	Order No.	Pcs. / Pkt.
Antenna splitter						
4-way	**RAD-ISM-2400-SPL-4-SMA**	**2867856**	1			
2-way				**RAD-ISM-2400-SPL-2-SMA**	**2885595**	1

RAD-Line accessories
Surge protection/adapter

- Surge protection adapter for installing the antenna outside buildings
- Adapter for installing the antenna inside buildings

Surge protection

Adapter

		Technical data		Technical data
General data		CN-LAMBDA/4-5.9...	CN-LAMBDA/4-2.0...	
Ambient temperature range		-40°C ... 90°C	-40°C ... 100°C	-65°C ... 165°C
Degree of protection		IP68	IP55	IP20
Attenuation	(at 2400 MHz)	Typ. 0.05 dB (≤ 0.15 dB)	0.2 dB (1.7 GHz ... 2.3 GHz)	0.3 dB
Impedance		50 Ω	50 Ω	50 Ω
Frequency range		2.4 GHz ... 5.9 GHz	1.7 GHz ... 2.3 GHz	≤ 12.4 GHz

	Ordering data			Ordering data		
Description	Type	Order No.	Pcs. / Pkt.	Type	Order No.	Pcs. / Pkt.
Surge protection adapter						
Female/female	**CN-LAMBDA/4-5.9-BB**	**2838490**	1			
Male/female	**CN-LAMBDA/4-5.9-SB**	**2800023**	1			
Female/female	**CN-LAMBDA/4-2.0-BB**	**2818863**	1			
Male/female	**CN-LAMBDA/4-2.0-SB**	**2818876**	1			
Adapter						
N (female) -> N (female)				**RAD-ADP-N/F-N/F**	**2867843**	1
N (male) -> SMA (female)				**RAD-ADP-N/M-SMA/F**	**2917036**	1
RSMA (female) -> SMA (female)				**RAD-ADP-RSMA/F-SMA/F**	**2884538**	1
SMA (female) -> SMA (female)				**RAD-ADP-SMA/F-SMA/F**	**2884541**	1
SMA (female) -> SMA (female), perpendicular				**RAD-ADP-SMA/F-SMA/M-90**	**2917324**	1

RAD-Line accessories
Adapter/extension cable

– Extension or adaptation of wireless module for antenna

Notes:

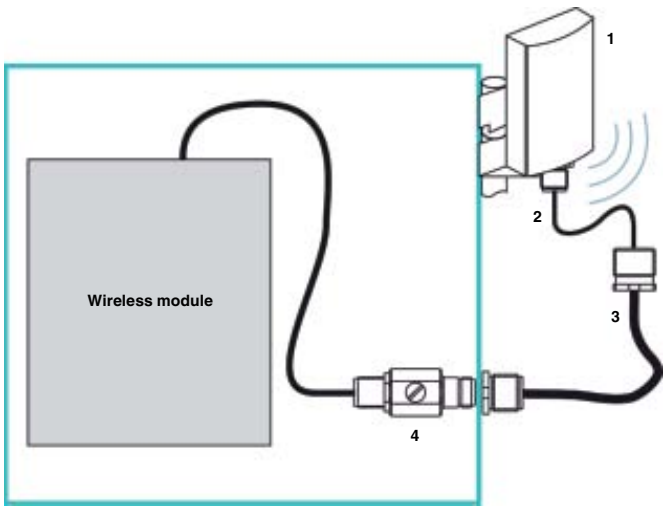
Keep the connection from the wireless module to the antenna as short as possible, as every cable leads to attenuation.

Antenna adapter cable

Antenna cable for longer connections

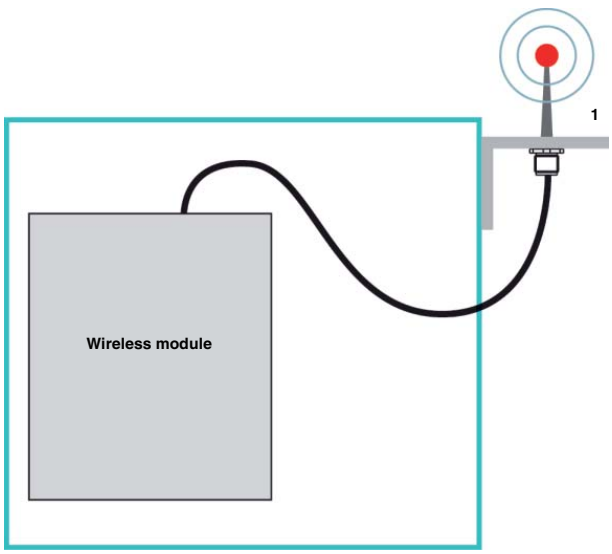
	Technical data			Technical data		
General data						
Ambient temperature range	-40°C ... 70°C			-40°C ... 105°C		
Attenuation / impedance (at 2400 MHz)	Approx. 1.5 dB/m / 50 Ω			Approx. 0.45 dB/m / 50 Ω		
	Ordering data			**Ordering data**		
Description	**Type**	**Order No.**	Pcs. / Pkt.	**Type**	**Order No.**	Pcs. / Pkt.
Antenna adapter cable						
1 m long, MCX (male) -> SMA (male)	**RAD-PIG-EF316-MCX-SMA**	**2867678**	1			
50 cm long, MCX (male) -> N (male)	**RAD-PIG-EF316-MCX-N**	**2867681**	1			
30 cm long, N (female) -> SMA (male)	**RAD-PIG-EF316-N-SMA**	**2867694**	1			
50 m long, N (female) -> N (male)	**RAD-PIG-EF316-N-N**	**2867704**	1			
50 cm long, SMA (male) -> SMA (male)	**RAD-PIG-EF316-SMA-SMA**	**2885618**	1			
Antenna extension cable						
3 m long, N connection at both ends (male)				**RAD-CAB-EF393- 3M**	**2867649**	1
5 m long, N connection at both ends (male)				**RAD-CAB-EF393- 5M**	**2867652**	1
10 m long, N connection at both ends (male)				**RAD-CAB-EF393-10M**	**2867665**	1
15 m long, N connection at both ends (male)				**RAD-CAB-EF393-15M**	**2885634**	1
3 m long, SMA connection at both ends (male)				**RAD-CAB-EF142-3M**	**2884512**	1
5 m long, SMA connection at both ends (male)				**RAD-CAB-EF142-5M**	**2884525**	1

Control cabinet/switch box
– For antennas with extension cable, with surge protection



1 Antenna
2 Antenna adapter cable (pigtail)
3 Antenna extension cable
4 Surge protection

Control cabinet/switch box
– For antennas without extension cable, without surge protection



Solar system – Autonomous power supply for RAD-Line wireless systems

The issue of the power supply frequently arises in the context of remote sensor signal acquisition. Phoenix Contact now offers a complete and fully autonomous power supply solution in the form of its solar systems. Due to great variations in solar radiation at the different application locations, different connected loads are permitted.

The areas of application are:
- Supply of RAD-ISM-2400 wireless modules, PSI-GPRS/GSM modems, etc. with the **RAD-SOL-SET-24-100** or **RAD-SOL-SET-24-200** solar system
- Supply of the RAD-ISM-2400-PIPE-TX wireless module with the **RAD-SOL-SET-12-10** solar system (for hopkey type H005 with transmission mode "send every 5 min.")

Notes:

More information about the specified wireless modules and systems for autonomous power supply can be found at www.phoenixcontact.com.

You can contact us as early as the planning and configuration stage so that together we can select the ideal standard solar system to meet your requirements (location, load, power reserve, etc.).

Accessories: M12 connecting cables in the required length, e.g., SAC-4P-MS-FS SCO sensor/actuator cable (Order No. 1523586) can be found in the PLUSCON catalog as well as on the Internet at www.phoenixcontact.com.

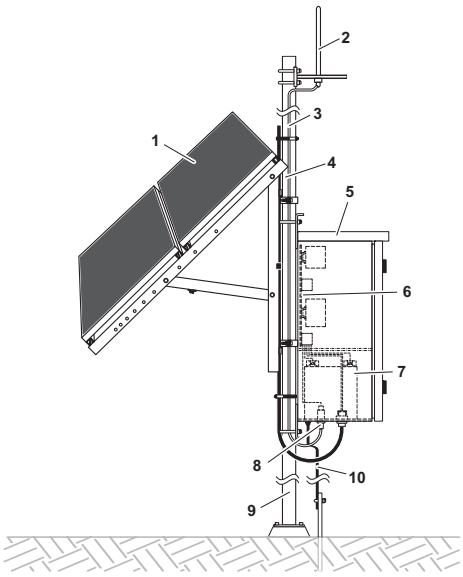
24 V/200 Wp solar system, 100 Ah battery capacitance

Technical data

Control cabinet/solar system	
System voltage	24 V DC
Max. load (depending on installation location)	0 W ... 23 W (maximum connected load for year-round constant load, in relation to power reserve)
Ambient temperature range	-20°C ... 50°C
Dimensions W / H / D	489 / 822.4 / 337.7 mm
Solar panel	
Output voltage	Typ. 17.9 V DC (voltage at maximum output)
Short-circuit current	Max. 3.07 A
Nominal capacitance	50 Wp +10 (- 5%)
Dimensions W / H / D	706 / 744 / 36 mm
Solar battery	
Nominal voltage U_N	12 V DC
Nominal capacitance	100 Ah
Weight	32 kg
Dimensions W / H / D	168 / 213 / 306 mm
Charge controller	
Supply voltage	24 V DC
Current consumption	Typ. 10 mA
Nominal load	10 A
Dimensions W / H / D	152 / 55 / 34 mm

Ordering data

Description	Type	Order No.	Pcs. / Pkt.
Solar system, comprising a solar panel, pre-wired control cabinet with charge controller and solar battery, and assembly material (including mast clips)			
24 V solar system 12 V solar system	**RAD-SOL-SET-24-200**	**2917722**	1



1 2 solar panels (conn. in series)
2 Antenna
3 Antenna cable
4 Flexible protective tubing
5 Control cabinet
6 Control cabinet electronics
7 Batteries
8 Surge protection for antenna cable and control cabinet electronics
9 Mast (e.g. signpost with 76 mm diameter
10 Protective earth (PE), grounding cable

Example of a typical solar system installation

24 V/100 Wp solar system, 40 Ah battery capacitance

12 V/10 Wp solar system, 6.6 Ah battery capacitance

Technical data

24 V DC 0 W ... 11 W (Maximum connected load for year-round constant load, in relation to power reserve) -20°C ... 55°C 489 / 822.4 / 337.7 mm
Typ. 17.9 V DC (voltage at maximum output) Max. 3.07 A 50 Wp +10 (- 5%) 706 / 744 / 36 mm
12 V DC 40 Ah 15 kg 175 / 210 / 175 mm
24 V DC Typ. 10 mA 10 A 152 / 55 / 34 mm

Technical data

12 V DC 0 mW ... 1200 mW (Maximum connected load for year-round constant load, in relation to power reserve) -20°C ... 55°C 200 / 300 / 120 mm
Typ. 16.8 V DC (voltage at maximum output) Max. 0.65 A 10 Wp +15% (-5%) 424 / 273 / 50 mm
12 V DC ±20% 6.6 Ah 2.6 kg 98.4 / 151.7 / 65.5 mm
12 V DC Typ. 10 mA 6 A 152 / 55 / 34 mm

Ordering data

Type	Order No.	Pcs. / Pkt.
RAD-SOL-SET-24-100	**2885472**	1

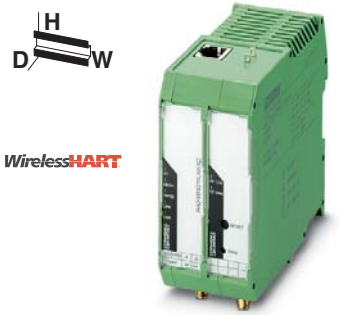
Ordering data

Type	Order No.	Pcs. / Pkt.
RAD-SOL-SET-12- 10	**2917146**	1

WirelessHART gateway

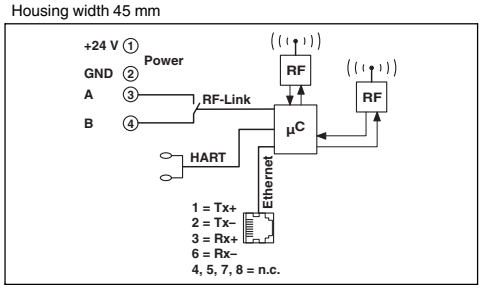
The **RAD-WHG/WLAN-XD** is a WirelessHART gateway with integrated 802.11b/g WLAN transceiver. It converts HART data to Modbus TCP for easy integration into almost any host system.

- Simple programming and diagnostics using an embedded web server or HART programmer
- WirelessHART gateway supports 250 WirelessHART devices
- 802.11b/g client can be used as WirelessHART backhaul connection with 802.11i (WPA2) 128-bit AES encryption
- Fully meshed routing (self-organizing and self-healing network) with WirelessHART
- WirelessHART uses "channel hopping" as a means of tolerating interference



WirelessHART gateway

Housing width 45 mm

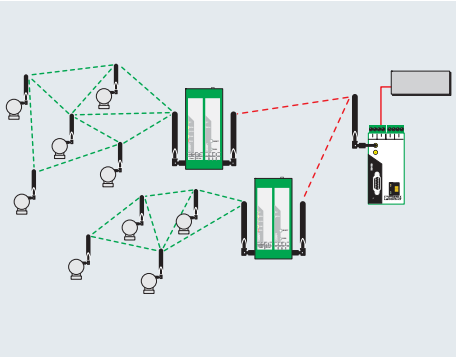


Technical data

Wireless path		
Interface description		WLAN according to IEEE 802.11b/g
Direction		Bidirectional
Frequency range		2.4 GHz ... 2.472 GHz
Transmission power		0 ... 20 dBm
Number of channels		13
Connection method		RP-SMA (female)
Wireless path		
Interface description		WirelessHART
Frequency range		2.4 GHz ... 2.4835 GHz
Transmission power		0 ... 10 dBm
Number of channels		15
Connection method		RP-SMA (female)
Ethernet interface		
Connection method		RJ45
Transmission speed		10/100 Mbps Ethernet
General data		
Supply voltage		9 V DC ... 30 V DC
Current consumption	typ. / max.	125 mA (at 24 V DC) / 300 mA (at 24 V DC)
Degree of protection		IP20
Ambient temperature range		-40°C ... 70°C
Housing material		Polyamide PA non-reinforced
Dimensions W / H / D		45 / 99 / 114.5 mm
Screw connection solid / stranded / AWG		0.2 ... 4 mm² / 0.2 ... 2.5 mm² / 24 - 14
Conformance/approvals		
Conformance		CE-compliant FCC Directive, Part 15.247
CSA, USA/Canada		Class I, Division 2, Groups A,B,C,D; Ex nA IIC T4 Class I, Zone 2, Group IIC; AEx nA IIC T4

Ordering data

Description	Type	Order No.	Pcs. / Pkt.
WirelessHART gateway			
	RAD-WHG/WLAN-XD	**2900178**	1



WirelessHART adapter

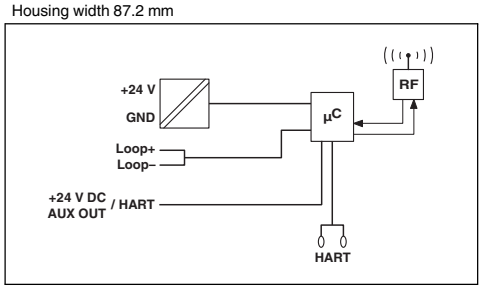
N

The **RAD-WHA-1/2NPT** is an adapter that allows up to 4 HART devices to be on a WirelessHART network.

- Allows wired HART devices to transfer data on a WirelessHART network
- Connect up to 4 HART device to one adapter
- Allows connection of one standard 4... 20 mA signal for easy integration of non-HART devices into a WirelessHART network
- 1/2" NPT fitting allows remote mounting or direct connection to instrument
- Removable antenna for connection of co-axial cable and high-gain antenna

WirelessHART adapter

Housing width 87.2 mm



Technical data

Wireless path		
Interface description		WirelessHART
Direction		Bidirectional
Frequency range		2.4 GHz ... 2.4835 GHz
Transmission power		0 ... 10 dBm
Number of channels		15
Connection method		N (female)
Analog input		
Number of inputs		1
Signal range		4 mA ... 20 mA
General data		
Supply voltage		11 V DC ... 30 V DC
Current consumption	max.	51 mA
Degree of protection		IP67
Ambient temperature range		-40°C ... 70°C
Housing material		Aluminum, die-cast, corrosion-resistant, powder-coated
Dimensions W / H / D		87.2 / 161 / 65.3 mm
Connection method		Free connecting cable, 20 AWG
Conformance/approvals		
Conformance		CE-compliant FCC Directive, Part 15.247

Ordering data

Description	Type	Order No.	Pcs. / Pkt.
WirelessHART adapter			
	RAD-WHA-1/2NPT	**2900100**	1

PSI-WL-...Bluetooth (2400 MHz)

Bluetooth interface converter for V.24 (RS-232), RS-422, RS-485 2-wire

Bluetooth converter, universal for V.24 (RS-232), RS-422, RS-485 2-wire

Applications:

The Bluetooth converter is used to convert V.24 (RS-232), RS-422, and RS-485 2-wire or USB interfaces to the license-free Bluetooth wireless standard. It serves as a straightforward and flexible substitute for a cable in order, for example, to perform programming/diagnostics tasks via a notebook or as a cost-effective alternative to slip rings, drag chains or fieldbus cables, such as Modbus, PROFIBUS, etc.

Topology:

– Point-to-point
– Multipoint with up to seven slaves

Features:

Flexible parameterization/application options:

– Suitable for worldwide use thanks to adjustable transmission power (-28 … 20 dBm)
– Can be used for V.24 (RS-232)/RS-422/RS-485-2 2-wire interfaces up to 187.5 kbps
– Transceiver for distances of up to 150 m

High transmission reliability:

– Secure and tamper-proof data transmission thanks to password protection, encryption, plus fixed and invisible device pairing
– Coexistence with other wireless systems thanks to adaptive frequency hopping (AFH) method

Easy installation:

– Wireless path diagnostics based on integrated bar graphs and 2 digital outputs
– Installation of parallel wireless paths thanks to 24 V DC and RS-485 cross-wiring
– Local configuration via USB interface without separate power supply unit

Technical data

Supply	
Supply voltage	10 V DC ... 30 V DC (via COMBICON plug-in screw terminal block)
Supply voltage	19 V AC ... 29 V AC (via COMBICON plug-in screw terminal block)
Supply voltage	24 V DC ±20% (alternative or redundant, via backplane bus contact and system power supply)
Nominal current consumption	≤ 100 mA (24 V DC)
Serial port	
Interfaces	V.24 (RS-232), RS-422, RS-485 2-wire
Connection method	D-SUB-9 male connector
Transmission speed	300, 1200, 2400, 4800, 7200, 9600, 19200, 31250, 38400, 57600, 75000, 93750, 115200, 136000, 187500 bps
Wireless interface	
Antenna connection	External
Transmission power	-28 dBm to 20 dBm (adjustable)
Receiver sensitivity	-83.00 dBm
Frequencies	2.402 GHz ... 2.48 GHz (ISM bandwidth)
Range depending on spatial conditions	20 dBm (100 mW) = 80 m to 150 m
Bluetooth multi-drop master/slave	1/7
General data	
Ambient temperature (operation)	-20°C ... 60°C
Electromagnetic compatibility	Conformance with R&TTE Directive 1999/5/EC
Dimensions W / H / D	22.5 mm / 99 mm / 114.5 mm

Ordering data

Description	Type	Order No.	Pcs. / Pkt.
PSI Bluetooth converter, MCX connection for external antenna, **supplied as standard**: PSI Bluetooth converter, CD containing configuration software			
- Device with 2x diagnostic outputs	**PSI-WL-RS232-RS485/BT/2DO**	**2313805**	1
- Device with HazLoc approval	**PSI-WL-RS232-RS485/BT/HL**	**2313795**	1
PSI Bluetooth PROFIBUS-SET, supplied as standard: 2x PSI Bluetooth converters, 2x Omnidirectional antennas			
PSI Bluetooth MPI-SET, supplied as standard: 1x PSI Bluetooth converter, 1x Omnidirectional antenna. 1x PSI-MPI/V.24 (RS-232) adapter, 1x V.24 (RS-232) cable			
PSI Bluetooth V.24 (RS-232) adapter, internal antenna. **Supplied as standard:** PSI Bluetooth V.24 (RS-232) adapter, CD containing configuration software			
PSI Bluetooth USB adapter, internal antenna. **Supplied as standard:** PSI Bluetooth USB adapter, CD containing driver, configuration software			

Accessories

V.24 (RS-232) D-SUB cable, length: 2 m - 9-pole female to 9-pole female	**PSM-KA9SUB9/BB/2METER**	**2799474**	1
Omnidirectional antenna	**RAD-ISM-2400-ANT-OMNI-2-1**	**2867461**	1
Panel directional wireless antenna (without cable)	**RAD-ISM-2400-ANT-PAN- 8-0**	**2867610**	1
Antenna adapter cable	**RAD-PIG-EF316-MCX-SMA**	**2867678**	1
System power supply unit, primary-switched	**MINI-SYS-PS-100-240AC/24DC/1.5**	**2866983**	1
TBUS DIN rail connector	**ME 22,5 TBUS 1,5/ 5-ST-3,81 GN**	**2707437**	50
1.5 m separate DC cable, to supply the PSI Bluetooth V.24 (RS-232) adapter from an external 5 V DC source			
Adapter set with 0.5 m cable, to supply the PSI Bluetooth V.24 (RS-232) adapter from a USB or PS2 interface			

Bluetooth sets, pre-configured for PROFIBUS connections or access to MPI adapter

Bluetooth V.24 (RS-232) adapter

Bluetooth USB adapter

Technical data

10 V DC ... 30 V DC (via COMBICON plug-in screw terminal block)	4 V DC ... 6 V DC (via 3-pole device connector, using adapter set)	-
19 V AC ... 29 V AC (via COMBICON plug-in screw terminal block)	-	-
24 V DC ±20% (alternative or redundant, via backplane bus contact and system power supply)	5 V DC ±20% (via 3-pole device connector, using adapter set)	5 V DC (directly via the USB interface)
≤ 100 mA (24 V DC)	70 mA (5 V DC)	100 mA (5 V DC)
Pre-configured COMBICON screw terminal block Pre-configured	V.24 (RS-232) D-SUB-9 female connector 300, 1200, 2400, 4800, 7200, 9600, 19200, 31250, 38400, 57600, 75000, 93750, 115200 bps	USB 2.0 USB type A, male connector Up to 2.1 Mbps
External 20 dBm -83.00 dBm 2.402 GHz ... 2.48 GHz (ISM bandwidth) 20 dBm (100 mW) = 80 m to 150 m -	Internal 0 dBm -75.00 dBm 2.402 GHz ... 2.48 GHz (ISM bandwidth) 0 dBm (1 mW) = 10 m to 30 m 1/3	Internal 20 dBm -80.00 dBm 2.402 GHz ... 2.48 GHz (ISM bandwidth) 20 dBm (100 mW) = 80 m to 150 m -
-20°C ... 60°C Conformance with R&TTE Directive 1999/5/EC 22.5 mm / 99 mm / 114.5 mm	-20°C ... 60°C Conformance with R&TTE Directive 1999/5/EC 52 mm / 60.5 mm / 16 mm	0°C ... 70°C Conformance with R&TTE Directive 1999/5/EC 18 mm / 58 mm / 8 mm

Ordering data

Type	Order No.	Pcs. / Pkt.
PSI-WL-PROFIB/BT-SET/2DO	**2313876**	1
PSI-WL-MPI/BT-SET	**2313562**	1

Ordering data

Type	Order No.	Pcs. / Pkt.
PSI-WL-PLUG-RS232/BT	**2708494**	1

Ordering data

Type	Order No.	Pcs. / Pkt.
PSI-WL-PLUG-USB/BT	**2313083**	1

Accessories

MINI-SYS-PS-100-240AC/24DC/1.5	**2866983**	1
ME 22,5 TBUS 1,5/ 5-ST-3,81 GN	**2707437**	50

Accessories

PSM-VLTG/1,5METER	**2787460**	1
PSM-VLTG-USB/PS2/0,5	**2708025**	1

Accessories

Quad band GPRS/EDGE mobile phone router with firewall, VPN, and alarm inputs and outputs

The PSI-MODEM-GSM/ETH GSM modem is an industrial router that can be used to transmit sensitive data securely via GSM networks.

Mobile phone network:
– GSM mobile phone network: 850, 900, 1800, and 1900 MHz
– For worldwide use

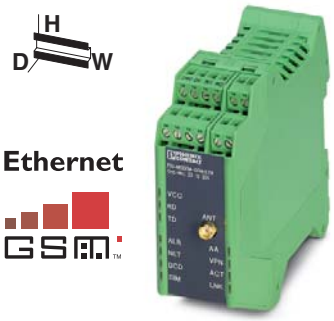
TCP/IP connection (GPRS/EDGE):
– Connection established via IP addresses
– Data rates of up to 210 kbps
– Security:
  - Firewall
  - NAT table

Ethernet interface:
– 10/100 Mbps automatic detection
– Autocrossing

VPN (virtual private network):
– IPsec and OpenVPN support
– Up to three VPN tunnels simultaneously
– Authentication with X.509 certificates
– Start VPN via call
– Start VPN via SMS

Digital I/Os:
– 6 digital switching inputs: Send freely configurable text messages (SMS, FAX, e-mail) and start user-defined functions
– Four switching outputs: Can be activated via SMS and Ethernet and for GSM and connection diagnostics

Additional features:
– Encryption of SIM card PINs
– Configuration via web-based management
– Upload and download configuration
– Configurable daily restart
– High electromagnetic compatibility
– Electrical isolation



GPRS/EDGE mobile phone router with firewall and VPN

Technical data

Supply	
Supply voltage	10 V DC ... 30 V DC (via COMBICON plug-in screw terminal block)
Supply voltage	24 V DC ±5% (alternative or redundant, via backplane bus contact and system power supply)
Nominal current consumption	< 360 mA (24 V DC)
Standby current consumption	< 90 mA
Ethernet interface	
Connection method	RJ45 female connector, shielded
Transmission speed	10/100 Mbps
Transmission length	100 m (shielded twisted pair)
Functions	
Management	Web-based management, SNMP
GSM/GPRS	
Frequencies	850 MHz (2 W (EGSM)) / 900 MHz (2 W (EGSM)) / 1800 MHz (1 W (EGSM)) / 1900 MHz (1 W (EGSM))
SIM interface	1.8 V and 3 V SIM card
GPRS compatibility	GPRS class 12, class B/encoding scheme: CS1 to CS4; EDGE (E-GPRS) multislot class 10
Network function	4 time slots for receiving data, 4 time slots for transmitting data. The PIN is saved in the modem. After a voltage interruption, automatically redials into the network. Integrated TCP/IP stack, firewall and VPN support, independent connection establishment.
Network check	LED to indicate data signal quality
Antenna connection	50 Ω impedance SMA female antenna connector
Input/output	
Switching input	6 x $U_{nominal}$, input range 10 V DC ... 30 V DC
Switching output	4 x $U_{nominal}$, input range 10 V DC ... 30 V DC / 250 mA, short-circuit-proof
General data	
Ambient temperature (operation)	-25°C ... 60°C
Electrical isolation	VCC//GSM//ETH//PE
Test voltage	1.5 kV (50 Hz, 1 min.)
Approvals for countries	EU, USA, Canada, other countries in preparation
Electromagnetic compatibility	Conformance with R&TTE Directive 1999/5/EC
Dimensions W / H / D	35 mm / 99 mm / 114.5 mm

Ordering data

Description	Type	Order No.	Pcs. / Pkt.
Industrial GPRS/EDGE modem for Ethernet with integrated Firewall and VPN	**PSI-MODEM-GSM/ETH**	**2313355**	1

Accessories

Multiband antenna for UMTS and quad-band GSM, with omnidirectional characteristic, 2 m antenna cable with SMA round connector, degree of protection: IP65, dimensions: 76 x 20 mm	**PSI-GSM/UMTS-QB-ANT**	**2313371**	1
System power supply unit, primary-switched	**MINI-SYS-PS-100-240AC/24DC/1.5**	**2866983**	1
DIN rail connector (optional), for routing through the supply voltage and data signal, two required per device	**ME 17,5 TBUS 1,5/ 5-ST-3,81 GN**	**2709561**	10

Quad band modem for GPRS and GSM with V.24 (RS-232) interface and 2 alarm inputs

Send V.24 (RS-232) data all around the world via the mobile phone network

Mobile phone network:
- GSM mobile phone network: 850, 900, 1800, and 1900 MHz
- For worldwide use

TCP/IP connection (GPRS)
- Connection established via IP addresses
- Client/server functionality
- IPT compatible
- Integrated TCP/IP stack for integrating devices without a TCP/IP stack into a network
- Data rates of up to 53.6 kbps
- Security:
  - Firewall

Dial-up connection (GSM):
- Connection established via data phone number (CSD)
- Security:
  - Connection established with password protection
  - Selective call acceptance
  - Callback function
- Fixed bandwidth (9.6 kbps or 14.4 kbps)
- Fixed latency

V.24 (RS-232) interface:
- Freely parameterizable (baud rate, data bits, parity, stop bit, flow control)

Digital I/Os:
- Two digital switching inputs: Send freely configurable text messages (SMS, FAX, e-mail)
- One switching output on backplane, can be activated via SMS with password protection

Additional features:
- Encryption of SIM card PINs
- Can be used regardless of controller manufacturer
- High electromagnetic compatibility
- Electrical isolation
- NEW: Convenient configuration software
- NEW: Configuration via SMS, e.g., update phone book entries, for SMS alerts
- NEW: IPT supported

Notes:
For application examples, see the user manual.

Quad band modem for GPRS and GSM with V.24 (RS-232) interface, integrated TCP/IP stack and 2 alarm inputs

Technical data

Supply	
Supply voltage	10 V DC ... 30 V DC (via COMBICON plug-in screw terminal block)
Supply voltage	24 V DC ±5% (alternative or redundant, via backplane bus contact and system power supply)
Nominal current consumption	< 350 mA (24 V DC)
Standby current consumption	< 80 mA
V.24 (RS-232) interface	
Connection method	D-SUB-9 male connector
Data format/encoding	Serial asynchronous UART/NRZ, 7/8 data, 1/2 stop, 1 parity, 10/11-bit character length
Data flow control/protocols	Software handshake, Xon/Xoff or hardware handshake RTS/CTS
Transmission speed	Automatic data rate detection (default) or fixed setting to 300, 1200, 2400, 4800, 9600, 19200, 38400, 57600, 115200 bps, can be set via software
GSM/GPRS	
Frequencies	850 MHz (2 W (EGSM)) / 900 MHz (2 W (EGSM)) / 1800 MHz (1 W (EGSM)) / 1900 MHz (1 W (EGSM))
SIM interface	1.8 V and 3 V SIM card
GPRS compatibility	GPRS class 10, class B/encoding scheme: CS1 to CS4
Network function	4 time slots for receiving data, 2 time slot for transmitting data. The PIN is saved in the modem. After a voltage interruption, automatically redials into the network Integrated TCP/IP stack, independent connection establishment.
Network check	LED to indicate data signal quality
Antenna connection	50 Ω impedance SMA female antenna connector
Input/output	
Switching input	2 x U_{Nom} 24 V DC / 5 mA, input range 9...60 V DC
Switching output	On the backplane (10 V DC ... 30 V DC / 80 mA at 24 V DC)
General data	
Ambient temperature (operation)	-25°C ... 60°C
Electrical isolation	Supply // V.24 (RS-232) // Antenna
Test voltage	1.5 kV
Approvals for countries	EU, USA, Canada, other countries in preparation
Electromagnetic compatibility	Conformance with R&TTE Directive 1999/5/EC
Dimensions W / H / D	22.5 mm / 99 mm / 118.6 mm

Ordering data

Description	Type	Order No.	Pcs. / Pkt.
Industrial GPRS/GSM modem with V.24 (RS-232) interface, scope of supply: Modem, CD with configuration software and user manual	**PSI-GPRS/GSM-MODEM/RS232-QB**	**2313106**	1

Accessories

Multiband antenna for UMTS and quad-band GSM, with omnidirectional characteristic, 2 m antenna cable with SMA round connector, degree of protection: IP65, dimensions: 76 x 20 mm	**PSI-GSM/UMTS-QB-ANT**	**2313371**	1
System power supply unit, primary-switched	**MINI-SYS-PS-100-240AC/24DC/1.5**	**2866983**	1
TBUS DIN rail connector	**ME 22,5 TBUS 1,5/ 5-ST-3,81 GN**	**2707437**	50
MPI adapter for coupling to the programming interface of a Siemens SIMATIC® S7-300/400 controller	**PSI-MPI/RS232-PC**	**2313148**	1
V.24 (RS-232) D-SUB cable, length: 2 m	**PSM-KA9SUB9/BB/2METER**	**2799474**	1
V.24 (RS-232) D-SUB cable, length: 0.5 m	**PSM-KA9SUB9/BB/0,5METER**	**2708520**	1

SMS relay modules

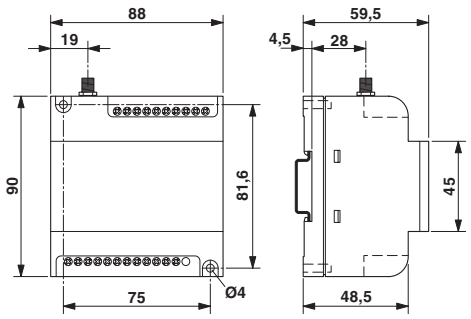
The PSI-MODEM-SMS-REL… is a compact remote control and signaling system. Six digital or configurable analog/digital inputs and four relay outputs with PDT contacts are monitored and controlled using SMS messages via any GSM mobile phone network.

Product features:

- GSM mobile phone network: 850, 900, 1800, and 1900 MHz
- For worldwide use
- Message via SMS in the event of status change at the input
- Alarm generation via SMS in the event of voltage failure
- SMS remote control of the outputs
- Switch outputs for a predefined time
- SMS status query of all inputs and outputs
- Password protection
- V.24 (RS-232) configuration interface
- Configuration software and programming cable supplied as standard
- Easy configuration on the PC without programming knowledge
- Integrated phone book for up to 50 numbers
- Max. 5 recipients per SMS
- Installation component device as per DIN 43880

Possible areas of application for the PSI-MODEM-SMS-REL… include:

- Machine, building, and system monitoring
- Pumps, sewage treatment plants, water supply
- Light controllers, remote switching systems
- Lifts, doors
- Alarm and domestic engineering
- Climate and ventilation engineering
- Temperature monitoring



SMS remote and signaling system with six inputs and four relay outputs

Technical data

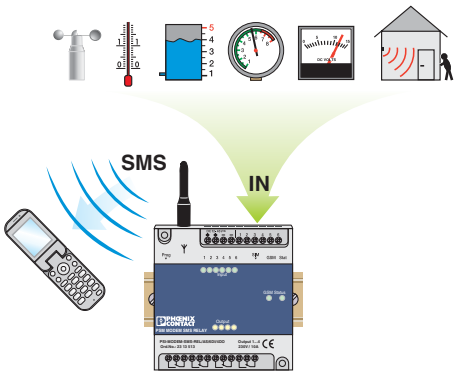
Supply		
Supply voltage	12 V DC ... 48 V DC	110 V AC ... 240 V AC
Nominal current consumption	15 mA	10 mA
Input data		
Switching input	Digital: 6 x U_N, switching threshold 9.5 V DC Analog: 0 - 10 V	Digital: 6 x U_N, switching threshold 85 V AC Analog: -
Output data		
Contact type	Single contact, 4 x SPDT contact	
Max. switching voltage	250 V AC/DC	
Min. switching voltage	12 V AC/DC	
Limiting continuous current	10 A	
GSM		
Frequencies	850 MHz (2 W (EGSM)) / 900 MHz (2 W (EGSM)) / 1800 MHz (1 W (EGSM)) / 1900 MHz (1 W (EGSM))	
SIM interface	3 V SIM card	
Antenna connection	50 Ω impedance SMA female antenna connector	
General data		
Ambient temperature (operation)	-25°C ... 55°C	
Electromagnetic compatibility	Conformance with R&TTE Directive 1999/5/EC	
Dimensions W / H / D	88 mm / 90 mm / 60 mm	

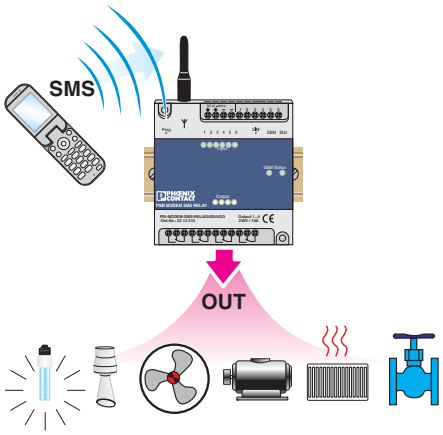
Ordering data

Description	Voltage U_N	Type	Order No.	Pcs. / Pkt.
SMS relay with six digital inputs and four relay outputs	110 V AC ... 240 V AC	PSI-MODEM-SMS-REL/6 DI/4DO/AC	2313513	1
SMS relay with six analog or digital configurable inputs and four relay outputs	12 V DC ... 48 V DC	PSI-MODEM-SMS-REL/6ADI/4DO/DC	2313520	1

Accessories

Multiband antenna for UMTS and quad-band GSM, with omnidirectional characteristic, 2 m antenna cable with SMA round connector, degree of protection: IP65, dimensions: 76 x 20 mm	PSI-GSM/UMTS-QB-ANT	2313371	1
Connecting cable, D-9-SUB to USB, with D-9-SUB to D-25-SUB adapter	CM-KBL-RS232/USB	2881078	1





Antennas

N

The PSI-GSM/UMTS-ANT-OMNI-2-5 and PSI-GSM/UMTS-QB-ANT multiband antennas are suitable for GSM networks operating at 850 MHz, 900 MHz, 1800 MHz, and 1900 MHz, as well as for UMTS networks.

The PSI-GSM/UMTS-ANT-OMNI-2-5 antenna is suitable for external panel and external mast mounting. The PSI-GSM/UMTS-QB-ANT antenna is ideal for mounting on a control cabinet or control box.

External antenna

Control cabinet antenna

Description	Ordering data			Ordering data		
	Type	Order No.	Pcs. / Pkt.	Type	Order No.	Pcs. / Pkt.
Multiband antenna for external panel and external mast mounting for UMTS and quad-band GSM, with omnidirectional characteristics, 5 m antenna cable with SMA round connector	PSI-GSM/UMTS-ANT-OMNI-2-5	2900982	1			
Multiband antenna for UMTS and quad-band GSM, with omnidirectional characteristic, 2 m antenna cable with SMA round connector, degree of protection: IP65, dimensions: 76 x 20 mm				PSI-GSM/UMTS-QB-ANT	2313371	1

Antenna extension cables and surge protection

N

The 5 m and 10 m long antenna extension cables allow greater flexibility when installing antennas. The surge protection is suitable for GSM networks operating at 850 MHz, 900 MHz, 1800 MHz, and 1900 MHz, as well as for UMTS networks.

Antenna extension cable

Protective adapter for coaxial cables

Description	Ordering data			Ordering data		
	Type	Order No.	Pcs. / Pkt.	Type	Order No.	Pcs. / Pkt.
Antenna extension cable for UMTS and quad-band GSM, 5 m long, antenna cable with SMA connector and SMA coupling	PSI-CAB-GSM/UMTS- 5M	2900980	1			
Antenna extension cable for UMTS and quad-band GSM, 10 m long, antenna cable with SMA connector and SMA coupling	PSI-CAB-GSM/UMTS-10M	2900981	1			
Surge protection for UMTS and quad-band GSM antenna, with SMA connector and SMA coupling				CSMA-LAMBDA/4-2.0-BS-SET	2800491	1

Country-specific registrations

The 900 MHz wireless systems with Trusted Wireless are currently approved in the following countries:

USA

Canada

Mexico

Argentina

Peru

USA

Australia

New Zealand

(Additional country registrations can be found at www.phoenixcontact.com or are available upon request.)

