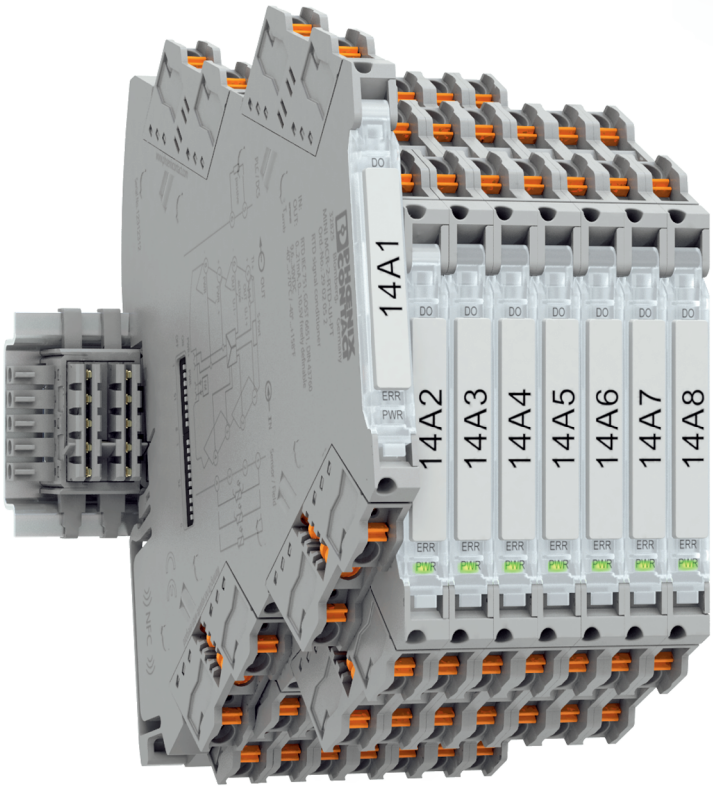
7

# Interface Technology and Switching Devices

2015 / 2016

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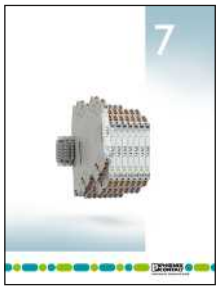

# Interface technology and switching devices

**Terminal blocks**

- Terminal blocks

**Surge protection and power supplies**

- Surge protection and interference suppression filters
- Power supplies and UPS
- Protective devices

**Sensor/actuator cabling and industrial connectors**

- Sensor/actuator cabling
- Cables and lines
- Connectors

**Control technology, I/O systems, and automation infrastructure**

- Lighting and signaling
- Fieldbus components and systems
- Functional Safety
- HMIs and industrial PCs
- I/O systems
- Industrial Ethernet
- Industrial communication technology
- Software
- Controllers
- Wireless data communication

**Marking systems, tools, and mounting material**

- Marking and labeling
- Tools
- Installation and mounting material

**PCB connection technology and electronics housing 2013/14**

- PCB terminal blocks and PCB connectors
- Electronics housing

**Connection technology for field devices 2013/14**

- Connectors
- Cables and lines

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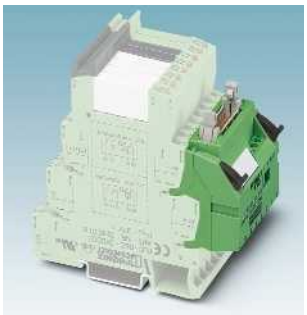

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PWR
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Err
L
R
EMM 3-24DC/500AC-16-IFS
Reset
max. 9 A
PWR
Err
ON
Reset
ELR H3-IES-PT-24DC/500AC-9
max. 9 A
PWR
DAT
DIAG
L
R
ELR H5-IES-PT/500AC-9-IFS
Set/Reset
max. 9 A
PWR
Err
L
R
Reset
ELR H51-ESSC-24DC-500AC-9
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# Electronic switching devices and motor control

Switching devices for starting, reversing, and protecting electric motors are some of the most frequently used components in automation technology. These are often designed redundantly for safety-sensitive applications. When it comes to reducing installation time and space requirements, CONTACTRON hybrid motor starters are the state-of-the-art alternative.

This is because CONTACTRON hybrid motor starters combine up to four functions in a single device. Integration into popular fieldbus systems is realized via the INTERFACE system connection or via the SmartWire-DT™ wiring system.

For protection of the entire system, the product range now includes the electronic motor manager (EMM). In addition to typical measured values such as voltage and current, the behavior of the system is monitored and protected by means of real power measurement. The process data in all popular fieldbus systems can be supplied via gateways and evaluated by a controller.

**Product range overview**


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## Product overview

### Motor management

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### Hybrid motor starters

Network-capable hybrid motor starters with reversing function
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### Solid-state contactors

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## Electronic motor management (EMM)

The electronic motor management modules offer all the advantages of modern real power monitoring.

The measuring and evaluation electronics for all performance classes. 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), thereby 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 violated, the EMM initiates an emergency shutdown of the motor immediately (or with an adjustable "delay time"). In addition, a message can be sent via an output.

This state can only be deactivated via a defined reset. If the real power consumed is determined as being above or below the message thresholds, all that occurs is that a check-back is returned for the duration for which the module was addressed.

In addition, signals are generated by the module for the recognition of the direction of rotation. Asymmetry and phase failures are detected and signaled.

Permanent status monitoring with high scanning rates and the fast semiconductor switch enable complete system protection, 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 mask out the switching operation from the monitoring process.

## INTERFACE system

The INTERFACE system (IFS) consists of devices which can be connected to each other via the DIN rail connector (TBUS). A GATEWAY with up to 32 IFS devices forms the head of the INTERFACE system and manages the station.

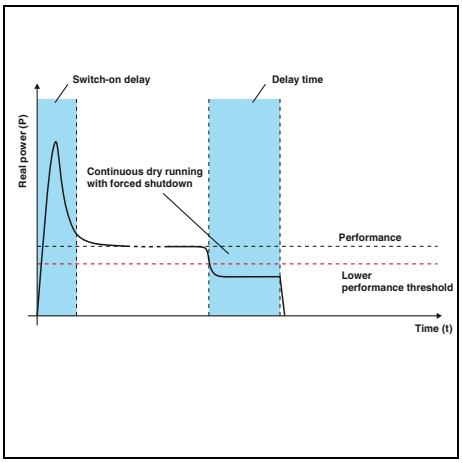
INTERFACE system properties:

- Use of the INTERFACE system via the DIN rail connector for the purpose of parameterization, diagnostics, and exchange of data with one another
- Compatible with defined IFS accessories
- 24 V supply of the devices (e.g., EMM...IFS, ELR...IFS, EM-GATEWAY-IFS) via the DIN rail connector

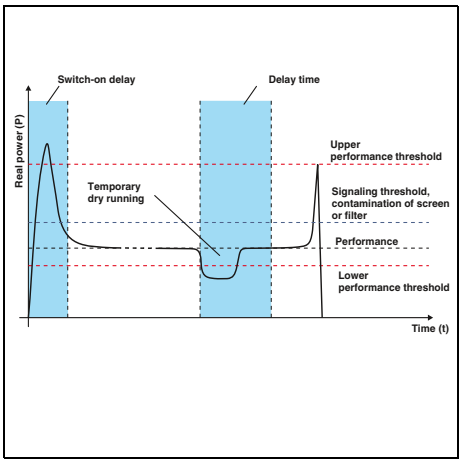
Protection against dry running, blocking, and cavitation, warning thresholds to indicate filter contamination.

Protection against blocking, warning thresholds for bearing wear and other cases that trigger overload.

Protection against blocking and broken tools, warning thresholds for tool and bearing wear.

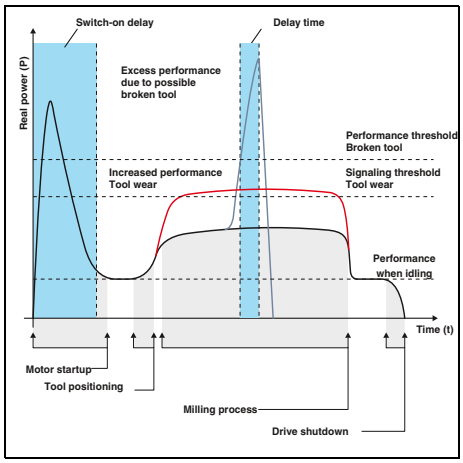



In the case of motor-driven pumps, the lower performance threshold provides reliable protection against hazardous dry running.




Forced shutdown of the drive can be delayed by the “delay time”.

This prevents forced shutdown in the event of air bubbles.



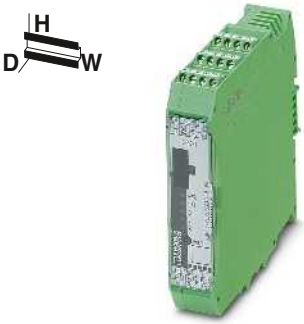

Machine tools are monitored and protected in a similar way when drilling, milling or grinding. If the feed value on a milling machine is set too high, a tool may break in the “worst-case” scenario. The power threshold - parameterized accordingly - can be used to resolve this issue.

Additionally, a message threshold signals tool wear in advance.

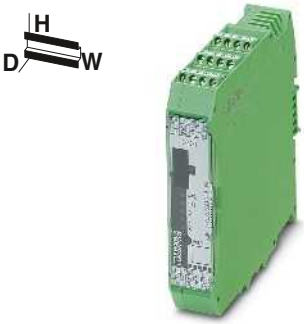
## Electronic motor management

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 EM-GATEWAY-IFS via TBUS

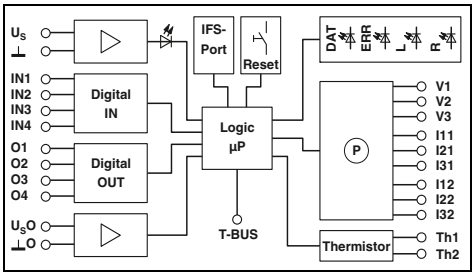



**Allows the use of external current transformers**

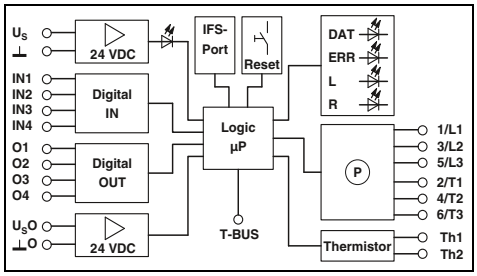



**With integrated current transformers**

Ex:



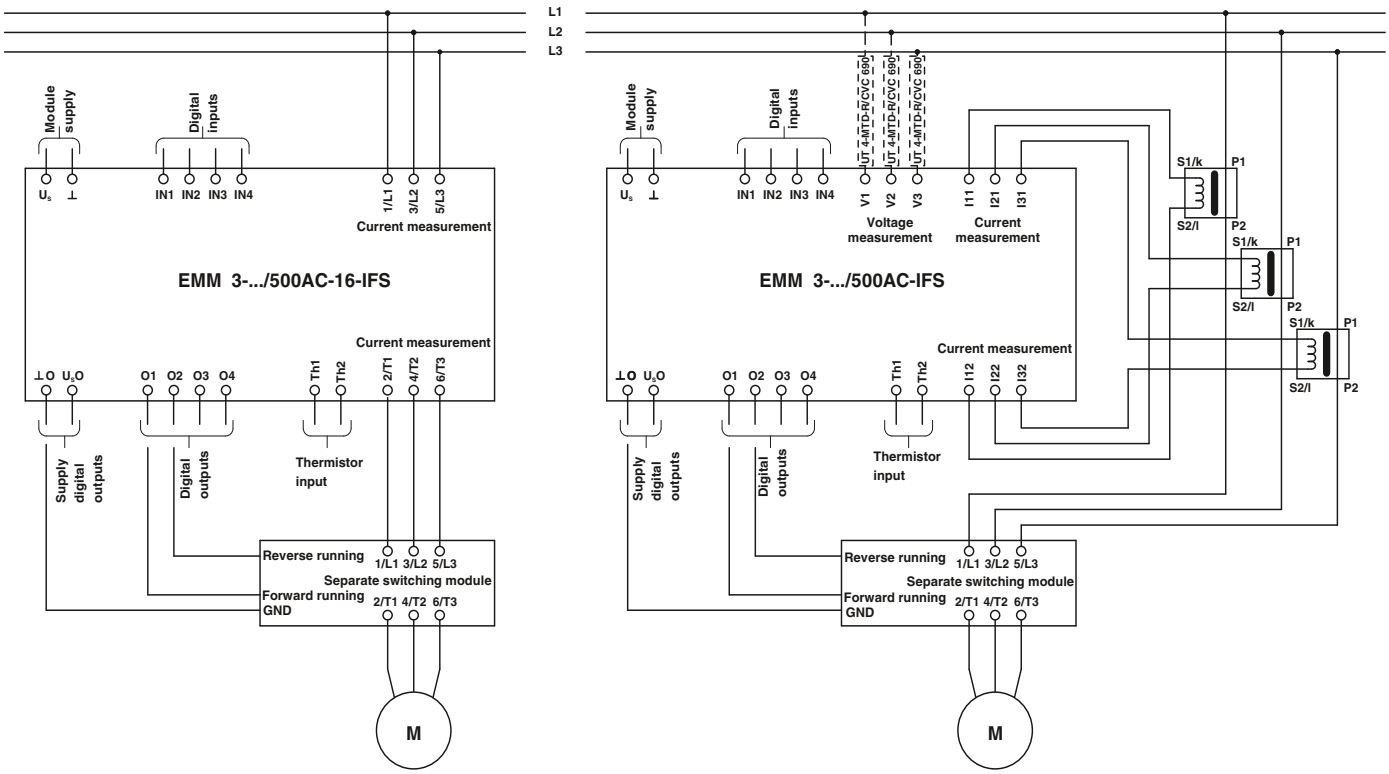

Ex:




| | Technical data | | Technical data | |
|---|---|---|---|---|
| Input data | | | | |
| Rated control supply voltage $U_S$ | 24 V DC | 230 V AC | 24 V DC | 230 V AC |
| Rated control supply voltage range with reference to $U_S$ | 0.8 ... 1.25 | 0.4 ... 1.1 | 0.8 ... 1.25 | 0.4 ... 1.1 |
| Rated control supply current $I_S$ at $U_S$ | 25 mA | 10 mA | 25 mA | 10 mA |
| Input data of digital inputs | EMM 3- 24DC/500AC-IFS | EMM 3-230AC/500AC-IFS | EMM 3- 24DC/500AC-16-IFS | EMM 3-230AC/500AC-16-IFS |
| Number of inputs | 4 (IN1 - IN4) | 4 (IN1 - IN4) | 4 (IN1 - IN4) | 4 (IN1 - IN4) |
| Rated actuating voltage $U_C$ | 24 V DC | 230 V AC | 24 V DC | 230 V AC |
| Rated actuating current $I_C$ | 3.3 mA | 3.5 mA | 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) | max. 16 A | max. 16 A |
| 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 | 24 V DC (semiconductor output) / 500 mA | 230 V AC (relay output/500 mA) / 500 mA |
| General data | | | | |
| Rated insulation voltage | 500 V | | 500 V | |
| Rated surge voltage | 6 kV | 6 kV | 6 kV | 6 kV |
| Ambient temperature (operation) | -25 °C ... 70 °C | | -25 °C ... 70 °C | |
| Standards/regulations | EN 60947 / EN 60947-4-2<br>DIN EN 50178 | | EN 60947 / EN 60947-4-2<br>DIN EN 50178 | |
| Degree of protection in acc. with IEC 60529/EN 60529 | IP20 | | IP20 | |
| Mounting position | Vertical (horizontal DIN rail) | | Vertical (horizontal DIN rail) | |
| Screw connection solid / stranded / AWG | 0.14 - 2.5 mm² / 0.14 - 2.5 mm² / 26 - 12 | | 0.14 - 2.5 mm² / 0.14 - 2.5 mm² / 26 - 12 | |
| Dimensions W / H / D | 22.5 mm / 99 mm / 114.5 mm | | 22.5 mm / 99 mm / 114.5 mm | |
| EMC note | Class A product, see page 625 | | Class A product, see page 625 | |

| Description | Ordering data: Type | Order No. | Pcs. / Pkt. | Ordering data: Type | Order No. | Pcs. / Pkt. |
|---|---|---|---|---|---|---|
| **Electronic motor management** | | | | | | |
| | **EMM 3- 24DC/500AC-IFS** | **2297497** | 1 | **EMM 3- 24DC/500AC-16-IFS** | **2297523** | 1 |
| | **EMM 3-230AC/500AC-IFS** | **2297507** | 1 | **EMM 3-230AC/500AC-16-IFS** | **2297536** | 1 |
| | **Accessories** | | | **Accessories** | | |
| **Programming adapter** for configuring modules with S-PORT interface | **IFS-USB-PROG-ADAPTER** | **2811271** | 1 | **IFS-USB-PROG-ADAPTER** | **2811271** | 1 |
| **DIN rail connector** | **ME 22,5 TBUS 1,5/ 5-ST-3,81 GN** | **2707437** | 50 | **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 module** for the INTERFACE system | | | | | | |
| - Flat design | **IFS-CONFSTICK** | **2986122** | 1 | **IFS-CONFSTICK** | **2986122** | 1 |
| - Tall design | **IFS-CONFSTICK-L** | **2901103** | 1 | **IFS-CONFSTICK-L** | **2901103** | 1 |
| **Mini COMBICON connector** | | | | | | |
| - Socket contact | **MC 1,5/ 5-ST-3,81** | **1803604** | 50 | **MC 1,5/ 5-ST-3,81** | **1803604** | 50 |
| - Pin contact | **IMC 1,5/ 5-ST-3,81** | **1857919** | 50 | **IMC 1,5/ 5-ST-3,81** | **1857919** | 50 |

## Electronic motor management




The electronic motor management modules offer all the advantages of modern real power monitoring. Every 6.6 ms, the real power of a drive system or of any other 3-phase load 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 real and reactive power
– Currents and voltages
– Phase angle
– Cycle and operating hours counter
– Power meter

Additional functions:

– Adjustable bimetal function class 5-30
– Thermistor monitor
– Recording measured values
– GATEWAY connection via TBUS
– Pre-configured motor exits 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.

Actuating and regulating drives, pumps, tools, conveyer belts or similar are switched and monitored for function, contamination or wear in the following operating modes: right rotation, left rotation, reverse, and limit switch operation (with integrated restart inhibit).

### 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 load (refer to connection diagram). For suitable current transformers, see INTERFACE catalog.