Note:
The products are offered exclusively for export outside the EU and the European Economic Area.

RAD-Line IO - BD wireless system with Trusted Wireless

The **RAD-ISM-900-SET-BD-BUS(ANT)** bidirectional wireless system comprises:

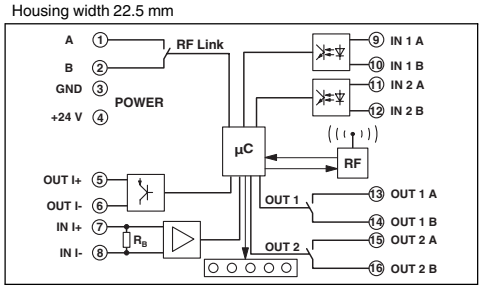
- Two transceivers pre-configured to communicate with one another
- Two omnidirectional antennas (optional)
- Operates in the license-free 902 - 928 MHz ISM band
- Frequency-hopping spread spectrum technology
- No additional parameterization or programming necessary
- Integrated bus foot allows connection to additional I/O modules
- Each transceiver has 1 analog (4… 20 mA) and 2 digital (5… 30 V AC/DC) inputs, as well as 1 analog and 2 digital outputs, for direct connection to compatible sensors and actuators to transmit data in both directions
- Additional transceivers can be added to build repeater systems
- Individual transceivers are Class I, Division 2 listed
- Radio link status via a relay (RF link)

Notes:

The products are only available for export outside the EU and the European Economic Area.

Set comprising 2 transceivers (transmitter and receiver) and two antennas with connecting cables

Housing width 22.5 mm



Technical data

Wireless path		America	Australia	New Zealand	
Direction		Bidirectional	Bidirectional	Bidirectional	
Frequency range		902 ... 928	915.1 ... 927.8	921.4 ... 927.7	[MHz]
Transmission power		1 W	1 W	1 W	
Analog input					
Number of inputs		1			
Signal range		4 mA ... 20 mA			
Input resistance		< 170 Ω			
Digital input					
Number of inputs		2			
Signal range		5 V AC/DC ... 30 V AC/DC			
Switching level	1 signal ("H")	Min. 5 V DC			
	0 signal ("L")	Max. 1.5 V DC			
Analog output					
Number of outputs		1			
Signal range		4 mA ... 20 mA			
Load R_B		700 Ω (at U_B = 24 V, R_B = [U_B-10 V] / 20 mA)			
Digital output					
Contact type		3 floating N/O contacts			
Switching voltage		30 V DC / 250 V AC			
Switching current		2 A			
General data					
Supply voltage		9 V DC ... 30 V DC			
Current consumption	typ. / max.	75 mA / 200 mA			
Degree of protection		IP20			
Ambient temperature range		-40°C ... 70°C			
Housing material		Polyamide PA non-reinforced			
Dimensions W / H / D		22.5 / 99 / 114.5 mm			
Screw connection solid / stranded / AWG		0.2 ... 4 mm² / 0.2 ... 2.5 mm² / 24 - 14			
Conformance/approvals					
Conformance		FCC Directive, Part 15.247 ISC Directive RSS 210			
UL, USA/Canada		Class I, Div. 2, Groups A, B, C, D			

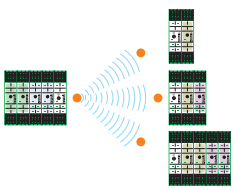
Ordering data

Description		Type	Order No.	Pcs. / Pkt.
Wireless set (2 transceivers, 2 antennas)	America	**RAD-ISM-900-SET-BD-BUS-ANT**	**2867270**	1
Wireless set (two transceivers)		**RAD-ISM-900-SET-BD-BUS**	**2867089**	1
Transceiver (individual)		**RAD-ISM-900-BD-BUS**	**2867092**	1
Wireless set (2 transceivers, 2 antennas)	Australia	**RAD-ISM-900-SET-BD-BUS-ANT-AU**	**2867490**	1
Wireless set (two transceivers)		**RAD-ISM-900-SET-BD-BUS-AU**	**2867487**	1
Transceiver (individual)		**RAD-ISM-900-BD-BUS-AU**	**2867500**	1
Wireless set (2 transceivers, 2 antennas)	New Zealand	**RAD-ISM-900-SET-BD-BUS-ANT-NZ**	**2885126**	1
Wireless set (two transceivers)		**RAD-ISM-900-SET-BD-BUS-NZ**	**2885113**	1
Transceiver (individual)		**RAD-ISM-900-BD-BUS-NZ**	**2885139**	1

Repeater
(bidirectional)

Point-to-point
(bidirectional)

Point-to-multipoint
(unidirectional)



Extension modules

RAD-Line extension modules provide additional inputs and outputs for Bidirectional RAD-Line IO and RAD-Line Serial wireless systems.

- Easily installed via an integrated bus foot
- Bus provides supply voltage
- Data transferred to transceiver module via bus
- Up to 8 modules can be connected to a single transceiver
- A maximum of 33 analog or 66 digital signals can be configured, depending on the selection of modules

D W H

Ex n

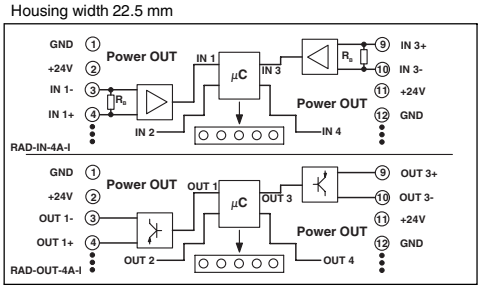
Analog components for 4 inputs or 4 outputs

D W H

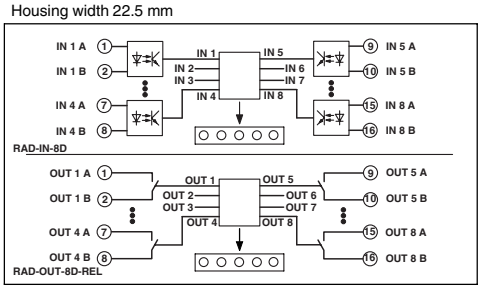
Ex n

Digital components for 8 inputs or 8 outputs

Ex:
Housing width 22.5 mm



Ex:
Housing width 22.5 mm



Technical data

Analog input	RAD-IN-4A-I	RAD-OUT-4A-I	
Number of inputs	4	-	
Signal range	4 mA ... 20 mA	-	
Input resistance	< 170 Ω	-	
Digital input			
Number of inputs	-	-	
Signal range	-	-	
Switching level	1 signal ("H")	-	-
	0 signal ("L")	-	-
Input frequency	-	-	
Pulse length	-	-	
Analog output			
Number of outputs	-	4	
Signal range	-	4 mA ... 20 mA	
Load R_B	-	700 Ω (at U_B = 24 V, R_B = [U_B-10 V] / 20 mA)	
Digital output			
Contact type	-	-	
Switching voltage	-	-	
Switching current	-	-	
Clock frequency	-	-	
Frequency output	-	-	
General data			
Supply voltage	9 V DC ... 30 V DC (via bus foot)	9 V DC ... 30 V DC (via bus foot)	
Current consumption	typ. / max.	100 mA / 130 mA	100 mA / 130 mA
Degree of protection		IP20	IP20
Ambient temperature range		-20°C ... 65°C	-20°C ... 65°C
Housing material		Polyamide PA non-reinforced	Polyamide PA non-reinforced
Dimensions W / H / D		22.5 / 99 / 114.5 mm	22.5 / 99 / 114.5 mm
Conformance/approvals			
Conformance		CE-compliant	
ATEX		Ⓔx II 3 G EEx nL IIC	
IECEx		Ex nL IIC	
UL, USA/Canada		Class I, Div. 2, Groups A, B, C, D	

Technical data

Analog input	RAD-IN-8D	RAD-OUT-8D-REL
Number of inputs	-	-
Signal range	-	-
Input resistance	-	-
Digital input		
Number of inputs	8	-
Signal range	5 V AC/DC ... 30 V AC/DC	-
Switching level	Min. 5 V DC	-
	Max. 1.5 V DC	-
Input frequency	-	-
Pulse length	-	-
Analog output		
Number of outputs	-	-
Signal range	-	-
Load R_B	-	-
Digital output		
Contact type	-	Relay output
Switching voltage	-	30 V AC/DC (EC declaration of conformity) 30 V DC (with UL approval) 250 V AC (with UL approval)
Switching current	-	0.5 A (EC declaration of conformity) 2 A (with UL approval)
Clock frequency	-	-
Frequency output	-	-
General data		
Supply voltage	9 V DC ... 30 V DC (via bus foot)	9 V DC ... 30 V DC (via bus foot)
Current consumption	25 mA / 30 mA	100 mA / 160 mA
Degree of protection	IP20	IP20
Ambient temperature range	-20°C ... 65°C	-20°C ... 65°C
Housing material	Polyamide PA non-reinforced	Polyamide PA non-reinforced
Dimensions W / H / D	22.5 / 99 / 114.5 mm	22.5 / 99 / 114.5 mm
Conformance/approvals		
Conformance	CE-compliant	
ATEX	Ⓔx II 3 G EEx nL IIC	
IECEx	Ex nL IIC	
UL, USA/Canada	Class I, Div. 2, Groups A, B, C, D	

Ordering data

Description		Type	Order No.	Pcs. / Pkt.
Extension module	Analog IN	**RAD-IN-4A-I**	**2867115**	1
Extension module	Analog OUT	**RAD-OUT-4A-I**	**2867128**	1
Extension module	Digital IN			
Extension module	Digital OUT			
Extension module	Mixed I/O			

Ordering data

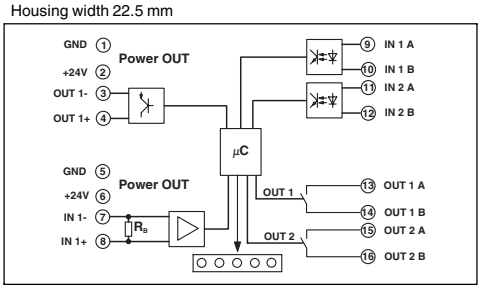
Type	Order No.	Pcs. / Pkt.
RAD-IN-8D	**2867144**	1
RAD-OUT-8D-REL	**2867157**	1

D W H

Ex n

Analog/digital module
for 2 digital I/Os and 1 analog I/O

Ex: Housing width 22.5 mm



Technical data
1
4 mA ... 20 mA
< 170 Ω
2
5 V AC/DC ... 30 V AC/DC
Min. 5 V DC
Max. 1.5 V DC
-
-
1
4 mA ... 20 mA
700 Ω (at U_B = 24 V, R_B = [U_B-10 V] / 20 mA)
Relay output
30 V AC/DC (EC declaration of conformity)
30 V DC (with UL approval)
250 V AC (with UL approval)
0.5 A (EC declaration of conformity)
2 A (with UL approval)
-
-
9 V DC ... 30 V DC (via bus foot)
70 mA / 110 mA
IP20
-20°C ... 65°C
Polyamide PA non-reinforced
22.5 / 99 / 114.5 mm
CE-compliant
Ex II 3 G EEx nL IIC
Ex nL IIC T5
Class I, Div. 2, Groups A, B, C, D

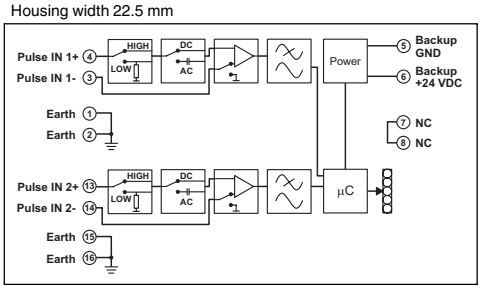
Ordering data		
Type	**Order No.**	Pcs. / Pkt.
RAD-IN+OUT-2D-1A-I	**2867322**	1

D W H

Ex n

Digital module
for two counter/frequency inputs

Ex: Housing width 22.5 mm



Technical data
-
-
-
2
0.1 V AC/DC ... 30 V AC/DC
(Common mode 3.6 V DC) / (Differential mode 100 mV_{PP})
-
(0.1 Hz ... 10 kHz (50% duty cycle))
(High time 50 µs)
-
-
-
-
-
9 V DC ... 30 V DC (via bus foot)
35 mA / 45 mA
IP20
-20°C ... 65°C
Polyamide PA non-reinforced
22.5 / 99 / 114.5 mm
CE-compliant
Ex II 3 G EEx nL IIC
-
Class I, Div. 2, Groups A, B, C, D

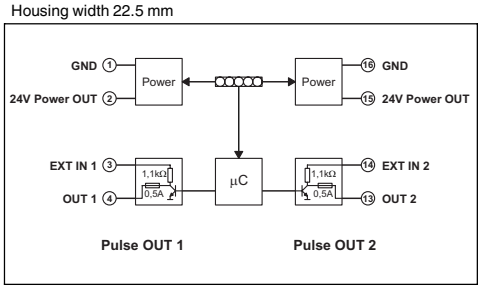
Ordering data		
Type	**Order No.**	Pcs. / Pkt.
RAD-IN-2D-CNT	**2885223**	1

D W H

Ex n

Digital module
for two counter/frequency outputs

Ex: Housing width 22.5 mm



Technical data
-
-
-
-
-
-
-
-
-
-
-
-
Transistor output, passive
-
Approx. 27 mA (terminal 3/14)
Approx. 25 mA (terminal 4/13)
(High speed 10 kHz with 50% duty cycle)
(Low speed 10 Hz with 50% duty cycle)
(0.1 Hz ... 10 kHz (50% duty cycle))
9 V DC ... 30 V DC (via bus foot)
90 mA / 115 mA
IP20
-20°C ... 65°C
Polyamide PA non-reinforced
22.5 / 99 / 114.5 mm
CE-compliant
Ex II 3 G EEx nL IIC
-
Class I, Div. 2, Groups A, B, C, D

Ordering data		
Type	**Order No.**	Pcs. / Pkt.
RAD-OUT-2D-CNT	**2885236**	1

RAD-Line IO - UD wireless system with Trusted Wireless

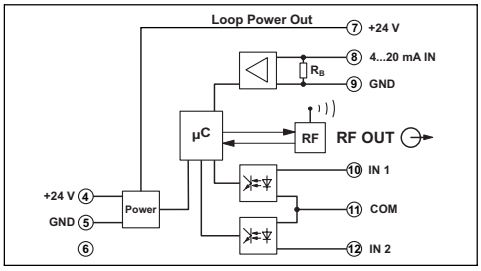
The **RAD-ISM-900-SET...UD...** unidirectional wireless system comprises:

- Two transceivers pre-configured to communicate with one another
- Two omnidirectional antennas
- Operates in the license-free 902 - 928 MHz ISM band
- Frequency-hopping spread spectrum technology
- The transmitter can be installed on a DIN rail or outside (IP65)
- Conduit-style transmitters can be either 24 V DC or 120/240 V AC powered
- DIN rail mounted receiver is supplied with 24 V DC

Notes:

The products are only available for export outside the EU and the European Economic Area.

Set comprising transmitter, receiver, and two antennas with connecting cables



Technical data

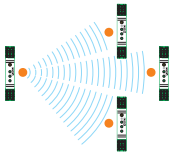
Wireless path		America	Australia	New Zealand
Direction		Unidirectional	Unidirectional	Unidirectional
Frequency range		902 ... 928	915.1 ... 927.8	921.4 ... 927.7 [MHz]
Transmission power		1 W	1 W	1 W
Number of channels		4 x 63	2 x 63	1 x 63
Analog input				
Number of inputs/signal range		1 x 4 mA ... 20 mA		
Input resistance		< 150 Ω		
Digital input				
Number of inputs/signal range		2 x 5 V AC/DC ... 30 V AC/DC		
Switching level	1 signal ("H")	Min. 5 V DC		
	0 signal ("L")	Max. 1.5 V DC		
Analog output				
Number of outputs/signal range		1 x 4 mA ... 20 mA		
Load R_B		700 Ω (at U_B = 24 V, R_B = [U_B-10 V] / 20 mA)		
Digital output		3 floating PDT contacts		
Switching voltage		30 V DC / 120 V AC		
Switching current		0.5 A		
General data		Transmitter (TX)		Receiver (RX)
Supply voltage		12 V DC ... 30 V DC		12 V DC ... 30 V DC
Current consumption	typ. / max.	75 mA / 350 mA		85 mA / 125 mA
Degree of protection		IP20		IP20
Ambient temperature range		-40°C ... 70°C		-40°C ... 70°C
Housing material		Polyamide PA non-reinforced		Polyamide PA non-reinforced
Dimensions W / H / D		17.5 / 99 / 114.5 mm		17.5 / 99 / 114.5 mm
Conformance/approvals				
Conformance		FCC Directive, Part 15.247 ISC Directive RSS 210		
UL, USA/Canada		Class I, Div. 2, Groups A, B, C, D		

Ordering data

Description		Type	Order No.	Pcs. / Pkt.
Wireless set (transmitter, receiver, including antennas)	America	**RAD-ISM-900-SET-UD-ANT**	**2867102**	1
Receiver (individual)		**RAD-ISM-900-RX**	**2867047**	1
Wireless set (transmitter, receiver, including antennas)	Australia	**RAD-ISM-900-SET-UD-ANT-AU**	**2867416**	1
Receiver (individual)		**RAD-ISM-900-RX-AU**	**2867445**	1
Wireless set (transmitter, receiver, including antennas)	New Zealand	**RAD-ISM-900-SET-UD-ANT-NZ**	**2885029**	1
Receiver (individual)		**RAD-ISM-900-RX-NZ**	**2885058**	1

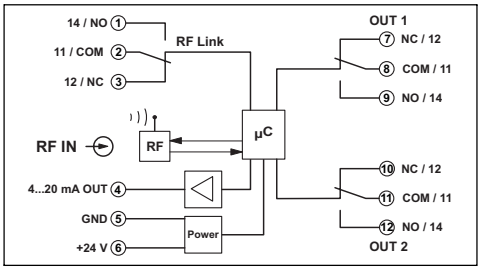
Point-to-point

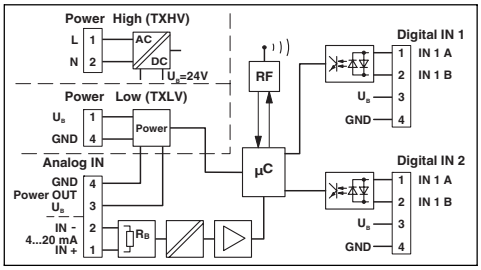
Point-to-multipoint



Set comprising transmitter for the mains connection (IP65) and receiver (IP20) including antennas

Set comprising transmitter for the low-voltage range (IP65) and receiver (IP20) including antennas





Technical data

America	Australia	New Zealand	
Unidirectional	Unidirectional	Unidirectional	
902 ... 928	915.1 ... 927.8	921.4 ... 927.7	[MHz]
1 W	1 W	1 W	
4 x 63	2 x 63	1 x 63	
1 x 4 mA ... 20 mA			
< 170 Ω			
2 x 85 V AC ... 240 V AC			
-			
-			
1 x 4 mA ... 20 mA			
700 Ω (at U_B = 24 V, R_B = [U_B-10 V] / 20 mA)			
3 floating PDT contacts			
30 V DC / 120 V AC			
0.5 A			
Transmitter (TX)		Receiver (RX)	
100 V AC ... 240 V AC		12 V DC ... 30 V DC	
57 mA / 109 mA		85 mA / 125 mA	
IP65		IP20	
-40°C ... 70°C		-40°C ... 70°C	
5052H32AL PBT		Polyamide PA non-reinforced	
57 / 57 / 280 mm		17.5 / 99 / 114.5 mm	
FCC Directive, Part 15.247 ISC Directive RSS 210 Class I, Div. 2, Groups A, B, C, D			

Ordering data

Type	Order No.	Pcs. / Pkt.
RAD-ISM-900-SET-AC-UD	**2867021**	1
RAD-ISM-900-SET-AC-UD-AU	**2867429**	1
RAD-ISM-900-SET-AC-UD-NZ	**2885032**	1

Technical data

America	Australia	New Zealand	
Unidirectional	Unidirectional	Unidirectional	
902 ... 928	915.1 ... 927.8	921.4 ... 927.7	[MHz]
1 W	1 W	1 W	
4 x 63	2 x 63	1 x 63	
1 x 4 mA ... 20 mA			
< 170 Ω			
2 x 5 V AC/DC ... 30 V AC/DC			
Min. 5 V DC			
Max. 1.5 V DC			
1 x 4 mA ... 20 mA			
700 Ω (at U_B = 24 V, R_B = [U_B-10 V] / 20 mA)			
3 floating PDT contacts			
30 V DC / 120 V AC			
0.5 A			
Transmitter (TX)		Receiver (RX)	
9 V DC ... 30 V DC		12 V DC ... 30 V DC	
75 mA / 350 mA		85 mA / 125 mA	
IP65		IP20	
-40°C ... 70°C		-40°C ... 70°C	
5052H32AL PBT		Polyamide PA non-reinforced	
57 / 57 / 280 mm		17.5 / 99 / 114.5 mm	
FCC Directive, Part 15.247 ISC Directive RSS 210 Class I, Div. 2, Groups A, B, C, D			

Ordering data

Type	Order No.	Pcs. / Pkt.
RAD-ISM-900-SET-DC-UD	**2867034**	1
RAD-ISM-900-SET-DC-UD-AU	**2867432**	1
RAD-ISM-900-SET-DC-UD-NZ	**2885045**	1

RAD-Line IO - XD wireless system with Trusted Wireless

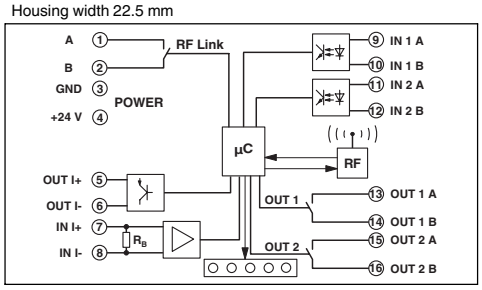
The **RAD-ISM-900-XD-BUS** bidirectional wireless system provides a safe and reliable method for configuring multipoint wireless I/O networks.

- Operates in the license-free 902 - 928 MHz ISM band
- Frequency-hopping spread spectrum technology
- System consists of master and up to 8 slave stations
- Integrated bus foot allows connection to additional I/O modules
- Additional transceivers can be added to build point-to-multipoint or repeater systems

Notes:
More detailed ordering options and documentation are available at www.phoenixcontact.com.
The products are only available for export outside the EU and the European Economic Area.

Transceiver (transmitter and receiver) for setting up multi-transmitter systems (multipoint-to-point)

Housing width 22.5 mm



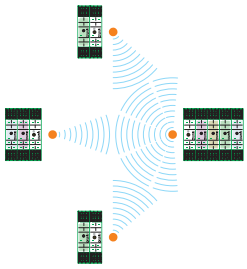
Technical data

Wireless path		
Direction		Bidirectional
Frequency range		902 MHz ... 928 MHz
Transmission power		1 W
Number of channels		4 x 63
Analog input		
Number of inputs		1
Signal range		4 mA ... 20 mA
Input resistance		< 170 Ω
Digital input		
Number of inputs		2
Signal range		5 V AC/DC ... 30 V AC/DC
Switching level	1 signal ("H")	Min. 5 V DC
	0 signal ("L")	Max. 1.5 V DC
Analog output		
Number of outputs		1
Signal range		4 mA ... 20 mA
Load R_B		700 Ω (at U_B = 24 V, R_B = [U_B-10 V] / 20 mA)
Digital output		
Contact type		3 floating N/O contacts
Switching voltage		30 V DC / 250 V AC
Switching current		2 A
General data		
Supply voltage		9 V DC ... 30 V DC
Current consumption	typ. / max.	75 mA / 200 mA
Degree of protection		IP20
Ambient temperature range		-40°C ... 70°C
Housing material		Polyamide PA non-reinforced
Dimensions W / H / D		22.5 / 99 / 114.5 mm
Screw connection solid / stranded / AWG		0.2 ... 4 mm² / 0.2 ... 2.5 mm² / 24 - 14
Conformance/approvals		
Conformance		FCC Directive, Part 15.247 ISC Directive RSS 210

Ordering data

Description	Type	Order No.	Pcs. / Pkt.
Wireless system, visit www.phoenixcon.com for more information	**RAD-ISM-900-XD-BUS**	**2885605**	1

Multipoint-to-point



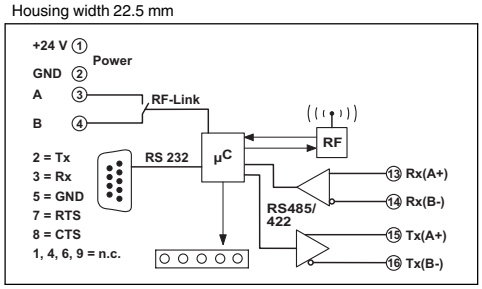
RAD-Line Serial IO - BD wireless system for transmission of serial data and I/O signals

The **RAD-ISM-900-DATA-BD-BUS...** bidirectional wireless system allows wireless connection of several decentralized controllers and the reception and output of I/O signals from the field to a central location (controller).

- Operates in the license-free 902 - 928 MHz ISM band
- Frequency-hopping spread spectrum technology
- Provides an interface for transfer of I/O data between 900 MHz wireless and V.24 (RS-232), RS-422, and RS-485 interfaces
- Programmable for point-to-point, point-to-multipoint, and multipoint-to-point configurations
- Integrated bus foot allows connection to additional I/O modules
- Individual modules can be configured as master, slave or repeater
- Up to 254 slaves may operate from a single master

Wireless transceiver for serial interfaces (V.24 (RS-232), RS-422/RS-485), can be extended

Ex: cULus
Housing width 22.5 mm



Notes:

The basic software for the configuration and diagnostics of two network devices can be downloaded free of charge at www.phoenixcontact.com. A software license is required to perform the diagnostic functions for multiple network devices.

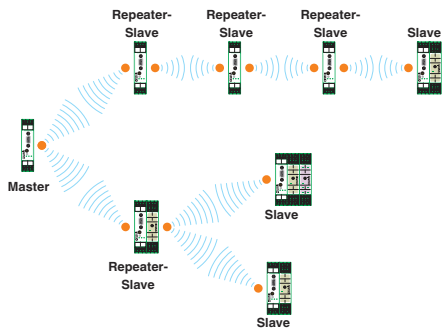
The products are only available for export outside the EU and the European Economic Area.

Technical data

Wireless path			
Direction	America	Australia	New Zealand
Frequency range	Bidirectional	Bidirectional	Bidirectional
Transmission power	902 ... 928	915.1 ... 927.8	921.4 ... 927.7 [MHz]
Number of channels	1 W	1 W	1 W
	4 x 63	2 x 63	1 x 63
Serial port	V.24 (RS-232)		RS-485/RS-422
Connection method	9-pole D-SUB (female connector)		COMBICON plug-in screw terminal block
Serial transmission speed	1.2 / 2.4 / 9.6 / 19.2 / 38.4 kbps		1.2 / 2.4 / 9.6 / 19.2 / 38.4 kbps
Data format/encoding	Asynchronous		
Data flow control/protocols	RTS/CTS		
General data			
Supply voltage	9 V DC ... 30 V DC		
Current consumption typ. / max.	110 mA / 180 mA		
Degree of protection	IP20		
Ambient temperature range	-40°C ... 70°C		
Housing material	Polyamide PA non-reinforced		
Dimensions W / H / D	22.5 / 99 / 114.5 mm		
Screw connection solid / stranded / AWG	0.2 ... 4 mm² / 0.2 ... 2.5 mm² / 24 - 12		
Conformance/approvals			
Conformance	FCC Directive, Part 15.247 ISC Directive RSS 210		
UL, USA/Canada	Class I, Div. 2, Groups A, B, C, D		

Ordering data

Description		Type	Order No.	Pcs. / Pkt.
Wireless module with serial interface	America	**RAD-ISM-900-DATA-BD-BUS**	**2867296**	1
Wireless module with serial interface	Australia	**RAD-ISM-900-DATA-BD-BUS-AU**	**2867996**	1
Wireless module with serial interface	New Zealand	**RAD-ISM-900-DATA-BD-BUS-NZ**	**2885168**	1



RAD-Line Serial - BD wireless system for transmission of serial data

The **RAD-ISM-900-DATA-BD...** bidirectional wireless system allows wireless connection of several decentralized controllers to a central location (controller).

- Operates in the license-free 902 - 928 MHz ISM band
- Frequency-hopping spread spectrum technology
- Provides an interface for transfer of data between 900 MHz wireless and V.24 (RS-232), RS-422, and RS-485 interfaces
- Programmable for point-to-point, point-to-multipoint, and multipoint-to-point configurations
- Individual modules can be configured as master, slave or repeater
- Up to 254 slaves may operate from a single master

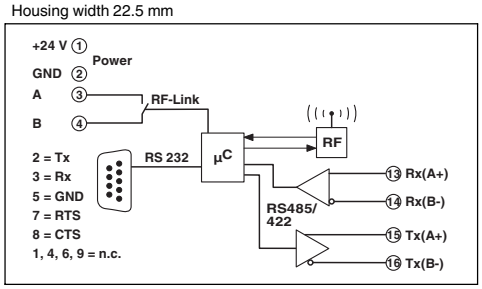
Notes:

The basic software for the configuration and diagnostics of two network devices can be downloaded free of charge at www.phoenixcontact.com. A software license is required to perform the diagnostic functions for multiple network devices.

The products are only available for export outside the EU and the European Economic Area.

Wireless transceiver for serial interfaces (V.24 (RS-232), RS-422/RS-485)

Ex: c UL us
Housing width 22.5 mm

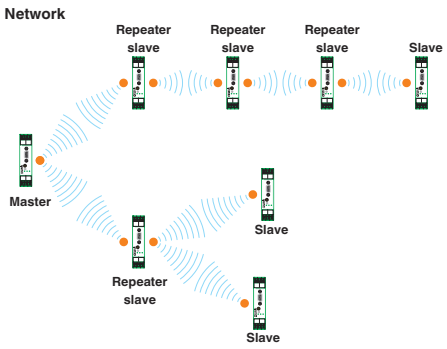


Technical data

Wireless path				
Direction		America	Australia	New Zealand
Frequency range		Bidirectional	Bidirectional	Bidirectional
Transmission power		902 ... 928	915.1 ... 927.8	921.4 ... 927.7 [MHz]
Number of channels		1 W	1 W	1 W
		4 x 63	2 x 63	1 x 63
Serial port		V.24 (RS-232)		RS-485/RS-422
Connection method		9-pole D-SUB (female connector)		COMBICON plug-in screw terminal block
Serial transmission speed		1.2 / 2.4 / 9.6 / 19.2 / 38.4 kbps		1.2 / 2.4 / 9.6 / 19.2 / 38.4 kbps
Data format/encoding		Asynchronous		
Data flow control/protocols		RTS/CTS		
General data				
Supply voltage		9 V DC ... 30 V DC		
Current consumption	typ. / max.	110 mA / 180 mA		
Degree of protection		IP20		
Ambient temperature range		-40°C ... 70°C		
Housing material		Polyamide PA non-reinforced		
Dimensions W / H / D		22.5 / 99 / 114.5 mm		
Screw connection solid / stranded / AWG		0.2 ... 4 mm² / 0.2 ... 2.5 mm² / 24 - 12		
Conformance/approvals				
Conformance		FCC Directive, Part 15.247 ISC Directive RSS 210		
UL, USA/Canada		Class I, Div. 2, Groups A, B, C, D		

Ordering data

Description		Type	Order No.	Pcs. / Pkt.
Wireless module with serial interface	America	**RAD-ISM-900-DATA-BD**	**2867131**	1
Wireless module with serial interface	Australia	**RAD-ISM-900-DATA-BD-AU**	**2867953**	1
Wireless module with serial interface	New Zealand	**RAD-ISM-900-DATA-BD-NZ**	**2885155**	1



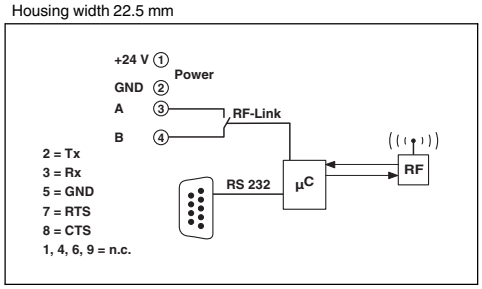
RAD-Line Serial - BD

The **RAD-ISM-900-RS232-BD...** bidirectional wireless system allows wireless connection of several decentralized controllers to a central location (controller) via a V.24 (RS-232) interface.

- Operates in the license-free 902 - 928 MHz ISM band
- Frequency-hopping spread spectrum technology
- Provides an interface for transfer of data between 900 MHz wireless and RS-232 interfaces
- Programmable for point-to-point, point-to-multipoint, and multipoint-to-point configurations
- Programmable for point-to-point, point-to-multipoint, and multipoint-to-point configurations
- Individual modules can be configured as master, slave or repeater
- Up to 254 slaves may operate from a single master

Wireless transceiver for serial interfaces (V.24 (RS-232))

Ex: cULus
Housing width 22.5 mm



Notes:

The basic software for the configuration and diagnostics of two network devices can be downloaded free of charge at www.phoenixcontact.com. A software license is required to perform the diagnostic functions for multiple network devices.

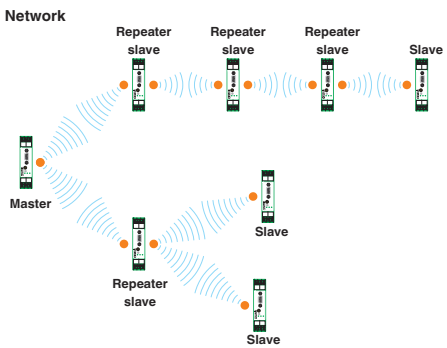
The products are only available for export outside the EU and the European Economic Area.

Technical data

Wireless path			
Direction		Bidirectional	Bidirectional
Frequency range		902 ... 928	921.4 ... 927.7 [MHz]
Transmission power		1 W	1 W
Number of channels		4 x 63	1 x 63
Serial port		V.24 (RS-232)	
Connection method		9-pole D-SUB (female connector)	
Serial transmission speed		1.2 / 2.4 / 9.6 / 19.2 / 38.4 kbps	
Data format/encoding		Asynchronous	
Data flow control/protocols		RTS/CTS	
General data			
Supply voltage		9 V DC ... 30 V DC	
Current consumption	typ. / max.	110 mA / 180 mA	
Degree of protection		IP20	
Ambient temperature range		-40°C ... 70°C	
Housing material		Polyamide PA non-reinforced	
Dimensions W / H / D		22.5 / 75 / 107.5 mm	
Screw connection solid / stranded / AWG		0.2 ... 4 mm² / 0.2 ... 2.5 mm² / 24 - 12	

Ordering data

Description		Type	Order No.	Pcs. / Pkt.
Wireless module with serial interface	America	**RAD-ISM-900-RS232-BD**	**2867555**	1
Wireless module with serial interface	New Zealand	**RAD-ISM-900-RS232-BD-NZ**	**2885142**	1



N

RAD-Line Ethernet with Trusted Wireless

The **RAD-ISM-900-EN-BD...** industrial wireless system allows wireless connection of several decentralized controllers to a central location (controller) via an Ethernet or serial connection.

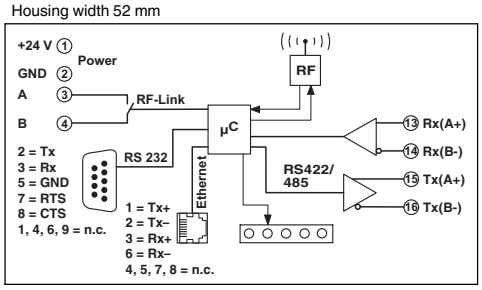
- Operates in the license-free 902 - 928 MHz ISM band
- Frequency-hopping spread spectrum technology
- Provides an interface for transfer of data between 900 MHz wireless and Ethernet, RS-232, RS-422 or RS-485 interfaces
- Contains an adjustable 10 mW... 1 W transmitter
- Supports TCP/IP, UDP, and IP v4 protocols
- Programmable for point-to-point, point-to-multipoint, and multipoint-to-point configurations
- Incorporates security using selectable 128/192/256-bit AES encryption
- **RAD-ISM-900-EN-BD-BUS** features an integrated bus foot to connect I/O modules (addressable via Modbus)
- Individual modules can be configured as master, slave or repeater using integrated web browser interface
- **RAD-ISM-900-EN-BD/B** is a dedicated slave wireless transceiver with no Ethernet ports

Notes:

The products are only available for export outside the EU and the European Economic Area.

Wireless transceiver for Ethernet and serial interfaces (V.24 (RS-232), RS-422/RS-485)

Ex: cULus
Housing width 52 mm



Technical data

Wireless path		
Direction	Bidirectional	
Frequency range	902 MHz ... 928 MHz	
Transmission power	10 ... 30 dBm	
Serial port	V.24 (RS-232)	RS-485
Connection method	9-pole D-SUB (female connector)	COMBICON plug-in screw terminal block
Serial transmission speed	300 ... 57,6 kbps	
Data format/encoding	Asynchronous	
Data flow control/protocols	RTS/CTS	
General data		
Supply voltage	11 V DC ... 30 V DC	
Current consumption max.	250 mA (at 24 V DC)	
Degree of protection	IP20	
Ambient temperature range	-40°C ... 65°C	
Housing material	Polyamide PA non-reinforced with aluminum heatsink	
Dimensions W / H / D	52 / 99 / 115 mm	
Screw connection solid / stranded / AWG	0.2 ... 4 mm² / 0.2 ... 2.5 mm² / 24 - 14	
Conformance/approvals		
Conformance	FCC Directive, Part 15.247 ISC Directive RSS 210	
UL, USA/Canada	Class I, Div. 2, Groups A, B, C, D	

Ordering data

Description	Type	Order No.	Pcs. / Pkt.
Wireless module with optional Ethernet and serial interfaces			
Bus foot for I/O extension modules	**RAD-ISM-900-EN-BD-BUS**	**2900017**	1
Cannot be extended	**RAD-ISM-900-EN-BD**	**2900016**	1
Without serial ports	**RAD-ISM-900-EN-BD/B**	**2901205**	1

RAD-Line Ethernet with 400 mW WLAN

High-power Ethernet industrial wireless transceiver that conforms to standard IEEE 802.11b/g.

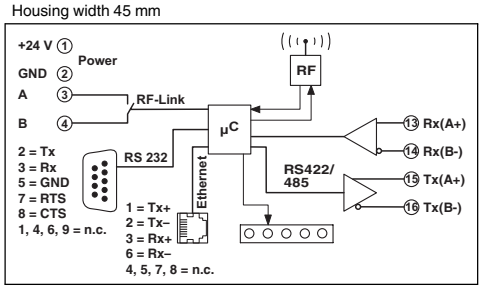
- Operates in the license-free 2.4 GHz ISM band
- Features a 400 mW industrial wireless transceiver
- Selectable 802.11i high security with 128/192/256-bit AES encryption and optional 802.1x authentication
- Supports TCP/IP, UDP, and IP v4 protocols
- Individual modules can be configured as point, bridge or client modes using integrated web browser interface
- Bridge mode supports a network of up to 40 nodes on a single network resulting in a highly reliable network
- Provides an interface for transfer of data between legacy serial devices (V.24 (RS-232), RS-422, RS-485 interfaces) to an Ethernet network
- Programmable for point-to-point, point-to-multipoint, and multipoint-to-point configurations
- Optional integrated bus foot for connection to RAD-Line extension modules
- Can be used as a Modbus RTU/TCP gateway

Notes:

The products are only available for export outside the EU and the European Economic Area.