### 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 32 EMMs (for example) to the PROFIBUS-GATEWAY-IFS.

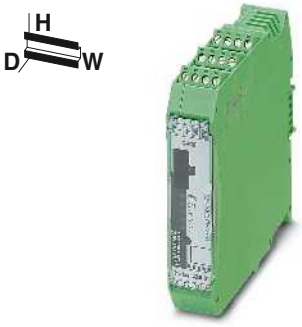
### Switching element

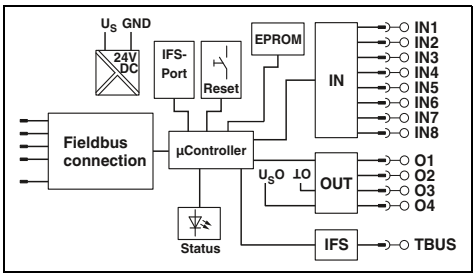
Depending on the particular requirements of the application, either an electro-mechanical contactor or reversing contactor combination, or a solid-state contactor or a solid-state reversing contactor is to be used for the actual task of switching the load. These switching elements are controlled via the digital outputs of the EMM modules.

## IFS gateways for INTERFACE system devices

EM...GATEWAY-IFS for connecting INTERFACE system devices (IFS) to popular bus systems: PROFIBUS DP, Modbus, Modbus/TCP, DeviceNet™, CANopen®, and PROFINET, EtherNet/IP™.

- Communication via TBUS with up to 32 INTERFACE system devices such as EMM...IFS and ELR...IFS modules
- Equipped with freely parameterizable digital inputs and outputs
- Digital switching outputs for direct control




### Technical data

| | | |
|---|---|---|
| Input data | | |
| Rated control supply voltage $U_S$ | | 24 V DC -20 % ... +25 % |
| Rated control supply current $I_S$ | | 85 mA (plus load current of the outputs) |
| Input circuit | | Protection against polarity reversal |
| Digital inputs | | |
| Rated actuating voltage $U_C$ | | 24 V DC ±20 % |
| Rated actuating current $I_C$ | | 3 mA |
| Input circuit | | Protection against polarity reversal |
| 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 | | DIN rail connector |
| General data | | |
| 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 / can be aligned without spacing |
| Connection data solid / stranded / AWG | | 0.2 ... 2 mm² / 0.2 ... 2.5 mm² / 12 - 24 |
| Dimensions | W / H / D | 22.5 mm / 99 mm / 114.5 mm |
| EMC note | | Class A product, see page 625 |

### Ordering data

| Description | Type | Order No. | Pcs. / Pkt. |
|---|---|---|---|
| **IFS gateway** for | | | |
| PROFIBUS DP | **EM-PB-GATEWAY-IFS** | **2297620** | 1 |
| RS-232 | **EM-RS232-GATEWAY-IFS** | **2901526** | 1 |
| RS-485 | **EM-RS485-GATEWAY-IFS** | **2901527** | 1 |
| Modbus/TCP | **EM-MODBUS-GATEWAY-IFS** | **2901528** | 1 |
| DeviceNet™ | **EM-DNET-GATEWAY-IFS** | **2901529** | 1 |
| CANopen® | **EM-CAN-GATEWAY-IFS** | **2901504** | 1 |
| PROFINET | **EM-PNET-GATEWAY-IFS** | **2904472** | 1 |
| Ethernet/IP™ | **EM-ETH-GATEWAY-IFS** | **2901988** | 1 |

### Accessories

| | | | |
|---|---|---|---|
| **Programming adapter** for configuring modules with S-PORT interface | **IFS-USB-PROG-ADAPTER** | **2811271** | 1 |
| **DIN rail connector** | **ME 22,5 TBUS 1,5/ 5-ST-3,81 GN** | **2707437** | 50 |
| **Mini COMBICON connector** | | | |
| - Socket contact | **MC 1,5/ 5-ST-3,81** | **1803604** | 50 |
| - Pin contact | **IMC 1,5/ 5-ST-3,81** | **1857919** | 50 |

## 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 also available separately as an option
- CONTACTRON-DTM-IFS also available free of charge as a separate download from phoenixcontact.com

| Description | Type | Order No. | Pcs. / Pkt. |
|---|---|---|---|
| | **Ordering data** | | |
| **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** for configuring modules with S-PORT interface | **IFS-USB-PROG-ADAPTER** | **2811271** | 1 |

Hybrid motor starters for controlling 3-phase asynchronous motors combine up to four functions in one device as required. These include forward running, reverse running with optional reversing function including load wiring. The locking circuit for the reversing function is also integrated and certified as a single electronic reversing starter according to UL 508a and the new UL 60947-1. Furthermore, the devices protect the motor by means of an integrated motor protection relay with automatic and remote reset function. The implemented safety function according to Performance Level e (PL e) of EN ISO 13849-1 provides the emergency stop requirement. A PDT confirmation contact provides information regarding the availability of the device, and the motor state. This means that in the event of motor control without an error message the integrated current measurement and symmetry scanning ensures that the motor is turning. Even with these numerous functions, the hybrid motor starter is just 22.5 mm wide.

Short-circuit-proof hybrid motor starters with integrated protective devices, for mounting on 35 mm DIN rails and 60 mm busbar systems and connection to popular bus systems via SmartWire-DT™ complete the product portfolio.

Hybrid motor starters with up to four functions in one device: forward running, reverse running, motor protection, and emergency stop.

Short-circuit-proof hybrid motor starters with integrated fuses for mounting on 35 mm DIN rails and 60 mm busbar systems.

Connection of hybrid motor starters in a bus system via SmartWire-DT™. Gateways are provided for the main bus systems: PROFIBUS, Modbus/TCP, EtherNet/IP™, and CANopen®.

Connection of the hybrid motor starter to a bus system via the IFS INTERFACE system.

Gateways are provided for the main bus systems: PROFIBUS DP, Modbus/TCP, EtherNet/IP™, CANopen®, DeviceNet™, PROFINET, etc.

## Network-capable hybrid motor starters with reversing function

These 3-phase hybrid motor starters provide up to four functions: right contactor, left contactor, motor protection relay, and emergency stop up to category 3.

They offer the following advantages:

- Connection to INTERFACE system (IFS) via TBUS
- Connection to SmartWire-DT™ (SWD)
- 22.5 mm wide
- Reduction in wiring
- Bi-metal function, adjustable up to 3 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.

Marking systems and mounting material
See Catalog 5

new

**Motor protection and SmartWire-DT™ support**

### Technical data

| | | |
|---|---|---|
| Input data | | |
| Rated control supply voltage $U_S$ | | 24 V DC |
| Rated control supply voltage range with reference to $U_S$ | | 0.8 ... 1.25 |
| Rated control supply current $I_S$ at $U_S$ | | 40 mA |
| Rated actuating voltage UC EN+ | | - |
| Rated actuating voltage range with reference to $U_C$ | | - |
| Rated actuating current $I_C$ at $U_C$ | | - |
| Input circuit | | Protection against polarity reversal, 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 |
| Surge current | | 100 A (t = 10 ms) |
| Output protection | | Surge protection |
| General data | | |
| Rated insulation voltage | | 550 V |
| Rated surge voltage | | 6 kV (safe isolation) |
| Ambient temperature (operation) | | -5 °C ... 55 °C |
| Electrical service life | | 3 x $10^7$ cycles |
| Standards/regulations | | IEC 60947-1 / EN 60947-4-2 |
| | | IEC 60947-1 |
| Mounting position | | Vertical (horizontal DIN rail) |
| Mounting | | can be aligned with spacing: see derating |
| Screw connection solid / stranded / AWG | | 0.14 - 2.5 $mm^2$ / 0.14 - 2.5 $mm^2$ / 26 - 14 |
| Dimensions | W / H / D | 22.5 mm / 99 mm / 114.5 mm |

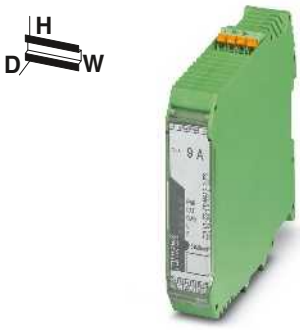
### Ordering data

| Description | Type | Order No. | Pcs. / Pkt. |
|---|---|---|---|
| **Load current 0.075 - 0.6 A** | | | |
| Screw connection | | | |
| Push-in connection | **ELR H5-I-PT-SWD/500AC-06** | **2905073** | 1 |
| **Load current 0.18 A ... 3 A** | | | |
| Screw connection | | | |
| Push-in connection | **ELR H5-I-PT-SWD/500AC-3** | **2905074** | 1 |

### Accessories

| | | | |
|---|---|---|---|
| **Device plug, 8-pos.** | **SWD4-8SF2-5 PXC** | **2903107** | 10 |
| **DIN rail connector** | | | |

new




**Motor protection, emergency stop, and INTERFACE system support**

| Technical data |
|---|
| |
| 24 V DC |
| 0.8 ... 1.25 |
| |
| 40 mA |
| 24 V DC |
| 0.8 ... 1.25 |
| |
| 5 mA |
| Protection against polarity reversal, surge protection |
| Green LED / Yellow LED / Red LED |
| |
| 42 V AC ... 550 V AC |
| 100 A (t = 10 ms) |
| Surge protection |
| |
| 550 V |
| 6 kV (safe isolation) |
| -5 °C ... 60 °C |
| 3 x $10^7$ cycles |
| IEC 60947-1 / EN 60947-4-2 / IEC 61508 / ISO 13849 |
| IEC 60947-1 |
| Vertical (horizontal DIN rail) |
| can be aligned with spacing: see derating |
| 0.14 - 2.5 $mm^2$ / 0.14 - 2.5 $mm^2$ / 26 - 14 |
| 22.5 mm / 99 mm / 114.5 mm |

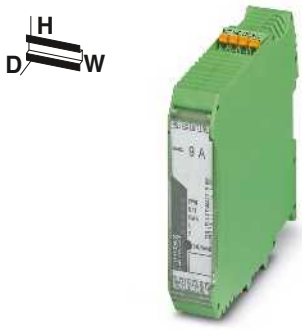
**Ordering data**

| Type | Order No. | Pcs. / Pkt. |
|---|---|---|
| **ELR H5-IES-SC/500AC-06-IFS** | **2905151** | 1 |
| **ELR H5-IES-PT/500AC-06-IFS** | **2905138** | 1 |
| **ELR H5-IES-SC/500AC-3-IFS** | **2905152** | 1 |
| **ELR H5-IES-PT/500AC-3-IFS** | **2905139** | 1 |

**Accessories**

| | | |
|---|---|---|
| **ME 22,5 TBUS 1,5/ 5-ST-3,81 GN** | **2707437** | 50 |

new




**Motor protection and INTERFACE system support**

| Technical data |
|---|
| |
| 24 V DC |
| 0.8 ... 1.25 |
| |
| 40 mA |
| - |
| - |
| |
| - |
| Protection against polarity reversal, surge protection |
| Green LED / Yellow LED / Red LED |
| |
| 42 V AC ... 550 V AC |
| 100 A (t = 10 ms) |
| Surge protection |
| |
| 550 V |
| 6 kV (safe isolation) |
| -5 °C ... 60 °C |
| 3 x $10^7$ cycles |
| IEC 60947-1 / EN 60947-4-2 |
| IEC 60947-1 |
| Vertical (horizontal DIN rail) |
| can be aligned with spacing: see derating |
| 0.14 - 2.5 $mm^2$ / 0.14 - 2.5 $mm^2$ / 26 - 14 |
| 22.5 mm / 99 mm / 114.5 mm |

**Ordering data**

| Type | Order No. | Pcs. / Pkt. |
|---|---|---|
| **ELR H5-I-SC/500AC-06-IFS** | **2905157** | 1 |
| **ELR H5-I-PT/500AC-06-IFS** | **2905144** | 1 |
| **ELR H5-I-SC/500AC-3-IFS** | **2905159** | 1 |
| **ELR H5-I-PT/500AC-3-IFS** | **2905146** | 1 |

**Accessories**

| | | |
|---|---|---|
| **ME 22,5 TBUS 1,5/ 5-ST-3,81 GN** | **2707437** | 50 |

## Hybrid motor starters with reversing function

These 3-phase hybrid motor starters provide up to four functions: right contactor, left contactor, motor protection relay, and emergency stop up to category 3.

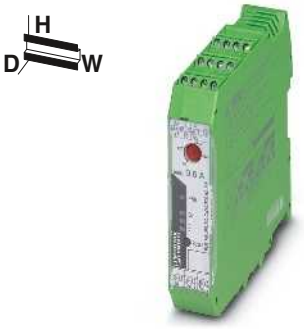
They offer the following advantages:

- 22.5 mm wide
- Reduction in wiring
- Bi-metal function, adjustable 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:<br>Polyamide PA non-reinforced, color: green. |
| Marking systems and mounting material<br>See Catalog 5 |




**Motor protection and emergency stop**

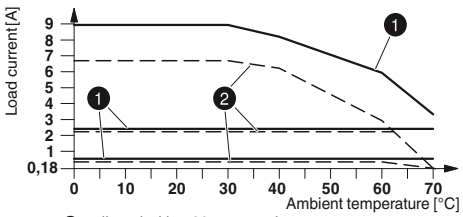
Ex:

### Technical data

| | | |
|---|---|---|
| Input data | | |
| Rated control supply voltage $U_S$ | 24 V DC | 230 V AC (50/60 Hz) |
| 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 $U_C$ | 5 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 |
| Surge current | 100 A (t = 10 ms) | 100 A (t = 10 ms) |
| Output protection | Surge protection | |
| 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 | |
| Electrical service life | 3 x $10^7$ cycles | |
| Standards/regulations | EN 60947 / IEC 61508 / ISO 13849<br>DIN EN 50178 | |
| Mounting position | Vertical (horizontal DIN rail) | |
| Mounting | can be aligned with spacing: see derating | |
| Screw connection solid / stranded / AWG | 0.14 - 2.5 $mm^2$ / 0.14 - 2.5 $mm^2$ / 26 - 14 | |
| Dimensions W / H / D | 22.5 mm / 99 mm / 114.5 mm | |

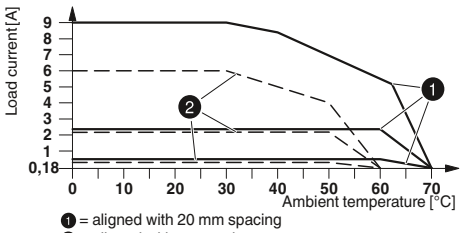
### Ordering data

| Description | Type | Order No. | Pcs. / Pkt. |
|---|---|---|---|
| **Load current 0.075 - 0.6 A** | | | |
| Screw connection | **ELR H5-IES-SC- 24DC/500AC-0,6** | **2900582** | 1 |
| Push-in connection | **ELR H5-IES-PT- 24DC/500AC-0,6** | **2903902** | 1 |
| Screw connection | **ELR H5-IES-SC-230AC/500AC-0,6** | **2900692** | 1 |
| **Load current 0.18 A ... 2.4 A** | | | |
| Screw connection | **ELR H5-IES-SC- 24DC/500AC-2** | **2900414** | 1 |
| Push-in connection | **ELR H5-IES-PT- 24DC/500AC-2** | **2903904** | 1 |
| Screw connection | **ELR H5-IES-SC-230AC/500AC-2** | **2900420** | 1 |
| **Load current 1.5 - 9 A** | | | |
| Screw connection | **ELR H5-IES-SC- 24DC/500AC-9** | **2900421** | 1 |
| Push-in connection | **ELR H5-IES-PT- 24DC/500AC-9** | **2903906** | 1 |
| Screw connection | **ELR H5-IES-SC-230AC/500AC-9** | **2900422** | 1 |
| **Load current 0 - 9 A** | | | |
| Screw connection | | | |
| Screw connection | | | |




❶ = aligned with > 20 mm spacing
❷ = aligned without spacing

**Derating curve for ELR H5...24DC...**




❶ = aligned with 20 mm spacing
❷ = aligned without spacing

**Derating curve for ELR H5...230AC...**

**Motor protection**

**Reversing function only**

## Technical data

| | |
|---|---|
| 24 V DC | 230 V AC (50/60 Hz) |
| 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 |
| 5 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 |
| 100 A (t = 10 ms) | 100 A (t = 10 ms) |
| Surge protection | |
| 500 V | |
| 6 kV (safe isolation) | 6 kV (safe isolation) |
| -25 °C ... 70 °C | |
| 3 x $10^7$ cycles | |
| EN 60947 | |
| DIN EN 50178 | |
| Vertical (horizontal DIN rail) | |
| can be aligned with spacing: see derating | |
| 0.14 - 2.5 $mm^2$ / 0.14 - 2.5 $mm^2$ / 26 - 14 | |
| 22.5 mm / 99 mm / 114.5 mm | |

## Ordering data

| Type | Order No. | Pcs. / Pkt. |
|---|---|---|
| **ELR H5-I-SC- 24DC/500AC-0,6** | **2900573** | 1 |
| **ELR H5-I-PT- 24DC/500AC-0,6** | **2903908** | 1 |
| **ELR H5-I-SC-230AC/500AC-0,6** | **2900691** | 1 |
| **ELR H5-I-SC- 24DC/500AC-2** | **2900574** | 1 |
| **ELR H5-I-PT- 24DC/500AC-2** | **2903910** | 1 |
| **ELR H5-I-SC-230AC/500AC-2** | **2900575** | 1 |
| **ELR H5-I-SC- 24DC/500AC-9** | **2900576** | 1 |
| **ELR H5-I-PT- 24DC/500AC-9** | **2903912** | 1 |
| **ELR H5-I-SC-230AC/500AC-9** | **2900578** | 1 |
| | | 1 |

## Technical data

| | |
|---|---|
| 24 V DC | 230 V AC (50/60 Hz) |
| 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 |
| 5 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 |
| 100 A (t = 10 ms) | 100 A (t = 10 ms) |
| Surge protection | |
| 500 V | |
| 6 kV (safe isolation) | 6 kV (safe isolation) |
| -25 °C ... 70 °C | |
| 3 x $10^7$ cycles | |
| EN 60947 | |
| DIN EN 50178 | |
| Vertical (horizontal DIN rail) | |
| can be aligned with spacing: see derating | |
| 0.14 - 2.5 $mm^2$ / 0.14 - 2.5 $mm^2$ / 26 - 14 | |
| 22.5 mm / 99 mm / 114.5 mm | |

## Ordering data

| Type | Order No. | Pcs. / Pkt. |
|---|---|---|
| **ELR H5-SC- 24DC/500AC-9** | **2900538** | 1 |
| **ELR H5-SC-230AC/500AC-9** | **2900539** | 1 |

## Network-capable hybrid motor starters with direct start function

These 3-phase hybrid motor starters provide up to three functions: right contactor, motor protection relay, and emergency stop up to category 3.