WLAN wireless transceiver for Ethernet and serial interfaces (V.24 (RS-232), RS-422/RS-485), can be extended with I/O extension mod-

Ex: c UL us
Housing width 45 mm



Technical data

Wireless path			
Direction		Bidirectional	
Frequency range		2.4032 GHz ... 2.4799 GHz	
Transmission power		400 mW	
Serial port		V.24 (RS-232)	RS-485/RS-422
Connection method		9-pole D-SUB (female connector)	COMBICON plug-in screw terminal block
Serial transmission speed		300 ... 57,6 kbps	300 ... 57,6 kbps
Data format/encoding		Asynchronous	
Data flow control/protocols		RTS/CTS	
General data			
Supply voltage		12 V DC ... 30 V DC	
Current consumption	typ. / max.	230 mA / 280 mA	
Degree of protection		IP20	
Ambient temperature range		-40°C ... 60°C	
Housing material		Polyamide PA non-reinforced	
Dimensions W / H / D		45 / 99 / 115 mm	
Screw connection solid / stranded / AWG		0.2 ... 4 mm² / 0.2 ... 2.5 mm² / 24 - 14	
Conformance/approvals			
Conformance		FCC Directive, Part 15.247 ISC Directive RSS 210	
UL, USA/Canada		Class I, Div. 2, Groups A, B, C, D	

Ordering data

Description	Type	Order No.	Pcs. / Pkt.
WLAN wireless module, high-power transceiver with Ethernet and serial interface			
Bus foot for I/O extension modules	**RAD-80211-XD/HP-BUS**	**2900047**	1
Cannot be extended	**RAD-80211-XD/HP**	**2900046**	1

RAD-Line accessories
Omnidirectional antennas

- Mobile or stationary applications
- Point-to-multipoint configurations
- Small antennas are suitable for applications with a shorter range
- Large antennas are suitable for applications requiring longer range

2.15 dBi gain

7 dBi gain

		Technical data	Technical data
General data			
Ambient temperature range		-40°C ... 75°C	-40°C ... 80°C
Degree of protection		IP65	IP65
Gain		2.15 dBi	7 dBi
Impedance		50 Ω	50 Ω
Connection method		MCX (male)	N (female)
Apex angle	Vertical / Horizontal	(N/A) / 360°	17° / 100°
Dimensions W / H		3 / 89 mm	3 / 609 mm
Frequency range		900 MHz	900 MHz
Scope of supply		Incl. mounting material	Incl. mounting material

	Ordering data			Ordering data		
Description	Type	Order No.	Pcs. / Pkt.	Type	Order No.	Pcs. / Pkt.
Omnidirectional antenna						
	RAD-ISM-900-ANT-OMNI-0-6	2867160	1	RAD-ISM-900-ANT-OMNI-5	2867199	1

RAD-Line accessories
Omnidirectional antennas

- Mobile or stationary applications
- Point-to-multipoint configurations
- Small antennas are suitable for applications with a shorter range
- Large antennas are suitable for applications requiring longer range

5 dBi gain

8 dBi gain

		Technical data	Technical data
General data			
Ambient temperature range		-40°C ... 80°C	-40°C ... 80°C
Degree of protection		IP65	IP65
Gain		5.15 dBi	8 dBi
Impedance		50 Ω	50 Ω
Connection method		N (female)	N (female)
Apex angle	Vertical / Horizontal	28° / 360°	15° / 360°
Dimensions W / H		60.452 / 1123.95 mm	60.5 / 1803.4 mm
Frequency range		902 MHz	900 MHz
Scope of supply		Incl. mounting material	Incl. mounting material

	Ordering data			Ordering data		
Description	Type	Order No.	Pcs. / Pkt.	Type	Order No.	Pcs. / Pkt.
Omnidirectional antenna						
	RAD-ISM-900-ANT-OMNI-FG-3-N	2867791	1	RAD-ISM-900-ANT-OMNI-FG-6-N	2885579	1

RAD-Line accessories
Directional (YAGI) antennas

- Stationary applications
- Point-to-point configurations with line of sight
- Longer ranges than omnidirectional antennas

5 dBi gain,
with 0.6 m connecting cable

8.5 dBi gain,
with 0.6 m connecting cable

		Technical data	Technical data
General data			
Ambient temperature range		-40°C ... 80°C	-40°C ... 80°C
Degree of protection		IP65	IP65
Gain		5 dBi	8.5 dBi
Impedance		50 Ω	50 Ω
Connection method		N (female) with cable (0.6 m)	N (female) with cable (0.6 m)
Apex angle	Vertical / Horizontal	78° / 168°	62° / 100°
Dimensions W / H		60 / 170 mm	60 / 170 mm
Frequency range		900 MHz	900 MHz
Scope of supply		Incl. mounting material	Incl. mounting material

	Ordering data			Ordering data		
Description	Type	Order No.	Pcs. / Pkt.	Type	Order No.	Pcs. / Pkt.
Directional antenna						
	RAD-ISM-900-ANT-YAGI-3-N	**2867801**	1	**RAD-ISM-900-ANT-YAGI-6.5-N**	**2867814**	1

RAD-Line accessories
Directional (YAGI) antennas

- Stationary applications
- Point-to-point configurations with line of sight
- Longer ranges than omnidirectional antennas

8.5 dBi gain,
with 7.5 m connecting cable

8.5 dBi gain,
with 15 m connecting cable

		Technical data	Technical data
General data			
Ambient temperature range		-40°C ... 80°C	-40°C ... 80°C
Degree of protection		IP65	IP65
Gain		8.5 dBi	8.5 dBi
Impedance		50 Ω	50 Ω
Connection method		N (female) with cable (7.5 m)	N (female) with cable (15 m)
Apex angle	Vertical / Horizontal	62° / 100°	62° / 100°
Dimensions W / H		60 / 170 mm	60 / 170 mm
Frequency range		900 MHz	900 MHz
Scope of supply		Incl. mounting material	Incl. mounting material

	Ordering data			Ordering data		
Description	Type	Order No.	Pcs. / Pkt.	Type	Order No.	Pcs. / Pkt.
Panel antenna, including extension cable						
	RAD-ISM-900-ANT-YAGI-6.5-25-AS	**2867827**	1	**RAD-ISM-900-ANT-YAGI-6.5-50-AS**	**2867830**	1

RAD-Line accessories
Surge protection

- For externally mounted installations
- Installed between antenna and wireless module for surge protection
- Replaceable, gas-filled arrestor

With N connector, grounded shield

		Technical data
General data		
Ambient temperature range		-40°C ... 80°C
Degree of protection		IP55
Attenuation	(at 900 MHz)	Typ. 0.2 dB (≤ 2.2 GHz)
Impedance		50 Ω

Ordering data

Description	Type	Order No.	Pcs. / Pkt.
COAXTRAB, attachment plug with surge protection for coaxial cables			
N connector, male/female	**CN-UB-280DC-SB**	**2818148**	1
N connector, female/female	**CN-UB-280DC-BB**	**2818850**	1

Antenna splitter

- Multiple wireless modules can share an antenna in a control cabinet

		Technical data
General data		
Ambient temperature range		-40°C ... 85°C
Degree of protection		IP20
Attenuation per branch	(at 900 MHz)	3 dB
Impedance		50 Ω
Connection method		Type MCX (female)

Ordering data

Description	Type	Order No.	Pcs. / Pkt.
Antenna splitter			
	RAD-ISM-900-ANT-4	**2867050**	1

RAD-Line accessories
Adapter cable

– Various cables for connecting different antennas

	Technical data	Technical data
General data		
Ambient temperature range	-40°C ... 75°C	-40°C ... 85°C
Attenuation (at 900 MHz)	0.89 dB/m	Approx. 1.5 dB/m
Impedance	50 Ω	50 Ω
Conformance/approvals		
UL, USA/Canada	-	Class I, Div. 1, 2, Groups A, B, C, D

Description	Ordering data: Type	Order No.	Pcs. / Pkt.	Ordering data: Type	Order No.	Pcs. / Pkt.
Antenna adapter cable						
1.2 m long, MCX (male) -> N (female)	**RAD-CON-MCX-N-SB**	**2867717**	1			
1.2 m long, 90° MCX (male) -> N (female)	**RAD-CON-MCX90-N-SS**	**2885207**	1			
1.2 m long, SMA (male) -> N (female)	**RAD-CON-SMA-N-SS**	**2867403**	1			
30 cm long, MCX (male) -> MCX (male)	**RAD-CON-MCX-MCX-SS**	**2867607**	1			
Antenna adapter cable for Ex Zone 1						
90 cm long, MCX (male) -> RPSMA (male)				**RAD-CON-MCX-RPSMA-EX**	**2885621**	1

Extension cable

– Various cables for extending the distance between the wireless module and antenna
– Distance should be kept as short as possible to reduce attenuation

	Technical data
General data	
Ambient temperature range	-40°C ... 75°C
Impedance	50 Ω

Description	Ordering data: Type	Order No.	Pcs. / Pkt.
Antenna extension cable, N connection at both ends (male)			
3 m long, attenuation (at 900 MHz) 0.5 dB/m	**RAD-CAB-RG58-10**	**2867364**	1
6 m long, attenuation (at 900 MHz) 0.5 dB/m	**RAD-CAB-RG58-20**	**2867212**	1
7 m long, attenuation (at 900 MHz) 0.25 dB/m	**RAD-CAB-RG213-25**	**2867597**	1
12 m long, attenuation (at 900 MHz) 0.25 dB/m	**RAD-CAB-RG213-40**	**2867377**	1
15 m long, attenuation (at 900 MHz) 0.25 dB/m	**RAD-CAB-RG213-50**	**2867225**	1
18 m long, attenuation (at 900 MHz) 0.13 dB/m	**RAD-CAB-LMR400-60**	**2867380**	1
24 m long, attenuation (at 900 MHz) 0.13 dB/m	**RAD-CAB-LMR400-80**	**2867393**	1
30 m long, attenuation (at 900 MHz) 0.13 dB/m	**RAD-CAB-LMR400-100**	**2867238**	1
38 m long, attenuation (at 900 MHz) 0.08 dB/m	**RAD-CAB-LMR600-125**	**2885210**	1
45 m long, attenuation (at 900 MHz) 0.08 dB/m	**RAD-CAB-LMR600-150**	**2885184**	1
60 m long, attenuation (at 900 MHz) 0.06 dB/m	**RAD-CAB-LMR900-200**	**2885197**	1

Solar system – Autonomous power supply for RAD-Line wireless systems

The **RAD-SOL-SET...** provides a complete, self-contained power supply for remote sensors outside the range of an installed power system.

– Pre-wired cabinet includes charge controller, solar battery, surge protection, and fuses
– Wall or mast mounting as an option

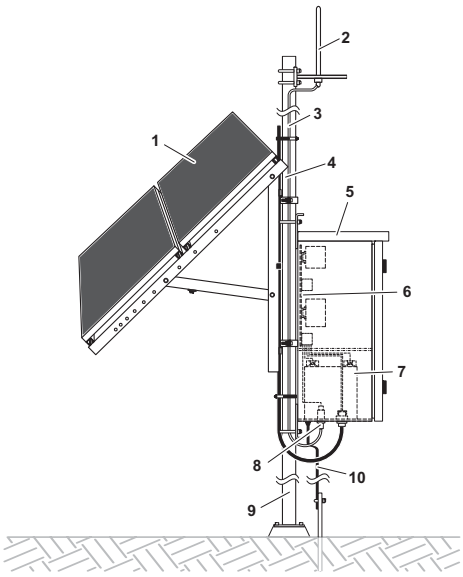
24 V/40 Wp solar system, 40 Ah battery capacitance

Technical data

Control cabinet/solar system	
System voltage	24 V DC
Max. load (dependent on site of appl.)	1 W ... 4.7 W
Ambient temperature range	-30°C ... 60°C
Dimensions W / H / D	489 / 822.4 / 337.7 mm
Solar panel	
Output voltage	Typ. 16.9 V DC (voltage at maximum output)
Short-circuit current	Max. 2.34 A
Nominal capacitance	40 Wp ±10%
Dimensions W / H / D	652 / 639 / 36 mm
Solar battery	
Nominal voltage U_N	12 V DC
Nominal capacitance	40 Ah
Weight	15 kg
Dimensions W / H / D	168 / 175 / 197 mm
Charge controller	
Supply voltage	24 V DC
Current consumption	Typ. 10 mA
Nominal load	10 A
Dimensions W / H / D	152 / 55 / 34 mm

Ordering data

Description	Type	Order No.	Pcs. / Pkt.
24 V solar system, comprising solar panel and pre-wired control cabinet with charge controller, solar battery, surge protection, fuses, and assembly material (including mast clips)	**RAD-SOL-SET-24-40**	**5605941**	1
Charge controller	**RAD-SOL-CHG-24- 10**	**2885443**	1
Solar panel			



1 2 solar panels (conn. in series)
2 Antenna
3 Antenna cable
4 Flexible protective tubing
5 Control cabinet
6 Control cabinet electronics
7 Batteries
8 Surge protection for antenna cable and control cabinet electronics
9 Mast (e.g. signpost with 76 mm diameter
10 Protective earth (PE), grounding cable

Example of a typical solar system installation

24 V/60 Wp solar system, 70 Ah battery capacitance

24 V/100 Wp solar system, 84 Ah battery capacitance

Technical data

24 V DC 1.5 W ... 7.2 W -30°C ... 60°C 489 / 822.4 / 337.7 mm	24 V DC 2.4 W ... 12 W -30°C ... 60°C 489 / 822.4 / 337.7 mm
Typ. 16.8 V DC (voltage at maximum output) Max. 1.94 A 30 Wp 652 / 639 / 36 mm	Typ. 17.4 V DC (voltage at maximum output) Max. 3.11 A 54 Wp +15% (-5%) 652 / 639 / 36 mm
12 V DC 70 Ah 19 kg 168 / 178 / 259 mm	12 V DC 84 Ah 24 kg 172 / 210 / 260 mm
24 V DC Typ. 10 mA 10 A 152 / 55 / 34 mm	24 V DC Typ. 10 mA 10 A 152 / 55 / 34 mm

Ordering data

Type	Order No.	Pcs. / Pkt.
RAD-SOL-SET-24- 60	**5605942**	1
RAD-SOL-CHG-24- 10	**2885443**	1

Ordering data

Type	Order No.	Pcs. / Pkt.
RAD-SOL-SET-24-100-US	**5605943**	1
RAD-SOL-CHG-24- 10	**2885443**	1
RAD-SOL-PAN-12- 50	**2885456**	2

EMpro
690.3 V
689.6
688.9
50.00 Hz
EMpro
103.8 kW
10.8 kvar
104.3 kVA
EMpro
296.7 kW
101.6 kvar
313.6 kVA

INTERFACE Monitoring

Energy meters, current transformers, measuring transducers, monitoring and timer relays

The INTERFACE Monitoring products allow you to measure, monitor, and convert electrical mains supply and system parameters.

Energy meters
EMpro energy monitors measure, analyze, and communicate all electrical parameters, such as voltages, currents, power values, energy consumption values, harmonics, and instances of mains unbalance.

Current transformers
PACT current transformers convert currents of up to 4000 amps into secondary currents of one and five amps.

Current and voltage transducers
MCR current and voltage transducers convert currents and voltages into standard analog signals.
Solarcheck enables string monitoring in photovoltaic systems.

Electronic monitoring relays
EMD relays monitor currents, voltages, phase parameters, winding temperatures, motor loads, and liquid levels - and signal when limits are exceeded via a relay output.

Electronic timer relays
ETD timer relays are used for straightforward time control functions.
We can offer you two product ranges: compact timer relays with a design width of 6.2 mm and multifunctional timer relays.

Special function modules
EMG special function modules enable straightforward components such as diodes to be used in an industrial context. These products feature a professional housing and connection method.

Product range overview

Product overview	**684**
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Monitoring relays, timer relays, special function modules	**722**
EMD electronic monitoring relays	**724**
ETD electronic timer relays	**730**
EMG special function modules	**734**

EMpro energy meters

	Energy meters		Extension modules		
Type	**EEM-MA600** **EEM-MA400**	**EEM-MA250** **EEM-MA200**	**EEM-2DIO-MA600** **EEM-2AO-MA600**	**EEM-MEMO-MA600**	**EEM-...**
Description	**Energy meters for front panel installation,** for counting, measuring, monitoring, analysis, and communication	**Energy meters for DIN rail mounting,** for counting, measuring, monitoring, analysis, and communication	**Special function modules,** - With two digital I/Os - With two analog outputs	**Memory module,** for storing measured values and alarms – 512 KB	**Communication modules,** JBUS/MODBUS RTU, PROFIBUS, Ethernet
Page	690	691	692	692	693

MCR current and voltage transducers

	Current transducers				Current protectors
Type	**MCR-S-1(0)-5(0)-UI-...** **MCR-SL-CUC-...**	**SCK-M-8S-20A** **SCK-C-MODBUS**	**MCR-SL-S-...** **MCR-SL-CAC...**	**MCR-SLP-1-5-UI-0**	**MCR-SL-S-16-SP-24**
Description	**For DC, AC, and distorted currents,** - 0...55 A AC/DC, programmable - 0...600 A AC/DC	**Solarcheck** **PV string monitoring,** measuring module, communication module	**For sinusoidal and non-sinusoidal alternating currents,** - 0...12 A AC - 0...200 A AC, can be retrofitted	**For sinusoidal alternating currents,** passive, 0...1 A/0...5 A AC	**For sinusoidal alternating currents,** 0...16 A AC
Page	712	715	716	718	719

MCR current and voltage transducers

	Voltage transducers			Accessories	
Type	**MCR-VDC-UI-B-DC**	**MCR-VAC-UI-0-DC**		**MCR/PI-CONF-WIN**	**CM-KBL-RS232/USB** **MCR-TTL-RS232-E**
Description	**For DC voltages,** 0...±660 V DC	**For sinusoidal DC voltages,** 0...440 V AC		**Configuration software package** for programming MCR-S-... modules	**USB adapter cable** **Software adapter cable,** for programming MCR-S-... modules
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PACT current transformers

Current transformers				Accessories
PACT MCR-V1(C)-...	**PACT MCR-V2(C)-...**	**PACT MCR-V3-...**		**PACT MCR-...**
Bus-bar current transformer, primary rated current I_{pn}: 0...(50...500) A AC, official calibration available as an option	**Plug-in current transformer,** primary rated current I_{pn}: 0...(100...4000) A AC, official calibration available as an option	**Winding current transformer,** primary rated current I_{pn}: 0...(1...40) A AC		**Copper sleeves** **Secondary terminal cover** **DIN rail adapter** **Insulating caps**
697	698	706		707

EMD electronic monitoring relays

Single-phase	Three-phase	Real power, cos ϕ	Temperature	Level
EMD-...-C-... **EMD-...-V-...**	**EMD-...-3V-...**	**EMD-FL-RP-480** **EMD-FL-PF-400**	**EMD-SL-PTC**	**EMD-SL-LL-...**
Current monitoring Overcurrent, undercurrent, window **Voltage monitoring** Surge voltage, undervoltage, window	**Voltage monitoring** Surge voltage, window, unbalance, phase sequence, phase failure	**Real power monitoring** Underload, overload, window, winding temperature **Load monitoring (cos ϕ)** Underload, overload, window	**Temperature monitoring (motor winding)**	**Level monitoring,** minimum, maximum monitoring
724	726	728	729	729

ETD electronic timer relays

Compact	Multifunctional
ETD-BL-1T-...	**ETD-FL-2T-DTI** **ETD-SL-...T-...**
6.2 mm compact timer relays, with switchoff delay, with switchoff delay, flasher function 10 s, 300 s, 30 min., 300 min.	**Multifunctional timer relays,** clocking, flashing, with switch-on/switch-off delay, passing make/break contact, pulse sequence evaluation
730	732

EMG special function modules

Diode modules	Lamp testing modules	Display modules
EMG...-DIO...	**EMG...-E/LP** **EMG...-M/LP**	**EMG..-LA...** **EMG...LED...**
Diode modules, - Can be wired individually - With P polarity (common cathode) - With M polarity (common anode)	**Lamp testing modules** - Individual checking of separate lamps - Centrally controlled checking of lamps	**Display modules** - With glow lamps - With LEDs
734	735	735

Measuring devices for energy management

Energy management

Within industry, energy is viewed as a variable cost factor. As a result, lower energy costs are becoming increasingly important in terms of providing companies with a major competitive edge in the areas of production, process, and industrial engineering.

By ensuring transparency in relation to your levels of energy consumption and energy costs, you can benefit from the following advantages:

– **Reduce electricity costs** - by recognizing energy-saving potential
– **Optimize peak loads** - with intelligent trend calculation and load management
– **Optimize system utilization** - thanks to intelligent switching of system parts, reduced harmonics, and even loading of the network
– **Safeguard the production process** - by constantly monitoring system parameters to allow faster detection of error sources

Alongside energy consumption, the quality of the energy supplied, the reliability of supply, and effective system utilization also play an important role in ensuring profitability. This calls for continuous measurement and analysis of all sources of energy.

The right solution for your energy management requirements

For the measuring, monitoring, and communication tasks associated with your energy management application, you need look no further than the EMpro product range for the ideal measuring device solution.

The communication expert

The EEM-MA600 energy meter is capable of performing all measurement tasks associated with power supply applications up to 700 V AC – from straightforward current and power measurement through to detection of harmonics, along with spectral analysis and trend calculation.

Plug-in extension modules turn the EEM-MA600 into a true communication expert, making it easy to integrate into fieldbus systems and network structures.

The web server that has been integrated into the Ethernet communication modules allows you to access measured data easily and to configure all connected measuring devices directly from the control center.

Application examples:
– Monitoring the mains supply parameters of power generation systems
– Monitoring and measuring the energy supplied
– Monitoring the quality of the mains during supply and consumption

The universal solution on the front panel

The EEM-MA400 energy meter is capable of all standard measurement tasks in the main distribution up to 500 V AC.

The plug-in RS-485 extension module allows the measuring device to be integrated easily into JBUS and MODBUS systems.

Application examples:
– Monitoring the mains supply parameters
– Monitoring and measuring energy flows
– Cost center accounting

The highly communicative device for use on DIN rails

The EEM-MA250 energy meter is ideal for straightforward measurement tasks in small control cabinets located directly on the machine.

The built-in RS-485 interface allows the measuring device to be integrated easily into JBUS and MODBUS systems.

The compact starter for use in the sub-distribution

The EEM-MA200 energy meter is perfect for straightforward measurement tasks where on-site analysis of the measured values is sufficient.

Application examples:
– Monitoring the mains supply parameters
– Measuring energy consumption levels
– Consumption accounting
– Machine monitoring

The communication expert: EEM-MA600

The universal solution on the front panel: EEM-MA400

The highly communicative solution: EEM-MA250/ The compact starter: EEM-MA200

Measurement - analysis - communication

The products in the EMpro measuring device range are capable of acquiring, monitoring, and displaying all electrical system and machine parameters locally. The devices can be integrated into network structures in a modular way so that the measured values can be communicated right through to the control center.

Using higher-level software, you are able to visualize and evaluate the results. On the basis of the consumption and load curves produced, as well as trend calculations, you can then carry out any optimization work required.

The EMpro measuring device range offers:

– Direct access to measured values
– Easy device configuration
– Flexible network connections
– High investment security

Direct access to measured values

At the touch of a button, you can access precisely those measured values that are of relevance. This enables fast, on-site analysis of the system parameters.

Use the convenient web server function to request measured values directly from the control center.

Easy device configuration

The choice is yours: either configure the EMpro measuring devices locally by following the operator guidance or via the web server on a PC.

Flexible network connections

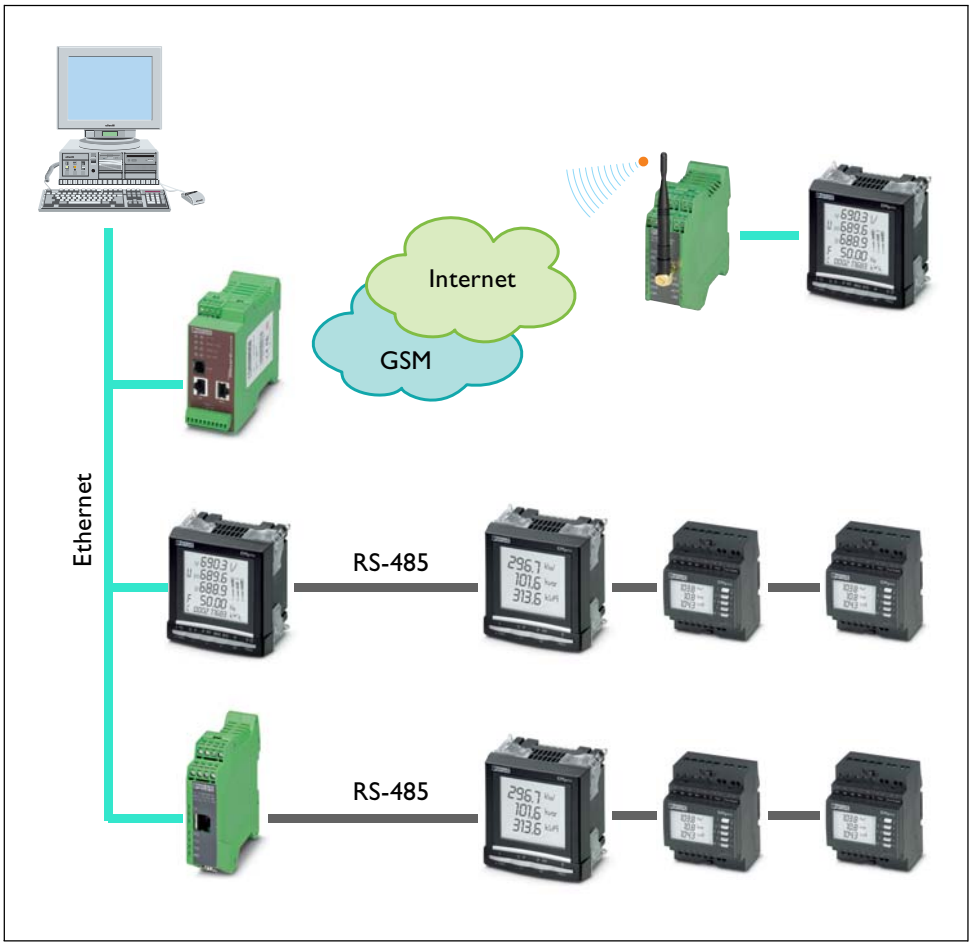
The communication modules allow you to integrate the EMpro measuring devices into network structures and fieldbus systems in a flexible way. This means that measured values can even be made available in the control center for further processing.

EMpro communication interfaces:
– Ethernet with integrated web server
– PROFIBUS DP (1.5 and 12 Mbit)
– RS-485, JBUS, and MODBUS RTU
– Ethernet/RS-485 gateway

High investment security

The special function and communication modules enable you to add new functions to your EMpro measuring devices at any time. In this way, the measuring devices can keep pace with your requirements as they grow. This means you can enjoy high levels of planning reliability and investment security.

EMpro extension modules:
– Digital inputs and outputs
– Analog outputs
– Communication interfaces
– Measured data memory



You can easily select the right device for your application by referring to the table below:

Product type	The compact starter EEM-MA200	The highly communicative device for use on DIN rails EEM-MA250 with RS-485	The universal solution on the front panel EEM-MA400	The communication expert EEM-MA600
Mounting				
DIN rail	•	•		
Front panel			•	•
Measurement				
Currents				
I1, I2, I3, Σ3	•	•		•
I1, I2, I3, IN (calculation)			•	•
Maximum values	•	•	•	•
Average values			•	•
Supports current measurement without an external transformer				•
Voltages				
U12, U23, U31, V1, V2, V3	•	•	•	•
Maximum values				•
Average values				•
Voltage measurement via voltage transducer				•
Voltage measurement, direct, up to 500 V	•	•	•	•
Voltage measurement, direct, up to 700 V				•
Frequency	•	•	•	•
Power				
ΣP, ΣQ, ΣS (±)	•	•	•	•
P, Q, S per phase (±)			•	•
Maximum values P, Q, S	•	•	•	•
Average values P, Q, S			•	•
Trend power				•
Power factor				
ΣPF	•	•	•	•
PF per phase			•	•
THD (Total Harmonic Distortion)				
3I, 3V, 3U	**Up to 51st harmonic**	**Up to 51st harmonic**		
I1, I2, I3, U12, U23, U31, V1, V2, V3			**Up to 51st harmonic**	**Up to 63rd harmonic**
Temperature				
Temperature measurement (internal)	•	•		
Counting				
Active and reactive energy (kWh+, kvarh+)	•	•	•	•
Active and reactive energy (kWh±, kvarh±)				•
Two-tariff meter	•	•		
Operating hours	•	•	•	•
Analysis				
Harmonics analysis				**Up to 63rd harmonic**
Outputs				
One configurable pulse output (kWh+, kvarh+) or alarm (threshold value)	•	•		
Inputs				
One configurable input for tariff switch-over	•	•		
Special function modules (optional)				
Memory				•
Two digital I/Os				•
Two analog outputs				•
Communication modules (optional)				
RS-485 JBUS/MODBUS			•	•
PROFIBUS DP				•
PROFIBUS (D-SUB)				•
Ethernet				•
RS-485/Ethernet gateway				•

Key

I1, I2, I3	Conductor currents	P	Real power
IN	Neutral conductor current	Q	Reactive power
U12, U23, U31	Phase conductor voltages	S	Apparent power
V1, V2, V3	Line voltages to N	PF	Power factor
		THD	Total Harmonic Distortion

Energy meters

N

EMpro energy meters are capable of acquiring, monitoring, and displaying all electrical system and machine parameters locally.

EEM-MA600
- Can be extended with special function and communication modules
- Remote access via web server, integrated into Ethernet communication module
- Acquisition of individual harmonics up to 63rd harmonic
- Trend calculation for active and reactive power

EEM-MA400
- Can be extended with RS-485 communication module (JBUS/MODBUS)
- Acquisition of total harmonics up to 51st harmonic

EEM-MA250
- Two-tariff measurement via pulse input
- Pulse output
- RS-485 interface (JBUS/MODBUS)

EEM-MA200
- Two-tariff measurement via pulse input
- Pulse output

Measuring voltage of up to 700 V AC, extendable

Housing width 96 mm

Technical data

Input data	
Measuring principle	True r.m.s. value measurement
Acquisition of harmonics	Up to 63rd harmonic
Measured value	AC sine (45 ... 65 Hz)
Voltage measuring input V1, V2, V3	
Input voltage range	18 V AC ... 700 V AC (phase/phase) 11 V AC ... 404 V AC (phase/neutral conductor) Primary 500 kV AC (via external voltage transducers) Secondary (60, 100, 110, 115, 120, 173, 190 V AC)
Accuracy	0.2%
Current measuring input I1, I2, I3	
Input current range (via external transformers)	9999 A (primary) (1 A or 5 A, secondary)
Overload capacitance	10 A (continuous)
Operate threshold	10 mA
Accuracy	0.2%
Power measurement	
Measuring range	0 MW ... 8000 MW / 0 Mvar ... 8000 Mvar / 0 MVA ... 8000 MVA
Accuracy	0.5%
Active energy (IEC 62053-22)	Class 0.5S
Reactive power (IEC 62053-23)	Class 2
Digital input	
Voltage input signal	(via extension module)
Switching output	
Output description	Via extension module
Maximum switching voltage	-
Current carrying capacitance	-
Serial port	
Output description	Via extension module
Serial transmission speed	-
Display	
Type	LCD, backlit
Measuring rate	1 s
General data	
Supply voltage	110 V AC ... 400 V AC ±10% 120 V DC ... 350 V DC (±20%)
Nominal power consumption	10 VA 20 VA (with maximum number of extension modules)
Degree of protection	IP51 (front), IP20 (back)
Ambient temperature range	-10°C ... 55°C (14°F to 131°F)
Dimensions W / H / D	96 / 96 / 60 mm
Dimensions W / H / D with extension module	96 / 96 / 95 mm
Connection cross section solid / stranded / AWG	
Voltage and other connections	0.5 ... 2.5 mm² / 0.5 ... 2.5 mm² / 20 - 14
Current connection	0.5 ... 6 mm² / 0.5 ... 6 mm² / 20 - 8
Conformance/approvals	
Conformance	CE-compliant

Ordering data

Description	Type	Order No.	Pcs. / Pkt.
Energy meter, for installation in front panel			
	EEM-MA600	**2901366**	1
Energy meter, for mounting on a DIN rail			

N

Measuring voltage of up to 500 V AC, can be extended with RS-485 interface

Housing width 96 mm

Technical data

True r.m.s. value measurement
Up to 51st harmonic
AC sine (45 ... 65 Hz)

50 V AC ... 500 V AC (phase/phase)
28 V AC ... 289 V AC (phase/neutral conductor)
-

0.2%

9999 A (primary)
5 A (secondary)
6 A (continuous)
5 mA
0.2%

0 MW ... 11 MW / 0 Mvar ... 11 Mvar / 0 MVA ... 11 MVA

0.5%
Class 0.5S
Class 2

-

-
-
-

Via extension module
-

LCD, backlit
1 s

110 V AC ... 400 V AC ±10%
120 V DC ... 350 V DC (±20%)
5 VA
10 VA (with maximum number of extension modules)
IP51 (front), IP20 (back)
-10°C ... 55°C (14°F to 131°F)
96 / 96 / 60 mm
96 / 96 / 95 mm

0.5 ... 2.5 mm² / 0.5 ... 2.5 mm² / 20 - 14
0.5 ... 6 mm² / 0.5 ... 6 mm² / 20 - 8

CE-compliant

Ordering data

Type	Order No.	Pcs. / Pkt.
EEM-MA400	**2901364**	1

N

Measuring voltage of up to 500 V AC, with RS-485 interface, DIN rail mounting

Housing width 90 mm

Technical data

True r.m.s. value measurement
Up to 51st harmonic
AC sine (45 ... 65 Hz)

50 V AC ... 519 V AC (phase/phase)
28 V AC ... 300 V AC (phase/neutral conductor)
-

0.2%

9999 A (primary)
5 A (secondary)
6 A (continuous)
5 mA
0.2%

0 kW ... 9999 kW / 0 kvar ... 9999 kvar / 0 kVA ... 9999 kVA

0.5%
Class 0.5S
Class 2

230 V AC ±10% (Tariff switch-over: e.g., day/nighttime tariff)

Transistor output, active
30 V DC
27 mA

Modbus RTU/JBUS RS-485
2.4 ... 38.4 kbps

LCD, backlit
1 s

200 V AC ... 277 V AC

5 VA

IP52 (front), IP30 (back)
-10°C ... 55°C (14°F to 131°F)
90 / 72 / 64 mm

0.5 ... 2.5 mm² / 0.5 ... 2.5 mm² / 20 - 14
0.5 ... 4 mm² / 0.5 ... 4 mm² / 20 - 10

CE-compliant

Ordering data

Type	Order No.	Pcs. / Pkt.
EEM-MA250	**2901363**	1

N

Measuring voltage of up to 500 V AC, DIN rail mounting

Housing width 90 mm

Technical data

True r.m.s. value measurement
Up to 51st harmonic
AC sine (45 ... 65 Hz)

50 V AC ... 519 V AC (phase/phase)
28 V AC ... 300 V AC (phase/neutral conductor)
-

0.2%

9999 A (primary)
5 A (secondary)
6 A (continuous)
5 mA
0.2%

0 kW ... 9999 kW / 0 kvar ... 9999 kvar / 0 kVA ... 9999 kVA

0.5%
Class 0.5S
Class 2

230 V AC ±10% (Tariff switch-over: e.g., day/nighttime tariff)

Transistor output, active
30 V DC
27 mA

-
-

LCD, backlit
1 s

200 V AC ... 277 V AC

5 VA

IP52 (front), IP30 (back)
-10°C ... 55°C (14°F to 131°F)
90 / 72 / 64 mm

0.5 ... 2.5 mm² / 0.5 ... 2.5 mm² / 20 - 14
0.5 ... 4 mm² / 0.5 ... 4 mm² / 20 - 10

CE-compliant

Ordering data

Type	Order No.	Pcs. / Pkt.
EEM-MA200	**2901362**	1

Extension modules

N

N

Plug-in special function module for the EEM-MA600 energy meter

EEM-2DIO-MA600

– Two digital inputs and outputs
– Configurable threshold values

EEM-2AO-MA600

– Two 0 ... 20 mA/4 ... 20 mA analog outputs, configurable

Two digital inputs and outputs

Two analog outputs

	Technical data	Technical data
Digital input		
Voltage input signal	10 V DC ... 30 V DC	-
Input pulse length	10 ms	-
Output		
Output description	Relay output	Current output
Maximum switching voltage	250 V AC/DC	-
General data		
Supply voltage	9 V (via EEM-MA600)	9 V (via EEM-MA600)
Degree of protection	IP20	IP20
Ambient temperature range	-10°C ... 55°C (14°F to 131°F)	-10°C ... 55°C (14°F to 131°F)
Conformance/approvals		
Conformance	CE-compliant	CE-compliant

Description	Ordering data: Type	Order No.	Pcs. / Pkt.	Ordering data: Type	Order No.	Pcs. / Pkt.
Special function module (for EEM-MA600) With two digital I/Os	**EEM-2DIO-MA600**	**2901371**	1			
With two analog outputs				**EEM-2AO-MA600**	**2901475**	1

Extension modules

N

Plug-in special function module for the EEM-MA600 energy meter

EEM-MEMO-MA600

– Stores the last ten alarms together with the time and date
– Stores the active and reactive power, e.g., for 31 days with a ten-minute synchronization pulse

Memory module

	Technical data
Digital input	
Voltage input signal	10 V DC ... 30 V DC
General data	
Supply voltage	9 V (via EEM-MA600)
Memory size	512 KB
Degree of protection	IP20
Ambient temperature range	-10°C ... 55°C (14°F to 131°F)
Conformance/approvals	
Conformance	CE-compliant

Description	Ordering data: Type	Order No.	Pcs. / Pkt.
Memory module (for EEM-MA600)	**EEM-MEMO-MA600**	**2901370**	1

Extension modules

N

Communication modules

EEM-RS485-MA...
– RS-485 (JBUS/MODBUS)

EEM-PB...-MA600
– PROFIBUS DP, with transmission speeds of 1.5 or 12 Mbps

RS-485

N

PROFIBUS

	Technical data		Technical data	
Serial port			EEM-PB-MA600	EEM-PB12-MA600
Output description	Modbus RTU/JBUS RS-485		PROFIBUS DP RS-485	PROFIBUS DP RS-485
Serial transmission speed	2.4 ... 38.4 kbps		9.6 kbps ... 1.5 Mbps	9.6 kbps ... 12 Mbps
General data				
Supply voltage	9 V (via EEM-MA400)		9 V (via EEM-MA600)	
Degree of protection	IP20		IP20	
Ambient temperature range	-10°C ... 55°C (14°F to 131°F)		-10°C ... 55°C (14°F to 131°F)	
Conformance/approvals				
Conformance	CE-compliant		CE-compliant	

	Ordering data			Ordering data		
Description	Type	Order No.	Pcs. / Pkt.	Type	Order No.	Pcs. / Pkt.
Communication module (for EEM-MA400)						
RS-485 JBUS/MODBUS	**EEM-RS485-MA400**	**2901365**	1			
Communication module (for EEM-MA600)						
RS-485 JBUS/MODBUS	**EEM-RS485-MA600**	**2901367**	1			
PROFIBUS DP (1.5 Mbps)				**EEM-PB-MA600**	**2901368**	1
PROFIBUS DP (12 Mbps)				**EEM-PB12-MA600**	**2901418**	1

Communication modules

N

EEM-ETH-MA600
– Ethernet
– Integrated web server

EEM-ETH-RS485-MA600
– Ethernet/RS-485 gateway
– MODBUS RTU master for up to 246 slaves
– Integrated web server

Ethernet
(MODBUS TCP)

N

Ethernet/RS-485 gateway
(MODBUS TCP/MODBUS RTU)

	Technical data		Technical data	
Serial port				
Output description	Modbus TCP Ethernet (RJ45)		Modbus TCP Ethernet (RJ45)	
Serial transmission speed	10/100 Mbps		10/100 Mbps	
General data				
Supply voltage	9 V (via EEM-MA600)		9 V (via EEM-MA600)	
Degree of protection	IP20		IP20	
Ambient temperature range	-10°C ... 55°C (14°F to 131°F)		-10°C ... 55°C (14°F to 131°F)	
Conformance/approvals				
Conformance	CE-compliant		CE-compliant	

	Ordering data			Ordering data		
Description	Type	Order No.	Pcs. / Pkt.	Type	Order No.	Pcs. / Pkt.
Communication module (for EEM-MA600)						
Ethernet	**EEM-ETH-MA600**	**2901373**	1			
RS-485/Ethernet gateway				**EEM-ETH-RS485-MA600**	**2901374**	1

PACT - The range of current transformers for versatile mounting

With PACT, Phoenix Contact offers a complete range of bus-bar, plug-in, and winding current transformers for measuring high currents of up to 4000 A.