They offer the following advantages:

- Connection to INTERFACE system (IFS) via TBUS
- Connection to SmartWire-DT™ (SWD)
- 22.5 mm wide
- Reduction in wiring
- Bi-metal function, adjustable up to 3 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.

Marking systems and mounting material
See Catalog 5

new

**Motor protection and SmartWire-DT™ support**

### Technical data

| | | |
|---|---|---|
| Input data | | |
| Rated control supply voltage $U_S$ | | 24 V DC (according to IEC 60947-1) |
| Rated control supply voltage range with reference to $U_S$ | | 0.8 ... 1.25 |
| Rated control supply current $I_S$ at $U_S$ | | 40 mA |
| Rated actuating voltage UC EN+ | | - |
| Rated actuating voltage range with reference to $U_C$ | | - |
| Rated actuating current $I_C$ at $U_C$ | | - |
| Input circuit | | Protection against polarity reversal, 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 |
| Surge current | | 100 A (t = 10 ms) |
| Output protection | | Surge protection |
| General data | | |
| Rated insulation voltage | | 550 V |
| Rated surge voltage | | 6 kV (safe isolation) |
| Ambient temperature (operation) | | -5 °C ... 55 °C |
| Electrical service life | | 3 x $10^7$ cycles |
| Standards/regulations | | IEC 60947-1 / EN 60947-4-2 |
| | | IEC 60947-1 |
| Mounting position | | Vertical (horizontal DIN rail) |
| Mounting | | can be aligned with spacing: see derating |
| Screw connection solid / stranded / AWG | | 0.14 - 2.5 $mm^2$ / 0.14 - 2.5 $mm^2$ / 26 - 14 |
| Dimensions | W / H / D | 22.5 mm / 99 mm / 114.5 mm |

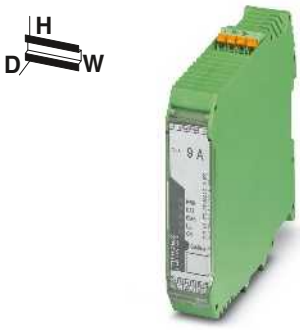
### Ordering data

| Description | Type | Order No. | Pcs. / Pkt. |
|---|---|---|---|
| **Load current 0.075 - 0.6 A** | | | |
| Screw connection | | | |
| Push-in connection | **ELR H3-I-PT-SWD/500AC-06** | **2905076** | 1 |
| **Load current 0.18 A ... 3 A** | | | |
| Screw connection | | | |
| Push-in connection | **ELR H3-I-PT-SWD/500AC-3** | **2905078** | 1 |

### Accessories

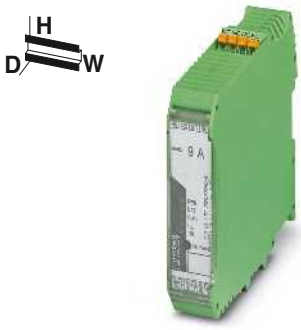
| | | | |
|---|---|---|---|
| **Device plug, 8-pos.** | **SWD4-8SF2-5 PXC** | **2903107** | 10 |
| **DIN rail connector** | | | |

new




**Motor protection, emergency stop, and INTERFACE system support**

new




**Motor protection and INTERFACE system support**

## Technical data

| | |
|---|---|
| 24 V DC | 24 V DC |
| 0.8 ... 1.25 | 0.8 ... 1.25 |
| 40 mA | 40 mA |
| 24 V DC | - |
| 0.8 ... 1.25 | - |
| 5 mA | - |
| Protection against polarity reversal, surge protection | Protection against polarity reversal, surge protection |
| Green LED / Yellow LED / Red LED | Green LED / Yellow LED / Red LED |
| 42 V AC ... 550 V AC | 42 V AC ... 550 V AC |
| 100 A (t = 10 ms) | 100 A (t = 10 ms) |
| Surge protection | Surge protection |
| 550 V | 550 V |
| 6 kV (safe isolation) | 6 kV (safe isolation) |
| -5 °C ... 60 °C | -5 °C ... 60 °C |
| 3 x $10^7$ cycles | 3 x $10^7$ cycles |
| IEC 60947-1 / EN 60947-4-2 / IEC 61508 / ISO 13849 | IEC 60947-1 / EN 60947-4-2 |
| IEC 60947-1 | IEC 60947-1 |
| Vertical (horizontal DIN rail) | Vertical (horizontal DIN rail) |
| can be aligned with spacing: see derating | can be aligned with spacing: see derating |
| 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 |
| 22.5 mm / 99 mm / 114.5 mm | 22.5 mm / 99 mm / 114.5 mm |

## Ordering data

| Type | Order No. | Pcs. / Pkt. |
|---|---|---|
| **ELR H3-IES-SC/500AC-06-IFS** | **2905154** | 1 |
| **ELR H3-IES-PT/500AC-06-IFS** | **2905141** | 1 |
| **ELR H3-IES-SC/500AC-3-IFS** | **2905155** | 1 |
| **ELR H3-IES-PT/500AC-3-IFS** | **2905142** | 1 |

## Accessories

| | | |
|---|---|---|
| **ME 22,5 TBUS 1,5/ 5-ST-3,81 GN** | **2707437** | 50 |

## Ordering data

| Type | Order No. | Pcs. / Pkt. |
|---|---|---|
| **ELR H3-I-SC/500AC-06-IFS** | **2905162** | 1 |
| **ELR H3-I-PT/500AC-06-IFS** | **2905148** | 1 |
| **ELR H3-I-SC/500AC-3-IFS** | **2905163** | 1 |
| **ELR H3-I-PT/500AC-3-IFS** | **2905149** | 1 |

## Accessories

| | | |
|---|---|---|
| **ME 22,5 TBUS 1,5/ 5-ST-3,81 GN** | **2707437** | 50 |

## Hybrid motor starters with direct start function

These 3-phase hybrid motor starters provide up to three functions: right contactor, motor protection relay, and emergency stop up to category 3.

They offer the following advantages:

– 22.5 mm wide
– Reduction in wiring
– Bi-metal function, adjustable 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.

Marking systems and mounting material
See Catalog 5

**Motor protection and emergency stop**

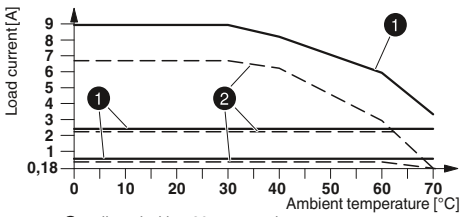
Ex:

### Technical data

| | | |
|---|---|---|
| **Input data** | | |
| Rated control supply voltage $U_S$ | 24 V DC | 230 V AC (50/60 Hz) |
| 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 $U_C$ | 5 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 |
| Surge current | 100 A (t = 10 ms) | 100 A (t = 10 ms) |
| Output protection | Surge protection | |
| **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 | |
| Electrical service life | 3 x $10^7$ cycles | |
| Standards/regulations | IEC 60947-1 / EN 60947-4-2 / IEC 61508 / ISO 13849<br>DIN EN 50178 | |
| Mounting position | Vertical (horizontal DIN rail) | |
| Mounting | can be aligned with spacing: see derating | |
| Screw connection solid / stranded / AWG | 0.14 - 2.5 $mm^2$ / 0.14 - 2.5 $mm^2$ / 26 - 14 | |
| Dimensions W / H / D | 22.5 mm / 99 mm / 114.5 mm | |

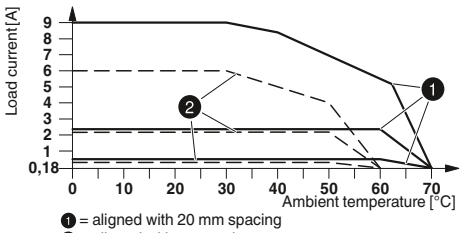
### Ordering data

| Description | Type | Order No. | Pcs. / Pkt. |
|---|---|---|---|
| **Load current 0.075 - 0.6 A** | | | |
| Screw connection | **ELR H3-IES-SC- 24DC/500AC-0,6** | **2900566** | 1 |
| Push-in connection | **ELR H3-IES-PT- 24DC/500AC-0,6** | **2903914** | 1 |
| Screw connection | **ELR H3-IES-SC-230AC/500AC-0,6** | **2900689** | 1 |
| **Load current 0.18 A ... 2.4 A** | | | |
| Screw connection | **ELR H3-IES-SC- 24DC/500AC-2** | **2900567** | 1 |
| Push-in connection | **ELR H3-IES-PT- 24DC/500AC-2** | **2903916** | 1 |
| Screw connection | **ELR H3-IES-SC-230AC/500AC-2** | **2900568** | 1 |
| **Load current 1.5 - 9 A** | | | |
| Screw connection | **ELR H3-IES-SC- 24DC/500AC-9** | **2900569** | 1 |
| Push-in connection | **ELR H3-IES-PT- 24DC/500AC-9** | **2903918** | 1 |
| Screw connection | **ELR H3-IES-SC-230AC/500AC-9** | **2900570** | 1 |
| **Load current 0 - 9 A** | | | |
| Screw connection | | | |
| Screw connection | | | |




1 = aligned with > 20 mm spacing
2 = aligned without spacing

**Derating curve for ELR H3...24DC...**




1 = aligned with 20 mm spacing
2 = aligned without spacing

**Derating curve for ELR H3...230AC...**

**Motor protection**

**Direct start function only**

## Technical data

| | |
|---|---|
| 24 V DC | 230 V AC (50/60 Hz) |
| 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 |
| 5 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 |
| 100 A (t = 10 ms) | 100 A (t = 10 ms) |
| Surge protection | |
| 500 V | |
| 6 kV (safe isolation) | 6 kV (safe isolation) |
| -25 °C ... 70 °C | |
| 3 x $10^7$ cycles | |
| EN 60947 | |
| DIN EN 50178 | |
| Vertical (horizontal DIN rail) | |
| can be aligned with spacing: see derating | |
| 0.14 - 2.5 $mm^2$ / 0.14 - 2.5 $mm^2$ / 26 - 14 | |
| 22.5 mm / 99 mm / 114.5 mm | |

## Ordering data

| Type | Order No. | Pcs. / Pkt. |
|---|---|---|
| **ELR H3-I-SC- 24DC/500AC-0,6** | **2900542** | 1 |
| **ELR H3-I-PT- 24DC/500AC-0,6** | **2903920** | 1 |
| **ELR H3-I-SC-230AC/500AC-0,6** | **2900685** | 1 |
| **ELR H3-I-SC- 24DC/500AC-2** | **2900543** | 1 |
| **ELR H3-I-PT- 24DC/500AC-2** | **2903922** | 1 |
| **ELR H3-I-SC-230AC/500AC-2** | **2900544** | 1 |
| **ELR H3-I-SC- 24DC/500AC-9** | **2900545** | 1 |
| **ELR H3-I-PT- 24DC/500AC-9** | **2903924** | 1 |
| **ELR H3-I-SC-230AC/500AC-9** | **2900546** | 1 |
| | | 1 |

## Technical data

| | |
|---|---|
| 24 V DC | 230 V AC (50/60 Hz) |
| 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 |
| 5 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 |
| 100 A (t = 10 ms) | 100 A (t = 10 ms) |
| Surge protection | |
| 500 V | |
| 6 kV (safe isolation) | 6 kV (safe isolation) |
| -25 °C ... 70 °C | |
| 3 x $10^7$ cycles | |
| EN 60947 | |
| DIN EN 50178 | |
| Vertical (horizontal DIN rail) | |
| can be aligned with spacing: see derating | |
| 0.14 - 2.5 $mm^2$ / 0.14 - 2.5 $mm^2$ / 26 - 14 | |
| 22.5 mm / 99 mm / 114.5 mm | |

## Ordering data

| Type | Order No. | Pcs. / Pkt. |
|---|---|---|
| **ELR H3-SC- 24DC/500AC-9** | **2900530** | 1 |
| **ELR H3-SC-230AC/500AC-9** | **2900531** | 1 |

## Hybrid motor starters with short-circuit protection

These short-circuit-proof 3-phase hybrid motor starters for mounting on 30 mm DIN rails or 60 mm power busbars combine four functions in one device: right contactor, left contactor, motor protection relay, and emergency stop up to category 3.

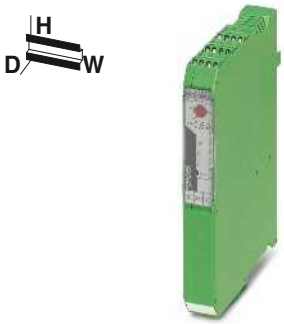
They offer the following advantages:

- 22.5 mm wide
- Bi-metal function can be set up to 9 A
- Long service life
- Space-saving
- Reduction in wiring
- 3-phase loop bridging
- Plug-in motor output terminal block
- Coordination type 2 according to IEC/EN 60947-4-2

| | |
|---|---|
| Input data | |
| Rated control supply voltage $U_S$ | |
| Rated control supply voltage range with reference to $U_S$ | |
| Rated control supply current $I_S$ at $U_S$ | |
| Rated actuating voltage $U_C$ R/L | |
| Rated actuating voltage range with reference to $U_C$ | |
| Rated actuating current $I_C$ at $U_C$ | |
| Input circuit | |
| Operating voltage / status / error indicator | |
| Output data load side | |
| Output voltage range | |
| Load current | |
| Min. load current | |
| Residual voltage | |
| Output protection | |
| General data | |
| Rated insulation voltage | |
| Rated surge voltage | |
| Ambient temperature (operation) | |
| Electrical service life | |
| Standards/regulations | |
| Mounting position | |
| Mounting | |
| Screw connection solid / stranded / AWG | |
| Dimensions | W / H / D |

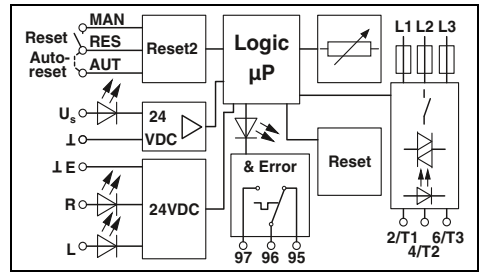
| Description |
|---|
| **Short-circuit-proof hybrid motor starter** |
| Hybrid motor starter |
| DIN rail adapter |
| Power rail adapter, 160 mm |
| Power rail adapter, 200 mm |
| **Set** consisting of short-circuit-proof hybrid motor starter and adapter |
| - with DIN rail adapter |
| - with power rail adapter, 160 mm |
| - with power rail adapter, 200 mm |

| **Fuse** |
|---|
| Coordination type 2 to 10 kA/500 V |
| Coordination type 2 to 5 kA/400 V |
| Coordination type 1 to 30 kA/500 V |



**For reversing 3~ AC motors up to 550 V AC/3 x 0.6 A**

Ex:




## Technical data

24 V DC
0.8 ... 1.25

40 mA
24 V DC
0.8 ... 1.25

5 mA
Protection against polarity reversal, surge protection
Green LED / Yellow LED / Red LED

42 V AC ... 550 V AC
max. 600 mA

75 mA
< 0.3 V
Surge protection, short-circuit protection

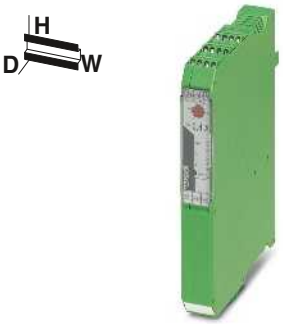
500 V
6 kV (safe isolation)
-25 °C ... 70 °C
3 x $10^7$ cycles
EN 60947
DIN EN 50178
Vertical (horizontal DIN rail)
Can be aligned with spacing = 20 mm
0.14 - 2.5 $mm^2$ / 0.14 - 2.5 $mm^2$ / 26 - 14
22.5 mm / 160 mm / 114.5 mm

## Ordering data

| Type | Order No. | Pcs. / Pkt. |
|---|---|---|
| **ELR H51-IESSC-24DC500AC-06** | **2902746** | 1 |
| **EM RD-ADAPTER** | **2902747** | 1 |
| **EM RI-ADAPTER COMPACT** | **2902748** | 1 |
| **EM RI-ADAPTER CLASSIC** | **2902831** | 1 |
| **ELR H51-0.6-DIN-RAIL-SET** | **2902952** | 1 |
| **ELR-H51-0,6-BUSBAR-COMPACT-SET** | **2904333** | 1 |
| **ELR-H51-0,6-BUSBAR-CLASSIC-SET** | **2904334** | 1 |

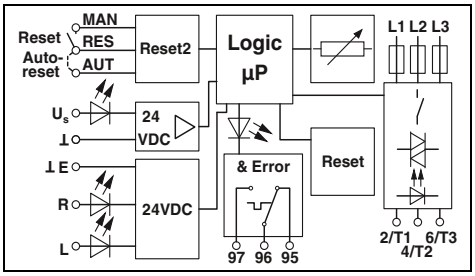
## Accessories

| | | |
|---|---|---|
| **FUSE-10X38-16A-GR** | **2903126** | 10 |
| **FUSE-10X38-20A-GR** | **2903384** | 10 |
| **FUSE-10X38-30A-MR** | **2903119** | 10 |



**For reversing 3~ AC motors up to 550 V AC/3 x 2.4 A**

Ex:




## Technical data

24 V DC
0.8 ... 1.25

40 mA
24 V DC
0.8 ... 1.25

5 mA
Protection against polarity reversal, surge protection
Green LED / Yellow LED / Red LED

42 V AC ... 550 V AC
max. 2.4 A

180 mA
< 0.4 V
Surge protection, short-circuit protection

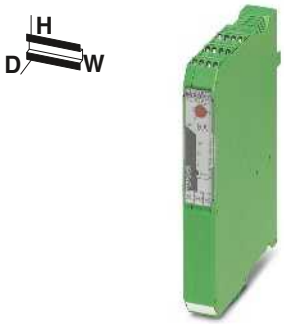
500 V
6 kV (safe isolation)
-25 °C ... 70 °C
3 x $10^7$ cycles
EN 60947
DIN EN 50178
Vertical (horizontal DIN rail)
Can be aligned with spacing = 20 mm
0.14 - 2.5 $mm^2$ / 0.14 - 2.5 $mm^2$ / 26 - 14
22.5 mm / 160 mm / 114.5 mm

## Ordering data

| Type | Order No. | Pcs. / Pkt. |
|---|---|---|
| **ELR H51-IESSC-24DC500AC-2** | **2902744** | 1 |
| **EM RD-ADAPTER** | **2902747** | 1 |
| **EM RI-ADAPTER COMPACT** | **2902748** | 1 |
| **EM RI-ADAPTER CLASSIC** | **2902831** | 1 |
| **ELR H51-2.4-DIN-RAIL-SET** | **2902953** | 1 |
| **ELR-H51-2,4-BUSBAR-COMPACT-SET** | **2904335** | 1 |
| **ELR-H51-2,4-BUSBAR-CLASSIC-SET** | **2904336** | 1 |

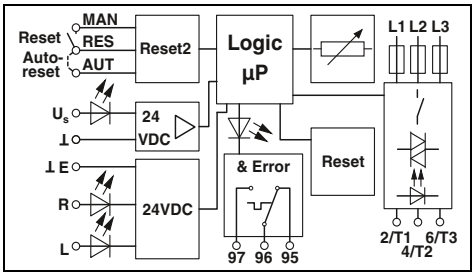
## Accessories

| | | |
|---|---|---|
| **FUSE-10X38-16A-GR** | **2903126** | 10 |
| **FUSE-10X38-20A-GR** | **2903384** | 10 |
| **FUSE-10X38-30A-MR** | **2903119** | 10 |



**For reversing 3~ AC motors up to 550 V AC/3 x 9 A**

Ex:




## Technical data

24 V DC
0.8 ... 1.25

40 mA
24 V DC
0.8 ... 1.25

5 mA
Protection against polarity reversal, surge protection
Green LED / Yellow LED / Red LED

42 V AC ... 550 V AC
max. 9 A

1.5 A
< 0.6 V
Surge protection, short-circuit protection

500 V
6 kV (safe isolation)
-25 °C ... 70 °C
3 x $10^7$ cycles
EN 60947
DIN EN 50178
Vertical (horizontal DIN rail)
Can be aligned with spacing = 20 mm
0.14 - 2.5 $mm^2$ / 0.14 - 2.5 $mm^2$ / 26 - 14
22.5 mm / 160 mm / 114.5 mm

## Ordering data

| Type | Order No. | Pcs. / Pkt. |
|---|---|---|
| **ELR H51-IESSC-24DC500AC-9** | **2902745** | 1 |
| **EM RD-ADAPTER** | **2902747** | 1 |
| **EM RI-ADAPTER COMPACT** | **2902748** | 1 |
| **EM RI-ADAPTER CLASSIC** | **2902831** | 1 |
| **ELR H51-9-DIN-RAIL-SET** | **2902954** | 1 |
| **ELR-H51-9-BUSBAR-COMPACT-SET** | **2904337** | 1 |
| **ELR-H51-9-BUSBAR-CLASSIC-SET** | **2904338** | 1 |

## Accessories

| | | |
|---|---|---|
| **FUSE-10X38-16A-GR** | **2903126** | 10 |
| **FUSE-10X38-20A-GR** | **2903384** | 10 |
| **FUSE-10X38-30A-MR** | **2903119** | 10 |

## Loop bridge for hybrid motor starters

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:

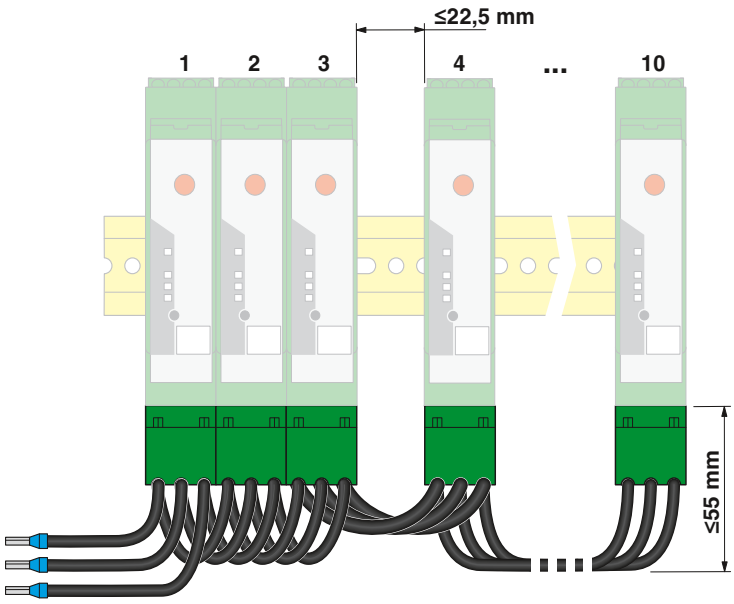
- Saves considerable wiring
- Suitable for CONTACTRON series
  - ELR H3...
  - ELR H5...
  - ELR (W)3...
  - EMM...IFS
- Bridging of 2 to 10 devices with maximum module spacing of 22.5 mm
- Up to 575 V AC/3 x 25 A
- Additional bridge versions available on request

**0.3 m connecting cable for hybrid motor starter with screw connection**

EAC

| | Technical data |
|---|---|
| General data | |
| Nominal voltage $U_N$ | 42 V AC ... 575 V AC |
| Nominal current at $U_N$ | ≤ 25 A |
| Cross section | 2.5 mm² |

| | Ordering data | | |
|---|---|---|---|
| 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 |



new

**3 m connecting cable for hybrid motor starter with screw connection**

EAC

| Technical data |
|---|
| 42 V AC ... 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 |

**3 m connecting cable for hybrid motor starter with push-in connection**

EAC

| Technical data |
|---|
| 42 V AC ... 575 V AC |
| ≤ 25 A |
| 2.5 mm² |

| Ordering data | | |
|---|---|---|
| **Type** | **Order No.** | Pcs. / Pkt. |
| **BRIDGE-PT 2** | **2904490** | 1 |
| **BRIDGE-PT 3** | **2904491** | 1 |
| **BRIDGE-PT 4** | **2904492** | 1 |
| **BRIDGE-PT 5** | **2904493** | 1 |
| **BRIDGE-PT 6** | **2904494** | 1 |
| **BRIDGE-PT 7** | **2904495** | 1 |
| **BRIDGE-PT 8** | **2904496** | 1 |
| **BRIDGE-PT 9** | **2904497** | 1 |
| **BRIDGE-PT 10** | **2904498** | 1 |

## SmartWire-DT™ accessories

Devices can be integrated seamlessly into the fieldbus world via SmartWire-DT™ with the SmartWire-DT™ "EM SWD-ADAPTER" adapter for CONTACTRON 24 V DC devices. Corresponding gateways are available for the following bus systems:
– PROFIBUS DP
– CANopen®
– Modbus/TCP / EtherNet/IP™

**SmartWire-DT™ adapter**

| | | Technical data |
|---|---|---|
| Input data | | |
| Supply voltage $U_{AUX}$ | | - |
| Rated current $I_{AUX}$ | | - |
| Supply voltage $U_{POW}$ | | - |
| Rated current $I_{POW}$ | | - |
| Input data | | |
| Description | | Enable input |
| Input voltage | | 24 V DC |
| Input current | | 5 mA |
| Output data | | |
| Description | | - |
| Output supply | | - |
| Output current | | - |
| SmartWire-DT™ interface | | |
| Connection method | | Pin strip, 8-pos. |
| Data rate | | 125 kBd / 250 kBd |
| Current consumption $I_{AUX}$ | | 120 mA |
| Current consumption $I_{POW}$ | | 25 mA |
| General data | | |
| Ambient temperature (operation) | | -25 °C ... 55 °C |
| Standards/regulations | | IEC 60947-1 / EN 60947-1 |
| Degree of protection in acc. with IEC 60529/EN 60529 | | IP20 |
| Mounting position | | any |
| Mounting | | On CONTACTRON hybrid motor starter |
| Connection data solid / stranded / AWG | | 0.14 - 1 mm² / 0.14 - 1 mm² / 26 - 18 |
| Dimensions | W / H / D | 22.5 mm / 165 mm / 114.5 mm |

**Ordering data**

| Description | Type | Order No. | Pcs. / Pkt. |
|---|---|---|---|
| **SmartWire-DT™ adapter** | | | |
| | **EM SWD-ADAPTER** | **2902776** | 1 |
| **Gateways** | | | |
| CANopen® | | | |
| PROFIBUS | | | |
| Ethernet | | | |
| **I/O modules** | | | |
| Digital, 4 inputs, 4 outputs | | | |
| Digital, 4 inputs | | | |
| Digital, 8 outputs | | | |
| Analog, 2 inputs, 2 outputs | | | |
| **Power feed module** for supplying further SmartWire-DT™ devices | | | |

Gateways

Input/output modules

Power feed

| Technical data | | | | | |
|---|---|---|---|---|---|
| | | - | - | | |
| 24 V DC -15 % ... +20 % | | - | - | 24 V DC -15 % ... +20 % | |
| 3 A | | - | - | 3 A | |
| 24 V DC -15 % ... +20 % | | - | - | 24 V DC -15 % ... +20 % | |
| 700 mA | | - | - | 700 mA | |
| | | - | - | | |
| - | | Digital inputs | Analog inputs | - | |
| - | | 24 V DC | - | - | |
| - | | typ. 4 mA | - | - | |
| | | - | - | | |
| - | | Digital outputs | Analog outputs | - | |
| - | | 24 V DC -15 % ... +20 % | - | - | |
| - | | typ. 500 mA | - | - | |
| | | - | - | | |
| Pin strip, 8-pos. | | Pin strip, 8-pos. | Pin strip, 8-pos. | Pin strip, 8-pos. | |
| 125 kBd / 250 kBd | | 125 kBd / 250 kBd | 125 kBd / 250 kBd | 125 kBd / 250 kBd | |
| - | | - | - | - | |
| - | | - | - | - | |
| | | | | | |
| -25 °C ... 55 °C | | - | | - | |
| EN 50178 | | EN 50178 | | EN 50178 | |
| IP20 | | IP20 | | IP20 | |
| any | | any | | any | |
| - | | - | | - | |
| 0.2 - 1.5 mm² / 0.2 - 1.5 mm² / 24 - 16 | | 0.2 - 1.5 mm² / 0.2 - 1.5 mm² / 24 - 16 | | 0.2 - 1.5 mm² / 0.2 - 1.5 mm² / 24 - 16 | |
| 35 mm / 90 mm / 127 mm | | 35 mm / 90 mm / 101 mm | | 35 mm / 90 mm / 124 mm | |

| Ordering data | | | Ordering data | | | Ordering data | | |
|---|---|---|---|---|---|---|---|---|
| Type | Order No. | Pcs. / Pkt. | Type | Order No. | Pcs. / Pkt. | Type | Order No. | Pcs. / Pkt. |
| **EU5C-SWD-CAN PXC** | **2903098** | 1 | | | | | | |
| **EU5C-SWD-DP PXC** | **2903100** | 1 | | | | | | |
| **EU5C-SWD-EIP-MODTCP PXC** | **2903244** | 1 | | | | | | |
| | | | **EU5E-SWD-4D4D PXC** | **2903101** | 1 | | | |
| | | | **EU5E-SWD-4DX PXC** | **2903102** | 1 | | | |
| | | | **EU5E-SWD-X8D PXC** | **2903103** | 1 | | | |
| | | | **EU5E-SWD-2A2A PXC** | **2903104** | 1 | | | |
| | | | | | | **EU5C-SWD-PF2-1 PXC** | **2903113** | 1 |

## SmartWire-DT™ accessories

Plug tools

Flat-ribbon cable, 8-pos.

| Description | Color | Ordering data: Type | Order No. | Pcs. / Pkt. | Ordering data: Type | Order No. | Pcs. / Pkt. |
|---|---|---|---|---|---|---|---|
| **Pliers for device plugs** | | **SWD4-CRP-1 PXC** | **2903110** | 1 | | | |
| **Pliers for flat plugs** | | **SWD4-CRP-2 PXC** | **2903114** | 1 | | | |
| **Flat-ribbon cable, 8-pos., 100 m** | | | | | **SWD4-100LF-8-24 PXC** | **2903111** | 1 |
| **Flat-ribbon cable, assembled with 2 flat plugs, 8-pos., 3 m** | | | | | **SWD4-3LF8-24-2S PXC** | **2903112** | 1 |

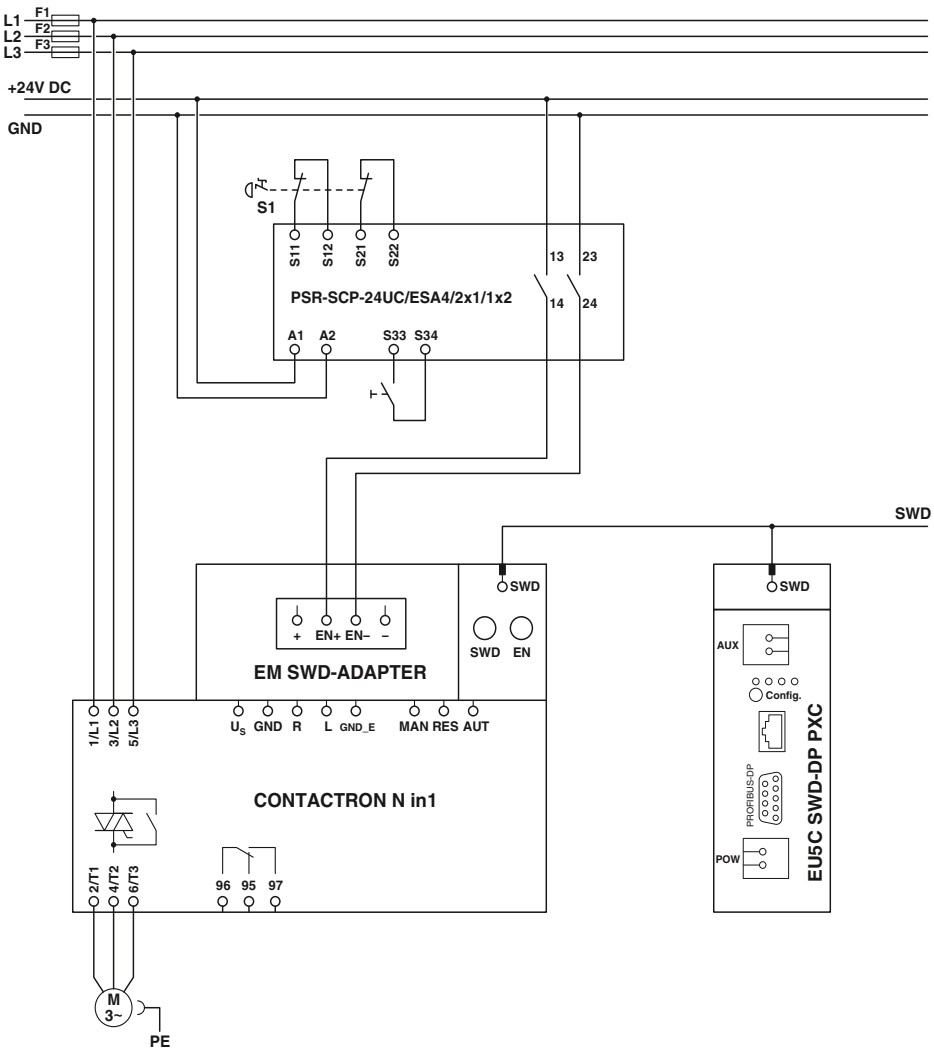
## SmartWire-DT™ accessories

Accessories for SmartWire-DT™ and SmartWire-DT™ devices for connecting digital and analog input and output signals.

Plug and coupling

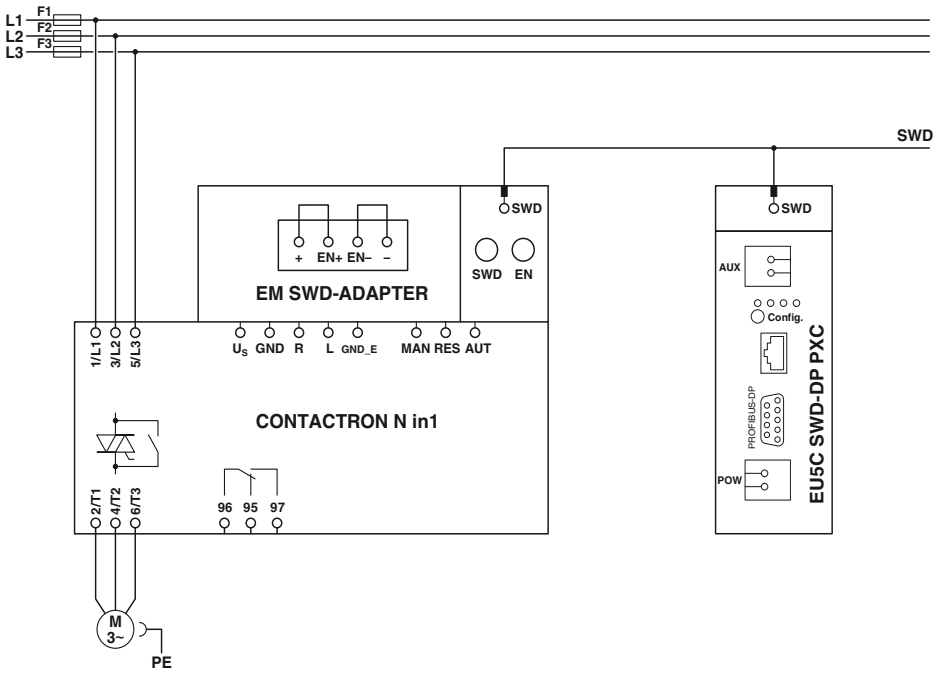
Programming adapter

| Description | Color | Ordering data: Type | Order No. | Pcs. / Pkt. | Ordering data: Type | Order No. | Pcs. / Pkt. |
|---|---|---|---|---|---|---|---|
| **Plug and coupling** | | | | | | | |
| Network dummy plug | | **SWD4-RC8-10 PXC** | **2903106** | 1 | | | |
| Device plug, 8-pos. | | **SWD4-8SF2-5 PXC** | **2903107** | 10 | | | |
| Flat plug, 8-pos. | | **SWD4-8MF2 PXC** | **2903108** | 10 | | | |
| Coupling for 8-pos. flat plug | | **SWD4-8SFF2-5 PXC** | **2903109** | 1 | | | |
| **Programming adapter** | | | | | **EU4A-RJ45-USB-CAB1 PXC** | **2903465** | 1 |

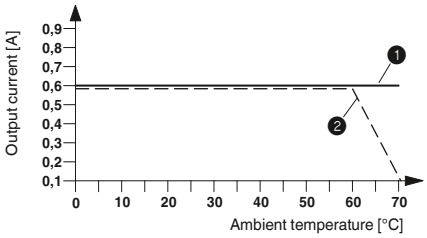



Emergency stop wiring example (two-channel)