These high-quality current transformers are available in almost 3000 different designs. You can choose from different accuracy classes, capacities, and sizes.

The current transformers are available in versions that can or cannot be officially calibrated.

Minimal depth

All sizes of transformer have a standard width of just 30 mm.

Flexible in terms of use

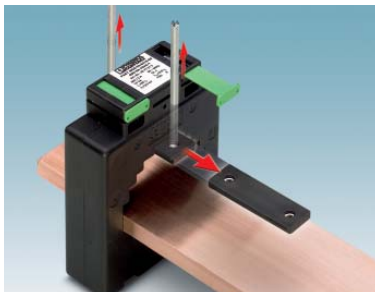
The primary rail support can be pulled out to allow flat installation directly on the copper rail. This provides a solid starting point for space-saving applications.

Variable mounting options

One such space-saving application is, for example, the measurement of currents in branch outlets.

The conductive connection between one copper rail and another is established by using a copper sleeve. This is inserted in the inner hole of the horizontal current transformer.

Minimal depth


Flexible in terms of use

Variable mounting options

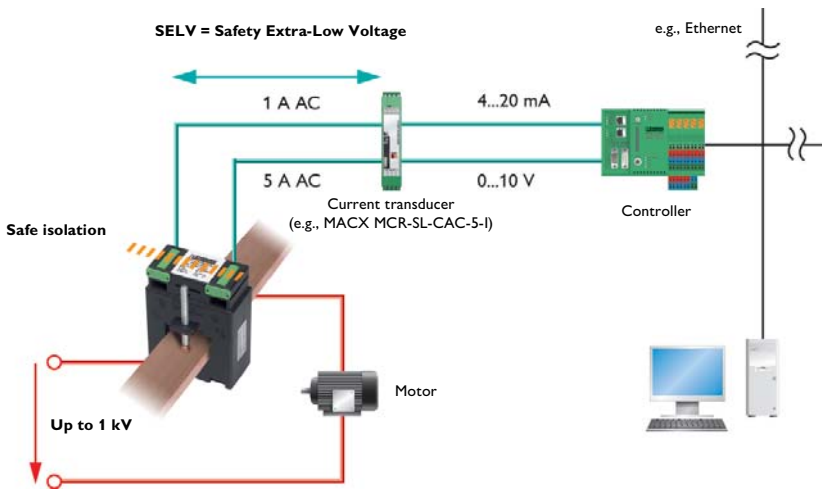
Professional connection method

PACT current transformers for safe isolation

PACT current transformers are tested in accordance with the EN 50178 standard ("Electronic equipment for use in power installations"). One of the key focal areas of EN 50178 is safety and reliability.

In light of the requirement for safe isolation, the current transformers are tested with an impulse withstand voltage of 12 kV. Where double insulation (safe isolation) from the environment for mains supply circuits is concerned, the amplitude of the impulse withstand voltage is calculated in accordance with surge voltage category 3. The impulse withstand voltage level results in a maximum permissible rated insulation voltage of 1000 V.

Safe isolation prevents sparkover from occurring on the current transformer secondary side. As a result, hazardous voltages cannot reach any other electrical components. This means that there is no risk to human life - inside or outside the control cabinet.



Selection guide

- Complete range of winding, bus-bar, and plug-in current transformers
- Popular types available from stock; alternatively, order key can be used for custom dimensioning
- Versions available to support official calibration

Selection

- Select your converter in accordance with the dimensions of the copper rail
- Specify the four electrical characteristics of the converter:
  1.The primary rated current strength I_{pn} - the maximum amperage occurring in the path to be measured
  2.The secondary rated current I_{sn} - supplied to the downstream measuring devices
  3. Class - accuracy in order to observe the specified tolerances
  4. Rated power S_n [VA] - takes account of all the loads occurring in the measuring circuit

	Technical data
Input data	
Thermal rated short-time current	$I_{th} = 60 * I_n$
Rated surge current	$I_{dyn} = 2.5 * I_{th}$
Rated frequency	50 Hz ... 60 Hz
Surge current limitation factor	FS 5
General data	
Rated insulation voltage	1 kV
Test voltage	3 kV (50 Hz, 1 min.)
Impulse withstand voltage	12 kV (1.2 / 50 µs)
Insulating material class	E
Connection capacitance of secondary terminals	2 x (2.5 x 4) mm
Ambient temperature (operation)	-25°C ... 40°C
Standards / regulations	IEC 60044-1, EN 50178
Housing material	Polyamide PA, fiberglass-reinforced

Calculation guide

Determination of the secondary side rated power S_n

All the occurring loads must be added:
- Calculate the power requirement of the copper cable (supply and return line)
- Take into account the power requirement of the connected devices (measuring devices)
- Add a reserve requirement

S_n total = S_n copper cable + S_n measuring device + S_n reserve

Power requirement of copper cables with a different diameter

Conductor cross-section in mm²	Rated power in VA/m (consider the supply and the return line)	
	Secondary current I_{sn} 5 A	Secondary current I_{sn} 1 A
1.5	0.2917	0.117
2.5	0.175	0.0070
4	0.1094	0.0044
6	0.0729	0.0029

Example:
S_n copper cable = cable length x 2 x rated power
S_n copper cable = 10 m x 2 x 0.1750 VA/m = 3.50 VA

S_n measuring device = 2 VA

S_n reserve < 0.5 x (S_n copper cable + S_n measuring device)
S_n reserve = 2 VA

S_n total = S_n copper cable + S_n measuring device + S_n reserve
S_n total = 3.5 VA + 2 VA + 2 VA = 7.5 VA

Order key - Example for PACT MCR-V2-3015-60

Preferred types that can be directly ordered have been marked in green in the selection table.

Order No.	Primary current I_{pn}	Secondary current I_{sn}	Class	Rated power S_n
2277271	IP02000	IS05	C10	P750
	IP00600 ≙ 60 A	IS01 ≙ 1 A	C02 ≙ **0.2**	P125 ≙ 1.25 VA
	IP00750 ≙ 75 A	IS05 ≙ 5 A	C05 ≙ **0.5**	P250 ≙ 2.5 VA
	IP00800 ≙ 80 A		C10 ≙ **1**	P375 ≙ 3.75 VA
	IP01000 ≙ 100 A			P500 ≙ 5.0 VA
	IP01250 ≙ 125 A			P750 ≙ 7.5 VA
	IP02000 ≙ 200 A			P1000 ≙ 10 VA
	IP02500 ≙ 250 A			

1. 2. 3. 4.

Standard table (extract)

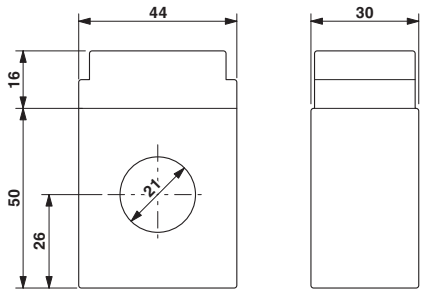
I_{sn}	Cl.	Primary rated current amperage I_{pn} [A] 60	75	80	100	125	150	200	250	Rated power S_n [VA]
1A	0.5				1.25	2.5	2.5	2.5	2.5	
								3.75	5	
	1	1.25	2.5	2.5	2.5	2.5	2.5	2.5	2.5	
						3.75	5	5	5	
									7.5	
5 A	0.5							2.5	2.5	
								3.75	5	
	1	1.25	1.25	1.25	2.5	2.5	2.5	2.5	2.5	
			1.5	2		3.75	3.75	5	5	
							5	7.5	7.5	
									10	

Current transformers

PACT MCR-V1-21-44

– Primary rated current I_{pn}: 0...(50...500) A
– Circular conductor dimensions: Ø 21 mm

Notes:
Our configurator, which is available at www.phoenixcontact.net/catalog, makes ordering easy.
Current transformers that support official calibration: To specify the type of current transformer you require, please use the order key on page 708.
Current transformers that support official calibration can be officially calibrated on request. We will be happy to make all arrangements for the official calibration of your measuring transducer, including preparing all certificates.
The relevant installation accessories can be found on page 707.



Bus-bar curr. transf., official calibration as an option

Ordering data

Description	Rated power S_n	Type	Order No.	Pcs. / Pkt.
Preferred versions available from stock (marked in green in the selection table) Primary rated current I_{pn}:				
- 50 A	1.25 VA	**PACT MCR-V1-21-44- 50-5A-1**	**2277019**	1
- 75 A	2.5 VA	**PACT MCR-V1-21-44- 75-5A-1**	**2277611**	1
- 100 A	2.5 VA	**PACT MCR-V1-21-44-100-5A-1**	**2277022**	1
- 125 A	3.75 VA	**PACT MCR-V1-21-44-125-5A-1**	**2277763**	1
- 150 A	5 VA	**PACT MCR-V1-21-44-150-5A-1**	**2277035**	1
- 200 A	5 VA	**PACT MCR-V1-21-44-200-5A-1**	**2277776**	1
- 250 A	5 VA	**PACT MCR-V1-21-44-250-5A-1**	**2277048**	1
- 300 A	10 VA	**PACT MCR-V1-21-44-300-5A-1**	**2277789**	1
- 400 A	5 VA	**PACT MCR-V1-21-44-400-5A-1**	**2277051**	1
- 500 A	10 VA	**PACT MCR-V1-21-44-500-5A-1**	**2277792**	1
Current transformer, to specify the type of current transformer you require, please refer to the order key		**PACT MCR-V1-21-44**	**2277268**	1
Current transformer that supports official calibration, to specify the type of current transformer you require, please refer to the order key (see notes)		**PACT MCR-V1C-21-44**	**2277420**	1

Add **order key** from the selection table (ordering example marked in orange)

Order No.		Primary current I_{pn}		Secondary current I_{sn}		Class		Rated power S_n
2277268	/	IP05000	/	IS01	/	C05	/	P1000

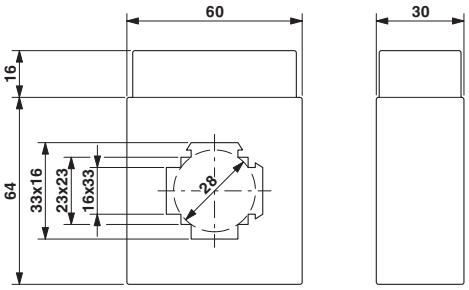
Selection table PACT MCR-V1-21-44 (Order No.: 2277268)

I_{sn}	Cl.	Primary rated current amperage I_{pn} [A] 50	60	75	80	100	125	150	200	250	300	400	500	Rated power S_n [VA]
IS01 ≙ 1 A	C05 ≙ 0.5					1.25	2.5	2.5	2.5	2.5	2.5	2.5	2.5	
								3.75	5	5	5	5	5	
										7.5		7.5	10	
	C10 ≙ 1	1.25	1.25	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	
							3.75	5	5	5	5	5	5	
										7.5		7.5	10	
IS05 ≙ 5 A	C05 ≙ 0.5					1.25	1.25	1.25	2.5	2.5	2.5	2.5	2.5	
						1.5	2.0	2.5	3.75	5	5	5	5	
										7.5	10	7.5	7.5	
	C10 ≙ 1	1.25	1.25	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	
			1.5				3.75	5	5	5	5	5	5	
									7.5	7.5	10	7.5	10	

Current transformers

PACT MCR-V2-3015-60

- Primary rated current I_{pn}:
  0...(50...750) A
- Circular conductor dimensions: Ø 28 mm
- Rail dimensions:
  30x15 mm; 20x20 mm



Plug-in curr. transformer, official calibration as an option

Notes:
Our configurator, which is available at www.phoenixcontact.net/catalog, makes ordering easy.
Current transformers that support official calibration: To specify the type of current transformer you require, please use the order key on page 708
Current transformers that support official calibration can be officially calibrated on request. We will be happy to make all arrangements for the official calibration of your measuring transducer, including preparing all certificates.
The relevant installation accessories can be found on page 707

Ordering data

Description	Rated power S_n	Type	Order No.	Pcs. / Pkt.
Preferred versions available from stock (marked in green in the selection table) Primary rated current I_{pn}:				
- 60 A	1.25 VA	**PACT MCR-V2-3015- 60- 60-5A-1**	**2277815**	1
- 75 A	1.25 VA	**PACT MCR-V2-3015- 60- 75-5A-1**	**2277828**	1
- 75 A	1.5 VA	**PACT MCR-V2- 3015- 60- 75-5A-1**	**2276502**	1
- 80 A	1.25 VA	**PACT MCR-V2-3015- 60- 80-5A-1**	**2277831**	1
- 100 A	2.5 VA	**PACT MCR-V2-3015- 60- 100-5A-1**	**2277064**	1
- 125 A	3.75 VA	**PACT MCR-V2-3015- 60- 125-5A-1**	**2277624**	1
- 150 A	3.75 VA	**PACT MCR-V2-3015- 60- 150-5A-1**	**2277844**	1
- 150 A	5 VA	**PACT MCR-V2-3015- 60- 150-5A-1**	**2277077**	1
- 200 A	5 VA	**PACT MCR-V2-3015- 60- 200-5A-1**	**2277637**	1
- 200 A	7.5 VA	**PACT MCR-V2-3015- 60- 200-5A-1**	**2277857**	1
- 250 A	5 VA	**PACT MCR-V2- 3015- 60-250-5A-1**	**2276544**	1
- 250 A	7.5 VA	**PACT MCR-V2-3015- 60- 250-5A-1**	**2277860**	1
- 250 A	10 VA	**PACT MCR-V2-3015- 60- 250-5A-1**	**2277080**	1
- 300 A	7.5 VA	**PACT MCR-V2-3015- 60- 300-5A-1**	**2277640**	1
- 400 A	10 VA	**PACT MCR-V2-3015- 60- 400-5A-1**	**2277093**	1
- 500 A	10 VA	**PACT MCR-V2-3015- 60- 500-5A-1**	**2277653**	1
- 600 A	10 VA	**PACT MCR-V2-3015- 60- 600-5A-1**	**2277103**	1
- 750 A	10 VA	**PACT MCR-V2-3015- 60- 750-5A-1**	**2277666**	1
Current transformer, to specify the type of current transformer you require, please refer to the order key		**PACT MCR-V2- 3015- 60**	**2277271**	1
Current transformer that supports official calibration, to specify the type of current transformer you require, please refer to the order key (see notes)		**PACT MCR-V2C- 3015- 60**	**2277433**	1

Add **order key** from the selection table (ordering example marked in orange)

Order No.		Primary current I_{pn}		Secondary current I_{sn}		Class		Rated power S_n
2277271	/	IP07500	/	IS01	/	C05	/	P1500

Selection table PACT MCR-V2-3015-60 (Order No.: 2277271)

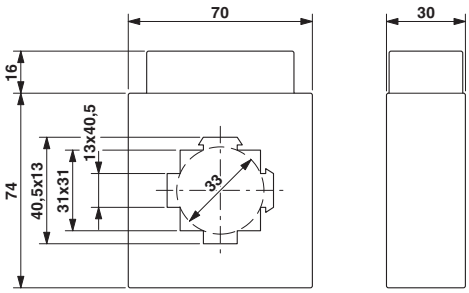
I_{sn}	Cl.	Primary rated current amperage I_{pn} [A] 50	60	75	80	100	125	150	200	250	300	400	500	600	750	
IS01 ≙ 1 A	C05 ≙ 0.5					1.25	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	Rated power S_n [VA]
									3.75	5	5	5	5	5	5	
											7.5	10	10	10	10	
														15	15	
	C10 ≙ 1	1.25	1.25	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	5	
							3.75	5	5	5	5	5	5	5	10	
										7.5	10	10	10	10	15	
														15	20	
IS05 ≙ 5 A	C05 ≙ 0.5								2.5	2.5	2.5	2.5	2.5	2.5	2.5	
									3.75	5	5	5	5	5	5	
											7.5	10	10	10	10	
	C10 ≙ 1		1.25	1.25	1.25	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	
				1.5	2		3.75	3.75	5	5	5	5	5	5	5	
								5	7.5	7.5	7.5	10	10	10	10	
										10	10	15			15	

Current transformers

PACT MCR-V2-4012-70

- Primary rated current I_{pn}: 0...(75...1000) A
- Circular conductor dimensions: Ø 33 mm
- Rail dimensions: 40x12 mm; 2x 30x10 mm

Notes:
Our configurator, which is available at www.phoenixcontact.net/catalog, makes ordering easy.
Current transformers that support official calibration: To specify the type of current transformer you require, please use the order key on page 708
Current transformers that support official calibration can be officially calibrated on request. We will be happy to make all arrangements for the official calibration of your measuring transducer, including preparing all certificates.
The relevant installation accessories can be found on page 707



Plug-in curr. transformer, official calibration as an option

Ordering data

Description	Rated power S_n	Type	Order No.	Pcs. / Pkt.
Preferred versions available from stock (marked in green in the selection table) Primary rated current I_{pn}:				
- 250 A	5 VA	**PACT MCR-V2-4012- 70- 250-5A-1**	**2277116**	1
- 300 A	7.5 VA	**PACT MCR-V2-4012- 70- 300-5A-1**	**2277679**	1
- 400 A	7.5 VA	**PACT MCR-V2-4012- 70- 400-5A-1**	**2277129**	1
- 500 A	10 VA	**PACT MCR-V2-4012- 70- 500-5A-1**	**2277682**	1
- 600 A	10 VA	**PACT MCR-V2-4012- 70- 600-5A-1**	**2277132**	1
- 750 A	10 VA	**PACT MCR-V2-4012- 70- 750-5A-1**	**2277695**	1
- 800 A	10 VA	**PACT MCR-V2-4012- 70- 800-5A-1**	**2277145**	1
- 1000 A	10 VA	**PACT MCR-V2-4012- 70-1000-5A-1**	**2277158**	1
Current transformer, to specify the type of current transformer you require, please refer to the order key		**PACT MCR-V2- 4012- 70**	**2277284**	1
Current transformer that supports official calibration, to specify the type of current transformer you require, please refer to the order key (see notes)		**PACT MCR-V2C- 4012- 70**	**2277446**	1

Add to order key from the selection table (ordering example marked in orange)

Order No.		Primary current I_{pn}		Secondary current I_{sn}		Class		Rated power S_n
2277284	/	IP010000	/	IS05	/	C10	/	P250

Selection table PACT MCR-V2-4012-70 (Order No.: 2277284)

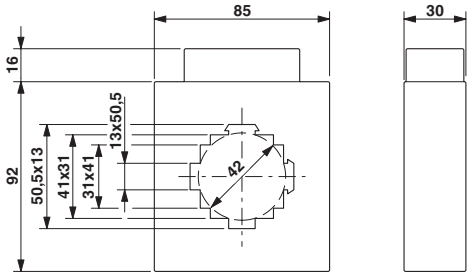
I_{sn}	Cl.	Primary rated current strength I_{pn} [A] 75	80	100	125	150	200	250	300	400	500	600	750	800	1000	
IS01 ≙1 A	C05 ≙ 0.5				1.25	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	Rated power S_n [VA]
							3.75	5	5	5	5	5	5	5	5	
										7.5	10	10	10	10	10	
														15		
	C10 ≙ 1	1.25	1.25	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	
					3.75	5	5	5	5	5	5	5	5	5	5	
								7.5	10	10	10	10	10	10	10	
													15	15		
IS05 ≙ 5 A	C05 ≙ 0.5				1.25	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	
							3.75	5	5	5	5	5	5	5	5	
										7.5	10	10	10	10	10	
														15		
	C10 ≙ 1	1.25	1.25	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	
					3.75	5	5	5	5	5	5	5	5	5	5	
								7.5	7.5	7.5	10	10	10	10	10	
													15	15		

Current transformers

PACT MCR-V2-5012-85

- Primary rated current I_{pn}: 0...(100...1500) A
- Circular conductor dimensions: Ø 42 mm
- Rail dimensions: 50x12 mm; 2x 40x10 mm

Notes:
Our configurator, which is available at www.phoenixcontact.net/catalog, makes ordering easy.
Current transformers that support official calibration: To specify the type of current transformer you require, please use the order key on page 708
Current transformers that support official calibration can be officially calibrated on request. We will be happy to make all arrangements for the official calibration of your measuring transducer, including preparing all certificates.
The relevant installation accessories can be found on page 707



Plug-in curr. transformer, official calibration as an option

Ordering data

Description	Rated power S_n	Type	Order No.	Pcs. / Pkt.
Preferred versions available from stock (marked in green in the selection table) Primary rated current I_{pn}:				
- 150 A	3.75 VA	**PACT MCR-V2-5012- 85- 150-5A-1**	**2276117**	1
- 200 A	5 VA	**PACT MCR-V2-5012- 85- 200-5A-1**	**2276120**	1
- 250 A	7.5 VA	**PACT MCR-V2-5012- 85- 250-5A-1**	**2276133**	1
- 300 A	10 VA	**PACT MCR-V2-5012- 85- 300-5A-1**	**2276146**	1
- 400 A	10 VA	**PACT MCR-V2-5012- 85- 400-5A-1**	**2277161**	1
- 500 A	15 VA	**PACT MCR-V2-5012- 85- 500-5A-1**	**2276159**	1
- 600 A	10 VA	**PACT MCR-V2-5012- 85- 600-5A-1**	**2277174**	1
- 600 A	15 VA	**PACT MCR-V2-5012- 85- 600-5A-1**	**2276162**	1
- 750 A	10 VA	**PACT MCR-V2-5012- 85- 750-5A-1**	**2276175**	1
- 800 A	10 VA	**PACT MCR-V2-5012- 85- 800-5A-1**	**2277187**	1
- 1000 A	10 VA	**PACT MCR-V2-5012- 85-1000-5A-1**	**2276463**	1
- 1000 A	15 VA	**PACT MCR-V2-5012- 85-1000-5A-1**	**2277190**	1
- 1250 A	15 VA	**PACT MCR-V2-5012- 85-1250-5A-1**	**2277200**	1
- 1500 A	15 VA	**PACT MCR-V2-5012- 85-1500-5A-1**	**2276188**	1
Current transformer, to specify the type of current transformer you require, please refer to the order key		**PACT MCR-V2- 5012- 85**	**2277297**	1
Current transformer that supports official calibration, to specify the type of current transformer you require, please refer to the order key (see notes)		**PACT MCR-V2C- 5012- 85**	**2277459**	1

Add **order key** from the selection table (ordering example marked in orange)

Order No.		Primary current I_{pn}		Secondary current I_{sn}		Class		Rated power S_n
2277297	/	IP02500	/	IS01	/	C10	/	P750

Selection table PACT MCR-V2-5012-85 (Order No.: 2277297)

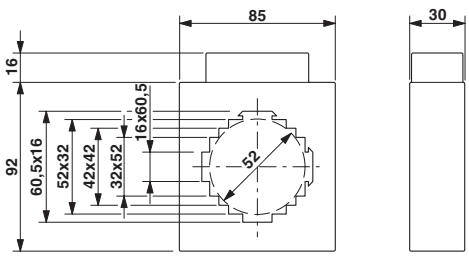
I_{sn}	Cl.	Primary rated current amperage I_{pn} [A] 100	125	150	200	250	300	400	500	600	750	800	1000	1250	1500	
IS01 ≙ 1 A	C05 ≙ 0.5			1.25	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	Rated power S_n [VA]
					5	5	5	5	5	5	5	5	5	5	5	
							7.5	10	10	10	10	10	10	10	10	
								15	15	15			15	15	15	
	C10 ≙ 1	1.25	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	5	5	5	
				3.75	5	5	5	5	5	5	5	5	10	10	10	
					7.5	7.5	10	10	10	10	10	10	15	15	15	
						10		15	20	20		15	20	20	30	
IS05 ≙ 5 A	C05 ≙ 0.5			1.25	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	
					5	5	5	5	5	5	5	5	5	5	5	
							7.5	10	10	20	10	10	10	10	10	
								15	15	15			15	15	15	
	C10 ≙ 1	1.25	2.5	2.5	2.5	2.5	2.5	2.5	5	5	2.5	2.5	5	5	5	
				3.75	5	5	5	5	10	10	5	5	10	10	10	
					7.5	7.5	10	10	15	15	10	10	15	15	15	
						10		15	20	20		15	20	20	20	

Current transformers

PACT MCR-V2-6015-85

– Primary rated current I_{pn}:
  0...(200...1600) A
– Circular conductor dimensions: Ø 52 mm
– Rail dimensions:
  60x15 mm; 2x 50x10 mm; 40x40 mm

Notes:
Our configurator, which is available at www.phoenixcontact.net/catalog, makes ordering easy.
Current transformers that support official calibration: To specify the type of current transformer you require, please use the order key on page 708
Current transformers that support official calibration can be officially calibrated on request. We will be happy to make all arrangements for the official calibration of your measuring transducer, including preparing all certificates.
The relevant installation accessories can be found on page 707



Plug-in curr. transformer, official calibration as an option

Ordering data

Description	Rated power S_n	Type	Order No.	Pcs. / Pkt.
Preferred versions available from stock (marked in green in the selection table) Primary rated current I_{pn}:				
- 200 A	2.5 VA	**PACT MCR-V2-6015- 85- 200-5A-1**	**2277873**	1
- 250 A	2.5 VA	**PACT MCR-V2-6015- 85- 250-5A-1**	**2277886**	1
- 300 A	2.5 VA	**PACT MCR-V2-6015- 85- 300-5A-1**	**2277899**	1
- 400 A	2.5 VA	**PACT MCR-V2-6015- 85- 400-5A-1**	**2277909**	1
- 500 A	5 VA	**PACT MCR-V2-6015- 85- 500-5A-1**	**2277912**	1
- 600 A	10 VA	**PACT MCR-V2-6015- 85- 600-5A-1**	**2277925**	1
- 750 A	10 VA	**PACT MCR-V2-6015- 85- 750-5A-1**	**2277938**	1
- 800 A	10 VA	**PACT MCR-V2-6015- 85- 800-5A-1**	**2277941**	1
- 1000 A	15 VA	**PACT MCR-V2-6015- 85-1000-5A-1**	**2277954**	1
- 1250 A	15 VA	**PACT MCR-V2-6015- 85-1250-5A-1**	**2277967**	1
- 1500 A	15 VA	**PACT MCR-V2-6015- 85-1500-5A-1**	**2277970**	1
- 1600 A	15 VA	**PACT MCR-V2-6015- 85-1600-5A-1**	**2277983**	1
Current transformer, to specify the type of current transformer you require, please refer to the order key		**PACT MCR-V2- 6015- 85**	**2277336**	1
Current transformer that supports official calibration, to specify the type of current transformer you require, please refer to the order key (see notes)		**PACT MCR-V2C- 6015- 85**	**2277462**	1

Add **order key** from the selection table (ordering example marked in orange)

Order No.		Primary current I_{pn}		Secondary current I_{sn}		Class		Rated power S_n
2277336	/	IP05000	/	IS01	/	C10	/	P375

Selection table PACT MCR-V2-6015-85 (Order No.: 2277336)

I_{sn}	Cl.	Primary rated current amperage I_{pn} [A] 200	250	300	400	500	600	750	800	1000	1250	1500	1600	
IS01 ≙ 1 A	C05 ≙ 0.5		1.25	1.25	1.25	2.5	2.5	2.5	2.5	2.5	2.5			Rated power S_n [VA]
								5			5			
	C10 ≙ 1	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5			
						3.75		5	3.75	3.75	5			
IS05 ≙ 5 A	C05 ≙ 0.5		1.25	1.25	1.25	2.5	2.5	2.5	2.5	2.5	5	5	5	
					2.5	5	5	5	5	5	10	10	10	
							10	10	10	10	15	15	15	
									15	15	20	20		
	C10 ≙ 1	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	5	5	5	5	
						5	5	5	5	10	10	10	10	
							10	10	10	15	15	15	15	
									15		20	30		

Current transformers

PACT MCR-V2-6315-95

- Primary rated current I_{pn}:
  0...(200...2500) A
- Circular conductor dimensions: Ø 53 mm
- Rail dimensions:
  63x15 mm; 2x 50x10 mm; 40x40 mm

PACT MCR-V2-6040-96

- Primary rated current I_{pn}:
  0...(200...2000) A
- Circular conductor dimensions: Ø 61 mm
- Rail dimensions:
  60x40 mm; 50x50 mm

Plug-in curr. transformer, official calibration as an option

Plug-in curr. transformer, official calibration as an option

Notes:
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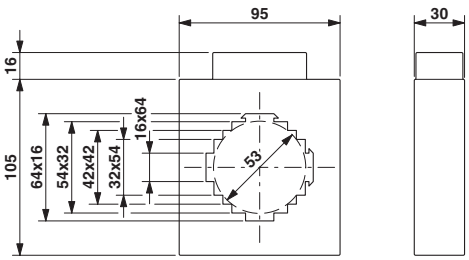
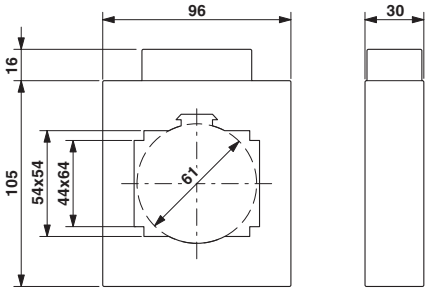
Current transformers that support official calibration: To specify the type of current transformer you require, please use the order key on page 709
Current transformers that support official calibration can be officially calibrated on request. We will be happy to make all arrangements for the official calibration of your measuring transducer, including preparing all certificates.
The relevant installation accessories can be found on page 707





Description	Rated power S_n	Ordering data: Type	Order No.	Pcs. / Pkt.	Ordering data: Type	Order No.	Pcs. / Pkt.
Preferred versions available from stock (marked in green in the selection table) Primary rated current I_{pn}:							
- 600 A	10 VA				**PACT MCR-V2-6040- 96- 600-5A-1**	**2276191**	1
- 750 A	10 VA				**PACT MCR-V2-6040- 96- 750-5A-1**	**2276201**	1
- 800 A	10 VA	**PACT MCR-V2-6315- 95- 800-5A-1**	**2277213**	1	**PACT MCR-V2-6040- 96- 800-5A-1**	**2276214**	1
- 1000 A	10 VA	**PACT MCR-V2-6315- 95-1000-5A-1**	**2277226**	1	**PACT MCR-V2-6040- 96-1000-5A-1**	**2277705**	1
- 1250 A	10 VA	**PACT MCR-V2-6315- 95-1250-5A-1**	**2277239**	1			
- 1250 A	15 VA				**PACT MCR-V2-6040- 96-1250-5A-1**	**2276227**	1
- 1500 A	10 VA	**PACT MCR-V2-6315- 95-1500-5A-1**	**2277242**	1	**PACT MCR-V2-6040- 96-1500-5A-1**	**2277718**	1
- 1600 A	10 VA	**PACT MCR-V2-6315- 95-1600-5A-1**	**2277255**	1			
- 1600 A	15 VA				**PACT MCR-V2-6040- 96-1600-5A-1**	**2276230**	1
- 2000 A	15 VA				**PACT MCR-V2-6040- 96-2000-5A-1**	**2276243**	1
Current transformer, to specify the type of current transformer you require, please refer to the order key		**PACT MCR-V2- 6315- 95**	**2277307**	1	**PACT MCR-V2- 6040- 96**	**2277349**	1
Current transformer that supports official calibration, to specify the type of current transformer you require, please refer to the order key (see notes)		**PACT MCR-V2C- 6315- 95**	**2277475**	1	**PACT MCR-V2C- 6040- 96**	**2277488**	1

Add **order key** from the selection table (ordering example marked in orange)

Order No.	Primary current I_{pn}	Secondary current I_{sn}	Class	Rated power S_n
2277307	IP25000	IS05	C05	P500

Selection table PACT MCR-V2-6315-95 (Order No.: 2277307)

I_{sn}	Cl.	Primary rated current amperage I_{pn} [A] 200	250	300	400	500	600	750	800	1000	1250	1500	1600	2000	2500	Rated power S_n [VA]
IS01 ≙ 1 A	C05 ≙ 0.5	2.5	2.5	2.5	2.5	2.5	2.5	5	5	5	5	5	5	5		
				5	5	5	5	10	10	10	10	10	10	10		
					7.5	10	10	15	15			15	15	15		
														20		
	C10 ≙ 1	2.5	2.5	2.5	2.5	2.5	2.5	5	5	5	5	5	5	10		
		3.75	5	5	5	5	5	10	10	10	10	10	10	15		
				7.5	10	10	10	15	15			15	15	20		
							15		20							
IS05 ≙ 5 A	C05 ≙ 0.5	2.5	2.5	2.5	2.5	2.5	2.5	5	5	5	5	5	5	5	5	
			3.75	5	5	5	5	10	10	10	10	10	10	10	10	
				7.5	10	10	10	15	15	15	15	15	15	15	15	
						15	15	20	20	30	20	30	30	30	30	
	C10 ≙ 1	2.5	2.5	2.5	2.5	5	5	5	5	10	5	5	10	10	10	
		3.75	5	5	5	10	10	10	10	15	10	10	15	15	15	
				10	10	15	15	15	15	30	15	15	30	30	30	
					15	20	20	30	30		30	30				

Selection table PACT MCR-V2-6040-96 (Order No.: 2277349)

I_{sn}	Cl.	Primary rated current amperage I_{pn} [A] 200	250	300	400	500	600	750	800	1000	1250	1500	1600	2000	Rated power S_n [VA]
IS01 ≙ 1 A	C05 ≙ 0.5		2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5			
					5	5	5	5	5	5	5				
						7.5		7.5	7.5	10	10				
	C10 ≙ 1	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5			
		3.75	5	5	5	5	5	5	5	5	5	5			
					7.5	7.5		7.5	7.5	10	10				
IS05 ≙ 5 A	C05 ≙ 0.5		2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	5	
					5	5	5	5	5	5	5	5	5	10	
						7.5	7.5	10	10	7.5	10	10	10	15	
													15		
	C10 ≙ 1	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	5	2.5	5	5	
		3.75	3.75	5	5	5	5	5	5	5	10	5	10	10	
					7.5	7.5	10	10	10	10	15	10	15	15	
									15						

Current transformers

PACT MCR-V2-8015-105

- Primary rated current I_{pn}: 0...(400...2500) A
- Circular conductor dimensions: Ø 61 mm
- Rail dimensions: 80x15 mm; 2x 60x10 mm; 3x 50x10 mm

PACT MCR-V2-8020-105

- Primary rated current I_{pn}: 0...(500...2000) A
- Circular conductor dimensions: Ø 70 mm
- Rail dimensions: 2x 80x10 mm; 60x60 mm

Plug-in curr. transformer, official calibration as an option

Plug-in curr. transformer, official calibration as an option

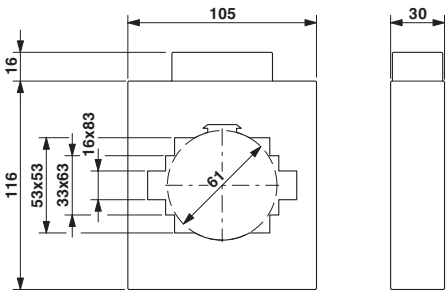
Notes:

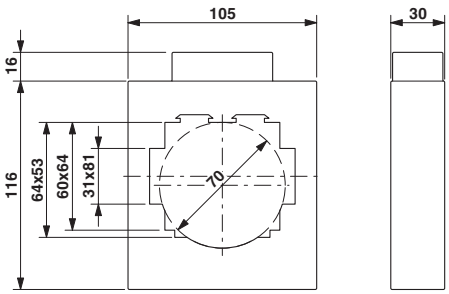
Our configurator, which is available at www.phoenixcontact.net/catalog, makes ordering easy.

Current transformers that support official calibration:
To specify the type of current transformer you require, please use the order key on page 709

Current transformers that support official calibration can be officially calibrated on request. We will be happy to make all arrangements for the official calibration of your measuring transducer, including preparing all certificates.