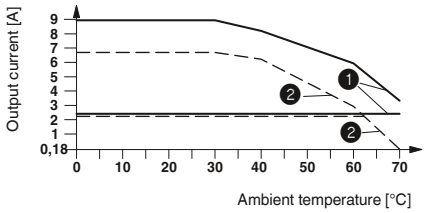
| Intended use<br>The SmartWire-DT™ adapter is approved exclusively for use in conjunction with the following CONTACTRON hybrid motor starters. If other switching devices are used, correct operation, in particular of the safety function, cannot be ensured. | |
|---|---|
| **Motor protection and safe shutdown** | |
| 2900582 | ELR H5-IES-SC-24DC/500AC-0,6 |
| 2900414 | ELR H5-IES-SC-24DC/500AC-2 |
| 2900421 | ELR H5-IES-SC-24DC/500AC-9 |
| 2900566 | ELR H3-IES-SC-24DC/500AC-0,6 |
| 2900567 | ELR H3-IES-SC-24DC/500AC-2 |
| 2900569 | ELR H3-IES-SC-24DC/500AC-9 |
| 2297031 | ELR W3- 24DC/500AC-2I |
| 2297057 | ELR W3- 24DC/500AC-9I |
| 2902952 | ELR H51-0,6-DINRAIL-SET |
| 2902953 | ELR H51-2,4-DINRAIL-SET |
| 2902954 | ELR H51-9-DINRAIL-SET |
| 2902746 | ELR H51-IESSC-24DC500AC-06 |
| 2902744 | ELR H51-IESSC-24DC500AC-2 |
| 2902745 | ELR H51-IESSC-24DC500AC-9 |
| **Motor protection only** | |
| 2900573 | ELR H5-I-SC-24DC/500AC-0,6 |
| 2900574 | ELR H5-I-SC-24DC/500AC-2 |
| 2900576 | ELR H5-I-SC-24DC/500AC-9 |
| 2900542 | ELR H3-I-SC-24DC/500AC-0,6 |
| 2900543 | ELR H3-I-SC-24DC/500AC-2 |
| 2900545 | ELR H3-I-SC-24DC/500AC-9 |




Wiring example without emergency stop




**Derating curve for ELR H5-IES-SC-SWD/500AC-0,6**
**100% operating time**




**Derating curve for ELR H5-IES-SC-SWD/500AC-2 and ELR H5-IES-SC-SWD/500AC-9**
**100% operating time**

❶ Aligned with > 20 mm spacing
❷ Aligned without spacing

## 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:

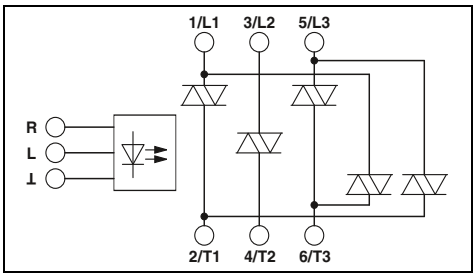
– Noise-free and wear-free switching
– Integrated protective circuit
– Stable and short switching times
– Long service life
– High switching frequency
– Integrated locking and load wiring
– Thermal fuse optional

**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

Marking systems and mounting material
See Catalog 5

**For reversing 3~ AC motors up to 575 V AC/3 x 2 A**




### Technical data

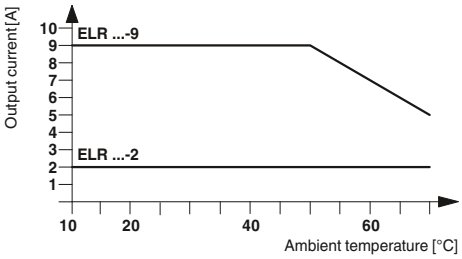
| | | |
|---|---|---|
| **Input data** | | |
| Rated actuating voltage $U_C$ R/L | 24 V DC | 230 V AC |
| Rated actuating voltage range with reference to $U_C$ | 0.8 ... 1.25 | 0.4 ... 1.1 |
| Rated actuating current $I_C$ at $U_C$ | 12.7 mA | 11.2 mA |
| Input circuit | Protection against polarity reversal, 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 $A^2$s | 250 $A^2$s |
| Output protection | RCV circuit | |
| **General data** | | |
| Rated insulation voltage | 500 V | |
| Rated surge voltage | 6 kV | 6 kV |
| Insulation | 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 | EN 60947<br>DIN EN 50178 | |
| Degree of protection in acc. with 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

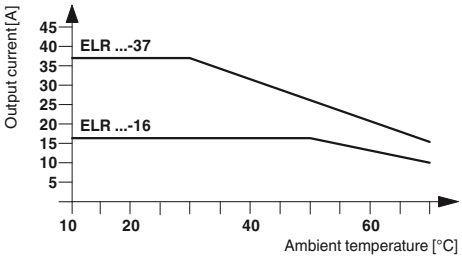
| Description | Type | Order No. | Pcs. / Pkt. |
|---|---|---|---|
| **3-phase solid-state reversing contactor** | | | |
| | **ELR W3- 24DC/500AC- 2** | **2297293** | 1 |
| | **ELR W3-230AC/500AC- 2** | **2297303** | 1 |

### Accessories

| | | | |
|---|---|---|---|
| **Thermal fuse** | **THERMAL FUSE TF104** | **2900796** | 1 |




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

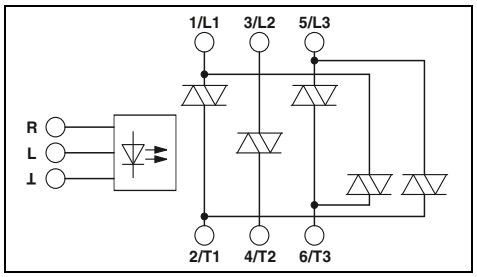


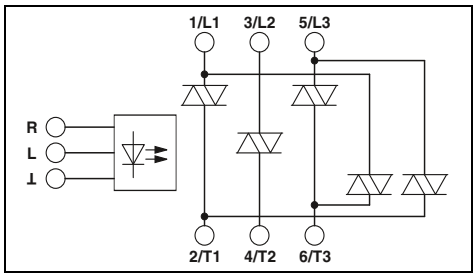

**Load current as a function of the ambient temperature**
**Operating time: 100% operating factor**

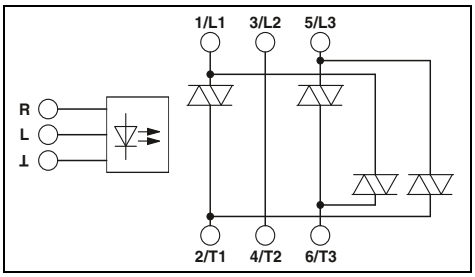
**For reversing 3~ AC motors up to 575 V AC/3 x 9 A**

**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

| | |
|---|---|
| 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 | 6 kV |
| Basic insulation | |
| max. 10 Hz | max. 2 Hz |
| max. 5 Hz | max. 1 Hz |
| -25 °C ... 70 °C | |
| EN 60947 | |
| DIN EN 50178 | |
| 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

| | |
|---|---|
| 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 | 6 kV |
| Basic insulation | |
| max. 10 Hz | max. 2 Hz |
| max. 5 Hz | max. 1 Hz |
| -25 °C ... 70 °C | |
| EN 60947 | |
| DIN EN 50178 | |
| 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

| | |
|---|---|
| 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 | 6 kV |
| Basic insulation | |
| max. 10 Hz | max. 2 Hz |
| max. 5 Hz | max. 1 Hz |
| -25 °C ... 70 °C | |
| EN 60947 | |
| DIN EN 50178 | |
| 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 |

## Three-phase solid-state contactors

Motors of mixers, machine tools, conveying systems, pumps and fans up to 575 V AC/3x37 A (equivalent to 1 kW to 18.5 kW) can be controlled using the CONTACTRON three-phase solid-state contactors.

Advantages of three-phase solid-state contactor:

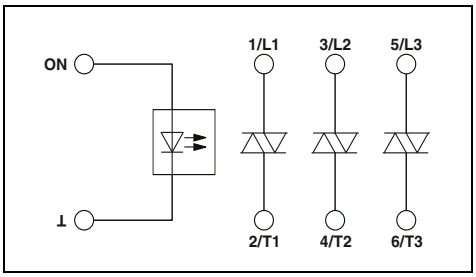
– Noise-free and wear-free switching
– Integrated protective circuit
– Stable and short switching times
– Long service life
– High switching frequency
– Thermal fuse optional

**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

Marking systems and mounting material
See Catalog 5

**For switching 3~ AC motors up to 575 V AC/3 x 2 A**




### Technical data

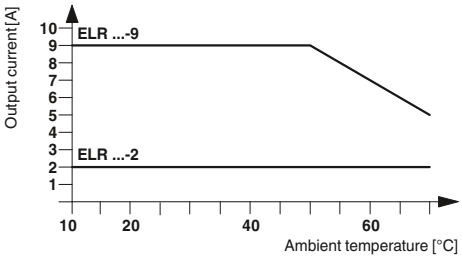
| | | |
|---|---|---|
| **Input data** | | |
| Rated actuation voltage $U_C$ ON | 24 V DC | 230 V AC |
| Rated actuating voltage range with reference to $U_C$ | 0.8 ... 1.25 | 0.4 ... 1.1 |
| Rated actuating current $I_C$ at $U_C$ | 8.3 mA | 12.5 mA |
| Input circuit | Protection against polarity reversal, 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 | ≤ 2 A (see derating curve) | ≤ 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 $A^2$s | 250 $A^2$s |
| Output protection | RCV circuit | |
| **General data** | | |
| Rated insulation voltage | 500 V | |
| Rated surge voltage | 6 kV | 6 kV |
| Insulation | Basic insulation | |
| Switching frequency | ≤ 10 Hz | ≤ 1 Hz |
| Ambient temperature (operation) | -25 °C ... 70 °C | |
| Standards/regulations | EN 60947<br>DIN EN 50178 | |
| Degree of protection in acc. with 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

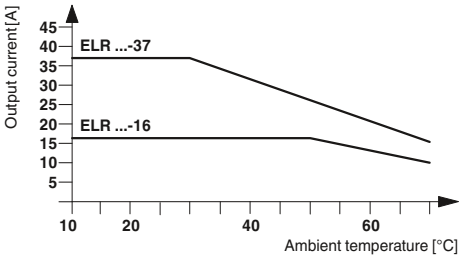
| Description | Type | Order No. | Pcs. / Pkt. |
|---|---|---|---|
| **Three-phase solid-state contactor** | | | |
| | **ELR 3- 24DC/500AC- 2** | **2297196** | 1 |
| | **ELR 3-230AC/500AC- 2** | **2297206** | 1 |

### Accessories

| | | | |
|---|---|---|---|
| **Thermal fuse** | **THERMAL FUSE TF104** | **2900796** | 1 |




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

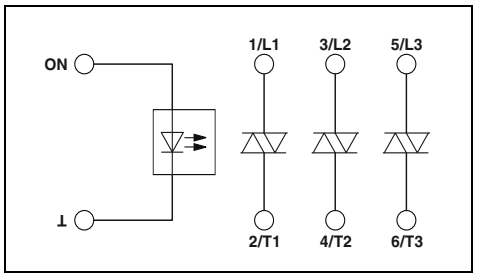


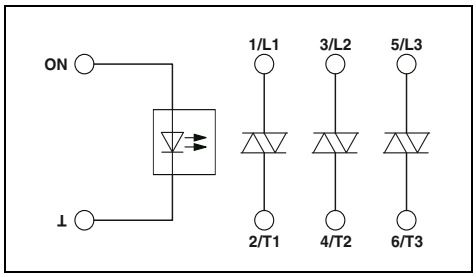

**Load current as a function of the ambient temperature**
**Operating time: 100% operating factor**

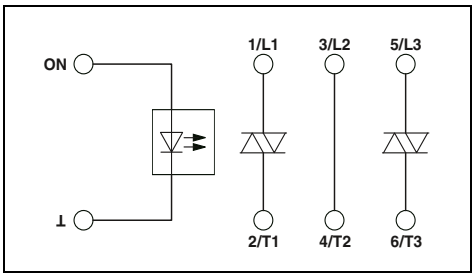
**For switching 3~ AC motors up to 575 V AC/3 x 9 A**

**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

| | |
|---|---|
| 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 |
| ≤ 9 A (see derating curve) | ≤ 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 | 6 kV |
| Basic insulation | |
| ≤ 10 Hz | ≤ 1 Hz |
| -25 °C ... 70 °C | |
| EN 60947 | |
| DIN EN 50178 | |
| 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

| | |
|---|---|
| 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 |
| ≤ 16 A (see derating curve) | ≤ 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 | 6 kV |
| Basic insulation | |
| ≤ 10 Hz | ≤ 1 Hz |
| -25 °C ... 70 °C | |
| EN 60947 | |
| DIN EN 50178 | |
| 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

| | |
|---|---|
| 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 |
| ≤ 37 A (see derating curve) | ≤ 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 | 6 kV |
| Basic insulation | |
| ≤ 10 Hz | ≤ 1 Hz |
| -25 °C ... 70 °C | |
| EN 60947 | |
| DIN EN 50178 | |
| 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 |

## Solid-state reversing contactor with soft starter

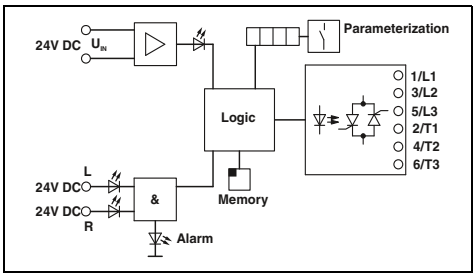
The ELR W 3/9-400 S soft switch can be used to increase the service life of a 3-phase induction motor.

- 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.

Marking systems and mounting material
See Catalog 5

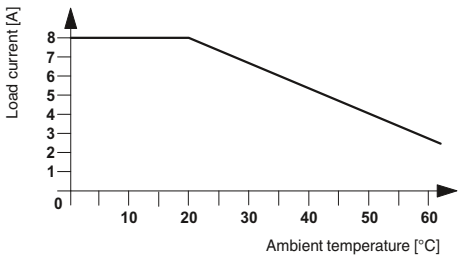



### Technical data

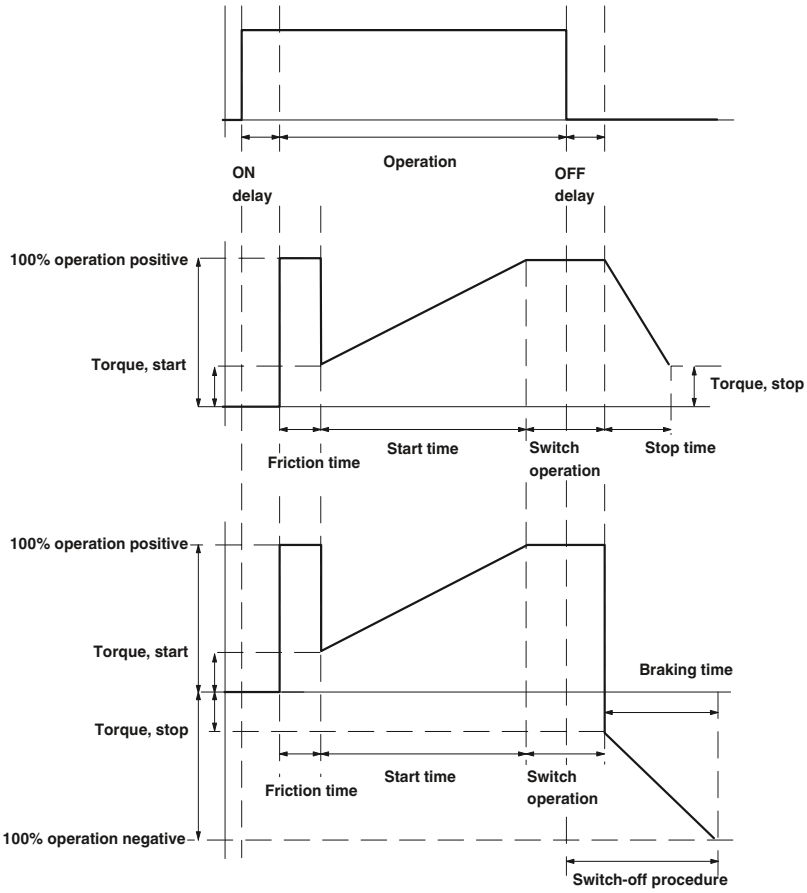
| | | |
|---|---|---|
| Input data | | |
| Supply nominal voltage $U_{VN}$ | | 24 V DC |
| Supply voltage range with reference to $U_{VN}$ | | 0.8 ... 1.2 |
| Quiescent current | | 85 mA |
| Control voltage $U_{ST}$ right/left | | 24 V DC |
| Control voltage range in reference to $U_{ST}$ | | 0.8 ... 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)<br>440 V AC (L2/T2)<br>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 Ta, see derating)<br>< 8 A (IL2, at 20 °C Ta, see derating)<br>< 8 A (IL3, at 20 °C Ta, 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 | | EN 61000-6-2 / EN 61000-6-4<br>DIN EN 50178 |
| Degree of protection in acc. with 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 |
| EMC note | | Class A product, see page 625 |

### 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.

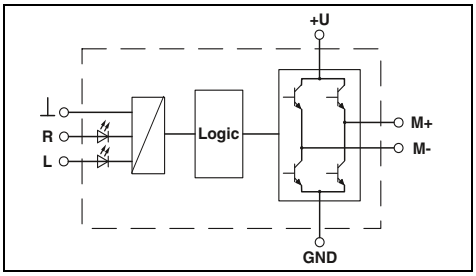
## Electronic reversing load relays for DC motors

The ELR-DC electronic reversing load relays 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 effort is reduced to a minimum.

| Notes: |
|---|
| Type of housing:<br>Polycarbonate PC, color: green. |
| Marking systems and mounting material<br>See Catalog 5 |
| PWM = Pulse Width Modulation |



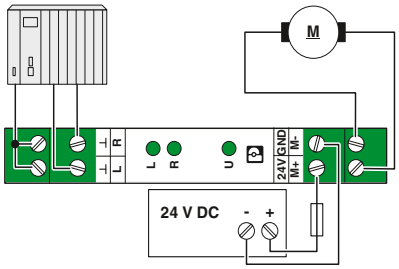

### Technical data

| | | |
|---|---|---|
| **Input data** | | |
| 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 $U_N$ | 3 mA | 3 mA |
| 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) / - | |
| **Output data load side** | | |
| Output voltage range | 10 V DC ... 30 V DC | 10 V DC ... 30 V DC |
| Load current | 2 A (aligned without 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 in acc. with 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 | |
| EMC note | Class A product, see page 625 | |

### 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 |

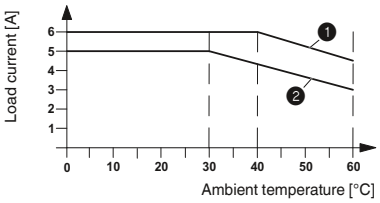
**Application example**




**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 depending on ambient temperature**
Operating time: 100% OT




1 Single device
2 Aligned without spacing

## 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 robust power semiconductors switch in zero voltage crossing and thus produce no additional high frequency interference. The modules are resistant to shock loads and vibrations – they can even be used in aggressive, polluted environments without any problems.

They offer the following advantages:

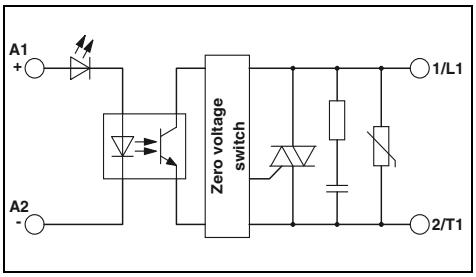
– High switching frequency
– Wear-free and output-free
– 24 V DC and 230 V AC input voltage versions

Common areas of application are:

– Conveyor equipment
– Light and lighting systems
– Conveyor equipment
– Light and lighting systems

| Notes: |
|---|
| Type of housing:<br>Polycarbonate PC, color: green. |
| Marking systems and mounting material<br>See Catalog 5 |

**For switching 1~ AC motors up to 660 V AC/20 A**

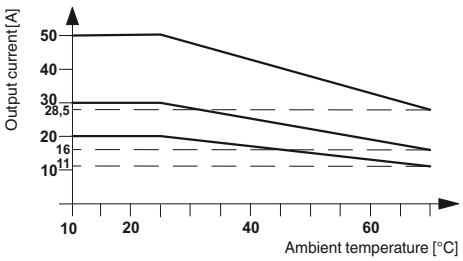



### Technical data

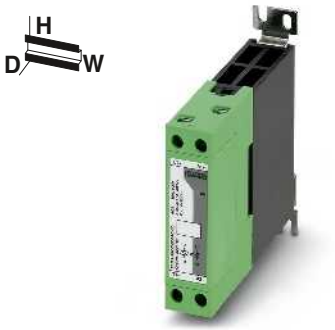
| | | | |
|---|---|---|---|
| Input data | | | |
| Input voltage range | | 4 V DC ... 32 V DC | 24 V AC ... 275 V AC |
| Typ. input current at $U_N$ | | approx. 12 mA | approx. 17 mA |
| Switching level | 1 signal ("H") | ≥ 4 V DC | ≥ 22 V AC |
| | 0 signal ("L") | ≤ 1 V DC | ≤ 6 V AC |
| Transmission 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 $kV_{rms}$ | |
| Insulation | | Basic insulation | |
| 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 | |
| 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 |

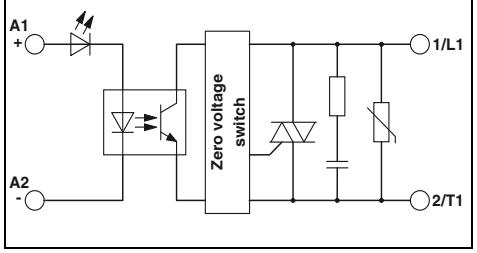


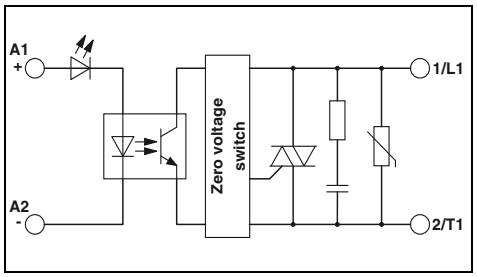

**Load current as a function of the ambient temperature**
**Operating time: 100% operating factor**



**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

| | |
|---|---|
| 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 $kV_{rms}$
Basic insulation
-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
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

| | |
|---|---|
| 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 $kV_{rms}$
Basic insulation
-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
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 |

## PROFINET motor starters

Motor starters in robust stainless steel housing (IP67) can be used directly in the system as a compact function unit. This eliminates the complex wiring of individual functions in the control cabinet.

The motor starter can be used to control three-phase asynchronous motors in two directions of rotation, completely via PROFINET. Distributed sensors and actuators can be directly connected to PROFINET without the need for further intermediate stations or additional cabling. A complete PROFINET motor starter consists of three products. For example:

– ELR 5011 IP PN
– IBS IP 400 MBH-F
– IBS PG SET

### Additional features:

– Performance classes: 1.1 kW to 3.0 kW
– One and two-motor reversing starters (CONTACTRON hybrid motor starter)
– Easy assembly
– Plug-in connection system
– Exchangeable module electronics
– Status and diagnostics indicators on the module
– 10 digital inputs for connecting sensors
– 4 digital outputs for connecting actuators

**Electronic motor starters, 1 x 1.1 kW and 2 x 1.1 kW**

PROFIBUS

### Technical data

| | ELR 5011 IP PN | ELR 5011-2 IP PN |
|---|---|---|
| Interface | | |
| Fieldbus system | PROFINET | |
| Connection method | 8-pos. RJ45 socket on motor starter | |
| Power supply for module electronics | | |
| Supply voltage | 24 V DC ($U_{S1}$ / $U_{S2}$) | |
| Supply voltage range | 20 V DC ... 30 V DC (including ripple) | |
| Power supply for sensors | | |
| Minimum voltage | $U_{INI}$ = $U_{S1}$ minus 1 V | |
| Nominal current per sensor | 500 mA | |
| Type of protection | Short-circuit/overload protection | |
| Digital inputs | | |
| Number of inputs | 10 | |
| Connection method | M12 connector | |
| Connection method | 2, 3, 4-wire | |
| Digital outputs | | |
| Number of outputs | 4 | |
| Connection method | M12 connector | |
| Connection method | 2-wire | |
| Output current | max. 500 mA (per channel) | |
| Motor starter, output | | |
| Connection method | POWER-COMBICON | |
| Operating voltage | 360 V AC ... 550 V AC (line voltage 50/60 Hz) | |
| Nominal current range | 0.18 A ... 2.4 A | |
| Frequency range | 50 Hz ... 60 Hz (mains frequency) | |
| Nominal motor power | 1.1 kW (at $U_{mains}$= 400 V AC) | |
| Motor monitoring | | |
| Parameterization range | 0.2 A ... 2.4 A | |
| Tripping class | Based on class 10 A of IEC 60947 | |
| General data | | |
| Weight | 2115 g | 2425 g |
| Degree of protection | IP67 in acc. with IEC 60529 | |
| Ambient temperature (operation) | -25 °C ... 50 °C (non-condensing) | |
| EMC note | | |

### Ordering data

| Description | Type | Order No. | Pcs. / Pkt. |
|---|---|---|---|
| **PROFINET motor starter** | | | |
| - 1-channel reversing starter, 1.1 kW | **ELR 5011 IP PN** | **2700745** | 1 |
| - 2-channel reversing starter, 1.1 kW | **ELR 5011-2 IP PN** | **2701007** | 1 |
| **PROFINET motor starter** | | | |
| - 1-channel reversing starter, 3.0 kW | | | |
| - 2-channel reversing starter, 3.0 kW | | | |
| **Lower housing part**, stainless steel | | | |
| - Standard version | **IBS IP 400 MBH -F** | **2732868** | 1 |
| **Pg screw connection**, plastic (IP67), for INTERBUS and PROFINET motor starters and variable frequency drives. | **IBS PG SET** | **2836599** | 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 |
| **Bus system cable** | **VS-937/...** | **1402611** | 1 |
| **Crimping pliers**, for assembling the RJ45 connectors | **FL CRIMPTOOL** | **2744869** | 1 |

**Electronic motor starters, 1 x 3.0 kW and 2 x 3.0 kW**

**Stainless steel lower housing part, IP67 protection**

## Technical data

| ELR 5030 IP PN | ELR 5030-2 IP PN |
|---|---|
| PROFINET | |
| 8-pos. RJ45 socket on motor starter | |
| 24 V DC ($U_{S1}$ / $U_{S2}$) | |
| 20 V DC ... 30 V DC (including ripple) | |
| $U_{INI}$ = $U_{S1}$ minus 1 V | |
| 500 mA | |
| Short-circuit/overload protection | |
| 10 | |
| M12 connector | |
| 2, 3, 4-wire | |
| 4 | |
| M12 connector | |
| 2-wire | |
| max. 500 mA (per channel) | |
| POWER-COMBICON | |
| 360 V AC ... 550 V AC (line voltage 50/60 Hz) | |
| 2.4 A ... 6 A | |
| 50 Hz ... 60 Hz (mains frequency) | |
| 3 kW (at $U_{mains}$= 400 V AC) | |
| 2.4 A ... 6 A | |
| Based on class 10 A of IEC 60947 | |
| 2115 g | 2425 g |
| IP67 in acc. with IEC 60529 | |
| -25 °C ... 50 °C (non-condensing) | |

## Ordering data

| Type | Order No. | Pcs. / Pkt. |
|---|---|---|
| **ELR 5030 IP PN** | **2701006** | 1 |
| **ELR 5030-2 IP PN** | **2701008** | 1 |
| **IBS IP 400 MBH -F** | **2732868** | 1 |
| **IBS PG SET** | **2836599** | 1 |

## Accessories

| | | |
|---|---|---|
| **FL PLUG RJ45 GR/2** | **2744856** | 1 |
| **FL PLUG RJ45 GN/2** | **2744571** | 1 |
| **VS-937/...** | **1402611** | 1 |
| **FL CRIMPTOOL** | **2744869** | 1 |

## Technical data

| IBS IP 400 MBH -F | |
|---|---|
| - | |
| - | |
| - | |
| - | |
| - | |
| - | |
| - | |
| - | |
| - | |
| - | |
| - | |
| - | |
| - | |
| - | |
| - | |
| 1130 g | - |
| IP67 in acc. with IEC 60529 | - |
| - | |
| Class A product, see page 625 | |

## Ordering data

| Type | Order No. | Pcs. / Pkt. |
|---|---|---|
| **IBS IP 400 MBH -F** | **2732868** | 1 |
| **IBS PG SET** | **2836599** | 1 |

## Accessories

| | | |
|---|---|---|
| **FL PLUG RJ45 GR/2** | **2744856** | 1 |
| **FL PLUG RJ45 GN/2** | **2744571** | 1 |
| **VS-937/...** | **1402611** | 1 |
| **FL CRIMPTOOL** | **2744869** | 1 |

## Inline frequency inverters

Inline frequency inverters for the control cabinet are the compact solution for extending your Easy Automation solution to include electronic speed regulation for asynchronous motors. The devices seamlessly integrate into the Inline system and have IP20 protection. Depending on the drive task, you can select frequency inverters from various performance classes, up to a maximum of 4 kW. In order to connect to the Inline system via the Fieldline local bus, you just need the IB IL 24 FLM-PAC Inline module. The Inline frequency inverter can be connected to a Phoenix Contact controller via the Inline module.

### Additional features:

- Max. motor power of 0.75 kW, 1.5 kW, 2.2 kW, and 4.0 kW
- 3 x 400 V mains input (±15%) 50/60 Hz
- DTM for parameterization and diagnostics
- 8 freely programmable parameter records
- PTC evaluation for 2.2 kW and 4.0 kW versions
- Integrated line filter
- U/f linear and U/f square operating modes
- S-ramp function
- Motor protection function ($I^2t$)
- Connection of a braking resistor
- DC braking
- Evaluation of the temperature switch in the motor
- Voltage boost
- 1 x analog input, 1 x analog output, 1 x relay output

**Frequency inverter for max. motor power of up to 0.75 kW**

### Technical data

| | |
|---|---|
| Interface | |
| Designation | Fieldline local bus |
| Connection method | 9-pos. D-SUB connector/socket |
| Power supply for module electronics | |
| Supply voltage | 24 V DC ±15 % |
| Supply voltage range | 20.4 V DC ... 27.6 V DC ±15 % |
| Digital inputs | |
| Number of inputs | 5 |
| Connection method | COMBICON |
| Connection method | Spring-cage connection |
| Analog inputs | |
| Number of inputs | 1 |
| Connection method | COMBICON |
| Connection method | Spring-cage connection |
| Analog outputs | |
| Number of inputs | 1 |
| Connection method | COMBICON |
| Connection method | Spring-cage connection |
| Frequency inverter output | |
| Rated current | 2.6 A +20 % |
| Frequency range | 0 Hz ... 400 Hz |
| Parameterization | Via INTERBUS |
| Tripping class | 5.6 A OC tripping current |
| General data | |
| Weight | 1400 g |
| Degree of protection | IP20 in acc. with IEC 60529/ EN 60529 |
| Width | 90 mm |
| Height | 173 mm |
| Depth | 153.5 mm |

### Ordering data

| Description | Type | Order No. | Pcs. / Pkt. |
|---|---|---|---|
| **Inline frequency inverter** for the control cabinet | | | |
| | **VFD 5007 IL IB** | **2701054** | 1 |

### Accessories

| | | | |
|---|---|---|---|
| **Inline Modular branch terminal** for coupling one Fieldline Modular M8 local bus at the end of an Inline station | **IB IL 24 FLM-PAC** | **2736903** | 1 |
| **Remote bus cable,** highly flexible, 3 x 2 x 0.25 mm² | **IBS RBC/F-T/** | **2740151** | 1 |

**Frequency inverter for max. motor power of up to 1.5 kW**

**Frequency inverter for max. motor power of up to 2.2 kW**

**Frequency inverter for max. motor power of up to 4.0 kW**

## Technical data

| | |
|---|---|
| Fieldline local bus | Fieldline local bus |
| 9-pos. D-SUB connector/socket | 9-pos. D-SUB connector/socket |
| 24 V DC ±15 %<br>20.4 V DC ... 27.6 V DC ±15 % | 24 V DC ±15 %<br>20.4 V DC ... 27.6 V DC ±15 % |
| 5<br>COMBICON<br>Spring-cage connection | 5<br>COMBICON<br>Spring-cage connection |
| 1<br>COMBICON<br>Spring-cage connection | 1<br>COMBICON<br>Spring-cage connection |
| 1<br>COMBICON<br>Spring-cage connection | 1<br>COMBICON<br>Spring-cage connection |
| 4.1 A +20 %<br>0 Hz ... 400 Hz<br>Via INTERBUS<br>8.8 A OC tripping current | 5.8 A +20 %<br>0 Hz ... 400 Hz<br>Via INTERBUS<br>12.5 A OC tripping current |
| 1400 g<br>IP20 in acc. with IEC 60529/ EN 60529<br>90 mm<br>173 mm<br>153.5 mm | 2200 g<br>IP20 in acc. with IEC 60529/ EN 60529<br>117 mm<br>173 mm<br>174.5 mm |

## Ordering data

| Type | Order No. | Pcs. / Pkt. |
|---|---|---|
| **VFD 5015 IL IB** | **2701055** | 1 |

## Accessories

| | | |
|---|---|---|
| **IB IL 24 FLM-PAC** | **2736903** | 1 |
| **IBS RBC/F-T/** | **2740151** | 1 |

## Technical data

| | |
|---|---|
| Fieldline local bus | Fieldline local bus |
| 9-pos. D-SUB connector/socket | 9-pos. D-SUB connector/socket |
| 24 V DC ±15 %<br>20.4 V DC ... 27.6 V DC ±15 % | 24 V DC ±15 %<br>20.4 V DC ... 27.6 V DC ±15 % |
| 5<br>COMBICON<br>Spring-cage connection | 5<br>COMBICON<br>Spring-cage connection |
| 1<br>COMBICON<br>Spring-cage connection | 1<br>COMBICON<br>Spring-cage connection |
| 1<br>COMBICON<br>Spring-cage connection | 1<br>COMBICON<br>Spring-cage connection |
| 5.8 A +20 %<br>0 Hz ... 400 Hz<br>Via INTERBUS<br>12.5 A OC tripping current | 9.5 A +20 %<br>0 Hz ... 400 Hz<br>Via INTERBUS<br>21 A OC tripping current |
| 2200 g<br>IP20 in acc. with IEC 60529/ EN 60529<br>117 mm<br>173 mm<br>174.5 mm | 2200 g<br>IP20 in acc. with IEC 60529/ EN 60529<br>117 mm<br>173 mm<br>174.5 mm |

## Ordering data

| Type | Order No. | Pcs. / Pkt. |
|---|---|---|
| **VFD 5022 IL IB** | **2701057** | 1 |

## Accessories

| | | |
|---|---|---|
| **IB IL 24 FLM-PAC** | **2736903** | 1 |
| **IBS RBC/F-T/** | **2740151** | 1 |

## Technical data

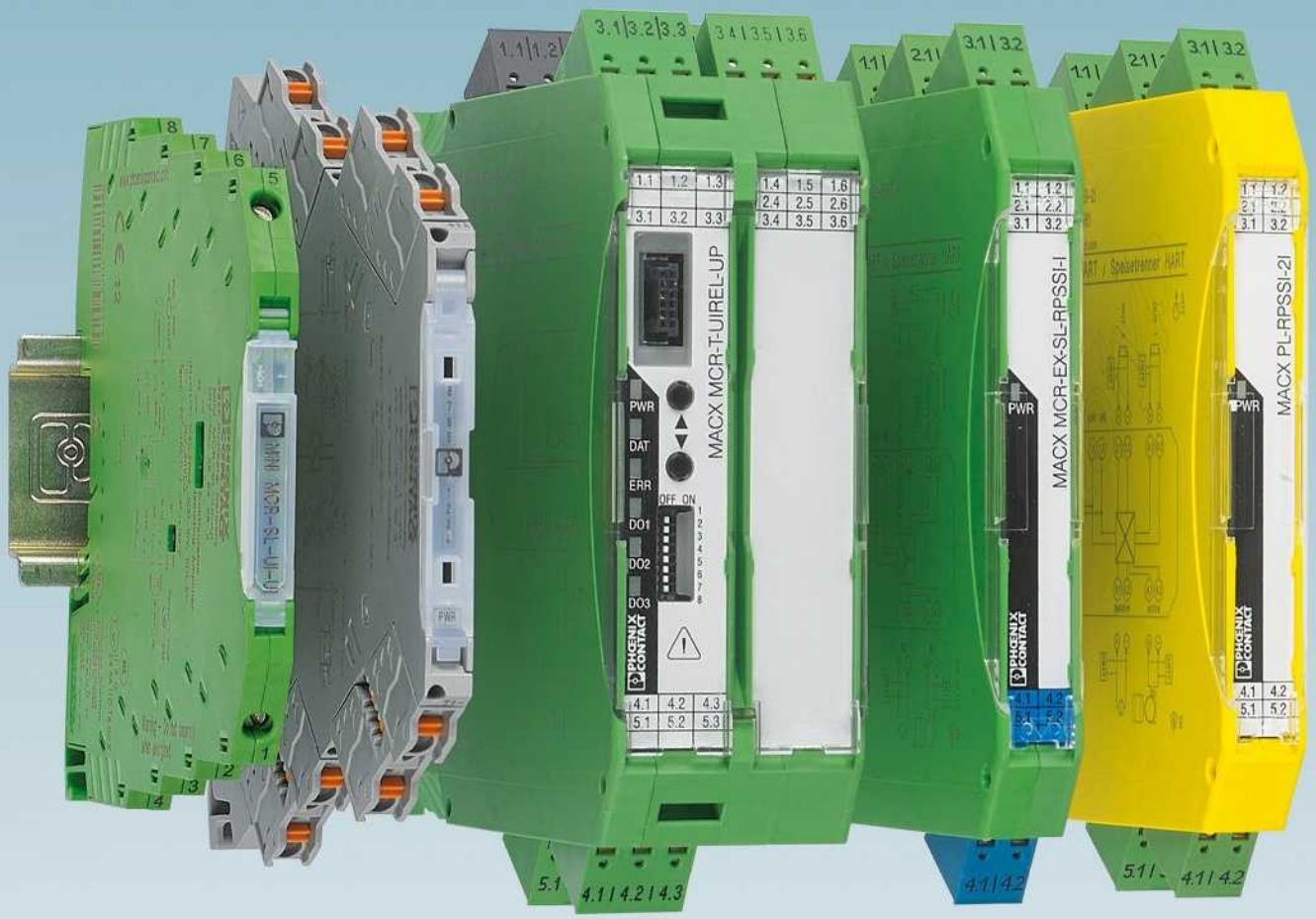
| | |
|---|---|
| Fieldline local bus | Fieldline local bus |
| 9-pos. D-SUB connector/socket | 9-pos. D-SUB connector/socket |
| 24 V DC ±15 %<br>20.4 V DC ... 27.6 V DC ±15 % | 24 V DC ±15 %<br>20.4 V DC ... 27.6 V DC ±15 % |
| 5<br>COMBICON<br>Spring-cage connection | 5<br>COMBICON<br>Spring-cage connection |
| 1<br>COMBICON<br>Spring-cage connection | 1<br>COMBICON<br>Spring-cage connection |
| 1<br>COMBICON<br>Spring-cage connection | 1<br>COMBICON<br>Spring-cage connection |
| 9.5 A +20 %<br>0 Hz ... 400 Hz<br>Via INTERBUS<br>21 A OC tripping current | |
| 2200 g<br>IP20 in acc. with IEC 60529/ EN 60529<br>117 mm<br>173 mm<br>174.5 mm | |