The relevant installation accessories can be found on page 707





Description	Rated power S_n	Ordering data: Type	Order No.	Pcs. / Pkt.	Ordering data: Type	Order No.	Pcs. / Pkt.
Preferred versions available from stock (marked in green in the selection table) Primary rated current I_{pn}:							
- 400 A	7.5 VA	**PACT MCR-V2-8015-105- 400-5A-1**	**2276256**	1			
- 500 A	10 VA	**PACT MCR-V2-8015-105- 500-5A-1**	**2276269**	1			
- 600 A	10 VA	**PACT MCR-V2-8015-105- 600-5A-1**	**2276272**	1			
- 750 A	10 VA	**PACT MCR-V2-8015-105- 750-5A-1**	**2276285**	1			
- 800 A	15 VA	**PACT MCR-V2-8015-105- 800-5A-1**	**2276298**	1			
- 1000 A	10 VA	**PACT MCR-V2-8015-105-1000-5A-1**	**2277721**	1	**PACT MCR-V2-8020-105-1000-5A-1**	**2277747**	1
- 1000 A	15 VA	**PACT MCR-V2-8015-105-1000-5A-1**	**2276308**	1			
- 1250 A	10 VA	**PACT MCR-V2-8015-105-1250-5A-1**	**2276311**	1			
- 1500 A	15 VA	**PACT MCR-V2-8015-105-1500-5A-1**	**2277734**	1	**PACT MCR-V2-8020-105-1500-5A-1**	**2277750**	1
- 1600 A	15 VA	**PACT MCR-V2-8015-105-1600-5A-1**	**2276324**	1			
- 2000 A	10 VA				**PACT MCR-V2-8020-105-2000-5A-1**	**2276382**	1
- 2000 A	20 VA	**PACT MCR-V2-8015-105-2000-5A-1**	**2276337**	1			
- 2500 A	20 VA	**PACT MCR-V2-8015-105-2500-5A-1**	**2276340**	1			
Current transformer, to specify the type of current transformer you require, please refer to the order key		**PACT MCR-V2- 8015-105**	**2277352**	1	**PACT MCR-V2- 8020-105**	**2277365**	1
Current transformer that supports official calibration, to specify the type of current transformer you require, please refer to the order key (see notes)		**PACT MCR-V2C- 8015-105**	**2277491**	1	**PACT MCR-V2C- 8020-105**	**2277501**	1

Add **order key** from the selection table (ordering example marked in orange)

Order No.		Primary current I_{pn}		Secondary current I_{sn}		Class		Rated power S_n
2277352	/	IP25000	/	IS05	/	C10	/	P3000

Selection table PACT MCR-V2-8015-105 (Order No.: 2277352)

I_{sn}	Cl.	Primary rated current amperage I_{pn} [A] 400	500	600	750	800	1000	1250	1500	1600	2000	2500	Rated power S_n [VA]
IS01 ≙ 1 A	C05 ≙ 0.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	5		
			5	5	5	5	5	5	5	5	10		
				10		10	7.5	10	10	10	15		
									15	15	20		
	C10 ≙ 1	2.5	2.5	2.5	2.5	2.5	2.5	2.5	5	5	10		
		5	5	5	5	5	5	5	10	10	15		
		7.5	10	10	10	10	10	10	15	15	20		
							15	15	20	20	25		
IS05 ≙ 5 A	C05 ≙ 0.5	2.5	2.5	2.5	2.5	2.5	5	2.5	2.5	2.5	2.5	5	
		5	5	5	5	5	10	5	5	5	5	10	
				10	10	10	15	10	10	10	10	15	
					15	15	20			15	15	20	
	C10 ≙ 1	2.5	2.5	2.5	2.5	5	5	2.5	2.5	5	5	10	
		5	5	5	5	10	10	5	5	10	10	15	
		7.5	10	10	10	15	15	10	10	15	15	20	
					15		20		15		20	30	

Selection table PACT MCR-V2-8020-105 (Order No.: 2277365)

I_{sn}	Cl.	Primary rated current amperage I_{pn} [A] 500	600	750	800	1000	1250	1500	1600	2000	Rated power S_n [VA]
IS01 ≙ 1 A	C05 ≙ 0.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5		
			5	5	5	5		5	5		
						10					
	C10 ≙ 1	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5		
		5	5	5	5	5	5	5	5		
			7.5	7.5	7.5	10					
						15					
IS05 ≙ 5 A	C05 ≙ 0.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	
		5	5	5	5	5	5	5	5	5	
			7.5	7.5	7.5	10	10	10	10	10	
									15		
	C10 ≙ 1	2.5	2.5	2.5	2.5	2.5	2.5	2.5	5	5	
		5	5	5	5	5	5	5	10	10	
			7.5	7.5	10	10	10	10	15		
								15			

Current transformers

PACT MCR-V2-10020-129

- Primary rated current I_{pn}: 0...(400...4000) A
- Circular conductor dimensions: Ø 85 mm
- Rail dimensions: 2x 100x10 mm; 80x64 mm

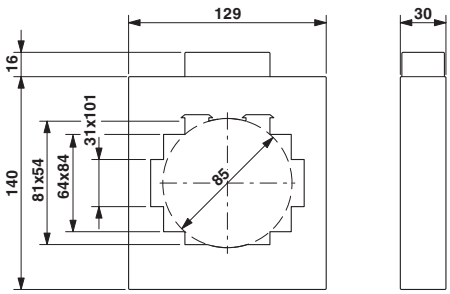
PACT MCR-V2-10036-129

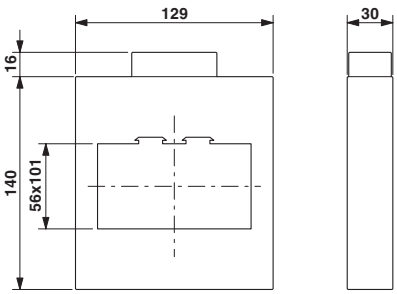
- Primary rated current I_{pn}: 0...(400...4000) A
- Rail dimensions: 3x 100x12 mm

Plug-in curr. transformer, official calibration as an option

Plug-in curr. transformer, official calibration as an option

Notes:
Our configurator, which is available at www.phoenixcontact.net/catalog, makes ordering easy.
Current transformers that support official calibration: To specify the type of current transformer you require, please use the order key on page 709
Current transformers that support official calibration can be officially calibrated on request. We will be happy to make all arrangements for the official calibration of your measuring transducer, including preparing all certificates.
The relevant installation accessories can be found on page 707





Description	Rated power S_n	Ordering data: Type	Order No.	Pcs. / Pkt.	Ordering data: Type	Order No.	Pcs. / Pkt.
Preferred versions available from stock (marked in green in the selection table) Primary rated current I_{pn}:							
- 2500 A	15 VA	**PACT MCR-V2-10020-129-2500-5A**	**2276395**	1			
- 3000 A	15 VA				**PACT MCR-V2-10036-129-3000-5A**	**2276405**	1
Current transformer, to specify the type of current transformer you require, please refer to the order key		**PACT MCR-V2-10020-129**	**2277378**	1	**PACT MCR-V2-10036-129**	**2277381**	1
Current transformer that supports official calibration, to specify the type of current transformer you require, please refer to the order key (see notes)		**PACT MCR-V2C-10020-129**	**2277514**	1	**PACT MCR-V2C-10036-129**	**2277527**	1

Add **order key** from the selection table (ordering example marked in orange)

Order No.	Primary current I_{pn}	Secondary current I_{sn}	Class	Rated power S_n
2277378	IP40000	IS05	C05	P2500

Selection table PACT MCR-V2-10020-129 (Order No.: 2277378)

I_{sn}	Cl.	Primary rated current amperage I_{pn} [A] 400	500	600	750	800	1000	1250	1500	1600	2000	2500	3000	4000	Rated power S_n [VA]
IS01 ≙ 1 A	C05 ≙ 0.5		2.5	5	5	5	5	5	5	5	5	5	5		
			5	10	10	10	10	10	10	10	10	10	10		
								15	15	15	15	15	15		
												20	20		
	C10 ≙ 1	2.5	2.5	5	5	5	5	5	5	5	5	5	5		
		5	5	10	10	10	10	10	10	10	10	10	10		
								15	15	15	15	15	15		
												25	30		
IS05 ≙ 5 A	C05 ≙ 0.5		2.5	2.5	5	5	5	5	5	5	5	5	5	5	
			5	5	10	10	10	10	10	10	10	10	10	10	
								15	15	15	15	15	15	15	
											20	20	25	25	
	C10 ≙ 1	2.5	2.5	5	5	5	5	5	5	5	5	5	5	5	
		5	5	10	10	10	10	10	10	10	10	10	10	10	
							15	15	15	15	15	15	15	15	
										20	25	30	30	30	

Selection table PACT MCR-V2-10036-129 (Order No.: 2277381)

I_{sn}	Cl.	Primary rated current amperage I_{pn} [A] 400	500	600	750	800	1000	1250	1500	1600	2000	2500	3000	4000	Rated power S_n [VA]
IS01 ≙ 1 A	C05 ≙ 0.5		2.5	5	5	5	5	5	5	5	5	5	5		
			5	10	10	10	10	10	10	10	10	10	10		
								15	15	15	15	15	15		
												20	20		
	C10 ≙ 1	2.5	2.5	5	5	5	5	5	5	5	5	5	5		
		5	5	10	10	10	10	10	10	10	10	10	10		
								15	15	15	15	15	15		
												25	30		
IS05 ≙ 5 A	C05 ≙ 0.5		2.5	2.5	5	5	5	5	5	5	5	5	5	5	
			5	5	10	10	10	10	10	10	10	10	10	10	
								15	15	15	15	15	15	15	
											20	20	25	25	
	C10 ≙ 1	2.5	2.5	5	5	5	5	5	5	5	5	5	5	5	
		5	5	10	10	10	10	10	10	10	10	10	10	10	
							15	15	15	15	15	15	15	15	
										20	25	30	30	30	

Current transformers

PACT MCR-V2-12020-159

- Primary rated current I_{pn}: 0...(400...4000) A
- Circular conductor dimensions: Ø 96 mm
- Rail dimensions: 2x 120x10 mm; 3x 100x10 mm; 80x80 mm

PACT MCR-V2-12040-159

- Primary rated current I_{pn}: 0...(400...4000) A
- Rail dimensions: 4x 120x10 mm

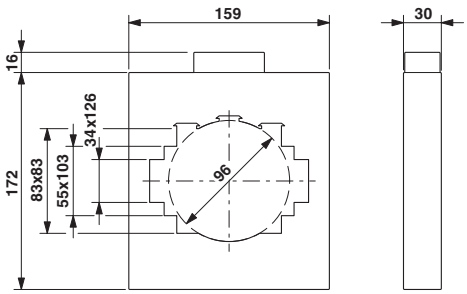
Plug-in current transformer

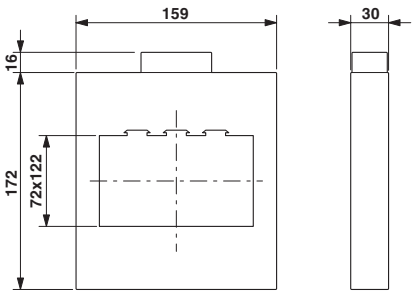
Plug-in current transformer

Notes:

Our configurator, which is available at www.phoenixcontact.net/catalog, makes ordering easy.

The relevant installation accessories can be found on page 707





Description	Rated power S_n	Ordering data: Type	Order No.	Pcs. / Pkt.	Ordering data: Type	Order No.	Pcs. / Pkt.
Preferred versions available from stock (marked in green in the selection table) Primary rated current I_{pn}: - 4000 A	15 VA				PACT MCR-V2-12040-159-4000-5A	2276418	1
Current transformer, to specify the type of current transformer you require, please refer to the order key		PACT MCR-V2-12020-159	2277394	1	PACT MCR-V2-12040-159	2277404	1

Add **order key** from the selection table (ordering example marked in orange)

Order No.		Primary current I_{pn}		Secondary current I_{sn}		Class		Rated power
2277404	/	IP08000	/	IS01	/	C05	/	P250

Selection table PACT MCR-V2-12020-159 (Order No.: 2277394)

I_{sn}	Cl.	Primary rated current amperage I_{pn} [A]													Rated power S_n [VA]
		400	500	600	750	800	1000	1250	1500	1600	2000	2500	3000	4000	
IS01 ≙ 1A	C05 ≙ 0.5	2.5	2.5	2.5	2.5	2.5	2.5	5	5	5	5	5	5	10	
		5	5	5	5	5	5	10	10	10	10	10	10	15	
		10	10	10	10	10	10	15	15	15	15	15	15	30	
							15	20	30	30	30	30	30	45	
	C10 ≙ 1	2.5	5	5	2.5	2.5	5	5	5	5	5	5	10	10	
		5	10	10	5	5	10	10	10	10	10	10	15	15	
		10	15	15	10	10	15	15	15	15	15	15	30	30	
		15	20	20		15	20	30	30	30	30	30	45	45	
IS05 ≙ 5 A	C05 ≙ 0.5	2.5	2.5	2.5	2.5	2.5	5	5	10	5	5	5	10	10	
		5	5	5	5	5	10	10	15	10	10	10	15	15	
		10	10	10	10	10	15	15	30	15	15	15	30	30	
					15	15	30	30	45	30	30	30	45	45	
	C10 ≙ 1	2.5	5	5	5	5	5	5	10	5	5	5	10	10	
		5	10	10	10	10	10	10	15	10	10	15	15	15	
		10	15	15	15	15	15	15	30	15	15	30	30	30	
		15	20	20	20	30	30	30	45	30	30	45	45	45	

Selection table PACT MCR-V2-12040-159 (Order No.: 2277404)

I_{sn}	Cl.	Primary rated current amperage I_{pn} [A]													Rated power S_n [VA]
		400	500	600	750	800	1000	1250	1500	1600	2000	2500	3000	4000	
IS01 ≙ 1A	C05 ≙ 0.5	2.5	2.5	2.5	2.5	2.5	2.5	5	5	5	5	5	5	10	
		5	5	5	5	5	5	10	10	10	10	10	10	15	
							10	15	15	15	15	15	15	30	
	C10 ≙ 1	2.5	5	5	2.5	2.5	5	5	5	5	5	5	10	10	
		5	10	10	5	5	10	10	10	10	10	10	15	15	
		10	15	15		10	15	15	15	15	15	15	30	30	
IS05 ≙ 5 A	C05 ≙ 0.5	2.5	2.5	2.5	2.5	2.5	5	5	10	5	5	5	10	10	
		5	5	5	5	5	10	10	15	10	10	10	15	15	
					10	10	15	15	30	15	15	15	30	30	
	C10 ≙ 1	2.5	5	5	5	5	5	5	10	5	5	10	10	10	
		5	10	10	10	10	10	10	15	10	10	15	15	15	
		10	15	15	15	15	15	15	30	15	15	30	30	30	

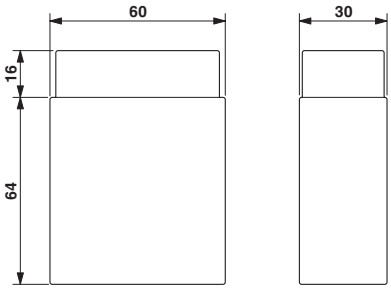
Current transformers

PACT MCR-V3-60

– Primary rated current I_{pn}: 0...(1...40) A

– Live copper conductors connected directly to the screw terminal blocks on the primary side

Notes:
Our configurator, which is available at www.phoenixcontact.net/catalog, makes ordering easy.
The relevant installation accessories can be found on page 707



Winding current transformer

Description	Ordering data		
	Type	Order No.	Pcs. / Pkt.
Current transformer, to specify the type of current transformer you require, please refer to the order key	PACT MCR-V3-60	2277417	1

Add to order key from the selection table (ordering example marked in orange)

Order No.		Primary current I_{pn}		Secondary current I_{sn}		Class		Rated power S_n
2277417	/	IP00025	/	IS01	/	C10	/	P250

Selection table PACT MCR-V3-60 (Order No.: 2277417)

I_{sn}	Cl.	Primary rated current strength I_{pn} [A]														Rated power S_n [VA]
		1	2	2.5	4	5	6	7.5	10	12.5	15	20	25	30	40	
IS01 ≙1 A	C05 ≙ 0.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	
		5	5	5	5	5	5	5	5	5	5	5	5	5	5	
	C10 ≙ 1	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	
		5	5	5	5	5	5	5	5	5	5	5	5	5	5	
IS05 ≙ 5 A	C05 ≙ 0.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	
		5	5	5	5	5	5	5	5	5	5	5	5	5	5	
	C10 ≙ 1	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	
		5	5	5	5	5	5	5	5	5	5	5	5	5	5	

Accessories

– Copper sleeves
– Secondary terminal cover

Copper sleeves

Secondary terminal cover

Description		Ordering data			Ordering data		
		Type	Order No.	Pcs. / Pkt.	Type	Order No.	Pcs. / Pkt.
Copper sleeves, for establishing a conductive connection during the horizontal assembly of PACT current transformers. The size of the copper sleeve depends on the diameter of the inner hole of the current transformer.							
- For PACT MCR-V1-21-44-...	Ø 21/8 mm	**PACT MCR-CB-21- 8**	**2277569**	1			
- For PACT MCR-V1-21-44-...	Ø 21/12 mm	**PACT MCR-CB-21-12**	**2277556**	1			
- For PACT MCR-V2-3015-60-...	Ø 28/12 mm	**PACT MCR-CB-28-12**	**2277543**	1			
- For PACT MCR-V2-5012-85-...	Ø 42/12 mm	**PACT MCR-CB-42-12**	**2277530**	1			
Secondary terminal cover, for increasing the air and creepage distances							
- For PACT MCR-V1-21-44-...	Length: 60 mm				**PACT MCR-ETC-60**	**2277572**	9
- For PACT MCR-V2-3015-60-... and PACT MCR-V2-5012-85-...	Length: 75 mm				**PACT MCR-ETC-75**	**2277585**	9

Accessories

– DIN rail adapter
– Insulating caps

Description	Ordering data			Ordering data		
	Type	Order No.	Pcs. / Pkt.	Type	Order No.	Pcs. / Pkt.
DIN rail adapter	**PACT MCR-RA**	**2277598**	12			
Insulating caps, for protection against accidental contact with mounting screws of the primary rail				**PACT MCR-ICAP**	**2277608**	18

Current transformers that can be calibrated - Order key and selection tables

Add **order key** from the relevant selection table (ordering examples are marked in orange)

Order No.	Primary current I_{pn}	Secondary current I_{sn}	Class	Rated power S_n	Calibration	Calibration certificate
	IP01500 ≙ 150 A IP02000 ≙ 200 A IP02500 ≙ 250 A IP03000 ≙ 300 A IP04000 ≙ 400 A IP05000 ≙ 500 A IP06000 ≙ 600 A IP07500 ≙ 750 A IP08000 ≙ 800 A IP10000 ≙ 1000 A IP12000 ≙ 1200 A IP12500 ≙ 1250 A IP15000 ≙ 1500 A IP16000 ≙ 1600 A IP20000 ≙ 2000 A IP25000 ≙ 2500 A	IS05 ≙ 5 A	C02S ≙ 0.2S C02 ≙ 0.2 C05S ≙ 0.5S C05 ≙ 0.5	P250 ≙ 2.5 VA P500 ≙ 5.0 VA P1000 ≙ 10 VA P1500 ≙ 15 VA P2000 ≙ 20 VA P3000 ≙ 30 VA	NONE ≙ Not calibrated YES ≙ Calibrated	NONE ≙ No calibration certificate YES ≙ Calibration certificate (a fee is charged) YESPLUS ≙ Calibration certificate with catalog of errors (5 measuring points) (a fee is charged)

PACT MCR-V1C-21-44 (Order No. 2277420)

Information about the product is available on page 697.

Add **order key** from the selection table

2277420	IP03000	IS05	C02	P250	NONE	NONE

Selection table

I_{sn}	Cl.	Primary rated current strength I_{pn} [A] 150	200	250	300	400	500	Rated power Sn [VA]
IS05 ≙ 5 A	C02S ≙ 0.2S					2.5	2.5	
							5	
	C02 ≙ 0.2				**2.5**	2.5	2.5	
					5	5	5	
	C05S ≙ 0.5S		2.5	2.5	2.5	2.5	2.5	
				5	5	5	5	
					10		10	
	C05 ≙ 0.5	2.5	2.5	2.5	2.5	2.5	2.5	
			5	5	5	5	5	
					10		10	

PACT MCR-V2C-3015-60 (Order No. 2277433)

Information about the product is available on page 698.

Add **order key** from the selection table

2277433	IP02000	IS05	C05	P250	NONE	NONE

Selection table

I_{sn}	Cl.	Primary rated current strength I_{pn} [A] 200	250	300	400	500	600	750	Rated power Sn [VA]
IS05 ≙ 5 A	C02S ≙ 0.2S						2.5	2.5	
							5	5	
							10	10	
	C02 ≙ 0.2				2.5	2.5	2.5	2.5	
						5	5	5	
							10	10	
	C05S ≙ 0.5S		2.5	2.5	2.5	2.5	2.5	2.5	
				5	5	5	5	5	
					10	10	10	10	
								15	
	C05 ≙ 0.5	**2.5**	2.5	2.5	2.5	2.5	2.5	2.5	
			5	5	5	5	5	5	
					10	10	10	10	
								15	

PACT MCR-V2C-4012-70 (Order No. 2277446)

Information about the product is available on page 699.

Add **order key** from the selection table

2277446	IP06000	IS05	C02	P1000	NONE	NONE

Selection table

I_{sn}	Cl.	Primary rated current strength I_{pn} [A] 200	250	300	400	500	600	750	800	1000	Rated power Sn [VA]
IS05 ≙ 5 A	C02S ≙ 0.2S						2.5	2.5	2.5	5	
							5	5	5	10	
								10	10		
	C02 ≙ 0.2				2.5	2.5	2.5	5	2.5	5	
					5	5	5	10	5	10	
						10	**10**		10		
	C05S ≙ 0.5S		2.5	2.5	2.5	2.5	5	5	2.5	5	
				5	5	5	10	10	5	10	
					10	10			10		
	C05 ≙ 0.5	2.5	2.5	2.5	2.5	2.5	5	5	2.5	5	
			5	5	5	5	10	10	5	10	
					10	10			10		

PACT MCR-V2C-5012-85 (Order No. 2277459)

Information about the product is available on page 700.

Add **order key** from the selection table

2277459	IP10000	IS05	C05	P1500	NONE	NONE

Selection table

I_{sn}	Cl.	Primary rated current strength I_{pn} [A] 200	250	300	400	500	600	750	800	1000	1200	Rated power Sn [VA]
IS05 ≙ 5 A	C02S ≙ 0.2S						2.5	2.5	2.5	5	5	
							5	5	5	10	10	
								10	10	15	15	
										20	30	
	C02 ≙ 0.2				2.5	2.5	2.5	2.5	2.5	5	5	
					5	5	5	5	5	10	10	
							10	10	10	15	15	
										30	30	
	C05S ≙ 0.5S	2.5	2.5	2.5	2.5	2.5	5	5	5	5	5	
				5	5	5	10	10	10	10	10	
					10	10				15	15	
										30	30	
	C05 ≙ 0.5	2.5	2.5	2.5	2.5	2.5	5	5	5	5	5	
			5	5	5	5	10	10	10	10	10	
					10	10				**15**	15	
										30	30	

PACT MCR-V2C-6015-85 (Order No. 2277462)

Information about the product is available on page 701.

Add **order key** from the selection table

2277462	IP02500	IS05	C05	P250	NONE	NONE

Selection table

I_{sn}	Cl.	Primary rated current strength I_{pn} [A] 250	300	400	500	600	750	800	1000	1200	Rated power Sn [VA]
IS05 ≙ 5 A	C02S ≙ 0.2S						2.5	2.5	2.5	2.5	
							5	5	5	5	
									10	10	
	C02 ≙ 0.2					2.5	2.5	2.5	2.5	2.5	
							5	5	5	5	
									10	10	
										15	
	C05S ≙ 0.5S			2.5	2.5	2.5	2.5	2.5	2.5	2.5	
					5	5	5	5	5	5	
							10	10	10	10	
									15	15	
	C05 ≙ 0.5	**2.5**	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	
					5	5	5	5	5	5	
							10	10	10	10	
									15	15	

Current transformers that can be calibrated - Order key and selection tables

Add **order key** from the relevant selection table (ordering examples are marked in orange)

Order No.	Primary current I_{pn}	Secondary current I_{sn}	Class	Rated power S_n	Calibration	Calibration certificate
	IP01500 ≙ 150 A IP02000 ≙ 200 A IP02500 ≙ 250 A IP03000 ≙ 300 A IP04000 ≙ 400 A IP05000 ≙ 500 A IP06000 ≙ 600 A IP07500 ≙ 750 A IP08000 ≙ 800 A IP10000 ≙ 1000 A IP12000 ≙ 1200 A IP12500 ≙ 1250 A IP15000 ≙ 1500 A IP16000 ≙ 1600 A IP20000 ≙ 2000 A IP25000 ≙ 2500 A	IS05 ≙ 5 A	C02S ≙ 0.2S C02 ≙ 0.2 C05S ≙ 0.5S C05 ≙ 0.5	P250 ≙ 2.5 VA P500 ≙ 5.0 VA P1000 ≙ 10 VA P1500 ≙ 15 VA P2000 ≙ 20 VA P3000 ≙ 30 VA	NONE ≙ Not calibrated YES ≙ Calibrated	NONE ≙ No calibration certificate YES ≙ Calibration certificate (a fee is charged) YESPLUS ≙ Calibration certificate with catalog of errors (5 measuring points) (a fee is charged)

PACT MCR-V2C-6315-95 (Order No. 2277475)

Information about the product is available on page 702.

Add **order key** from the selection table

2277475	IP15000	IS05	C05	P3000	NONE	NONE

Selection table

I_{sn}	Cl.	Primary rated current strength I_{pn} [A] 200	250	300	400	500	600	750	800	1000	1200	1250	1500	Rated power Sn [VA]
IS05 ≙ 5 A	C02S ≙ 0.2S									2.5	5	5	5	
										5	10	10	10	
										10	15	15	15	
											20	20	20	
	C02 ≙ 0.2				2.5	2.5	2.5	2.5	2.5	5	5	5	5	
					5	5	5	5	5	10	10	10	10	
							10	10	10	15	15	15	15	
								15	15	20	20	20	30	
	C05S ≙ 0.5S			2.5	2.5	2.5	2.5	2.5	5	5	5	5	5	
					5	5	5	5	10	10	10	10	10	
						10	10	10	15	15	15	15	15	
								15	20	20	20	30	30	
	C05 ≙ 0.5	2.5	2.5	2.5	2.5	2.5	2.5	5	5	5	5	5	5	
			5	5	5	5	5	10	10	10	10	10	10	
					10	10	10	15	15	15	15	15	15	
					15	15	15	20	30	30	20	30	30	

PACT MCR-V2C-6040-96 (Order No. 2277488)

Information about the product is available on page 702.

Add **order key** from the selection table

2277488	IP12000	IS05	C02	P1000	NONE	NONE

Selection table

I_{sn}	Cl.	Primary rated current strength I_{pn} [A] 500	600	750	800	1000	1200	1250	1500	Rated power Sn [VA]
IS05 ≙ 5 A	C02S ≙ 0.2S						2.5	2.5	2.5	
							5	5	5	
								10		
								15		
	C02 ≙ 0.2			2.5	2.5	2.5	2.5	2.5	2.5	
				5	5	5	5	5	5	
							10	10		
								15		
	C05S ≙ 0.5S	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	
			5	5	5	5	5	5	5	
					10	10	10	10	10	
							15	15		
	C05 ≙ 0.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	
		5	5	5	5	5	5	5	5	
				10	10	10	10	10	10	
							15	15		

PACT MCR-V2C-8015-105 (Order No. 2277491)

Information about the product is available on page 703.

Add **order key** from the selection table

2277491	IP05000	IS05	C05	P500	NONE	NONE

Selection table

I_{sn}	Cl.	Primary rated current strength I_{pn} [A] 400	500	600	750	800	1000	1200	1250	1500	Rated power Sn [VA]
IS05 ≙ 5 A	C02S ≙ 0.2S									2.5	
										5	
	C02 ≙ 0.2			2.5	2.5	2.5	2.5	2.5	2.5	2.5	
				5	5	5	5	5	5	5	
					10	10	10	10	10	10	
							15			15	
	C05S ≙ 0.5S	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	
				5	5	5	10	5	5	5	
					10	10	15	10	10	10	
						15	20			15	
	C05 ≙ 0.5	2.5	2.5	2.5	2.5	2.5	5	2.5	2.5	2.5	
		5	5	5	5	5	10	5	5	5	
				10	10	10	15	10	10	10	
					15	15	20			15	

PACT MCR-V2C-8020-105 (Order No. 2277501)

Information about the product is available on page 703.

Add **order key** from the selection table

2277501	IP15000	IS05	C05S	P1000	NONE	NONE

Selection table

I_{sn}	Cl.	Primary rated current strength I_{pn} [A] 400	500	600	750	800	1000	1200	1250	1500	Rated power Sn [VA]
IS05 ≙ 5 A	C02S ≙ 0.2S								2.5	2.5	
									5	5	
	C02 ≙ 0.2			2.5	2.5	2.5	2.5	2.5	2.5	2.5	
							5	5	5	5	
								10	10	10	
	C05S ≙ 0.5S		2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	
				5	5	5	5	5	5	5	
						10	10	10	10	10	
	C05 ≙ 0.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	
		5	5	5	5	5	5	5	5	5	
						10	10	10	10	10	

PACT MCR-V2C-10020-129 (Order No. 2277514)

Information about the product is available on page 704.

Add **order key** from the selection table

2277514	IP08000	IS05	C05	P1500	NONE	NONE

Selection table

I_{sn}	Cl.	Primary rated current strength I_{pn} [A] 500	600	750	800	1000	1200	1250	1500	1600	2000	2500	Rated power Sn [VA]
IS05 ≙ 5 A	C02S ≙ 0.2S								2.5	2.5	2.5	2.5	
									5	5	5	5	
												10	
	C02 ≙ 0.2					2.5	2.5	2.5	2.5	2.5	2.5	2.5	
						5	5	5	5	5	5	5	
						10	10	10	10	10	10	10	
								15	15	15	15	15	
	C05S ≙ 0.5S	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	
		5	5	5	5	5	5	5	5	5	5	5	
					10	10	10	10	10	10	10	10	
							15	15	15	15	15	15	
	C05 ≙ 0.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	
		5	5	5	5	5	5	5	5	5	5	5	
				10	10	10	10	10	10	10	10	10	
					15	15	15	15	15	15	15	15	

PACT MCR-V2C-10036-129 (Order No. 2277527)

Information about the product is available on page 704.

Add **order key** from the selection table

2277527	IP16000	IS05	C05	P500	NONE	NONE

Selection table

I_{sn}	Cl.	Primary rated current strength I_{pn} [A] 500	600	750	800	1000	1200	1250	1500	1600	2000	2500	Rated power Sn [VA]
IS05 ≙ 5 A	C02S ≙ 0.2S												
	C02 ≙ 0.2					2.5	2.5	2.5	2.5	2.5	2.5	2.5	
						5	5	5	5	5	5	5	
						10	10	10	10	10	10	10	
									15	15	15	15	
	C05S ≙ 0.5S												
	C05 ≙ 0.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	
		5	5	5	5	5	5	5	5	5	5	5	
				10	10	10	10	10	10	10	10	10	
								15	15	15	15	15	

Current measurement

If purely ohmic loads (incandescent lamps, heaters, etc.) are run on a conventional 230 V power system, no distortions are produced on this network.

As non-linear loads increase as a result of phase angle-controlled regulation modules, pure sine waves gradually take on a trapezoidal curve shape.

The majority of current and voltage transducers are calibrated for sinusoidal alternating currents, which means that they can only indicate the r.m.s. value of an alternating current by mean-value generation.

True r.m.s. measuring transducers are independent of specific form factors and will accept any curve shape.

Measurement of root mean square (r.m.s.) values according to the transformer principle

According to Faraday's law of induction, a magnetic flux which changes over time produces an induced voltage on the terminals of a coil. A circuit arrangement comprising two electrically isolated but magnetically coupled circuits is known as a transformer. This is one of the simplest and most commonly used methods of current transfer.

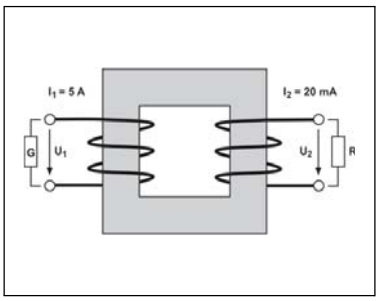
True r.m.s. (TRMS) measurement according to the Rogowski principle

The Rogowski principle is a special method used to measure sinusoidal and non-sinusoidal alternating currents in a transformer. A non-ferrous induction coil (air-core coil), known as the Rogowski coil, measures the magnetic voltage along a closed circumference around a live wire.

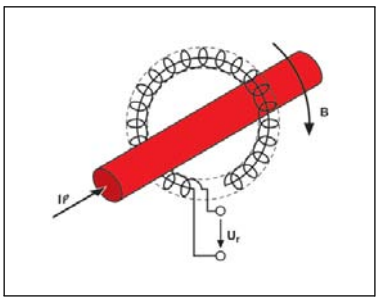
The output signal of the Rogowski coil is then conditioned so as to obtain an exact replica of the primary current.

True r.m.s. (TRMS) measurement with a Hall sensor

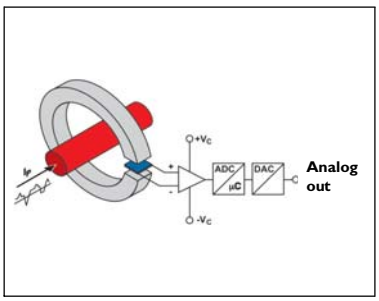
The magnetic flux generated by the primary current I_P is condensed in the magnetic circuit and measured in the air gap using a Hall sensor. The output signal of the Hall sensor is then conditioned so that an exact replica of the primary current is obtained.



Measurement of root mean square (r.m.s.) values according to the transformer principle



True r.m.s. (TRMS) measurement according to the Rogowski principle



True r.m.s. (TRMS) measurement with a Hall sensor

Mean-value generation

R.m.s. value (root mean square value)

The r.m.s. value of an AC current corresponds to the steady-state value that results from the instantaneous values of this current. This steady-state value generates the same thermal work in an ohmic resistor as a DC current of identical magnitude.

The term "true r.m.s. value" simply means that distorted, direct, and pulsating currents may also be measured. Here, the measuring transducer is compatible with any curve shape.

For a sinusoidal AC current this means:

$$I_{rm} = \frac{I_S}{\sqrt{2}} \qquad U_r = \frac{U_S}{\sqrt{2}}$$

Arithmetic average value

The arithmetic average value is used to measure DC currents or filter a DC component out from a pulsating current. Applying the arithmetic average value to a symmetrical AC current would result in a measured value of "0".

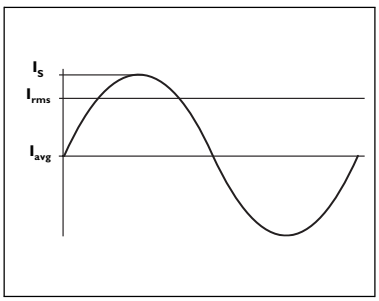
The arithmetic average value enables DC currents to be made available at the output in the form of standard analog signals. The polarity can be evaluated by means of a bipolar output signal.

For a 230 V/50 Hz network, this results in the following as regards the voltage levels:

U_{rms} = 230 V

U_S = 325 V

U_{avg} = 0 V



Arithmetic average value

Current transducers, programmable and configurable

The **MCR-S-...-UI(-SW)-DCI** current transducers measure direct, alternating, and distorted currents.

- Device can be set via DIP switches or MCR/PI-CONF-WIN configuration software
- True r.m.s. value measurement
- 3-way isolation
- With optional relay and transistor output

Notes:

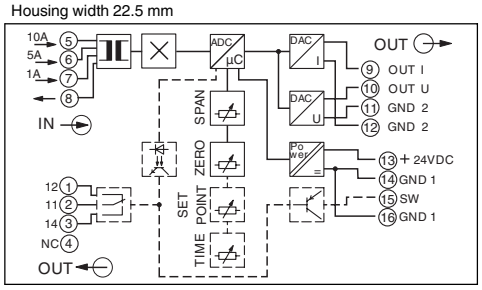
To order a configurable product, enter the required configuration by referring to the adjacent order key.

Further information about the configuration software can be found on page 721

For DC, AC, and distorted currents
0 ... 11 A

Ex:

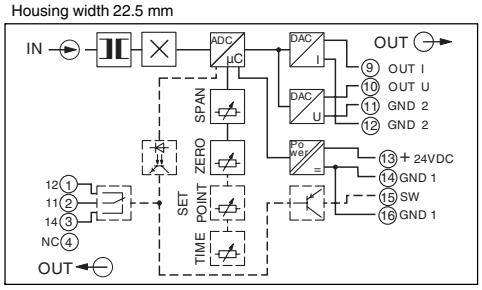
Housing width 22.5 mm



For DC, AC, and distorted currents
0 ... 55 A

Ex:

Housing width 22.5 mm



		Technical data		Technical data	
Input data					
Input current		0 A ... 11 A (AC/DC)		0 A ... 55 A (AC/DC)	
Operate threshold		2% (of measuring range nominal value 1/5/10 A)		0.8% (of measuring range nominal value 50 A)	
Frequency range		15 Hz ... 400 Hz		15 Hz ... 400 Hz	
Curve type		AC, DC or distorted currents		AC, DC or distorted currents	
Overload capacitance		2 x I_N (continuous)		Depends on through-connected conductor	
Surge strength		20 x I_N (1 s)		Depends on through-connected conductor	
Connection method		Screw connection		Through connection, diameter 10.5 mm	
Output data		U output	I output	U output	I output
Output signal (normal and inverse)		0 ... 5 V / 1 ... 5 V / 0 ... 10 V 2 ... 10 V / -5 ... 5 V / -10 ... 10 V	0 ... 20 mA / 4 ... 20 mA	0 ... 5 V / 1 ... 5 V / 0 ... 10 V 2 ... 10 V / -5 ... 5 V / -10 ... 10 V	0 ... 20 mA / 4 ... 20 mA
Load R_B		> 10 kΩ	< 500 Ω	> 10 kΩ	< 500 Ω
Switching output					
Relay output	Contact material	1 PDT / AgSnO, hard gold-plated		1 PDT / AgSnO, hard gold-plated	
	Max. switching current	50 mA (with gold layer, 30 V AC/ 36 V DC) 2 A (with damaged gold layer, 250 V AC)		50 mA (with gold layer, 30 V AC/ 36 V DC) 2 A (with damaged gold layer, 250 V AC)	
Transistor output pnp	Output voltage	19 V ... 29 V (supply voltage - 1 V)		19 V ... 29 V (supply voltage - 1 V)	
	Continuous load current	80 mA (not short-circuit-proof)		80 mA (not short-circuit-proof)	
Setting range of the threshold value		1% ... 110%		1% ... 110%	
Response delay		0.1 s ... 20 s		0.1 s ... 20 s	
Status indication		Yellow LED		Yellow LED	
General data					
Supply voltage U_B		20 V DC ... 30 V DC		20 V DC ... 30 V DC	
Current consumption		< 50 mA (without load)		< 50 mA (without load)	
Maximum transmission error		< 0.5% (of nominal range value under nominal conditions)		< 0.5% (of nominal range value under nominal conditions)	
Temperature coefficient		typ. < 0.025%/K		typ. < 0.025%/K	
Step response (10 - 90%)		330 ms (with AC) 40 ms (with DC)		330 ms (with AC) 40 ms (with DC)	
Safe isolation		According to EN 50178, EN 61010		According to EN 50178, EN 61010	
Rated insulation voltage		300 V AC (to ground)		300 V AC (to ground)	
Surge voltage category / pollution degree		III / 2		III / 2	
Test voltage input/output		4 kV (50 Hz, 1 min.)		4 kV (50 Hz, 1 min.)	
Test voltage input/power supply		4 kV (50 Hz, 1 min.)		4 kV (50 Hz, 1 min.)	
Test voltage output/power supply		500 V (50 Hz, 1 min.)		500 V (50 Hz, 1 min.)	
Degree of protection		IP20		IP20	
Ambient temperature range		-20°C ... 60°C		-20°C ... 60°C	
Dimensions W / H / D		22.5 / 99 / 114.5 mm		22.5 / 99 / 114.5 mm	
Screw connection solid / stranded / AWG		0.2 ... 2.5 mm^2 / 0.2 ... 2.5 mm^2 / 24 - 14		0.2 ... 2.5 mm^2 / 0.2 ... 2.5 mm^2 / 24 - 14	
Conformance/approvals					
Conformance		CE-compliant		CE-compliant	
UL, USA/Canada		Class I, Zone 2, AEx nC IIC T6, Ex nC IIC T6		Class I, Zone 2, AEx nC IIC T6, Ex nC IIC T6	

Description	Ordering data: Type	Order No.	Pcs. / Pkt.	Ordering data: Type	Order No.	Pcs. / Pkt.
MCR current measuring transducer for measuring AC, DC, and distorted currents with relay and transistor switching output						
Configurable product	**MCR-S-1-5-UI-SW-DCI**	**2814650**	1	**MCR-S-10-50-UI-SW-DCI**	**2814663**	1
Standard product	**MCR-S-1-5-UI-SW-DCI-NC**	**2814731**	1	**MCR-S10-50-UI-SW-DCI-NC**	**2814744**	1
Configurable product, without switching output	**MCR-S-1-5-UI-DCI**	**2814634**	1	**MCR-S-10-50-UI-DCI**	**2814647**	1
Standard product, without switching output	**MCR-S-1-5-UI-DCI-NC**	**2814715**	1	**MCR-S10-50-UI-DCI-NC**	**2814728**	1

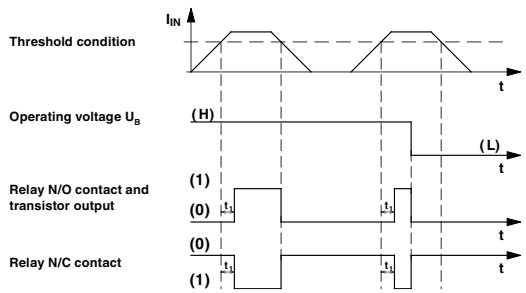
Order key for the current transducers (Standard configuration entered as example)

Order No.	Measuring range: Start	Measuring range: End	Output	Threshold value	Suppression time	Operating behavior of relay and transistor	
2814634 /	**0.00** /	**5.00** /	**OUT01**				
2814650 /	**0.00** /	**5.00** /	**OUT01** /	**50** /	**3.0** /	**A** /	**O**
2814634 ≙ MCR-S-1-5-UI-DCI 2814650 ≙ MCR-S-1-5-UI-SW-DCI	Measuring range starting value is between 0.00…7.50 A 0.00 ≙ 0.00 A	Measuring range final value between 0.2...11 A 5.00 ≙ 5.00 A	OUT01 ≙ 0...20 mA OUT02 ≙ 4...20 mA OUT03 ≙ 0...10 V OUT04 ≙ 2...10 V OUT05 ≙ 0...5 V OUT06 ≙ 1...5 V OUT07 ≙ 20...0 mA OUT08 ≙ 20...4 mA OUT09 ≙ 10...0 V OUT10 ≙ 10...2V OUT11 ≙ 5...0 V OUT12 ≙ 5...1 V OUT13 ≙ -5...+5 V OUT14 ≙ -10...+10 V OUT17 ≙ +10...-10 V OUT18 ≙ +5...-5 V	Switching threshold between 1 ... 110% 50 ≙ 50% of set upper measuring range value (here: 2.5 A)	between 0.1 ... 20 s 3.0 ≙ 3 s	A ≙ Operating current controlled R ≙ Closed-circuit current controlled	O ≙ Overrange U ≙ Underrange

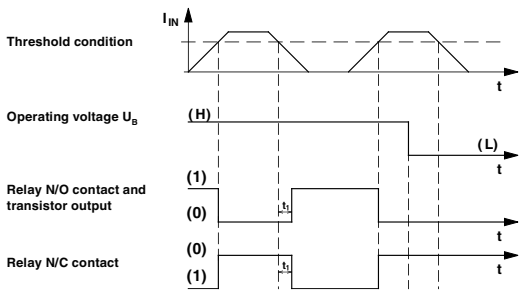
Order No.	Measuring range: Start	Measuring range: End	Output	Threshold value	Suppression time	Operating behavior and Transistor	
2814647 /	**0.0** /	**50.0** /	**OUT01**				
2814663 /	**0.0** /	**50.0** /	**OUT01** /	**50** /	**3.0** /	**A** /	**O**
2814647 ≙ MCR-S-10-50-UI-DCI 2814663 ≙ MCR-S-10-50-UI-SW-DCI	Measuring range start value is between 0.00…37.5 A 0.0 ≙ 0.0 A	Measuring range final value between 9.5...55 A 50.0 ≙ 50.0 A	OUT01 ≙ 0...20 mA OUT02 ≙ 4...20 mA OUT03 ≙ 0...10 V OUT04 ≙ 2...10 V OUT05 ≙ 0...5 V OUT06 ≙ 1...5 V OUT07 ≙ 20...0 mA OUT08 ≙ 20...4 mA OUT09 ≙ 10...0 V OUT10 ≙ 10...2V OUT11 ≙ 5...0 V OUT12 ≙ 5...1 V OUT13 ≙ -5...+5 V OUT14 ≙ -10...+10 V OUT17 ≙ +10...-10 V OUT18 ≙ +5...-5 V	Switching threshold between 1 ... 110% 50 ≙ 50% of set upper measuring range value (here: 25 A)	between 0.1 ... 20 s 3.0 ≙ 3 s	A ≙ Operating current controlled R ≙ Closed-circuit current controlled	O ≙ Overrange U ≙ Underrange

Function diagrams: Switching behavior of relay and transistor output:

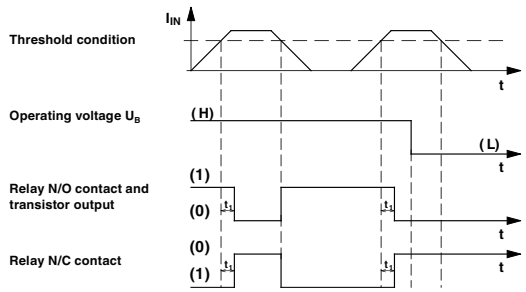
1) Operating current-controlled when above threshold value



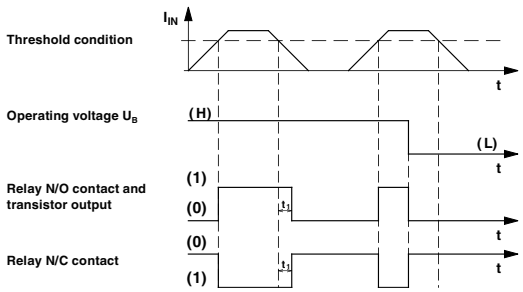
2) Operating current-controlled when below threshold value



3) Closed circuit current-controlled when above threshold value



4) Closed circuit current-controlled when below threshold value



(0) ≙ N/O contact and transistor open / N/C contact closed
(1) ≙ N/O contact and transistor closed / N/C contact open

Current transducers

The **MCR-SL-CUC-...** current transducers measure DC, AC, and distorted currents of 0 ... 600 A.