## Ordering data

| Type | Order No. | Pcs. / Pkt. |
|---|---|---|
| **VFD 5040 IL IB** | **2701058** | 1 |

## Accessories

| | | |
|---|---|---|
| **IB IL 24 FLM-PAC** | **2736903** | 1 |
| **IBS RBC/F-T/** | **2740151** | 1 |


MACX MCR-T-UIREL-UP
PWR
DAT
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DO1
DO2
DO3
OFF ON
PHOENIX CONTACT
MACX MCR-EX-SL-RPSSI-I
PWR
PHOENIX CONTACT
MACX PL-RPSSI-2I
PWR
PHOENIX CONTACT

# MCR technology

From highly compact 6 mm signal conditioners to functionally safe signal conditioners through to signal isolators for intrinsically safe circuits in the Ex area: our signal conditioner range offers a solution for all applications in analog signal conditioning.

We offer the following product ranges:

**Highly compact signal conditioners with plug-in connection technology – MINI Analog Pro**

For maximum convenience during installation and service
- Overall width of just 6.2 mm
- Current measurement without isolation
- Safe electrical isolation

**Highly compact signal conditioners – MINI Analog**

For significant space savings and efficiency
- Overall width of just 6.2 mm
- System cabling and multiplexer solutions
- Electrical isolation

**Signal conditioners, head transducers, and digital displays – MCR Analog**
- Electrical isolation
- Record and convert temperatures directly in the field
- Display process values

**Signal conditioners with SIL functional safety – MACX Analog**

For maximum signal safety
- Consistent SIL certification
- Safe electrical isolation

**Signal conditioners with PL functional safety – MACX Safety**

The proven MACX range for safety applications according to the Machinery Directive

**Ex i signal conditioners with SIL functional safety – MACX Analog Ex**

For intrinsically safe circuits in the Ex area
- Maximum explosion protection for all Ex zones and gas groups
- Safe electrical isolation

**Ex i signal conditioners with PL functional safety – MACX Safety Ex**

The proven MACX EX range for safety applications according to the Machinery Directive

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## Selection guide for signal conditioners

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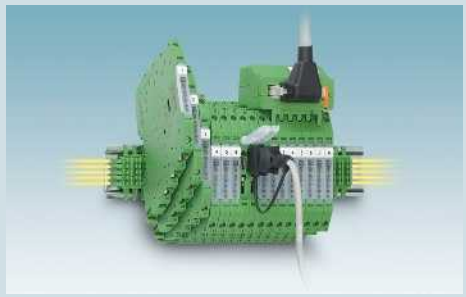

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**Ex i signal conditioners with SIL functional safety - MACX Analog Ex**

**Ex i signal conditioners with PL functional safety - MACX Safety Ex**

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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 signal generator. If these values are exceeded, suppressor 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 a signal conditioner 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 consumption of the module. The greater the auxiliary power consumption of the passive isolator, the smaller the operational output load is allowed to be. Low auxiliary power consumption is regarded as an indicator of device quality.

**Common mode rejection**

In the case of signal conditioners, operational amplifiers are used internally for transmission. 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 "0 V". 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**

During uninterrupted operation of the devices, an overload at the input cannot cause greater values than 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 curve is increased or decreased by an amplification factor.

**Load**

The load on the output side indicates the load-carrying capacity of a measuring transducer or a signal conditioner. 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 behavior**

With some measuring transducers, the input signal is permanently monitored for possible open circuits in the signal line. 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.

## Digital output

**Relays**

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. Even very small currents are transmitted perfectly. If the afore-mentioned 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 supplies for specific products. There is a standard power supply available in the form of a 24 V DC version that operates within a voltage range of 20 ... 30 V DC. For other supply voltages, please refer to the technical data.

**Current consumption**

The value specified here describes the self-consumption of the devices. It also includes the output current and, where applicable, the switching output load.

**Transmission errors**

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 a signal conditioner 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.

### Cut-off frequency

Signal conditioners are generally designed for transmitting 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 cut-off frequency. At the same time, a low cut-off 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 cut-off frequency. This means that the response time decreases as the cut-off frequency increases.

### Test voltage

The test voltage indicates the electric 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 discharge is able to move to another potential level in the device.

### Safe isolation

"Safe isolation" is defined as protection against hazardous shock currents. When module specifications are provided according to EN 61010, a distinction is made between error-free operation and operation under fault conditions. With error-free operation, nominal supply voltages of 30 V AC/60 V DC are valid.

### Ambient temperature range

The temperature limits specified here relate exclusively to operation. These limits do not apply to storage and transport. It is here 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.

### Protective circuit

In order to protect the measurement and control 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

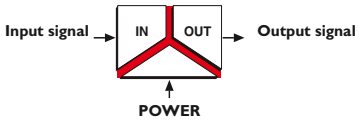
When carrying out further processing of non-independent items of equipment (components), the applicable regulations pertaining to installation must be observed.

The relevant device-specific regulations also apply with regard to installation in devices.
(Standards applicable at the time of going to print)

| Directives | EU | International |
|---|---|---|
| Electromagnetic Compatibility Directive (EMC) | 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 | - |
| Safety requirements for electrical equipment for measurement, control, and laboratory use - Part 1: General requirements | EN 61010-1:2001 | IEC 61010-1:2004 |
| Programmable logic 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 equipment 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 equipment for explosive gas atmospheres - Part 15: Construction, test, and marking of protection type "n" electrical equipment | 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

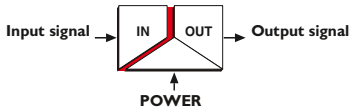



In the case of modules with this isolation method, all components that are connected to the input, output or power supply are protected against interference from each other. All three directions (input, output, and power supply) are electrically isolated from one another accordingly.

The 3-way isolation provides electrical isolation between the measurement sensor and the controller as well as between the controller and the actuating element.

On the input side, the modules need active signals. On the output side, they provide a filtered and amplified signal.

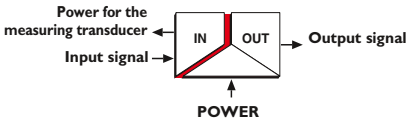
### Input isolation




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 which 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



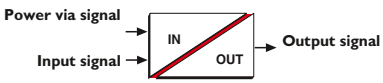

Repeater power supplies use the signal input side not only for measured value acquisition, but also to provide the necessary power to the passive measurement sensors connected on the input side.

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

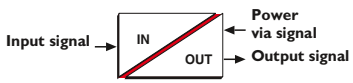
### Passive isolation, supplied on the input side




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 actuating elements.

This passive isolation allows signal conditioning (interruption of ground loops) and filtering without an additional power supply.

### Passive isolation, supplied on the output side (loop-powered)

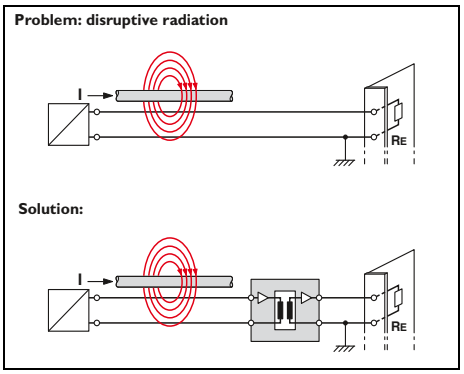


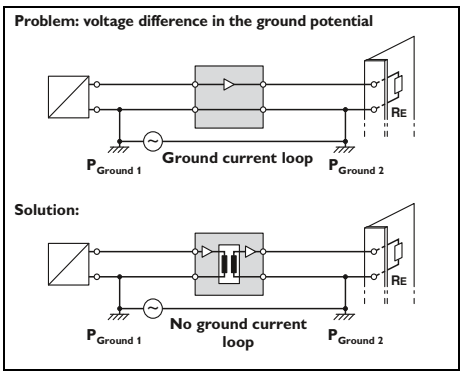

The modules obtain the power needed for signal transmission and electrical isolation from the active output circuit, ideally from the PLC input board that supplies power.

On the output side, the loop-powered modules operate with a 4 ... 20 mA standard signal. On the input side, the passive isolator processes active signals.

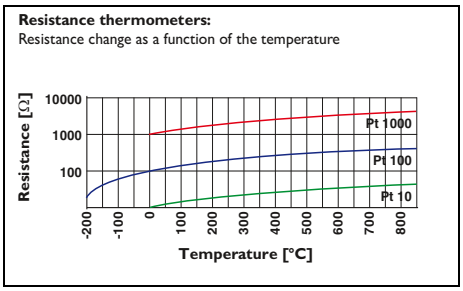
When this isolation method is used, it is important to make sure that the active signal source connected on the output side (e.g., an active PLC input board) is able to supply the passive isolator with power, as well as operate its load.

## Applications



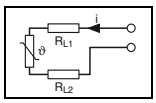
## Resistance thermometers




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-conductor connection technology

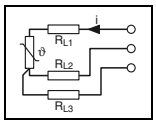



The resistance thermometer is connected to the MCR measuring transducer using a two-core cable. Please note that the supply cable resistances are added to the measured resistance and consequently distort the result.

A distance of 10 m should not be exceeded.

**Example:** a 50 meter 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 per 1 K temperature change of 0.384 Ω This corresponds to an error of 8.8°C.

### Three-conductor connection technology




Three-conductor technology 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 measuring 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.

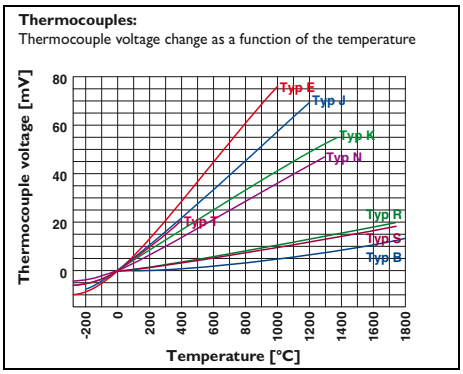
Since this is more or less the case in the majority of applications, three-wire technology is the most commonly encountered today. Line compensation is not necessary.

### Four-conductor connection technology

Four-conductor connection technology is an ideal connection technology 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 therefore be measured and compensated for separately. Line compensation is not necessary.

## Thermocouples

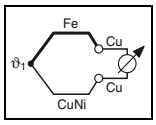



In contrast to resistance thermometers, thermocouples are active sources that generate a voltage in the microvolt range. The temperature difference measured between the measurement junction and the cold junction is converted into an absolute temperature with the help of cold junction compensation.

### Operating 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 ($\vartheta_1$) and the cold junction ($\vartheta_2$), 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 that do not completely cancel each other out, and thus current flows.

A thermocouple thus 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.

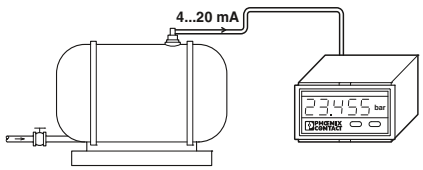
### Parameterization of the characteristic curve using interpolation points

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 characteristic 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 of use from bottling technology - allows you to switch over at the touch of a button 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 also be called at the touch of a button. 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 activated.

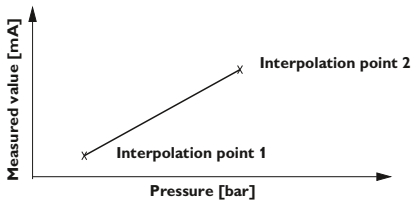
Other applications include indicating liquid levels, pressures, and temperatures. With servo motors, the analog output signals (0 ... 10 V) generated by the tachometer can be supplied to the input of the digital display in order to indicate the motor speed.

**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:**



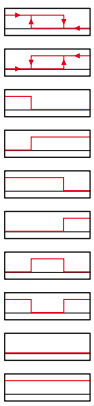

## Switching behavior of relay or transistor outputs:

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 in this case, if the relay is 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**



Relay picks up when the value is below SPL, Hysteresis active
Relay picks up when SPH is exceeded, Hysteresis active
Relay picks up when the value is below SPL
Relay picks up when SPL is exceeded
Relay picks up when the value is below SPH
Relay picks up when SPH is exceeded
Relay picks up when value is between SPL and SPH
Relay picks up when value is outside SPL and SPH
Relay is permanently dropped
Relay is permanently picked up

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 devices 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 Pro, MINI Analog, and MACX Analog ranges are designed to provide protection type "n" for this purpose and must be installed in zone 2 in suitable and approved housing (EN 60079-15 and EN 60079-0) with at least IP54 protection class.

**Example:**

A sensor/actuator with protection type "n" can be connected to an isolator from the MINI Analog Pro, 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 explosion-proof housing or if they have their own explosion-proof housing, they can also be installed in zone 1.

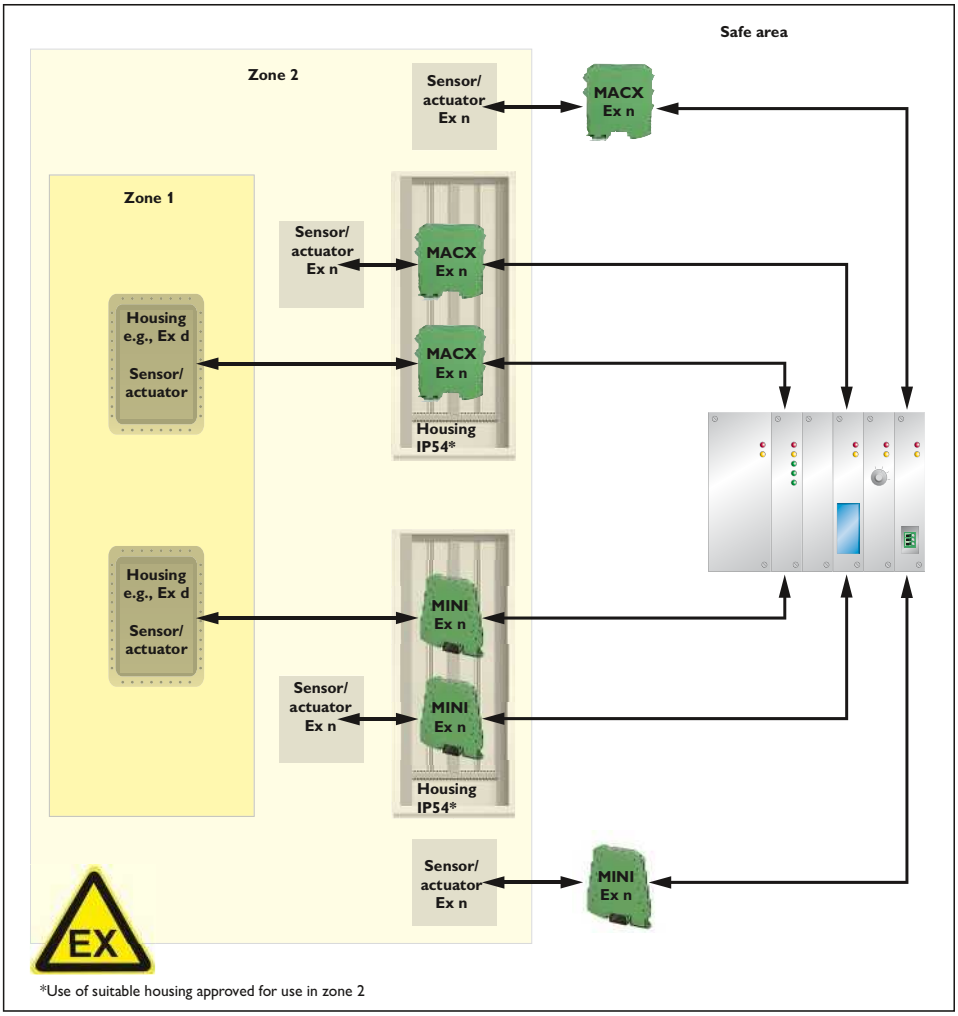
**Installation requirements**

The figure shows a range of options for installing electrical devices in areas with a danger of gas explosions. Special requirements regarding the configuration, selection, and installation of electrical systems in areas with a danger of gas explosions can be found in EN 60079-14.

In the 2008 edition, the relevant contents of EN 61241-14 were incorporated in EN 60079-14.