- Universal current measurement, no shunt required
- Compact dimensions also enable distributed use
- Variable mounting on DIN rail and mounting plate
- Simple connection method thanks to COMBICON plug-in connection terminal blocks
- 3-way isolation

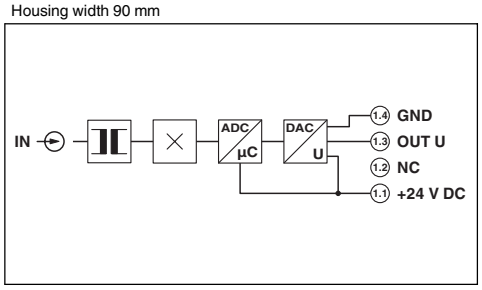
N

For DC, AC, and distorted currents of 0 ... 300 A, voltage output

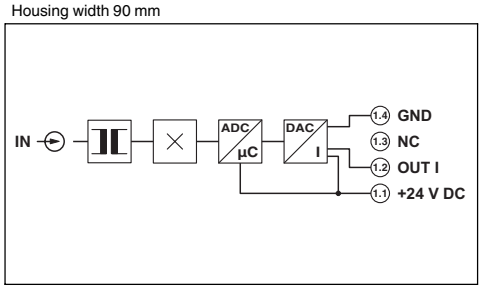
N

For DC, AC, and distorted currents of 0 ... 600 A, current output

Housing width 90 mm



Housing width 90 mm



	Technical data	Technical data
Input data		
Frequency range	20 Hz ... 6000 Hz	20 Hz ... 6000 Hz
Curve type	AC, DC or distorted currents	AC, DC or distorted currents
Connection method	Clamp-on cable design, 32 mm in diameter	Clamp-on cable design, 32 mm in diameter
Output data		
Output signal	0 ... 10 V	4 ... 20 mA
Maximum output signal		< 25 mA
Load R_B	≥ 10 kΩ	< 300 Ω
General data		
Supply voltage U_B	20 V DC ... 30 V DC	20 V DC ... 30 V DC
Maximum transmission error	<±1% (of final value)	<±1% (of final value)
Temperature coefficient	typ. 0.02%/K (0 ... 60°C) 0.04%/K (-40 ... 65°C)	typ. 0.02%/K (0 ... 60°C) 0.04%/K (-40 ... 65°C)
Step response (10 - 90%)	150 ms	150 ms
Safe isolation	According to EN 61010	According to EN 61010
Rated insulation voltage	300 V AC	300 V AC
Surge voltage category / pollution degree	III / 2	III / 2
Degree of protection	IP20	IP20
Ambient temperature range	-40°C ... 65°C	-40°C ... 65°C
Dimensions W / H / D	90 / 33.8 / 85 mm	90 / 33.8 / 85 mm
Spring-cage connection solid / stranded / AWG	0.25 ... 2.5 mm² / 0.2 ... 2.5 mm² / 24 - 12	0.25 ... 2.5 mm² / 0.2 ... 2.5 mm² / 24 - 12
Conformance/approvals		
Conformance	CE-compliant	CE-compliant
UL, USA/Canada	UL applied for	UL applied for

Ordering data

Description	Overload capacitance	Type	Order No.	Pcs. / Pkt.
Universal current transducer				
Input current range: 0 ... 100 A	6 x I_{IN}	**MCR-SL-CUC-100-U**	**2308108**	1
Input current range: 0 ... 200 A	3 x I_{IN}	**MCR-SL-CUC-200-U**	**2308205**	1
Input current range: 0 ... 300 A	3.33 x I_{IN}	**MCR-SL-CUC-300-U**	**2308302**	1
Input current range: 0 ... 400 A	2.5 x I_{IN}			
Input current range: 0 ... 500 A	3.6 x I_{IN}			
Input current range: 0 ... 600 A	3 x I_{IN}			

Ordering data

Type	Order No.	Pcs. / Pkt.
MCR-SL-CUC-100-I	**2308027**	1
MCR-SL-CUC-200-I	**2308030**	1
MCR-SL-CUC-300-I	**2308043**	1
MCR-SL-CUC-400-I	**2308072**	1
MCR-SL-CUC-500-I	**2308085**	1
MCR-SL-CUC-600-I	**2308098**	1

PV string monitoring, Solarcheck

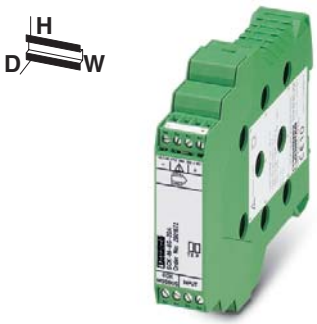
Solarcheck is a two-part monitoring system for photovoltaic plants.

The measuring module can be used to measure a voltage and the current in up to eight strings.

- Current measurement up to 20 A
- Voltage measurement up to 1200 V
- Digital input for monitoring the remote indication contacts of surge protection modules
- Internal temperature monitoring of measuring module
- Measuring modules supplied via the communication module

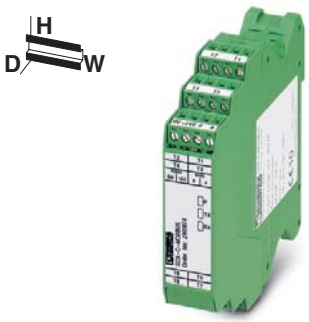
The communication module is used to acquire measured values from up to eight measuring modules and to make these available for forwarding to higher-level controllers.

N



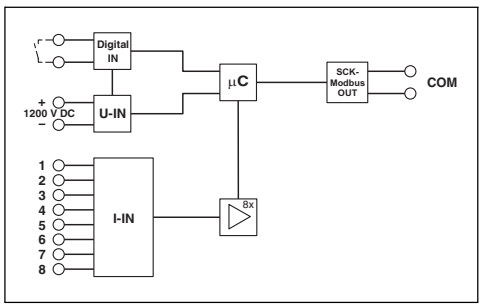
Measuring module, 20 A/1200 V

N

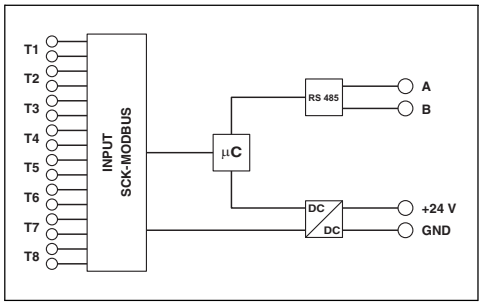


Communication module RS-485 (Modbus RTU)

Housing width 22.5 mm

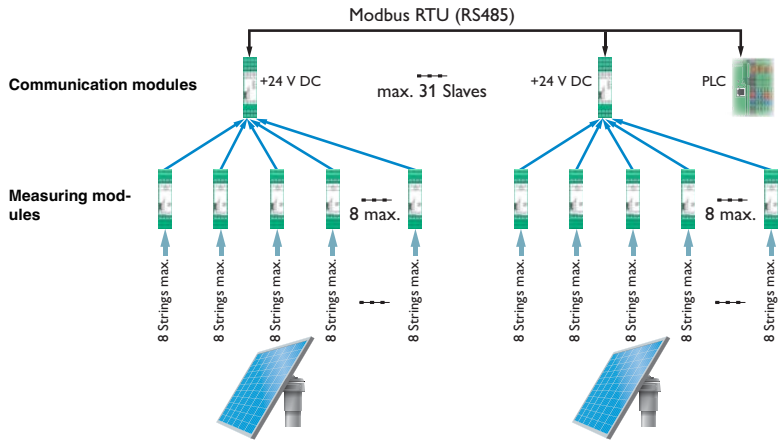


Housing width 22.5 mm



	Technical data	Technical data
Input data		
Input current	0 A ... 20 A	-
Input voltage range	0 V DC ... 1200 V DC	-
Overload capacitance	Depends on through-connected conductor	-
Connection method	Through connection, 10 mm diameter	-
Measuring category	CAT I	-
Digital input	Non-floating contact	
Load capacitance	Controlled by external floating contact	-
Pulse length	20 ms	-
Serial port		RS-485 Modbus RTU
Serial transmission speed	-	9.6 kbps
General data		
Supply voltage U_B	(via SCK-C-MODBUS communication module)	23 V DC ... 30 V DC
Current consumption		Max. 800 mA
Maximum transmission error	< 1% (of nominal range value under nominal conditions)	-
Degree of protection	IP20	IP20
Ambient temperature range	-20°C ... 70°C	-20°C ... 70°C
Dimensions W / H / D	22.5 / 102 / 128.5 mm	22.5 / 102 / 106 mm
Screw connection solid / stranded / AWG	0.14 ... 1.5 mm² / 0.14 ... 1.5 mm² / 26 - 16	0.14 ... 1.5 mm² / 0.14 ... 1.5 mm² / 26 - 16
Conformance/approvals		
Conformance	CE-compliant	CE-compliant

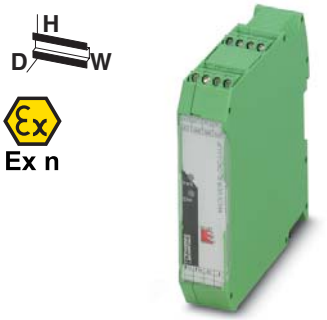
	Ordering data			Ordering data		
Description	Type	Order No.	Pcs. / Pkt.	Type	Order No.	Pcs. / Pkt.
Solarcheck - Measuring module	**SCK-M-8S-20A**	**2901672**	1			
Solarcheck - Communication module				**SCK-C-MODBUS**	**2901674**	1



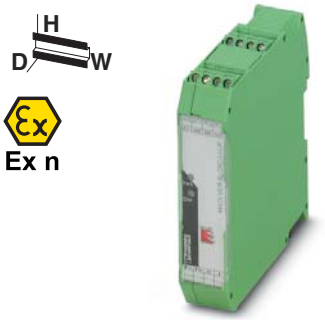
Current transducers

The **MCR-SL-CAC-...** current transducers measure sinusoidal alternating currents within the range of 0 ... 1/5/12 A.

- Wide-range version from 19.2 ... 253 V AC/DC
- 3-way isolation
- Input/output can be configured using the DIP switch



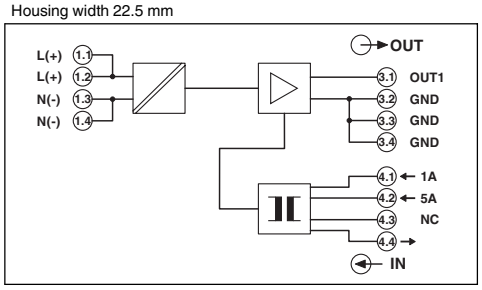
For sinusoidal alternating currents 0 ... 1 A/0 ... 5 A



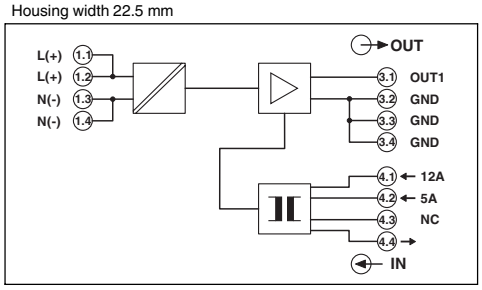
For sinusoidal alternating currents 0 ... 5 A/0 ... 12 A

Ex:

Housing width 22.5 mm



Housing width 22.5 mm



	Technical data		Technical data
Input data			
Input current (configurable)	0 A AC ... 1 A AC (configurable) / 0 A AC ... 5 A AC (configurable)		0 A AC ... 5 A AC (configurable) / 0 A AC ... 12 A AC (configurable)
Nominal frequency	50 Hz		-
Frequency range	45 Hz ... 65 Hz		45 Hz ... 65 Hz
Curve type	Sine		Sine
Overload capacitance	2 x I_N (continuous)		1 x I_N (continuous)
Surge strength	20 x I_N (1 s)		8 x I_N (1 s)
Connection method	Screw terminal block		Screw terminal block
Output data			
Output signal (configurable)	0 ... 20 mA / 4 ... 20 mA		0 ... 20 mA / 4 ... 20 mA
Maximum output signal	25 mA		25 mA
Load R_B	< 500 Ω (at 20 mA)		< 500 Ω (at 20 mA)
Ripple	< 10 mV_{PP} (for 500 Ω at 20 mA)		< 10 mV_{PP} (for 500 Ω at 20 mA)
General data	MACX MCR-SL-CAC- 5-I	MACX MCR-SL-CAC- 5-I-UP	
Supply voltage U_B	19.2 V DC ... 30 V DC	19.2 V AC/DC ... 253 V AC/DC	19.2 V AC/DC ... 253 V AC/DC
Current consumption	< 32 mA (at U_B=24 V DC, I_{OUT}=20 mA)	< 30 mA (at U_B=24 V DC, I_{OUT}=20 mA)	< 33 mA (at 24 V DC)
Maximum transmission error	≤ 0.5% (of nominal range value under nominal conditions)	≤ 0.5% (of nominal range value under nominal conditions)	≤ 0.5% (of nominal range value under nominal conditions)
Temperature coefficient	< 0.02%/K	< 0.02%/K	< 0.02%/K
Step response (10 - 90%)	Max. 300 ms; typ. 200 ms	Max. 300 ms; typ. 200 ms	< 300 ms
Safe isolation	According to EN 61010	According to EN 61010	According to EN 61010
Rated insulation voltage	-	-	300 V AC (to ground)
Surge voltage category input/output	-	-	III
Pollution degree	2	2	2
Test voltage input/output	4 kV (50 Hz, 1 min.)	4 kV (50 Hz, 1 min.)	4 kV (50 Hz, 1 min.)
Test voltage output/power supply	1.5 kV (50 Hz, 1 min.)	2 kV (50 Hz, 1 min.)	2 kV (50 Hz, 1 min.)
Degree of protection	IP20	IP20	IP20
Ambient temperature range	-20°C ... 65°C (-4°F ... 149°F)	-20°C ... 65°C (-4°F ... 149°F)	-20°C ... 65°C
Dimensions W / H / D	22.5 / 104 / 114.5 mm	22.5 / 104 / 114.5 mm	22.5 / 104 / 114.5 mm
Screw connection solid / stranded / AWG	0.2 ... 2.5 mm^2 / 0.2 ... 2.5 mm^2 / 24 - 14	0.2 ... 2.5 mm^2 / 0.2 ... 2.5 mm^2 / 24 - 14	0.2 ... 2.5 mm^2 / 0.2 ... 2.5 mm^2 / 24 - 14
Conformance/approvals			
Conformance	CE-compliant		CE-compliant
ATEX	Ex II 3 G Ex nA II T4 X		Ex II 3 G Ex nA II T4 X
UL, USA/Canada	UL 508 recognized		-

Ordering data

Description	Type	Order No.	Pcs. / Pkt.
MCR current measuring transducer for sinusoidal alternating currents			
Supply voltage 19.2 ... 30 V DC	**MACX MCR-SL-CAC- 5-I**	**2810612**	1
Supply voltage 19.2 ... 253 V AC/DC	**MACX MCR-SL-CAC- 5-I-UP**	**2810625**	1

Ordering data

Type	Order No.	Pcs. / Pkt.
MACX MCR-SL-CAC-12-I-UP	**2810638**	1

Accessories

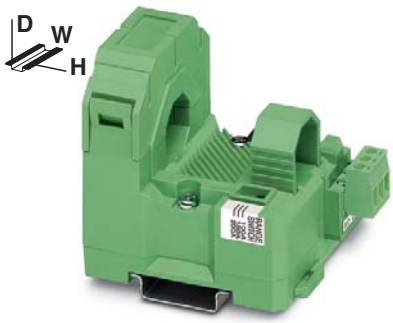
DIN rail connector, for bridging the supply voltage (19.2...30 V DC), can be snapped on to 35 mm DIN rails as per EN 60715	**ME 22,5 TBUS 1,5/ 5-ST-3,81 GN**	**2707437**	50

Accessories

Current transducers

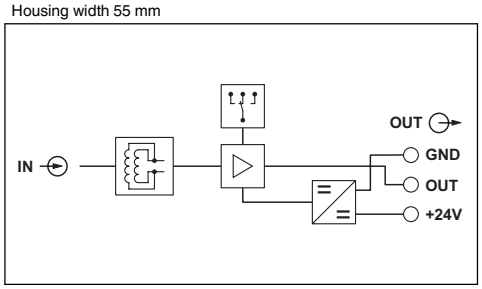
The **MCR-SL-S-...00-...** current transducers measure sinusoidal and non-sinusoidal alternating currents within the range of 0 ... 200 A.

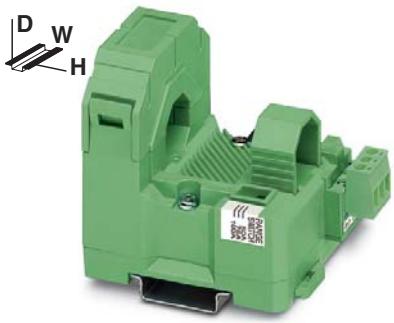
- True r.m.s. value measurement from 30...6000 Hz
- Measuring range selection with slide switch
- Loop-powered
- Can be retrofitted with the open-up Rogowski coil



For sinusoidal and non-sinusoidal alternating currents, 0 ... 200 A, voltage output

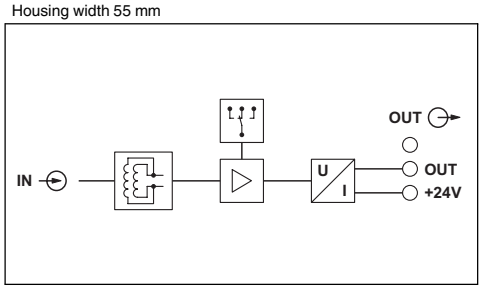
Ex:
Housing width 55 mm





For sinusoidal and non-sinusoidal alternating currents, 0 ... 200 A, current output (loop-powered)

Ex:
Housing width 55 mm



Technical data

Input data	...-S-100-U	...-S-200-U
Input current	0 A ... 100 A (0...50/75/100 A)	0 A ... 200 A (0..100/150/200 A)
Operate threshold	1% (of final value)	
Frequency range	30 Hz ... 6000 Hz	
Curve type	Sinusoidal and non-sinusoidal	
Overload capacitance	Depends on laid conductor	
Surge strength	Depends on through-connected conductor	
Connection method	Clamp-on cable design, diameter 18.5 mm	
Output data		
Output signal	0 ... 5 V / 0 ... 10 V	
Maximum output signal	((0 V ... 10 V) 14 V, (0 V ... 5 V) 7 V)	
Load R_B	≥ 10 kΩ	
General data		
Supply voltage U_B	20 V DC ... 30 V DC	
Current consumption	< 30 mA	
Maximum transmission error	< 1% (of final value)	
Cable position error	< 0.63%	
Temperature coefficient	< 0.035%/K	
Step response (10 - 90%)	< 340 ms	
Safe isolation	As per IEC 61010-1 and IEC 61326	
Rated insulation voltage	300 V AC (to ground)	
Surge voltage category / pollution degree	III / 2	
Test voltage input/output	5 kV (50 Hz, 1 min.)	
Degree of protection	IP20	
Ambient temperature range	-20°C ... 60°C	
Dimensions W / H / D	55 / 85 / 70.5 mm	
Screw connection solid / stranded / AWG	0.2 ... 2.5 mm² / 0.2 ... 2.5 mm² / 24 - 14	
Conformance/approvals		
Conformance	CE-compliant	
UL, USA/Canada	cULus	

Technical data

Input data	...-S-100-I-LP	...-S-200-I-LP
Input current	0 A ... 100 A (0...50/75/100 A)	0 A ... 200 A (0...100/150/200 A)
Operate threshold	1% (of final value)	
Frequency range	30 Hz ... 6000 Hz	
Curve type	Sinusoidal and non-sinusoidal	
Overload capacitance	Depends on laid conductor	
Surge strength	Depends on through-connected conductor	
Connection method	Clamp-on cable design, diameter 18.5 mm	
Output data		
Output signal	4 ... 20 mA	
Maximum output signal	< 25 mA	
Load R_B	((U_B - 12 V) x 350 / 12 A)	
General data		
Supply voltage U_B	20 V DC ... 30 V DC	
Current consumption		
Maximum transmission error	< 1% (of final value)	
Cable position error	< 0.63%	
Temperature coefficient	< 0.025%/K	
Step response (10 - 90%)	< 340 ms	
Safe isolation	As per IEC 61010-1 and IEC 61326	
Rated insulation voltage	300 V AC (to ground)	
Surge voltage category / pollution degree	III / 2	
Test voltage input/output	5 kV (50 Hz, 1 min.)	
Degree of protection	IP20	
Ambient temperature range	-20°C ... 60°C	
Dimensions W / H / D	55 / 85 / 70.5 mm	
Screw connection solid / stranded / AWG	0.2 ... 2.5 mm² / 0.2 ... 2.5 mm² / 24 - 14	
Conformance/approvals		
Conformance	CE-compliant	
UL, USA/Canada	cULus	

Ordering data

Description	Type	Order No.	Pcs. / Pkt.
MCR current measuring transducer for sinusoidal and non-sinusoidal alternating currents			
Input current range: 0...50/75/100 A	**MCR-SL-S-100-U**	**2813457**	1
Input current range: 0..0.100/150/200 A	**MCR-SL-S-200-U**	**2813460**	1

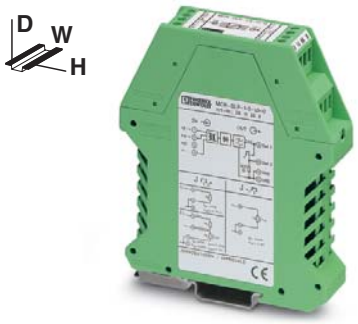
Ordering data

Type	Order No.	Pcs. / Pkt.
MCR-SL-S-100-I-LP	**2813486**	1
MCR-SL-S-200-I-LP	**2813499**	1

Passive current transducer

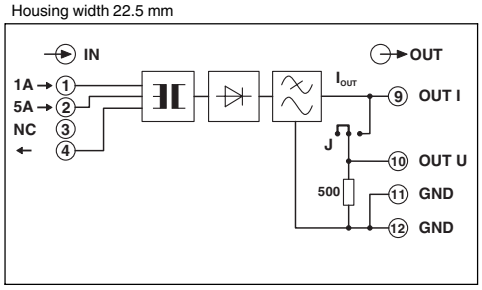
The **MCR-SLP-1-5-UI-0** passive current transducer measures sinusoidal alternating currents within the range of 0 ... 1 A/0 ... 5 A.

– Loop-powered
– Measuring ranges 1 A and 5 A AC, reconnectable



For sinusoidal alternating currents 0 ... 1 A/0 ... 5 A

Housing width 22.5 mm



Technical data

Input data	1 A input	5 A input
Input current	0 A AC ... 1 A AC	0 A AC ... 5 A AC
Frequency range	45 Hz ... 60 Hz	45 Hz ... 60 Hz
Curve type	Sine	Sine
Overload capacitance	2 x I_N (5 min. at 60°C ambient temperature)	-
Surge strength	50 A (1 s)	100 A (1 s)
Permissible output range	1.2 x I_N	1.2 x I_N
Connection method	Screw connection	Screw connection
Output data	U output	I output
Output signal	0 ... 10 V	0 ... 20 mA
Maximum output signal	20 V	30 mA
Load R_B	> 100 kΩ	< 750 Ω < 250 Ω (when current and voltage outputs are used simultaneously)
Ripple	< 50 mV_{PP}	< 50 mV_{PP}
General data		
Maximum transmission error	< 0.5% (of final value)	
Temperature coefficient	< 0.015%/K	
Step response (10 - 90%)	< 200 ms	
Safe isolation	According to EN 50178, EN 61010	
Rated insulation voltage	300 V AC (to ground)	
Surge voltage category / pollution degree	III / 2	
Test voltage input/output	4 kV (50 Hz, 1 min.)	
Degree of protection	IP20	
Ambient temperature range	-25°C ... 60°C	
Dimensions W / H / D	22.5 / 99 / 114.5 mm	
Screw connection solid / stranded / AWG	0.2 ... 2.5 mm^2 / 0.2 ... 2.5 mm^2 / 24 - 14	
Conformance/approvals		
Conformance	CE-compliant	

Ordering data

Description	Type	Order No.	Pcs. / Pkt.
MCR passive current measuring transducer for sinusoidal alternating currents	**MCR-SLP-1-5-UI-0**	**2814359**	1

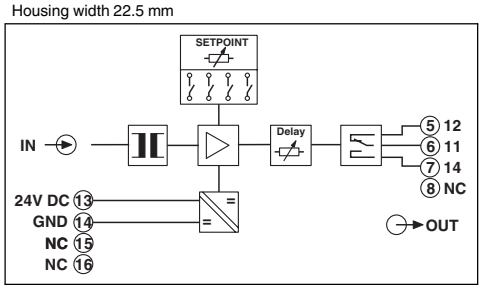
Current protector

The **MCR-SL-S-16-SP-24** current protector converts sinusoidal 50 Hz/60 Hz alternating currents into binary switching signals.

- Switching point can be freely selected in the measuring range of 0...16 A AC
- Changeover relay output
- Adjustable switch hysteresis
- 3-way isolation
- Adjustable operating/closed circuit current behavior

For sinusoidal alternating currents, 0 ... 16 A AC

Housing width 22.5 mm

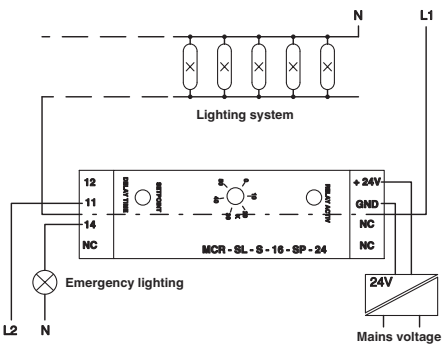


Technical data

Input data	
Input current	0 A AC ... 16 A AC
Frequency range	45 Hz ... 65 Hz
Curve type	Sine
Overload capacitance	2 x I_N (continuous)
Connection method	Through connection, diameter 4.2 mm
Switching output	Relay output
Contact type	1 PDT
Contact material	AgSnO, hard gold-plated
Max. switching current	50 mA (with gold layer, 30 V AC/ 36 V DC) 2 A (with damaged gold layer, 250 V AC)
Switching hysteresis	Can be set via DIP switch (0.5%, 5%, 10%, 15%)
Response delay	Typ. 0.1 s ... 10 s (can be set via potentiometer)
Operating and closed circuit current behavior	Can be set via DIP switch
Relay status display	Yellow LED (relay active)
General data	
Supply voltage U_B	20 V DC ... 30 V DC
Current consumption	< 30 mA
Setting accuracy	< 0.5%
Temperature coefficient	< 0.02%/K
Step response (10 - 90%)	40 ms
Safe isolation	According to EN 50178, EN 61010-1
Rated insulation voltage	300 V AC (to ground)
Surge voltage category / pollution degree	III / 2
Test voltage input/output	4 kV (50 Hz, 1 min.)
Test voltage input/power supply	4 kV (50 Hz, 1 min.)
Degree of protection	IP20
Ambient temperature range	-20°C ... 65°C
Dimensions W / H / D	22.5 / 99 / 114.5 mm
Screw connection solid / stranded / AWG	0.2 ... 2.5 mm^2 / 0.2 ... 2.5 mm^2 / 24 - 14
Conformance/approvals	
Conformance	CE-compliant

Ordering data

Description	Type	Order No.	Pcs. / Pkt.
MCR current protector for sinusoidal alternating currents	**MCR-SL-S- 16-SP- 24**	**2864464**	1



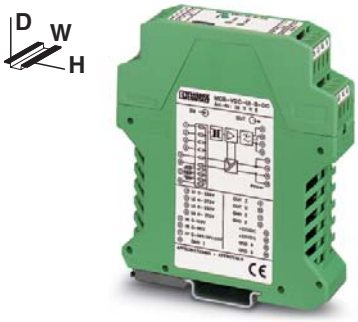
Lighting system with emergency lighting

Voltage transducers

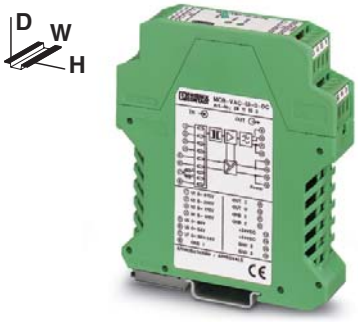
The **MCR-VDC-UI-B-DC** voltage transducer measures DC voltages within the range of 0 ... ±660 V DC.

The **MCR-VAC-UI-O-DC** voltage transducer measures sinusoidal AC voltages within the range of 0 ... 440 V AC.

– Bidirectional output signals
– Adjustable voltage ranges
– ZERO/SPAN adjustment ±20%
– 3-way isolation

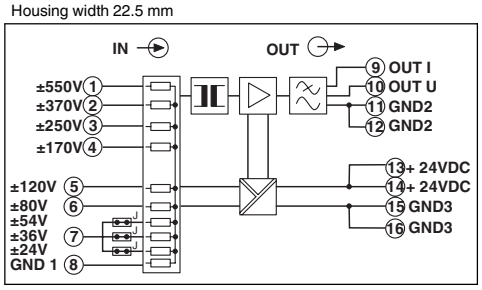


For DC voltages
0 ... ±660 V DC

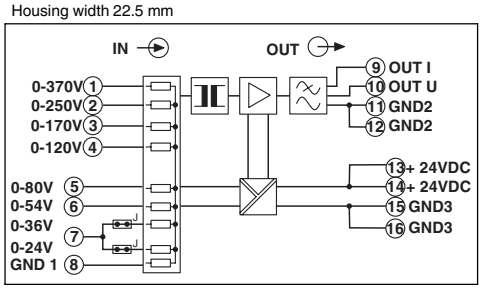


For sinusoidal AC voltages
0 ... 440 V AC

Housing width 22.5 mm



Housing width 22.5 mm



	Technical data		Technical data	
Input data				
Input voltage range / resistor	-550 V DC ... 550 V DC	550 kΩ	0 V ... 370 V AC	370 kΩ
	-370 V DC ... 370 V DC	370 kΩ	0 V ... 250 V AC	250 kΩ
	-250 V DC ... 250 V DC	250 kΩ	0 V ... 170 V AC	170 kΩ
	-170 V DC ... 170 V DC	170 kΩ	0 V ... 120 V AC	120 kΩ
	-120 V DC ... 120 V DC	120 kΩ	0 V ... 80 V AC	80 kΩ
	-80 V DC ... 80 V DC	80 kΩ	0 V ... 54 V AC	54 kΩ
	-54 V DC ... 54 V DC	54 kΩ	0 V ... 36 V AC	36 kΩ
	-36 V DC ... 36 V DC	36 kΩ	0 V ... 24 V AC	24 kΩ
	-24 V DC ... 24 V DC	24 kΩ		
ZERO / SPAN adjustment	±20% / ±20%		±20% / ±20%	
Frequency range	-		45 Hz ... 400 Hz	
Output data	U output	I output	U output	I output
Output signal	-10 ... 10 V	-20 ... 20 mA	0 ... 10 V	0 ... 20 mA / 4 ... 20 mA
Maximum output signal	±15 V	±30 mA	15 V	30 mA
Load R_B	> 10 kΩ	< 500 Ω	> 10 kΩ	< 500 Ω
Ripple	< 50 mV_{PP}	< 50 mV_{PP}	< 50 mV_{PP}	< 50 mV_{PP}
General data				
Supply voltage U_B	18.5 V DC ... 30.2 V DC		18.5 V DC ... 30.2 V DC	
Current consumption	< 50 mA		< 45 mA	
Maximum transmission error	< 1% (of final value)		< 1.5% (of final value)	
Temperature coefficient	< 0.015%/K		-	
Limit frequency (3 dB)	40 Hz		-	
Step response (10 - 90%)	12 ms		250 ms	
Safe isolation	According to EN 50178		According to EN 50178	
Rated insulation voltage	-		300 V DC	
Surge voltage category / pollution degree	II / 2		III / 2	
Test voltage input/output	1.5 kV (50 Hz, 1 min.)		3.3 kV (50 Hz, 1 min.)	
Degree of protection	IP20		IP20	
Ambient temperature range	-25°C ... 50°C		-25°C ... 60°C	
Dimensions W / H / D	22.5 / 99 / 114.5 mm		22.5 / 99 / 114.5 mm	
Screw connection solid / stranded / AWG	0.2 ... 2.5 mm^2 / 0.2 ... 2.5 mm^2 / 24 - 14		0.2 ... 2.5 mm^2 / 0.2 ... 2.5 mm^2 / 24 - 14	
Conformance/approvals				
Conformance	CE-compliant		CE-compliant	

	Ordering data			Ordering data		
Description	Type	Order No.	Pcs. / Pkt.	Type	Order No.	Pcs. / Pkt.
MCR voltage transducer, for DC voltages from 0...±20 V DC to 0...±660 V DC	**MCR-VDC-UI-B-DC**	**2811116**	1			
MCR voltage transducer, for sinusoidal AC voltages from 0...20 V AC to 0...440 V AC				**MCR-VAC-UI-O-DC**	**2811103**	1

Accessories
Configuration software package

The **MCR/PI-CONF-WIN configuration software package** is used to configure and visualize all parameters for the programmable MCR measuring transducers.
– User-friendly menu interface
– Quick programming

Notes:
The software runs under the following operating systems: Windows NT™, 2000™, and XP™.

For MCR-S-... current transducers

Description	Ordering data: Type	Order No.	Pcs. / Pkt.
MCR configuration software, for programming MCR-T-..., MCR-...-LP-..., MCR-...-HT-..., MCR-S-..., MCR-f-..., and MCR-PSP-..., modules, CD-ROM	**MCR/PI-CONF-WIN**	**2814799**	1
	Accessories		
Labels, for labeling MCR-T and MCR-S modules, four sheets of DIN A4 marking labels (112 pcs.)	**MCR-ET 38X35 WH**	**2814317**	1

USB adapter cable
Software adapter cable

The following adapter cables are available for programming the MCR-S... current transducers:
– USB adapter cable
– Software adapter cable

For MCR-S-... current transducers

Description	Ordering data: Type	Order No.	Pcs. / Pkt.
USB adapter cable, D-9-SUB to USB, with D-9-SUB to D-25-SUB adapter	**CM-KBL-RS232/USB**	**2881078**	1
Software adapter cable (stereo jack connector/25-pole D-SUB), 1.2 m in length, for programming MCR-T..., MCR-S..., and MCR-f... modules	**MCR-TTL-RS232-E**	**2814388**	1
	Accessories		
Adapter cable, stranded, 9-pole D-SUB female connector to 25-pole D-SUB male connector	**PSM-KAD 9 SUB 25/BS**	**2761295**	1

ETD-SL-2T-I
ETD-SL-1T-S
ETD-SL-1T-DTF
ETD-FL-2T-DTI
PHOENIX CONTACT
TIME1
TIME2
TIME
FUNCTION
A1+
A2-
B1
OFF-CC 0,1-10 s
OFF-CC 3-300 s
OFF-CC 0,3-30 min
OFF-CC 3-300 min
x10%

Components for interference-free operation

Safety and system availability requirements are constantly on the increase – across all industries. Processes are becoming more and more complex, not only in the mechanical engineering and chemical industries but also in plant and automation technology contexts. The demands placed on power engineering are also constantly on the rise.

It is only by continuously monitoring key network and system parameters that error-free, and therefore cost-effective, operation can be achieved. Electronic monitoring relays from the EMD series are available for a wide range of monitoring tasks so that the consequences of errors can be avoided or kept within limits.

Performance characteristics

The operating states are indicated using color LEDs. Any errors that occur can be sent to a controller via a floating contact or can trigger a shutdown of part of the system. Some device versions are equipped with startup and response delays so that measured values outside the set monitoring range can be briefly tolerated.

Compact timer relays with a narrow 6.2 mm housing or multifunctional timer relays are available for controlling time sequences in a production and process engineering context.

Monitoring relays

Compact timer relays

Monitoring relays

The monitoring relays from the EMD series offer a cost-effective solution for monitoring quantities such as current, voltage, phase parameters, winding temperature, motor load, and fluid level.

Timer relays

There are compact relays available with slim 6.2 mm housing, an adjustable time range, and a single function. Alternatively, there are various multifunctional timer relays to choose from.

Special function modules

The special function modules are packed with straightforward functions (right down to component level) for industrial applications and feature a professional connection method.

Examples include diode modules, lamp testing modules, and display modules.

Adjustable time range

Multifunctional timer relays

Special function modules

Single-phase current monitoring

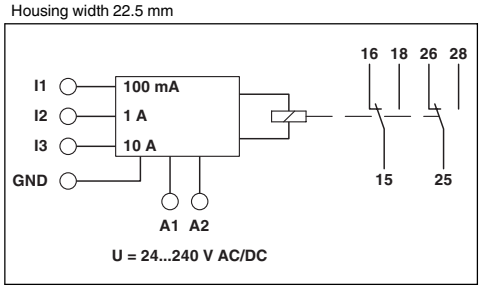
EMD-...C... monitoring relays monitor DC and AC currents within the range 0 ... 10 A.

- Startup and response delays can be set separately
- Variable supply voltage range
- Can be adjusted via potentiometer on the front

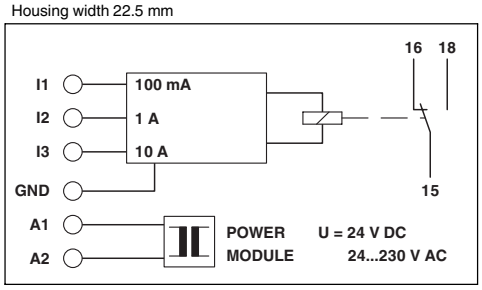
Overcurrent and undercurrent monitoring

Over or undercurrent monitoring

Housing width 22.5 mm



Housing width 22.5 mm



	Technical data	Technical data	
Functions		EMD-SL-C-OC-10	EMD-SL-C-UC-10
	Overcurrent, undercurrent, window, error memory	Overcurrent	Undercurrent
Input			
Input ranges	0 mA ... 100 mA AC/DC (connection terminal blocks: I1 and GND) 0 A ... 1 A AC/DC (connection terminal blocks: I2 and GND) 0 A ... 10 A AC/DC (connection terminal blocks: I3 and GND)	0 mA ... 100 mA AC/DC (connection terminal blocks: I1 and GND) 0 A ... 1 A AC/DC (connection terminal blocks: I2 and GND) 0 A ... 10 A AC/DC (connection terminal blocks: I3 and GND)	
Input resistance	470 mΩ (at I_N = 100 mA); 47 mΩ (at I_N = 1 A); 5 mΩ (at I_N = 10 A)	470 mΩ (at I_N = 100 mA); 47 mΩ (at I_N = 1 A); 5 mΩ (at I_N = 10 A)	
Min. setting range	5% ... 95% (of I_N)	5% ... 95% (of I_N)	
Max. setting range	10% ... 100% (of I_N)	10% ... 100% (of I_N)	
Setting range for response delay	0.1 s ... 10 s	0.2 s ... 10 s	
Setting range for startup delay	0 s ... 10 s	-	
Basic accuracy	±5% (of scale end value)	±5% (of scale end value)	
Setting accuracy	≤ 5% (of scale end value)	≤ 5% (of scale end value)	
Repeat accuracy	≤ 2%	≤ 2%	
Relay output			
Contact type	2 floating PDT contacts	1 floating PDT	
Switching capacity	750 VA (3 A/250 V AC, module aligned, ≤ 5 mm spacing) 1250 VA (5 A/250 V AC, module not aligned, ≥ 5 mm spacing)	750 VA (3 A/250 V AC, module aligned, ≤ 5 mm spacing) 1250 VA (5 A/250 V AC, module not aligned, ≥ 5 mm spacing)	
Electrical service life	2 x 10^5 cycles at ohmic load, 1000 VA	2 x 10^5 cycles at ohmic load, 1000 VA	
Mechanical service life	Approx. 2 x 10^7 cycles	Approx. 2 x 10^7 cycles	
Output fuse	5 A (fast-blow)	5 A (fast-blow)	
General data			
Supply voltage	24 V AC ... 240 V AC -15% ... +10% 24 V DC ... 240 V DC -20% ... +25%	24 V AC ... 230 V AC (see power modules) 24 V DC (see power modules)	
Nominal power consumption	4.5 VA (1.5 W)	2 VA (1.5 W)	
Degree of protection	IP40 (housing) / IP20 (connection terminal blocks)	IP40 (housing) / IP20 (connection terminal blocks)	
Ambient temperature range	-25°C ... 55°C	-25°C ... 55°C	
Dimensions W / H / D	22.5 / 90 / 113 mm	22.5 / 90 / 113 mm	
Screw connection solid / stranded / AWG	0.5 ... 2.5 mm^2 / 0.25 ... 2.5 mm^2 / 20 - 14	0.5 ... 2.5 mm^2 / 0.25 ... 2.5 mm^2 / 20 - 14	
Conformance/approvals			
Conformance	CE-compliant	CE-compliant	
UL, USA/Canada	UL/C-UL listed UL 508	UL/C-UL listed UL 508	

	Ordering data			Ordering data		
Description	**Type**	**Order No.**	Pcs. / Pkt.	**Type**	**Order No.**	Pcs. / Pkt.
Electronic monitoring relay						
	EMD-FL-C-10	**2866022**	1	**EMD-SL-C-OC-10**	**2866019**	1
				EMD-SL-C-UC-10	**2867937**	1
Power module, plug-in, please order at the same time						
Supply voltage 20 ... 30 V DC				**EMD-SL-PS- 24DC**	**2885359**	1
Supply voltage 20.2 ... 26.4 V AC				**EMD-SL-PS- 24AC**	**2866103**	1
Supply voltage 88 ... 121 V AC				**EMD-SL-PS-110AC**	**2866116**	1
Supply voltage 108 ... 132 V AC				**EMD-SL-PS-120AC**	**2885731**	1
Supply voltage 195 ... 264 V AC				**EMD-SL-PS-230AC**	**2866129**	1

Single-phase voltage monitoring

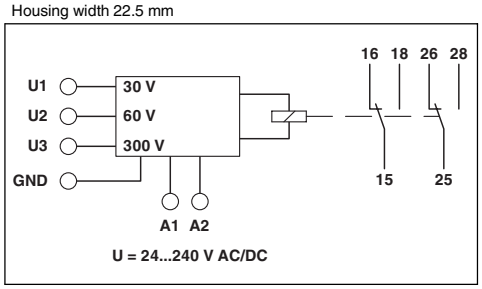
EMD-...V... monitoring relays monitor DC and AC voltages within the range 0 ... 300 V.

- Startup and response delays can be set separately
- Variable supply voltage range
- Can be adjusted via potentiometer on the front

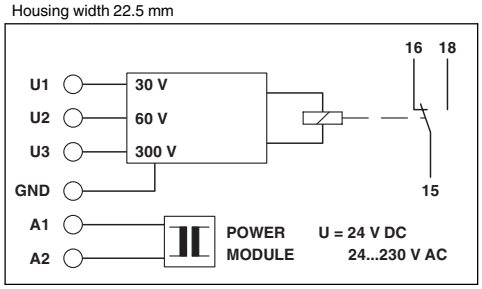
Undervoltage and surge voltage monitoring

Undervoltage monitoring

Housing width 22.5 mm



Housing width 22.5 mm



	Technical data	Technical data
Functions		
	Undervoltage, surge voltage, window, error memory	Undervoltage
Input		
Input ranges	0 V ... 30 V AC/DC (connection terminal blocks: U1 and GND) 0 V ... 60 V AC/DC (connection terminal blocks: U2 and GND) 0 V ... 300 V AC/DC (connection terminal blocks: U3 and GND)	0 V ... 30 V AC/DC (connection terminal blocks: U1 and GND) 0 V ... 60 V AC/DC (connection terminal blocks: U2 and GND) 0 V ... 300 V AC/DC (connection terminal blocks: U3 and GND)
Input resistance	47 kΩ (connection terminal blocks: U1 and GND) 100 kΩ (connection terminal blocks: U2 and GND) 470 kΩ (connection terminal blocks: U3 and GND)	47 kΩ (connection terminal blocks: U1 and GND) 100 kΩ (connection terminal blocks: U2 and GND) 470 kΩ (connection terminal blocks: U3 and GND)
Min. setting range	5% ... 95% (of U_N)	5% ... 95% (of U_N)
Max. setting range	10% ... 100% (of U_N)	10% ... 100% (of U_N)
Setting range for response delay	0.1 s ... 10 s	0.2 s ... 10 s
Setting range for startup delay	0 s ... 10 s	-
Basic accuracy	±5% (of scale end value)	±5% (of scale end value)
Setting accuracy	≤ 5% (of scale end value)	≤ 5% (of scale end value)
Repeat accuracy	≤ 2%	≤ 2%
Relay output		
Contact type	2 floating PDT contacts	1 floating PDT
Switching capacity	750 VA (3 A/250 V AC, module aligned, ≤ 5 mm spacing) 1250 VA (5 A/250 V AC, module not aligned, ≥ 5 mm spacing)	750 VA (3 A/250 V AC, module aligned, ≤ 5 mm spacing) 1250 VA (5 A/250 V AC, module not aligned, ≥ 5 mm spacing)
Electrical service life	2 x 10^5 cycles at ohmic load, 1000 VA	2 x 10^5 cycles at ohmic load, 1000 VA
Mechanical service life	Approx. 2 x 10^7 cycles	Approx. 2 x 10^7 cycles
Output fuse	5 A (fast-blow)	5 A (fast-blow)
General data		
Supply voltage	24 V AC ... 240 V AC -15% ... +10% 24 V DC ... 240 V DC -20% ... +25%	24 V AC ... 230 V AC (see power modules) 24 V DC (see power modules)
Nominal power consumption	4.5 VA (1.5 W)	2 VA (1.5 W)
Degree of protection	IP40 (housing) / IP20 (connection terminal blocks)	IP40 (housing) / IP20 (connection terminal blocks)
Ambient temperature range	-25°C ... 55°C	-25°C ... 55°C
Dimensions W / H / D	22.5 / 90 / 113 mm	22.5 / 90 / 113 mm
Screw connection solid / stranded / AWG	0.5 ... 2.5 mm^2 / 0.25 ... 2.5 mm^2 / 20 - 14	0.5 ... 2.5 mm^2 / 0.25 ... 2.5 mm^2 / 20 - 14
Conformance/approvals		
Conformance	CE-compliant	CE-compliant
UL, USA/Canada	UL/C-UL listed UL 508	UL/C-UL listed UL 508

	Ordering data			Ordering data		
Description	**Type**	**Order No.**	Pcs. / Pkt.	**Type**	**Order No.**	Pcs. / Pkt.
Electronic monitoring relay						
	EMD-FL-V-300	**2866048**	1	**EMD-SL-V-UV-300**	**2866035**	1
Power module, plug-in, please order at the same time						
Supply voltage 20 ... 30 V DC				**EMD-SL-PS- 24DC**	**2885359**	1
Supply voltage 20.2 ... 26.4 V AC				**EMD-SL-PS- 24AC**	**2866103**	1
Supply voltage 88 ... 121 V AC				**EMD-SL-PS-110AC**	**2866116**	1
Supply voltage 108 ... 132 V AC				**EMD-SL-PS-120AC**	**2885731**	1
Supply voltage 195 ... 264 V AC				**EMD-SL-PS-230AC**	**2866129**	1

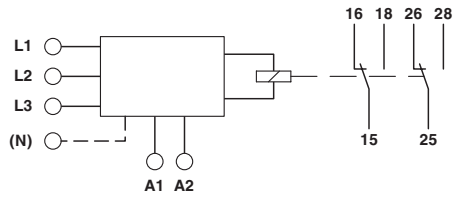
Three-phase voltage monitoring

EMD-...-3V... monitoring relays monitor three-phase AC voltages within the range of 160 ... 897 V AC (depending on the device concerned).

– Adjustable response delay
– Variable supply voltage range
– Can be adjusted via potentiometer on the front
– Adjustable asymmetry

Undervoltage and phase monitoring, 400 V or 230 V

Housing width 22.5 mm

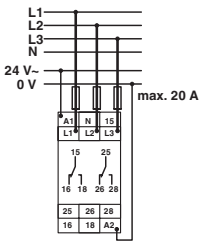


Technical data

Functions	EMD-FL-3V-400	EMD-FL-3V-230
	Undervoltage, window, asymmetry, phase sequence, phase failure	Undervoltage, window, asymmetry, phase sequence, phase failure
Input		
Monitoring range	280 V AC ... 520 V AC	161 V AC ... 299 V AC
Input ranges	3 N ~ 400/230 V	3 N ~ 230/132 V
Input resistance	1 MΩ	470 kΩ
Min. setting range	-30% ... 20% (From U_N)	
Max. setting range	-20% ... 30% (From U_N)	
Setting range for response delay	0.1 s ... 10 s	
Asymmetry	5% ... 25% / OFF	5% ... 25% / OFF
Basic accuracy	±5% (of scale end value)	
Setting accuracy	≤ 5% (of scale end value)	
Repeat accuracy	≤ 2%	
Relay output		
Contact type	2 floating PDT contacts	
Switching capacity	750 VA (3 A/250 V AC, module aligned, ≤ 5 mm spacing) 1250 VA (5 A/250 V AC, module not aligned, ≥ 5 mm spacing)	
Electrical service life	2 x 10^5 cycles at ohmic load, 1000 VA	
Mechanical service life	Approx. 2 x 10^7 cycles	
Output fuse	5 A (fast-blow)	
General data		
Supply voltage	24 V AC ... 240 V AC -15% ... +10% 24 V DC ... 240 V DC -20% ... +25%	
Nominal power consumption	4.5 VA (1.5 W)	
Degree of protection	IP40 (housing) / IP20 (connection terminal blocks)	
Ambient temperature range	-25°C ... 55°C	
Dimensions W / H / D	22.5 / 90 / 113 mm	
Screw connection solid / stranded / AWG	0.5 ... 2.5 mm^2 / 0.25 ... 2.5 mm^2 / 20 - 14	
Conformance/approvals		
Conformance	CE-compliant	
UL, USA/Canada	UL/C-UL listed UL 508	

Ordering data

Description	Type	Order No.	Pcs. / Pkt.
Electronic monitoring relay			
	EMD-FL-3V-400	**2866064**	1
	EMD-FL-3V-230	**2885773**	1
Power module, plug-in, please order at the same time			
Supply voltage 20 ... 30 V DC			
Supply voltage 20.2 ... 26.4 V AC			
Supply voltage 88 ... 121 V AC			
Supply voltage 108 ... 132 V AC			
Supply voltage 195 ... 264 V AC			
Supply voltage 323 ... 456 V AC			



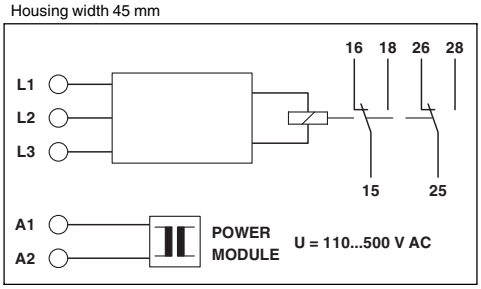
Connection example

Undervoltage and phase monitoring, 500 V or 690 V

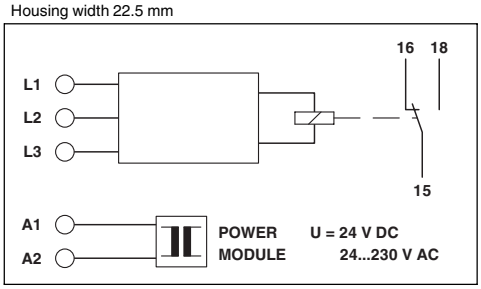
Undervoltage/surge voltage monitoring, 400 V with/without neutral conductor

Phase monitoring, 400 V

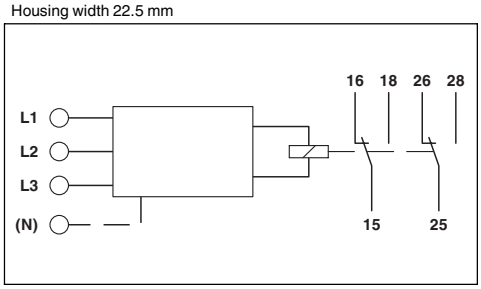
Housing width 45 mm



Housing width 22.5 mm



Housing width 22.5 mm



Technical data

EMD-FL-3V-690	EMD-FL-3V-500
Undervoltage, window, asymmetry, phase sequence, phase failure	Undervoltage, window, asymmetry, phase sequence, phase failure
483 V AC ... 897 V AC	350 V AC ... 650 V AC
3 ~ 690 V	3 ~ 500 V
1 MΩ	1 MΩ
-30% ... 20% (From U_N)	
-20% ... 30% (From U_N)	
0.1 s ... 10 s	
5% ... 25% / OFF	5% ... 25% / OFF
±5% (of scale end value)	
≤ 5% (of scale end value)	
≤ 2%	
2 floating PDT contacts	
750 VA (3 A/250 V AC, module aligned, ≤ 5 mm spacing)	
1250 VA (5 A/250 V AC, module not aligned, ≥ 5 mm spacing)	
2 x 10^5 cycles at ohmic load, 1000 VA	
Approx. 2 x 10^7 cycles	
5 A (fast-blow)	
110 V AC ... 500 V AC (see power modules)	
4.5 VA (1.5 W)	
IP40 (housing) / IP20 (connection terminal blocks)	
-25°C ... 55°C	
45 / 90 / 113 mm	
0.5 ... 2.5 mm^2 / 0.25 ... 2.5 mm^2 / 20 - 14	
CE-compliant	
UL/C-UL listed UL 508	

Ordering data

Type	Order No.	Pcs. / Pkt.
EMD-FL-3V-690	**2885249**	1
EMD-FL-3V-500	**2867979**	1
EMD-SL-PS45-110AC	**2885281**	1
EMD-SL-PS45-120AC	**2885744**	1
EMD-SL-PS45-230AC	**2885294**	1
EMD-SL-PS45-400AC	**2885304**	1

Technical data

EMD-SL-3V-400	EMD-SL-3V-400-N
Window, without neutral conductor connection	Window, with neutral conductor connection
280 V AC ... 520 V AC	280 V AC ... 520 V AC
3 ~ 400 V	(3 N ~ 400/230 V)
1 MΩ	1 MΩ
-30% ... 20% (From U_N)	
-20% ... 30% (From U_N)	
0.2 s ... 10 s	
±5% (of scale end value)	
≤ 5% (of scale end value)	
≤ 2%	
1 floating PDT	
750 VA (3 A/250 V AC, module aligned, ≤ 5 mm spacing)	
1250 VA (5 A/250 V AC, module not aligned, ≥ 5 mm spacing)	
2 x 10^5 cycles at ohmic load, 1000 VA	
Approx. 2 x 10^7 cycles	
5 A (fast-blow)	
24 V AC ... 230 V AC (see power modules)	
24 V DC (see power modules)	
2 VA (1.5 W)	
IP40 (housing) / IP20 (connection terminal blocks)	
-25°C ... 55°C	
22.5 / 90 / 113 mm	
0.5 ... 2.5 mm^2 / 0.25 ... 2.5 mm^2 / 20 - 14	
CE-compliant	
UL/C-UL listed UL 508	

Ordering data

Type	Order No.	Pcs. / Pkt.
EMD-SL-3V-400	**2866051**	1
EMD-SL-3V-400-N	**2885278**	1
EMD-SL-PS- 24DC	**2885359**	1
EMD-SL-PS- 24AC	**2866103**	1
EMD-SL-PS-110AC	**2866116**	1
EMD-SL-PS-120AC	**2885731**	1
EMD-SL-PS-230AC	**2866129**	1

Technical data

Phase sequence, phase failure, asymmetry
342 V AC ... -
3 N ~ 400/230 V
15 kΩ
-
-
≤ 350 ms (fixed setting)
Fixed, approx. 30%
-
-
-
2 floating PDT contacts
750 VA (3 A/250 V AC, module aligned, ≤ 5 mm spacing)
1250 VA (5 A/250 V AC, module not aligned, ≥ 5 mm spacing)
2 x 10^5 cycles at ohmic load, 1000 VA
Approx. 2 x 10^7 cycles
5 A (fast-blow)
(From the measured voltage)
9 VA
IP40 (housing) / IP20 (connection terminal blocks)
-25°C ... 55°C
22.5 / 90 / 113 mm
0.5 ... 2.5 mm^2 / 0.25 ... 2.5 mm^2 / 20 - 14
CE-compliant
UL/C-UL listed UL 508

Ordering data

Type	Order No.	Pcs. / Pkt.
EMD-SL-PH-400	**2866077**	1

Effective power monitoring, load monitoring (cos ϕ)

Effective power monitoring

The effective power in single and 3-phase networks can be monitored with the **EMD-FL-RP-480** effective power monitoring relay.

- Monitoring range up to 7.2 kW
- Startup and response delays can be set separately
- Temperature monitoring of the motor winding
- Variable supply voltage range
- Detection of switched off loads

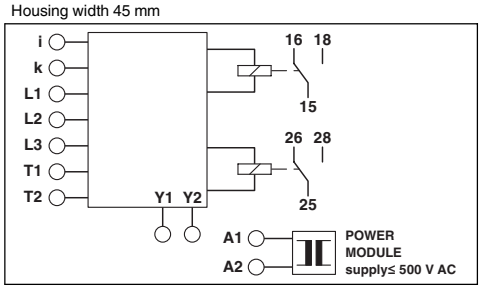
Load monitoring (cos ϕ)

The **EMD-FL-PF-400** monitoring relay is a cos ϕ monitor for load monitoring in single or three-phase networks.

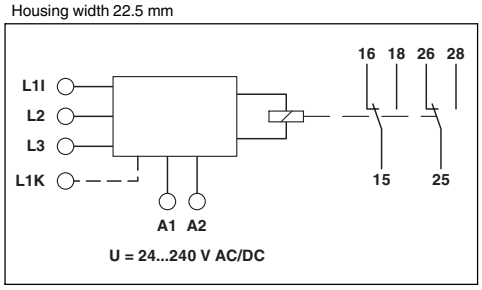
Effective power monitoring

Load monitoring (cos ϕ)

Housing width 45 mm



Housing width 22.5 mm



	Technical data	Technical data
Functions		
	Underload, overload, window, winding temperature monitoring	Underload, overload, Window
Input		
Description of the input	Voltage input	-
Measured value	AC sine (10 Hz ... 400 Hz)	AC sine (10 ... 100 Hz)
Measuring ranges P_N	Can be switched between 0.75 kW, 1.5 kW, 3 kW, and 6 kW	-
Nominal input voltage U_N	480 V (3 N ~ 480/277 V)	(3 N ~ 415/240 V)
Input ranges	1(N) ~ 0 V AC ... 480 V AC (single-phase load) 3 (N) ~ 0 V AC ... 480 V AC (3-phase load)	1(N) ~ 40 V AC ... 415 V AC 3 (N) ~ 40 V AC ... 415 V AC
Input ranges	0.15 A ... 6 A (range: 0.75 kW and 1.5 kW) 0.3 A ... 12 A (range: 3 kW and 6 kW)	0.5 A ... 10 A (connection terminal blocks: L1i and L1k)
Min. setting range	5% ... 110% (of P_N)	-
Max. setting range	10% ... 120% (of P_N)	-
Switching threshold cos ϕ Min.	-	0.1 ... 0.99
Switching threshold cos ϕ Max.	-	0.2 ... 1
Relay output		
Contact type	2 floating PDT contacts	2 floating PDT contacts
Switching capacity	750 VA (3 A/250 V AC, module aligned, ≤ 5 mm spacing) 1250 VA (5 A/250 V AC, module not aligned, ≥ 5 mm spacing)	750 VA (3 A/250 V AC, module aligned, ≤ 5 mm spacing) 1250 VA (5 A/250 V AC, module not aligned, ≥ 5 mm spacing)
Electrical service life	2 x 10^5 cycles at ohmic load, 1000 VA	2 x 10^5 cycles at ohmic load, 1000 VA
Mechanical service life	Approx. 2 x 10^7 cycles	Approx. 2 x 10^7 cycles
Output fuse	5 A (fast-blow)	5 A (fast-blow)
General data		
Supply voltage	110 V AC ... 500 V AC (see power modules)	24 V AC ... 240 V AC -15% ... +10% 24 V DC ... 240 V DC -20% ... +25%
Nominal power consumption	3.5 VA (3 W)	4.5 VA (1.5 W)
Rated insulation voltage	300 V (according to EN 50178)	300 V (according to EN 50178)
Degree of protection	IP40 (housing) / IP20 (connection terminal blocks)	IP40 (housing) / IP20 (connection terminal blocks)
Ambient temperature range	-25°C ... 55°C	-25°C ... 55°C
Dimensions W / H / D	45 / 90 / 113 mm	22.5 / 90 / 113 mm
Screw connection solid / stranded / AWG	0.5 ... 2.5 mm^2 / 0.25 ... 2.5 mm^2 / 20 - 14	0.5 ... 2.5 mm^2 / 0.25 ... 2.5 mm^2 / 20 - 14
Conformance/approvals		
Conformance	CE-compliant	CE-compliant
UL, USA/Canada	UL applied for	UL/C-UL listed UL 508

Description	Ordering data: Type	Order No.	Pcs. / Pkt.	Ordering data: Type	Order No.	Pcs. / Pkt.
Electronic monitoring relay						
	EMD-FL-RP-480	**2900177**	1	**EMD-FL-PF-400**	**2885809**	1
Power module, plug-in, please order at the same time						
Supply voltage 88 ... 121 V AC	**EMD-SL-PS45-110AC**	**2885281**	1			
Supply voltage 108 ... 132 V AC	**EMD-SL-PS45-120AC**	**2885744**	1			
Supply voltage 195 ... 264 V AC	**EMD-SL-PS45-230AC**	**2885294**	1			
Supply voltage 323 ... 456 V AC	**EMD-SL-PS45-400AC**	**2885304**	1			
Supply voltage 425 ... 550 V AC	**EMD-SL-PS45-500AC**	**2885317**	1			

N

Temperature monitoring, filling level monitoring

Temperature monitoring (motor winding)

The **EMD-SL-PTC** monitoring relay monitors the motor winding temperatures by means of PTC (PTC thermistor resistance) as per DIN 44081.

- Test function with integrated test/reset button
- Variable supply voltage range
- Short-circuit and open-circuit monitoring

Fill level monitoring

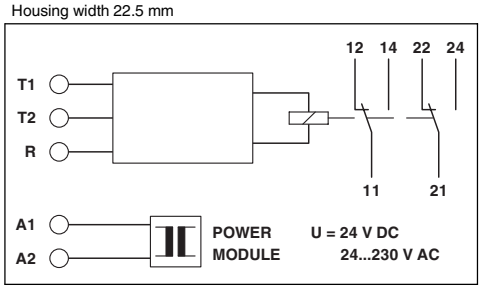
The **EMD-SL-LL-...** monitoring relay monitors the level of electrically conductive liquids with the help of conductive probes (not supplied as standard).

- Adjustable response delay
- Can be adjusted via potentiometer on the front

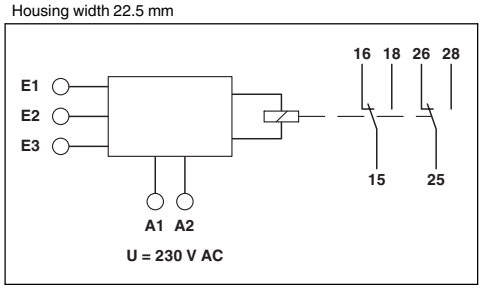
Temperature monitoring (motor windings)

Fill level monitoring

Housing width 22.5 mm



Housing width 22.5 mm



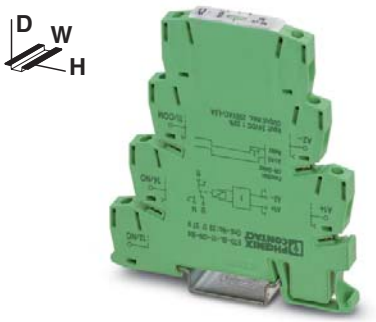
	Technical data	Technical data	
Functions			
	Winding temperature monitoring	Pump up (minimum monitoring), pump down (maximum monitoring)	
Input			
Total cold resistance	< 1.5 kΩ	-	
Response value	≥ 3.6 kΩ (relay drops out)	-	
Release value	≤ 1.8 kΩ (relay picks up)	-	
Basic accuracy	±10% (of scale end value)	-	
Repeat accuracy	≤ 2%	-	
Measuring input	-	Conductive probe, type: SK1, SK2, SK3	
Max. probe voltage	-	16 V AC	
Max. probe current	-	7 mA	
Length of probe cable	-	< 1000 m set value < 50% (capacitance 100 nF/km) < 100 m set value 100% (capacitance100 nF/km)	
Switching threshold	-	0.25 kΩ ... 100 kΩ (4 mS ... 1 µS)	
Relay output			
Contact type	2 floating PDT contacts	2 floating PDT contacts	
Switching capacity	750 VA (3 A/250 V AC, module aligned, ≤ 5 mm spacing) 1250 VA (5 A/250 V AC, module not aligned, ≥ 5 mm spacing)	750 VA (3 A/250 V AC, module aligned, ≤ 5 mm spacing) 1250 VA (5 A/250 V AC, module not aligned, ≥ 5 mm spacing)	
Electrical service life	2 x 10^5 cycles at ohmic load, 1000 VA	2 x 10^5 cycles at ohmic load, 1000 VA	
Mechanical service life	Approx. 2 x 10^7 cycles	Approx. 2 x 10^7 cycles	
Output fuse	5 A (fast-blow)	5 A (fast-blow)	
General data		EMD-SL-LL-230	EMD-SL-LL-110
Supply voltage	24 V AC ... 230 V AC (see power modules) 24 V DC (see power modules)	230 V AC -15% ... +15% AC	110 V AC -10% ... +15% AC
Nominal power consumption	2 VA (1.5 W)	2 VA (1.5 W)	
Degree of protection	IP40 (housing) / IP20 (connection terminal blocks)	IP40 (housing) / IP20 (connection terminal blocks)	
Ambient temperature range	-25°C ... 55°C	-25°C ... 55°C	
Dimensions W / H / D	22.5 / 90 / 113 mm	22.5 / 90 / 113 mm	
Screw connection solid / stranded / AWG	0.5 ... 2.5 mm^2 / 0.25 ... 2.5 mm^2 / 20 - 14	0.5 ... 2.5 mm^2 / 0.25 ... 2.5 mm^2 / 20 - 14	
Conformance/approvals			
Conformance	CE-compliant	CE-compliant	
UL, USA/Canada	UL/C-UL listed UL 508	UL/C-UL listed UL 508	

	Ordering data			Ordering data		
Description	Type	Order No.	Pcs. / Pkt.	Type	Order No.	Pcs. / Pkt.
Electronic monitoring relay						
	EMD-SL-PTC	**2866093**	1	**EMD-SL-LL-230**	**2885906**	1
				EMD-SL-LL-110	**2901137**	1
Power module, plug-in, please order at the same time						
Supply voltage 20 ... 30 V DC	**EMD-SL-PS- 24DC**	**2885359**	1			
Supply voltage 20.2 ... 26.4 V AC	**EMD-SL-PS- 24AC**	**2866103**	1			
Supply voltage 88 ... 121 V AC	**EMD-SL-PS-110AC**	**2866116**	1			
Supply voltage 108 ... 132 V AC	**EMD-SL-PS-120AC**	**2885731**	1			
Supply voltage 195 ... 264 V AC	**EMD-SL-PS-230AC**	**2866129**	1			

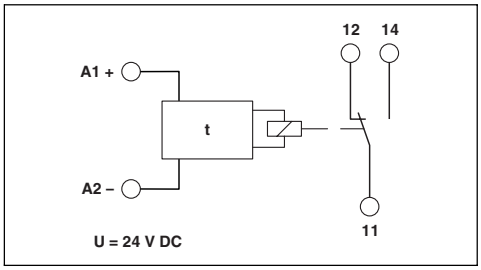
Compact timer relays in just 6.2 mm

The **ETD-BL-1T-...** compact timer relays show their strengths in applications that involve set parameters for functionality and time range.

- Purposeful device selection: One function, one time range
- High level of setting accuracy thanks to labeled and illuminated thumb wheel
- 6.2 mm slim design width



Timer relay with switch-on delay, voltage controlled

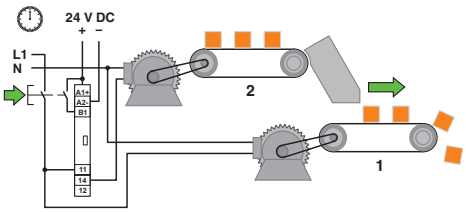


Technical data

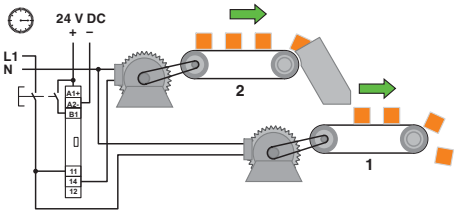
Functions	
	ON: With switch-on delay
Control contact	
Connection	-
Control pulse length	Min. 50 ms
Relay output	
Contact type	1 floating PDT
Switching capacity	1500 VA (6 A / 250 V AC)
Mechanical service life	Approx. 2 x 10^7 cycles
General data	
Supply voltage	24 V DC (19,2 V DC ...30 V DC)
Typical nominal current	15 mA (relay ON) 7 mA (relay OFF)
Impulse withstand voltage	6 kV (according to EN 50178)
Degree of protection	IP20
Ambient temperature range	-20°C ... 65°C
Housing material	Polyamide PA, self-extinguishing
Dimensions W / H / D	6.2 / 80 / 86 mm
Screw connection solid / stranded / AWG	0.14 ... 2.5 mm^2 / 0.14 ... 2.5 mm^2 / 26 - 14
Spring-cage connection solid / stranded / AWG	0.14 ... 2.5 mm^2 / 0.14 ... 2.5 mm^2 / 26 - 14
Conformance/approvals	
Conformance	CE-compliant
ATEX	Ex II 3 G Ex nAC II T4 X

Ordering data

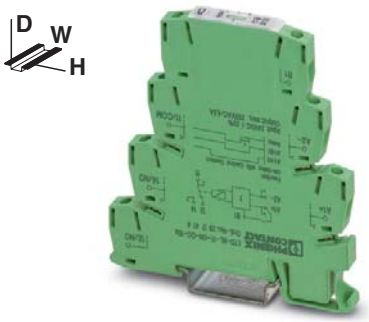
Description	Type	Order No.	Pcs. / Pkt.
Compact timer relay, with screw connection			
Time range 0.1...10 s	**ETD-BL-1T-ON- 10S**	**2917379**	1
Time range 3...300 s	**ETD-BL-1T-ON-300S**	**2917382**	1
Time range 0.3...30 min	**ETD-BL-1T-ON- 30MIN**	**2917395**	1
Time range 3...300 min	**ETD-BL-1T-ON-300MIN**	**2917405**	1
Compact timer relay, with spring-cage connection			
Time range 0.1...10 s	**ETD-BL-1T-ON- 10S-SP**	**2917531**	1
Time range 3...300 s	**ETD-BL-1T-ON-300S-SP**	**2917544**	1
Time range 0.3...30 min	**ETD-BL-1T-ON- 30MIN-SP**	**2917557**	1
Time range 3...300 min	**ETD-BL-1T-ON-300MIN-SP**	**2917560**	1



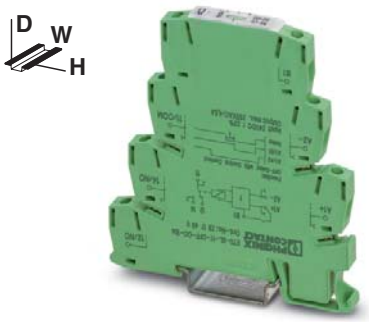
Conveyor belt 1 starts immediately



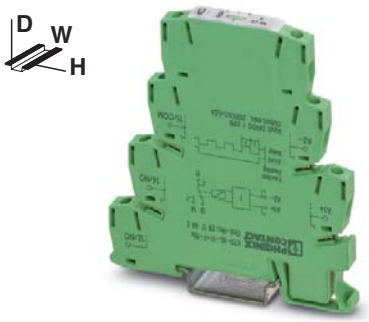
Conveyor belt 2 stars with a time delay



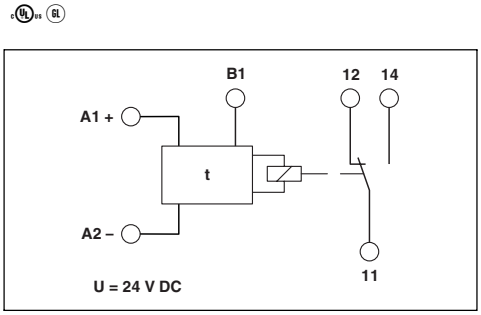
Timer relay with switch-on delay, with control contact

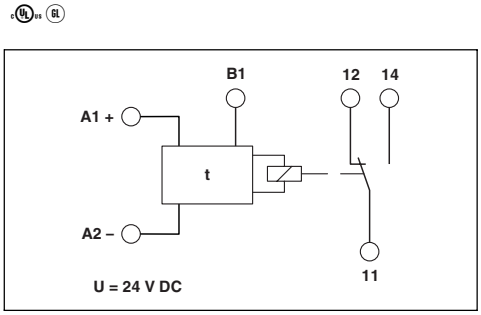


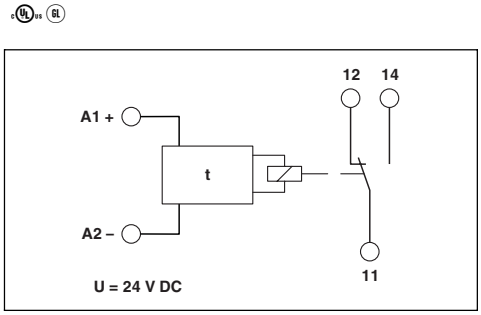
Timer relay with off delay, with control contact



Timer relay with flashing indic. function, beginning with pulse







Technical data

ON-CC: With switch-on delay with control contact

Non-floating, terminal blocks A1-B1
Min. 50 ms

1 floating PDT
1500 VA (6 A / 250 V AC)
Approx. 2 x 10^7 cycles

24 V DC (19,2 V DC ...30 V DC)
15 mA (relay ON)
7 mA (relay OFF)
6 kV (according to EN 50178)
IP20
-20°C ... 65°C
Polyamide PA, self-extinguishing
6.2 / 80 / 86 mm
0.14 ... 2.5 mm^2 / 0.14 ... 2.5 mm^2 / 26 - 14
0.14 ... 2.5 mm^2 / 0.14 ... 2.5 mm^2 / 26 - 14

CE-compliant
Ex II 3 G Ex nAC II T4 X

Ordering data

Type	Order No.	Pcs. / Pkt.
ETD-BL-1T-ON-CC- 10S	2917418	1
ETD-BL-1T-ON-CC-300S	2917421	1
ETD-BL-1T-ON-CC- 30MIN	2917434	1
ETD-BL-1T-ON-CC-300MIN	2917447	1
ETD-BL-1T-ON-CC- 10S-SP	2917573	1
ETD-BL-1T-ON-CC-300S-SP	2917586	1
ETD-BL-1T-ON-CC- 30MIN-SP	2917599	1
ETD-BL-1T-ON-CC-300MIN-SP	2917609	1

Technical data

OFF-CC: Off delay with control contact

Non-floating, terminal blocks A1-B1
Min. 50 ms

1 floating PDT
1500 VA (6 A / 250 V AC)
Approx. 2 x 10^7 cycles

24 V DC (19,2 V DC ...30 V DC)
15 mA (relay ON)
7 mA (relay OFF)
6 kV (according to EN 50178)
IP20
-20°C ... 65°C
Polyamide PA, self-extinguishing
6.2 / 80 / 86 mm
0.14 ... 2.5 mm^2 / 0.14 ... 2.5 mm^2 / 26 - 14
0.14 ... 2.5 mm^2 / 0.14 ... 2.5 mm^2 / 26 - 14

CE-compliant
Ex II 3 G Ex nAC II T4 X

Ordering data

Type	Order No.	Pcs. / Pkt.
ETD-BL-1T-OFF-CC- 10S	2917450	1
ETD-BL-1T-OFF-CC-300S	2917463	1
ETD-BL-1T-OFF-CC- 30MIN	2917467	1
ETD-BL-1T-OFF-CC-300MIN	2917489	1
ETD-BL-1T-OFF-CC- 10S-SP	2917612	1
ETD-BL-1T-OFF-CC-300S-SP	2917625	1
ETD-BL-1T-OFF-CC- 30MIN-SP	2917638	1
ETD-BL-1T-OFF-CC-300MIN-SP	2917641	1

Technical data

F: Flashing beginning with pulse

-
Min. 50 ms

1 floating PDT
1500 VA (6 A / 250 V AC)
Approx. 2 x 10^7 cycles

24 V DC (19,2 V DC ...30 V DC)
15 mA (relay ON)
7 mA (relay OFF)
6 kV (according to EN 50178)
IP20
-20°C ... 65°C
Polyamide PA, self-extinguishing
6.2 / 80 / 86 mm
0.14 ... 2.5 mm^2 / 0.14 ... 2.5 mm^2 / 26 - 14
0.14 ... 2.5 mm^2 / 0.14 ... 2.5 mm^2 / 26 - 14

CE-compliant
Ex II 3 G Ex nAC II T4 X

Ordering data

Type	Order No.	Pcs. / Pkt.
ETD-BL-1T-F- 10S	2917492	1
ETD-BL-1T-F-300S	2917502	1
ETD-BL-1T-F- 30MIN	2917515	1
ETD-BL-1T-F-300MIN	2917528	1
ETD-BL-1T-F- 10S-SP	2917654	1
ETD-BL-1T-F-300S-SP	2917667	1
ETD-BL-1T-F- 30MIN-SP	2917670	1
ETD-BL-1T-F-300MIN-SP	2917683	1

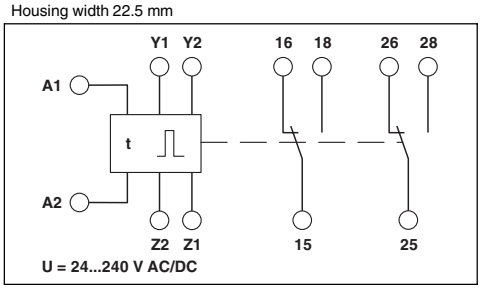
Multifunctional timer relays

The full range of conventional applications can be accommodated by the three versions of the **ETD** multifunctional timer relay.

- Suitable for universal use thanks to varied functions and selectable time ranges
- Time ranges from a few milliseconds to several days
- Variable supply voltage range
- 2 floating PDT outputs

Multifunctional timer relay, two adjustable times

Housing width 22.5 mm

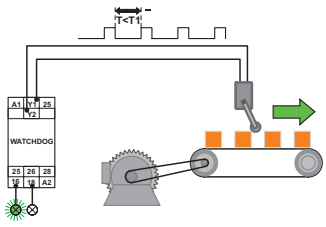


Technical data

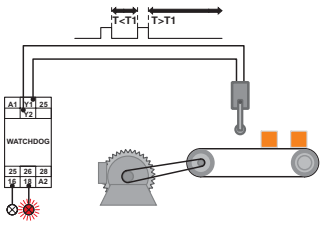
Functions	
	Ip: Switched-mode beginning with pause Ii: Switched-mode beginning with pulse ER: With switch-on and release delay with control contact EWu: With switch-on delay and single shot leading edge, voltage controlled EWs: With switch-on delay and single shot leading edge with control contact WsWa: With single shot leading edge and single shot trailing edge with control contact Wt: Pulse sequence evaluation (retriggerable release delay)
Time ranges	
Setting range	50 ms ... 10 h (10 time end ranges)
Control contact	
Connection	Floating, basic insulation between connection and input/output/bridge Y1-Y2
Load capacitance	Cannot carry load
Cable length	Max. 10 m
Control pulse length	Min. 50 ms (only with Wt function: > 7 ms)
Relay output	
Contact type	2 floating PDT contacts
Switching capacity	750 VA (3 A/250 V AC, module aligned, ≤ 5 mm spacing) 1250 VA (5 A/250 V AC, module not aligned, ≥ 5 mm spacing)
Mechanical service life	Approx. 2 x 10^7 cycles
General data	
Supply voltage	24 V DC ... 240 V DC -20% ... +25% 24 V AC ... 240 V AC -15% ... +10%
Nominal power consumption	2.5 VA (1 W)
Degree of protection	IP40 (housing) / IP20 (connection terminal blocks)
Ambient temperature range	-25°C ... 55°C
Housing material	Polyamide PA, self-extinguishing
Dimensions W / H / D	22.5 / 90 / 113 mm
Screw connection solid / stranded / AWG	0.5 ... 2.5 mm^2 / 0.5 ... 2.5 mm^2 / 20 - 14
Conformance/approvals	
Conformance	CE-compliant
UL, USA/Canada	UL/C-UL listed UL 508

Ordering data

Description	Type	Order No.	Pcs. / Pkt.
Electronic timer relay with adjustable functions and times	**ETD-FL-2T-DTI**	**2866187**	1



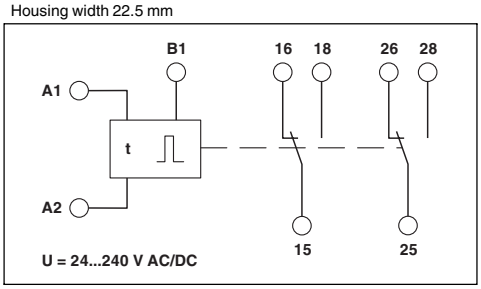
Function: Pulse sequence evaluation



Message for incorrect pulse

Multifunctional timer relay, one adjustable time

Housing width 22.5 mm



Technical data

E: With switch-on delay
R: With release delay and control contact
Es: With switch-on delay and control contact
Wu: With single shot leading edge, voltage controlled
Ws: With single shot leading edge and control contact
Wa: With single shot trailing edge and control contact
Bi: Flashing beginning with pulse
Bp: Flashing beginning with pause

50 ms ... 100 h (7 time end ranges)

Non-floating, terminal blocks A1-B1

Parallel switched minimum load current 1 VA (0.5 W), terminal blocks A2-B1
Max. 10 m
Min. 70 ms

2 floating PDT contacts
750 VA (3 A/250 V AC, module aligned, ≤ 5 mm spacing)
1250 VA (5 A/250 V AC, module not aligned, ≥ 5 mm spacing)

Approx. 2 x 10^7 cycles

24 V DC ... 240 V DC -20% ... +25%
24 V AC ... 240 V AC -15% ... +10%
2.5 VA (1 W)
IP40 (housing) / IP20 (connection terminal blocks)
-25°C ... 55°C
Polyamide PA, self-extinguishing
22.5 / 90 / 113 mm
0.5 ... 2.5 mm^2 / 0.5 ... 2.5 mm^2 / 20 - 14

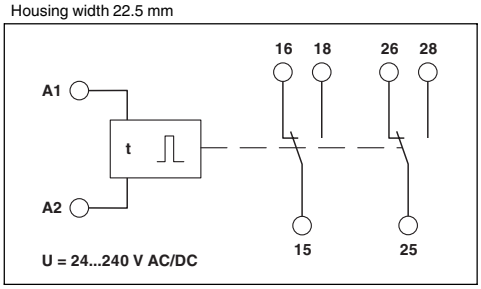
CE-compliant
UL/C-UL listed UL 508

Ordering data

Type	Order No.	Pcs. / Pkt.
ETD-SL-1T-DTF	**2866161**	1

Impulse encoder, adjustable pulse and pause times

Housing width 22.5 mm



Technical data

Ip: Switched-mode beginning with pause
Ii: Switched-mode beginning with pulse

50 ms ... 100 h (7 time end ranges)

-

-

-
-

2 floating PDT contacts
750 VA (3 A/250 V AC, module aligned, ≤ 5 mm spacing)
1250 VA (5 A/250 V AC, module not aligned, ≥ 5 mm spacing)

Approx. 2 x 10^7 cycles

24 V DC ... 240 V DC -20% ... +25%
24 V AC ... 240 V AC -15% ... +10%
2.5 VA (1 W)
IP40 (housing) / IP20 (connection terminal blocks)
-25°C ... 55°C
Polyamide PA, self-extinguishing
22.5 / 90 / 113 mm
0.5 ... 2.5 mm^2 / 0.5 ... 2.5 mm^2 / 20 - 14

CE-compliant
UL/C-UL listed UL 508

Ordering data

Type	Order No.	Pcs. / Pkt.
ETD-SL-2T-I	**2866174**	1

Diode modules

Diode circuits perform various tasks in electrical control systems, particularly in electronic ones:

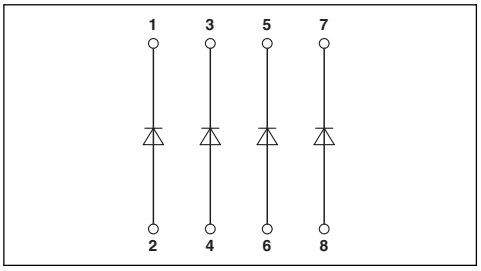
- Electrical decoupling of messages in fault signaling systems
- Spark-suppression diodes for limiting surge voltages of inductive loads, (solenoid valves, DC relays or similar)
- Can be supplied as "diode gates" combined with anode or cathode or as freely assignable diodes

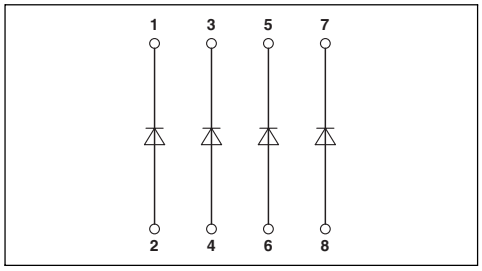
Notes:

Further circuit diagrams can be found in the data sheet at www.phoenixcontact.com.

With diode type 1 N 4007

With diode type 1 N 5408





Technical data

Diodes	4E / 8E / 17E / 7P / 7M	14P / 14M / 32P / 32M
Max. operating voltage U_{max}	250 V AC	250 V AC
Peak reverse voltage per diode	1300 V	1300 V
Reverse current per diode	5 µA	5 µA
Conducting state voltage per diode	Approx. 0.8 V	Approx. 0.8 V
Conducting state current per diode		
with single load	0.7 A	0.7 A
with simultaneous loads	0.5 A	0.2 A
General data		
Ambient temperature range	-20°C ... 50°C	
Rated insulation voltage	300 V (according to EN 50178)	
Pollution degree / surge voltage category	III, basic insulation (according to EN 50178)	
Pollution degree / surge voltage category	2 (according to EN 50178)	
Mounting position	Any	
Mounting	In rows with zero spacing	
Dimensions H / D	75 / 55 mm	
Screw connection solid / stranded / AWG	0.2 ... 4 mm² / 0.2 ... 2.5 mm² / 24 - 12	
Conformance/approvals		
Conformance	CE-compliant	

Technical data

Diodes	4E-... / 4P-... / 4M-... / 8E-...	8P-... / 8M-...
Max. operating voltage U_{max}	250 V AC	250 V AC
Peak reverse voltage per diode	1000 V	1000 V
Reverse current per diode	10 µA	10 µA
Conducting state voltage per diode	Approx. 0.8 V	Approx. 0.8 V
Conducting state current per diode		
with single load	1.5 A	1.5 A
with simultaneous loads	1 A	0.3 A
General data		
Ambient temperature range	-20°C ... 50°C	
Rated insulation voltage		
Pollution degree / surge voltage category	III, basic insulation (according to EN 50178)	
Pollution degree / surge voltage category	2 (according to EN 50178)	
Mounting position	Any	
Mounting	In rows with zero spacing	
Dimensions H / D	75 / 55 mm	
Screw connection solid / stranded / AWG	0.2 ... 4 mm² / 0.2 ... 2.5 mm² / 24 - 12	
Conformance/approvals		
Conformance	CE-compliant	

Ordering data

Description	Housing width	Type	Order No.	Pcs. / Pkt.
Diode module, can be individually wired				
4 diodes	22.5 mm	**EMG 22-DIO 4E**	**2950048**	10
8 diodes	45 mm	**EMG 45-DIO 8E**	**2950103**	5
17 diodes	90 mm	**EMG 90-DIO 17E**	**2954895**	5
Diode module, with positive polarity (common cathode)				
4 diodes	22.5 mm			
7 diodes	22.5 mm	**EMG 22-DIO 7P**	**2950064**	10
8 diodes	45 mm			
14 diodes	45 mm	**EMG 45-DIO14P**	**2950116**	5
32 diodes	90 mm	**EMG 90-DIO 32P**	**2954918**	5
Diode module, with negative polarity (common anode)				
4 diodes	22.5 mm			
7 diodes	22.5 mm	**EMG 22-DIO 7M**	**2950077**	10
8 diodes	45 mm			
14 diodes	45 mm	**EMG 45-DIO14M**	**2950129**	5
32 diodes	90 mm	**EMG 90-DIO 32M**	**2954934**	5

Ordering data

Type	Order No.	Pcs. / Pkt.
EMG 22-DIO 4E-1N5408	**2952790**	10
EMG 45-DIO 8E-1N5408	**2949389**	5
EMG 22-DIO 4P-1N5408	**2952198**	10
EMG 45-DIO 8P-1N5408	**2954879**	5
EMG 22-DIO 4M-1N5408	**2952211**	10
EMG 45-DIO 8M-1N5408	**2954882**	5

Accessories

Equipment marker	**EMG-GKS 12**	**2947035**	50

Accessories

EMG-GKS 12	**2947035**	50

Lamp testing modules, Display modules

Lamp testing modules

Lamp testing modules for checking lamps that are installed and ready for operation:

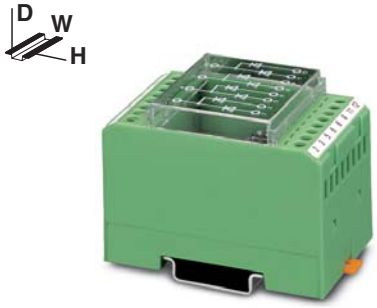
– Individual checking of separate lamps (EMG...-E/LP)
– Centrally controlled checking of lamps (EMG...-M/LP)

Display modules

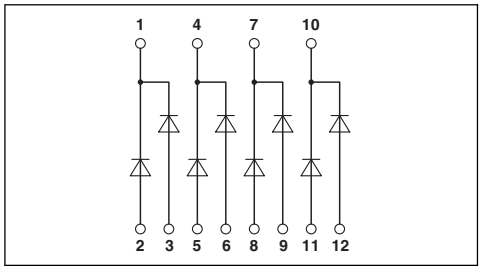
– Light indicator modules facilitate the monitoring of processes on electronic control systems during troubleshooting

Notes:

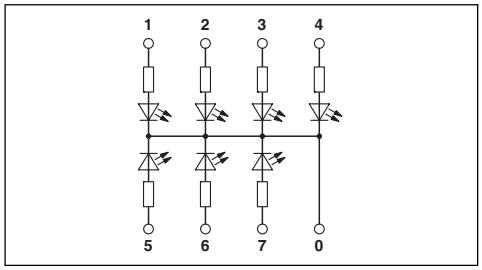
Further circuit diagrams can be found in the data sheet at www.phoenixcontact.com.



Lamp testing module, groups of 2 diodes with common cathode



Light indicator module, with common return line



	Technical data		Technical data	
Diodes	8E/16E	14M/32M	LA 7S	LED 7S/LED 14S
Max. operating voltage U_{max}	250 V AC	250 V AC		
Peak reverse voltage per diode	1300 V	1300 V		
Reverse current per diode	≤ 5 µA	≤ 5 µA		
Conducting state voltage per diode	Approx. 0.8 V	Approx. 0.8 V		
Conducting state current per diode				
with single load	0.7 A	0.7 A		
with simultaneous loads	0.4 A	0.2 A		
Input				
Current required per light indicator			Approx. 1 mA	Approx. 3 mA
General data				
Ambient temperature range	-20°C ... 50°C		-20°C ... 45°C	
Rated insulation voltage	300 V (according to EN 50178)			
Pollution degree / surge voltage category	III, basic insulation (according to EN 50178)		III, basic insulation (according to EN 50178)	
Pollution degree / surge voltage category	2 (according to EN 50178)		2 (according to EN 50178)	
Mounting position	Any		Any	
Mounting	In rows with zero spacing		In rows with zero spacing	
Dimensions H / D	75 / 55 mm		75 / 47.5 mm	
Screw connection solid / stranded / AWG	0.2 ... 4 mm² / 0.2 ... 2.5 mm² / 24 - 12		0.2 ... 4 mm² / 0.2 ... 2.5 mm² / 24 - 12	
Conformance/approvals				
Conformance	CE-compliant		CE-compliant	

Description	Housing width	Ordering data: Type	Order No.	Pcs. / Pkt.	Ordering data: Type	Order No.	Pcs. / Pkt.
Lamp testing module, for individual wiring							
4-pair	45 mm	**EMG 45-DIO 8E/LP**	**2954798**	5			
8-pair	90 mm	**EMG 90-DIO 16E/LP**	**2954808**	5			
Lamp testing module, with common control							
7-pair	45 mm	**EMG 45-DIO14M/LP**	**2950132**	5			
16-pair	90 mm	**EMG 90-DIO 32M/LP**	**2954785**	5			
Light indicator module, 110 ... 230 V AC input voltage							
7 glow lamps	22.5 mm				**EMG 22-LA 7S/230**	**2949677**	10
Light indicator module, 24 V DC input voltage							
7 LEDs	22.5 mm				**EMG 22-LED 7S/24**	**2952305**	10
14 LEDs	45 mm				**EMG 45-LED 14S/24**	**2952334**	5

	Accessories			Accessories		
Equipment marker	**EMG-GKS 12**	**2947035**	50	**EMG-GKS 12**	**2947035**	50

Quality in quantity

Integrated management system

The aim of the Phoenix Contact integrated management system is to coordinate all the requirements regarding products, processes, and organization.

Statutory and regulatory requirements, as well as those of international standards and our customers, are met and, in some cases, even exceeded in all phases of the product lifecycle.

In the Phoenix Contact management system, the integration of quality, environmental protection, and safety in the workplace is monitored each year for conformance by internationally recognized independent bodies. Certification in accordance with international standards ISO 9001, ISO 14001, and BS OHSAS 18001 is the result of our corporate philosophy of meeting the needs of our customers, staff, and environment as best as possible. They serve as the basis for innovative products with the familiar high Phoenix quality standard, actively practiced environmental protection, and responsibility in the field of occupational health and safety. Of course, we integrate all further requirements of standards, international approvals or special customer requirements into company processes.

This system provides a building block for the success of the Phoenix Contact Group and its products and services.

CE marking

The CE mark was introduced as an important instrument for the free movement of goods within the single European market. By attaching the mark to a product, the manufacturer confirms that it complies with all applicable European Union (EU) directives. EC directives describe the product properties with regard to device safety and avoiding danger. These are legally binding regulations of the European Union (EU). In other words, compliance with the requirements is a **statutory condition for marketing the product within the EU**.

Where applicable, the products that our company currently manufactures fall within the purview of the following directives:

- 2006/95/EC
  Electrical equipment designed for use within certain voltage limits (Low Voltage Directive)
- 2004/108/EC
  Electromagnetic compatibility (EMC Directive)
- 2006/42/EC
  Safety of machinery (Machinery Directive)
- 94/9/EC
  Equipment and protective systems intended for use in potentially explosive atmospheres (ATEX Directive 100a)
- 1999/5/EC
  Radio and telecommunications terminal equipment (R&TTE)

The standards upon which the specified directives are based, have been part of our standard of development for a long time. This guarantees conformance with European directives. The numbers of the directives indicate their version at the time of publication. In the event of changes to directives and/or standards, our products will undergo conformity assessment again in good time and a new declaration of conformity will be issued promptly. The current declarations for each product can also be found in our Download Center.

The EMC Directive occupies a special place among the European directives listed. It defines electromagnetic compatibility as a fundamental property of devices based on mandatory guidelines. European Law therefore acknowledges the electromagnetic compatibility of devices and systems as an important condition for error-free operation of machinery and systems. Phoenix Contact is one of the leading international companies in surge protection, and therefore possesses broad expertise in EMC. This expertise and the experience gained over years of developing and applying industrial interface and communication technology have resulted in our products having an extremely high standard of quality with regard to electromagnetic compatibility. In order to also provide other companies with this expertise, our associate company, Phoenix Testlab, was founded. Phoenix Testlab GmbH is an independent, accredited service provider offering EMC testing that complies with European standards. At Phoenix Testlab, devices are also tested with regard to their electrical safety, mechanical influences, and their behavior in relation to environmental influences. Furthermore, Phoenix Testlab is a "Notified Body" in accordance with EMC Directive 2004/108/EC and according to R&TTE Directive 1999/5/EC for radio and telecommunications terminal equipment. As a "Telecom Certification Body" (TCB), Phoenix Testlab may also approve these products for markets in the USA, Canada, and Japan.

Standards and regulations

All relevant standards and regulations are used as the basis for the development and maintenance of our products.

International standards are subject to continuous changes as a result of harmonization and new developments. In line with this process, the current version of all standards that are relevant to our products is documented on the Internet at **www.phoenixcontact.com**.

Online product information service on the web

Phoenix Contact's product range is growing constantly.

Due to our commitment to product monitoring, all products are subject to improvement.

The Internet is an ideal platform to quickly communicate new product developments and improvements to the market.

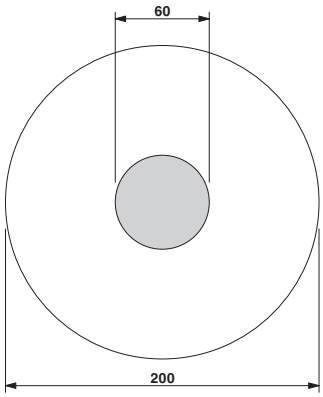
You can quickly access the relevant Phoenix Contact website for your region via www.phoenixcontact.com. Here, you will always find the latest overview of products, solutions, and services from Phoenix Contact. This includes technical documents, such as data sheets and user manuals, the latest driver and demo software, plus a means of contacting the appropriate contact person directly.

Note:

Subject to changes that serve the purpose of technical progress.

Shock protection

Touch-proof



Back of hand safety

Example: Pressure actuation

The BGV A 2 accident prevention regulations issued by the Trade Association for Precision Mechanics and Electrical Engineering (Berufsgenossenschaft für Feinmechanik und Elektrotechnik) apply to electrical system operators and are aimed at preventing electrical accidents by means of special safety requirements.

These regulations stipulate safety distances for work, as well as operational and occasional handling activities, carried out in the vicinity of live components (which are referred to as "active components") in low-voltage systems up to 1000 V ~ or 1500 V –.

- Work on active (i.e., live) components, is only permissible once the unit has been correctly de-energized. Operational activities are only permitted in the vicinity of active components if these components are de-energized or are protected against direct contact (section 6). The following safety measures apply when working in the vicinity of active components:
- Ensure that the system remains de-energized throughout the entire time that the work is being carried out or
- Ensure shock protection is in place in the form of covers or barriers during the work, or
- Ensure that the minimum permissible clearances are observed (section 7)

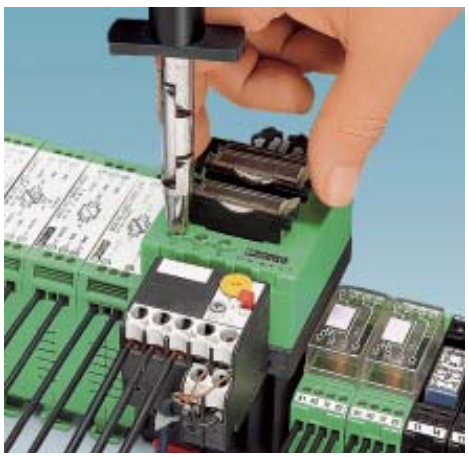
The term "occasional handling" has been coined to refer to the operation of elements such as push-buttons, rocker arms or rotary buttons in the vicinity of live parts.

In VDE 0105-1, this is covered by "operation with partial protection against direct contact".

Detailed specifications for "occasional handling" can be found in DIN VDE 0106-100. Among other things, this specifies the extent to which active components in the vicinity of operating elements need to be protected against contact. The basis for this is the definition of a "protection area for occasional handling"; this is the area into which the user must reach in order to handle the machine.

The most important thing is that an area formed by an even envelope curve of 30 mm radius must surround the active components. This area must be **touch-proof**, i.e., the straight VDE test finger according to IEC IEC 60529/DIN VDE 0470-1 (test finger) does not come into contact with the live components of the electrical equipment.

Back of hand safety is specified for the



"rest of the area" up to 100 mm around the operating element. **Back of hand safety** means that when a force of 50 N is applied to a ball with a diameter of 50 mm, this does not come into contact with the live components of the operating equipment. No special measures for ensuring shock protection are stipulated outside this area.

Note: Systems and equipment that are operated with safety extra-low voltages of up to 25 V ~ or 60 V are deemed to be protected

against "direct contact".

According to section 5, subsection 4 of the BGV A 2 regulations, there is no need to test the condition of the system prior to initial startup if the company has confirmation from the manufacturer or installer that the electrical systems and operating equipment conform to BGV A 2. The confirmation required relates to systems and operating equipment that have been installed and are ready for operation and can only be issued by the installer or installation company. The manufacturer of the electrical operating equipment can only issue a confirmation that products have been produced in accordance with the relevant electrotechnical DIN VDE regulations stipulated in BGV A 2. The installer must bear this in mind when selecting the operating equipment to be used.

In the field of connection technology, Phoenix Contact offers a wide range of products which are touch-proof or can be protected against contact by means of covers. The individual types of terminal blocks and accessories must be selected according to local conditions.

Quality features of insulating housing

Thermoplastics

The majority of our insulating housing is made from thermoplastic materials. Roughly speaking, these can be divided into amorphous and semi-crystalline substances. Thermoplastics are processed using the efficient and environmentally-friendly injection molding process. They have good recycling properties and can be reused. We use many materials that are modified in different ways to meet the demanding requirements that electrical and electronic modules, devices, and systems have to meet with regard to their mechanical, thermal, and electrical properties.

Behavior of plastics under the influence of temperature (operating temperatures, mechanical influences)

All plastics undergo a process referred to as thermal aging when they are subjected to the influence of heat over long periods. This process causes changes in the mechanical and electrical properties of the material. External influences, e.g., radiation, additional mechanical, chemical or electrical stress, reinforce this effect. Special tests on samples can yield characteristic data which serves as a good yardstick for comparing different plastics. However, applying these characteristic values to an evaluation of molded plastic parts is only possible to a limited extent, and can only provide the designer with a rough guide when selecting a plastic material. This catalog uses the following assessment criteria: the **RTI value** according to UL746B/ANSI 746 B (elec. ref. to dielectric strength) and the **Ti value** according to IEC 60216-1 (ref. to a 50% reduction in tensile strength after 20,000 hours).

IEC 60947-7-1/EN 60947-7-1 specifies a permissible temperature increase of 45 K for modular terminal blocks under rated load. Phoenix Contact terminal blocks meet this requirement.

The properties of plastics are not only affected by the influence of heat as described above; they also undergo changes as a result of cold influences. When subjected to cold as well as low levels of humidity, plastics becoming increasingly brittle with the result that they are no longer capable of withstanding the same mechanical loads. As the table on the right shows, the plastics concerned can be used down to a temperature of -40°C, but only without a mechanical load. As far as the products presented in the catalog are concerned, it is the ambient temperature specified in each case that is to be regarded as definitive for operation. Regardless of the plastics used, this may be subject to further restrictions (e.g., limited to -20°C) as a result of the components used or other restrictive parameters.

At very low temperatures, this means that any form of mechanical load on the plastic components must be avoided (e.g., mounting of products on/removal of products from the DIN rail, actuation of terminal points, locking/ejection of relays from bases, prizing out of plug-in bridges, bending of cables and lines, etc.), as there is always an associated risk of damage. Unless otherwise indicated, you are recommended to carry out the specified mounting/operational tasks in a temperature range from -10°C to +40°C.

Inflammability characteristics of plastics (UL 94)

Inflammability tests for plastics have been defined by Underwriters Laboratories (USA) in regulation UL 94. This applies to all areas of application, but in particular to electrical engineering. A horizontal or vertical test is carried out at the test laboratory to determine the inflammability of the plastic material with a naked flame. In order of increasing resistance to combustion, the evaluation classes are HB, V2, V1, V0, and 5V. Test results are recorded on what are known as "yellow cards" and are published annually in the **Recognized Component Directory.**

Thermoplastics: Non-reinforced polyamide, PA

We use modern, semi-crystalline polyamide insulation material, which has now become an essential component in electrical engineering and electronics. It has been prominent for a long time and is authorized for use by the relevant approval offices such as CSA, NEMKO, KEMA, PTB, SEV, UL, VDE, etc.

Polyamide also has excellent electrical, mechanical, chemical, and other properties, even at high operating temperatures. Brief peak temperatures of up to approximately 200°C are permissible as a result of heat aging stabilization. Depending on the type (PA 4.6, 6.6, 6.10, etc.), its melting point is in the region of 215°C to 295°C.

Polyamide absorbs moisture from its surroundings, on average 2.8%. However, this moisture is not in the form of crystallization water in the plastic itself, but chemically bonded H_2O groups in the molecule structure. This makes the plastic flexible and resistant to breakage, even at temperatures as low as -40°C. According to UL 94, PA belongs to inflammability class V2 to V0.

Thermoplastics: Polyester, PBT

We use semi-crystalline thermoplastic polyester in non-reinforced and glass-fiber-reinforced variants for special applications which require increased dimensional and form stability.

Apart from the high operating temperature, the material is characterized by excellent mechanical strength and hardness. Polyester does not absorb moisture from its surroundings. Therefore, PBT is particularly suitable for strips, for example, that are soldered onto PCBs and are subsequently required to pass a burn-in test where they are subjected to the influence of heat. According to UL 94, PBT belongs to inflammability class V2 to V0.

Thermoplastics: Polycarbonate, PC

Polycarbonate combines many advantages such as rigidity, impact strength, transparency, dimensional stability, good insulation properties, and resistance to heat.

This amorphous material only absorbs moisture to a very limited degree, and is used for items such as large, rigid electronics component housing.

In its transparent form, polycarbonate is particularly suitable for use as a material for cover profiles or marking materials.

PC has good resistance properties in relation to mineral acids, saturated aliphatic hydrocarbons, gasoline, greases, and oils.

This material is not very resistant to solvents, benzene, alkalis, acetone, and ammonia. Strain cracks may result from contact with certain chemicals.

According to UL 94, PC belongs to inflammability class V2 to V0.

Thermoplastics: Polycarbonate fiber-reinforced, PC-F

The properties that set fiber-reinforced polycarbonates apart from non-reinforced materials are their higher rigidity, impact strength, and operating temperature. In other respects, their properties are largely identical to those of non-reinforced polycarbonate.

Thermoplastics: ABS

We use the thermoplastic molding compound ABS for products which must have good impact and notched impact properties in addition to high mechanical stability and rigidity. The products are resistant to chemicals and stress cracking due to their special surface quality and hardness.

The characteristic thermal properties provide good dimensional stability at both low and high temperatures. Products made from ABS can be coated with metallic surfaces, e.g., nickel.

According to UL 94, the molding compound used belongs to inflammability class HB to V0.

Dimensions: Width/height/depth

The dimensions "width/height/depth" are defined as follows for all DIN-rail-mountable products in the INTERFACE range:

- Width: Measurement taken along the DIN rail
- Height: Measurement taken across the DIN rail
- Depth: Measurement taken starting from the mounting plate and including the DIN rail
  NS 35/7,5 (EN 60715)

The width, height, and depth never change, even if the products shown in this catalog happen to be photographed from two different perspectives (horizontal or vertical).

To make things easier for you, one of the following two symbols has been included next to each product photo:

Properties	Unit/ level	Polyamide PA	Polyester PBT	Polycarbonate PC	Polycarbonate PC-F	ABS
Operating temperature RTI */**	°C	≤ 105	≤ 105	≤ 125	≤ 120	≤ 80
Minimum temperature (without mech. load)	°C	-40	-40	-40	-40	-40
Dielectric strength according to IEC 60243-1/DIN VDE 0303-	kV/cm	600	400	> 300		850
Creep resistance	CTI...M	550	225	175		200
IEC 60112/DIN VDE 0303-1	CTI...	600	225	175	175	600
Tropical and termite resistance		Good	Good	Good		
Specific contact resistance IEC 60093/VDE 0303 Part 30; IEC 60167/VDE 0303 Part 31	Ω cm	10^{12}	10^{16}	> 10^{16}	> 10^{14}	10^{14}
Surface resistance IEC 60093/VDE 0303 Part 30; IEC 60167/VDE 0303 Part 31	Ω	10^{10}	10^{13}	> 10^{14}		10^{13}
Inflammability class according to UL 94		V2-V0	V0	V2-V0	V0	HB-V0

* According to UL 746 B/ANSI 746 B (elec.) ** Minimum value

Connection cross section

The rated cross sections of modular terminal blocks must be specified by the manufacturer in accordance with IEC 60947-7-1. This refers to the conductor cross section that can be connected in single, multi or fine-strand versions. Specific thermal, mechanical, and electrical requirements relate to this cross section.

The manufacturer must also specify the **rated connection capacitance**, i.e., the area of the conductor that can be connected, as well as the number of conductors that can be connected simultaneously and the necessary preparation of the conductor ends. The conductors can be **solid (single or multi-strand)** or stranded **(fine-strand)**.

These values can be found in the product-specific technical data.

The rated connection capacitance of Phoenix Contact modular terminal blocks usually exceeds the requirements stipulated in standards. These state specify that it must only be possible to connect one conductor with one of the two next smallest cross sections, excluding the rated cross section, (standardized for the cross section range from 0.2 to 35 mm2).

In addition, conductors with a rated cross section can generally be wired using a ferrule with a plastic sleeve.

Phoenix Contact modular terminal blocks are designed to allow copper conductors to be connected to them without ever requiring any special preparation. "Special treatment" or the use of ferrules – both are permissible according to IEC 60947-7-1 – is not necessary. If ferrules are nevertheless used to provide stranded conductors with protection against splicing, the connection capacitance of the stranded conductor is generally reduced by one level.

Structure and dimensions of connecting cables

Cross section	Single-strand		Multi-strand		Fine-strand		American Wire Gauge [AWG]						
	Diameter (max. dimension)	Number of wires	Diameter (max. dimension)	Number of wires (minimum number)	Diameter (max. dimension)	Number of wires (guide value)	Gauge No.	Solid wires			Stranded wires		
[mm²]							AWG	[∅ mm]	[circ. miles]	[mm²]	[∅ mm]	[circ. miles]	[mm²]
0.2	0.5	1	–	–	–	–	24	0.51	404	0.21	–	–	–
0.5	0.9	1	1.1	7	1.1	16	20	0.81	1022	0.52	0.97	1111	0.56
0.75	1.0	1	1.2	7	1.3	24	18	1.02	1620	0.82	1.16	1600	0.82
1	1.2	1	1.4	7	1.5	32	(17)	1.15	2050	1.04			
–	–	–	–	–	–	–	16	1.29	2580	1.31	1.50	2580	1.32
1.5	1.5	1	1.7	7	1.8	30	(15)	1.45	3260	1.65			
–	–	–	–	–	–	–	14	1.63	4110	2.08	1.85	4100	2.09
2.5	1.9	1	2.2	7	2.3	50	(13)	1.83	5180	2.63			
–	–	–	–	–	–	–	12	2.05	6530	3.31	2.41	6500	3.32
4	2.4	1	2.7	7	2.9	56	(11)	2.30	8230	4.17			
–	–	–	–	–	–	–	10	2.59	10380	5.26	2.95	10530	5.37
6	2.9	1	3.3	7	3.9	84	(9)	2.91	13100	6.63			
–	–	–	–	–	–	–	8	3.26	16510	8.37	3.73	16625	8.48

Tightening torque of terminal block screws

IEC 60947-1/EN 60947-1, modified, table 4 specifies torques for screw connections according to screw size for electrical and mechanical type tests.

Extract from IEC 60 947-1/EN 60 947-1, table 4
The torque according to IEC and the recommended tightening torque for Phoenix Contact terminal blocks are specified.

Thread	Head screw with slot	
	Torque [Nm]	Recommended tightening torque [Nm]
M 2.5 (M 2.6)	0.4	0.4-0.5
M 3	0.5	0.5-0.6
M 3.5	0.8	0.8-1.0
M 4	1.2	1.2-1.5

Current carrying capacitance

Standard IEC IEC 60947-7-1/ EN 60947-7-1/DIN VDE 0611-1 stipulates the test currents listed in the adjacent table for the individual conductor cross sections. The relevant currents are listed under the connection data for the individual terminal blocks. The type tests for modular terminal blocks are based on this data.

Test currents according to IEC 60947-7-1/EN 60947-7-1, table 5

Rated cross section	[mm²]	0.2	0.5	0.75	1.0	1.5	2.5	4	6	10	16
Test current	[A]	4	6	9	13.5	17.5	24	32	41	57	76

Overview of approval bodies and safety marks

National approval bodies and certification procedures		Country code
CB scheme	IECEE CB Scheme	International
CCA	CENELEC Certification Agreement	EU
	Canadian Standards Association (CSA)	CA
	Underwriters Laboratories Inc. (UL)	US
	Underwriters Laboratories Inc. (UL) - UL approval for Canada -	CA
	Underwriters Laboratories Inc. (UL) Combined logo - UL approval for the USA and Canada -	US CA
	Elektromontaz	PL
	INSIEME PER LA QUALITA'E LA SICUREZZA	IT
	Gosudarstvenne Komitet Standartov (GOST)	RU
KEMA KEUR	KEMA Nederland B.V.	NL
ÖVE	Österreichischer Verband für Elektrotechnik	AT
SABS	South African Bureau of Standards	ZA
SEV	Eidgenössisches Starkstrominspektorat (ESTI) electrosuisse SEV Verband für Elektro-, Energie- und Informationstechnik	CH
VDE	Verband Deutscher Elektrotechniker e.V. (VDE) – Approval of drawings – Reports with production monitoring	DE
LGA Konformitäts-Zertifikat	Landesgewerbeanstalt Bayern	DE
	Berufsgenossenschaft (BG) GS - Geprüfte Sicherheit	DE
TÜV	TÜV Rheinland	DE
TÜV NORD	TÜV Nord	DE

Approval bodies for explosion protection		Country code
FM APPROVED	FM Approvals	US
KEMA	KEMA Quality B.V.	NL
PTB	Physikalisch-Technische Bundesanstalt	DE
	Société Nationale de Certification et d'Homologation	LU
VTT	VTT Technical Research Centre of Finland	FI
	Nemko AS	NO
TÜV	TÜV Rheinland do Brasil Ltda.	BR
	Underwriters Laboratories Inc. (UL)	US
	FTZU - Fyzikalne technicky zkusebni ustav (CZ)	CZ

Ship classification societies		Country code
	Bureau Veritas	FR
GL	Germanischer Lloyd AG	DE
Lloyd's Register	Lloyd Register of Shipping	GB
ClassNK	Nippon Kaiji Kyokai	JP
	Det Norske Veritas	NO
	Polski Rejestr Statków	PL
	Russian Maritime Register of Shipping	RU
KR	Korean Register of Shipping	KR
ABS	American Bureau of Shipping	US

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2277912	PACT MCR-V2-6015- 85- 500-5A-1	701
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2296074	PLC-V8/D15S/IN	125
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