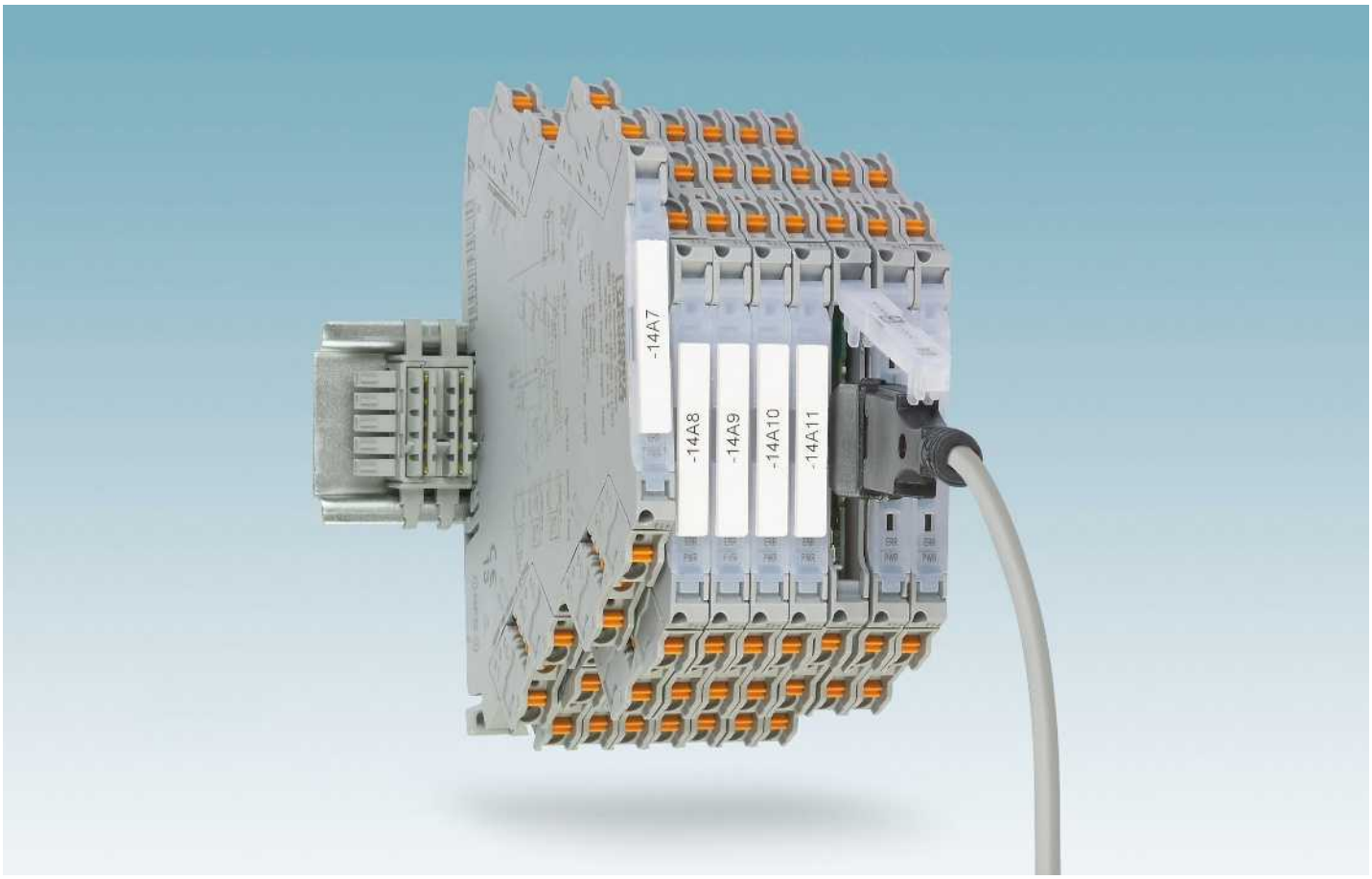
EN 61241-14 must still be observed when installing electrical equipment in areas containing combustible dust. Other important factors when it comes to running systems in potentially explosive areas are inspection, maintenance, and repairs. Stipulations regarding these matters can be found in EN 60079-17 and EN 60079-19.

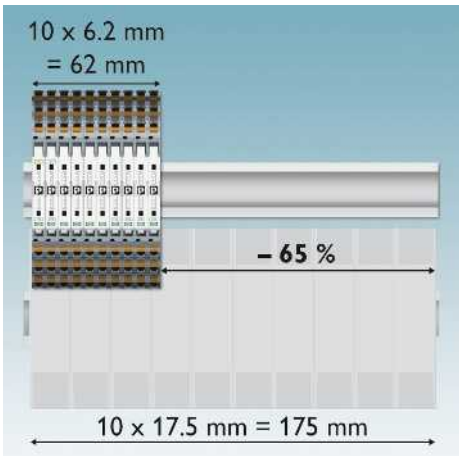
**Installation of electrical devices for signal transmission**




*Use of suitable housing approved for use in zone 2

## Highly compact signal conditioners with plug-in connection technology - MINI Analog Pro



**Easier than ever but as slim as before**

MINI Analog Pro offers you the easiest installation and startup in confined spaces.

– Space savings of up to 65%

**Select from the following categories**

– Analog IN/OUT
– Temperature
– Frequency
– Potentiometer
– Digital IN
– Threshold values
– Accessories

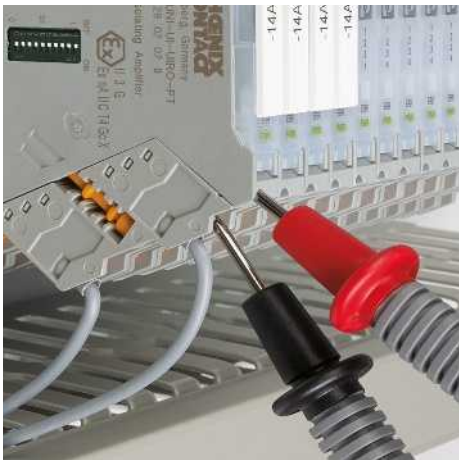
**Easy installation**

– Easily visible and accessible terminal points and FASTCON Pro plug-in connection terminal blocks

**Power bridging and fault monitoring**

– The DIN rail connector simplifies supply and enables group error monitoring via remote diagnostics

**DIN rail connector-compatible**
The DIN rail connector enables the modular bridging of the 24 V supply voltage.



**Measure current signals during operation**

Measure signals conveniently for startup and servicing during operation, thanks to integrated knife disconnect terminal blocks.

– The circuit does not have to be separated in order to integrate the measuring device in the signal circuit
– By setting the connector to the disconnect position, signal circuits can be easily interrupted during servicing and startup

**Numerous parameterization options**

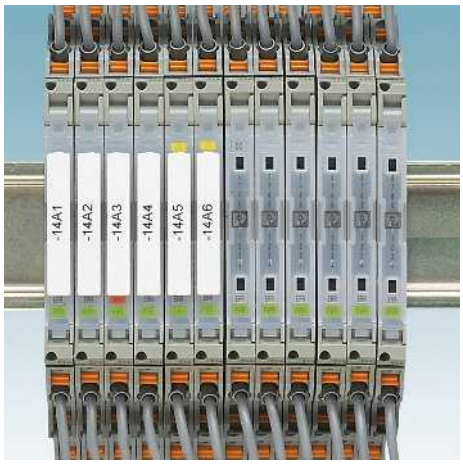
– Via DIP, PC or smartphone app

**App functions via NFC communication**

**Access to information**
– Access module information

**DIP switch setting help**
– Access module information
– Display DIP switch setting help on the smartphone

**Configuration via NFC**
– Access module information
– Display DIP switch setting help
– Wireless configuration via smartphone




**Service-friendly**

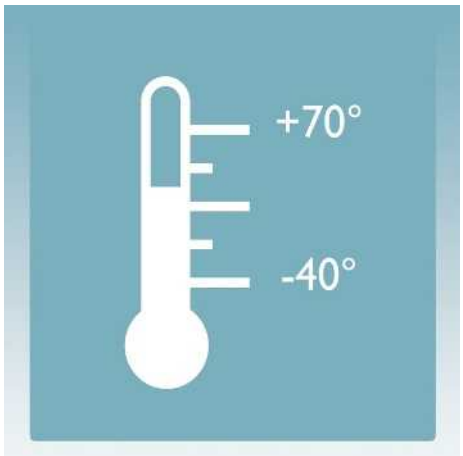
– Large-surface marking areas for complete loop identification using standard marking material as well as constantly visible status LEDs in every module

**Choice of connection technology**

– Wiring with screw connection or fast and tool-free with push-in connection technology

**Optimum signal quality**

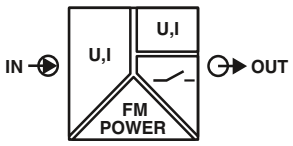
– The latest transmission technology and safe electrical isolation between input, output, and supply with 3 kV test voltage

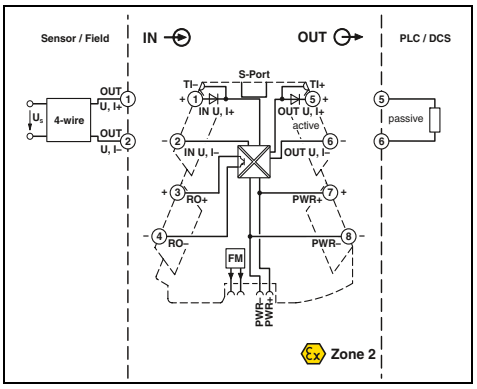



**Suitable for any application**

– Extended supply voltage and temperature range as well as multifunctional device types.

## Analog IN/Analog OUT
## 4-way signal conditioner



Ex n

**Universal 4-way signal conditioner with switching output, configurable**

Ex:

Housing width 6.2 mm

- Universally configurable, highly compact signal conditioner with switching output for electrical isolation, conversion, amplification, and filtering of standard analog signals
- Plug-in connection system
- Safe 4-way isolation
- Standard signal combinations configurable via DIP switches
- Freely configurable via software or smartphone app
- Power supply and fault monitoring possible via DIN rail connector
- Limiting behavior at the output configurable
- Status and error indicator LEDs

**Notes:**

The configuration software can be downloaded from the Internet: phoenixcontact.net/products.

Information on the programming adapters can be found on page 89

Information on MINI Analog Pro accessories can be found from page 85

To order a product with an order configuration, please enter the desired configuration by referring to the order key.

### Technical data

| | | |
|---|---|---|
| Input data | U input | I input |
| Input signal (configurable via DIP switch or freely via software) | 0 V ... 10 V<br>2 V ... 10 V<br>0 V ... 5 V<br>1 V ... 5 V<br>10 V ... 0 V<br>10 V ... 2 V<br>5 V ... 0 V<br>5 V ... 1 V<br>0 V ... 12 V | 0 mA ... 20 mA<br>4 mA ... 20 mA<br>0 mA ... 10 mA<br>2 mA ... 10 mA<br>20 mA ... 0 mA<br>20 mA ... 4 mA<br>10 mA ... 0 mA<br>10 mA ... 2 mA<br>0 mA ... 24 mA |
| Input resistance | > 120 kΩ | approx. 50 Ω |
| Output data | U output | I output |
| Output signal (configurable via DIP switch or freely via software) | 0 V ... 10 V<br>2 V ... 10 V<br>0 V ... 5 V<br>1 V ... 5 V<br>0 V ... 10.5 V | 0 mA ... 20 mA<br>4 mA ... 20 mA<br>0 mA ... 10 mA<br>2 mA ... 10 mA<br>0 mA ... 21 mA |
| Maximum output signal | approx. 12.3 V | 24.6 mA |
| Load $R_B$ | ≥ 10 kΩ | ≤ 600 Ω (at 20 mA) |
| Ripple | < 20 $mV_{PP}$ (at 600 Ω) | < 20 $mV_{PP}$ (at 600 Ω) |
| General data | U output | I output |
| Supply voltage $U_B$ | 9.6 V DC ... 30 V DC | |
| Nominal supply voltage | 24 V DC | |
| Current consumption | 32 mA (at 24 V DC) | 63 mA (at 12 V DC) |
| Power consumption | | ≤ 1 W (at $I_{OUT}$ = 20 mA, 9.6 V DC, 600 Ω load) |
| Maximum transmission error | 0.1 % (of final value) | |
| Temperature coefficient | 0.01 %/K | |
| Step response (10-90%) | approx. 140 ms (15 Hz sample rate)<br>approx. 45 ms (60 Hz sample rate)<br>approx. 25 ms (240 Hz sample rate) | |
| Electrical isolation | Reinforced insulation in accordance with IEC 61010-1 | |
| Test voltage, input/output/supply | 3 kV (50 Hz, 1 min.) | |
| Degree of protection | IP20 | |
| Ambient temperature (operation) | -40 °C ... 70 °C | |
| Mounting | any | |
| Housing material | PBT | |
| Dimensions W / H / D | 6.2 / 110.5 / 120.5 mm | |
| Push-in connection solid / stranded / AWG | 0.14 ... 2.5 $mm^2$ / 0.14 ... 2.5 $mm^2$ / 24 - 12 | |
| Screw connection solid / stranded / AWG | 0.2 ... 1.5 $mm^2$ / 0.2 ... 1.5 $mm^2$ / 24 - 12 | |
| EMC note | Class A product, see page 625 | |
| Conformance / approvals | | |
| Conformance | CE-compliant | |
| ATEX | II 3 G Ex nA IIC T4 Gc X | |
| UL, USA / Canada | UL 508 Listed<br>Class I, Div. 2, Groups A, B, C, D T6<br>Class I, Zone 2, Group IIC T6 | |
| GL | GL applied for | |

### Ordering data

| Description | | Type | Order No. | Pcs. / Pkt. |
|---|---|---|---|---|
| **4-way signal conditioner with switching output,** for electrical isolation of analog signals | | | | |
| Standard configuration | Push-in connection | **MINI MCR-2-UNI-UI-UIRO-PT** | **2902028** | 1 |
| Standard configuration | Screw connection | **MINI MCR-2-UNI-UI-UIRO** | **2902026** | 1 |
| Order configuration | Push-in connection | **MINI MCR-2-UNI-UI-UIRO-PT-C** | **2902027** | 1 |
| Order configuration | Screw connection | **MINI MCR-2-UNI-UI-UIRO-C** | **2902024** | 1 |

### Accessories

| | | | |
|---|---|---|---|
| **Programming adapter** for configuring modules with S-PORT interface | **IFS-USB-PROG-ADAPTER** | **2811271** | 1 |
| **Programming adapter** for configuring modules with NFC interface | **NFC-USB-PROG-ADAPTER** | **2900013** | 1 |

**Order key for MINI MCR-2-UNI-UI-UIRO(-PT)(-C) 4-way signal conditioner** (standard configuration entered as an example)

| Order No. | Input<br>Input signal | Start | End | Sample rate | Output<br>Output signal | Start | End | Output limitation |
|---|---|---|---|---|---|---|---|---|
| **2902024** | **I** | **0.0** | **20.0** | **15** | **I** | **0.0** | **20.0** | **0** |
| 2902024 ≙<br>MINI MCR-2-<br>UNI-UI-UIRO-C<br><br>2902027 ≙<br>MINI MCR-2-<br>UNI-UI-UIRO-PT-C | I ≙ I<br>U ≙ U | 0.0 ≙ 0 mA<br>I: freely selectable between 0.0 ... 24 mA<br><br>U: freely selectable between 0.0 ... 12 V | 20.0 ≙ 20 mA<br>I: freely selectable between 0.0 ... 24 mA<br><br>U: freely selectable between 0.0 ... 12 V | 15 ≙ 15 Hz<br>60 ≙ 60 Hz<br>240 ≙ 240 Hz | I ≙ I<br>U ≙ U | 0.0 ≙ 0 mA<br>I: freely selectable between 0.0 ... 21 mA<br><br>U: freely selectable between 0.0 ... 10.5 V | 20.0 ≙ 20 mA<br>I: freely selectable between 0.0 ... 21 mA<br><br>U: freely selectable between 0.0 ... 10.5 V | 0 ≙ OFF<br>1 ≙ ON |

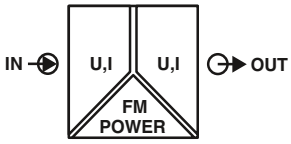
Measuring range span at least 0.5 V/1 mA
Increment 0.1 V/0.1 mA

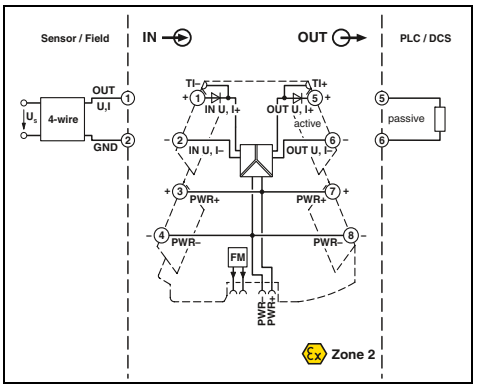
Output signal span at least 0.5 V/1 mA
Increment 0.1 V/0.1 mA

**Failure information**

| ... | Behavior in the event of an error | Open circuit/short circuit | Overrange | Underrange |
|---|---|---|---|---|
| | **NE43DO** | **0.0** | **0.0** | **0.0** |
| | FD ≙ freely definable | 0.0 ≙ 0 mA<br>I: freely selectable between 0.0 ... 21.5 mA<br>U: freely selectable between 0.0 ... 11 V<br>(free definition only for unlimited output)<br>(signal type corresponds to selected output signal) | 0.0 ≙ 0 mA<br>I: freely selectable between 0.0 ... 21.5 mA<br>U: freely selectable between 0.0 ... 11 V<br>(free definition only for unlimited output)<br>(signal type corresponds to selected output signal) | 0.0 ≙ 0 mA<br>I: freely selectable between 0.0 ... 21.5 mA<br>U: freely selectable between 0.0 ... 11 V<br>(free definition only for unlimited output)<br>(signal type corresponds to selected output signal) |
| | **Note: failure information according to NE 43 can only be selected for 4 ... 20 mA output** | | | |
| | NE43UP ≙ NE 43 upscale<br>NE43DO ≙ NE 43 downscale<br>NE430 ≙ NE 43 0 mA<br>NE43UD ≙ NE 43 upscale/downscale | 21.5 mA<br>3.5 mA<br>0 mA<br>3.5 mA | 21.5 mA<br>3.5 mA<br>0 mA<br>21.5 mA | 21.5 mA<br>3.5 mA<br>0 mA<br>21.5 mA |

## Analog IN/Analog OUT
## 3-way signal conditioner



Ex n

NFC

**3-way signal conditioner for standard signals, configurable**

Ex:

Housing width 6.2 mm

- Configurable, highly compact signal conditioner for electrical isolation, conversion, amplification, and filtering of standard analog signals
- Plug-in connection system
- Safe 3-way isolation
- Standard signal combinations configurable via DIP switches
- Power supply and fault monitoring possible via DIN rail connector
- Status LED

**Notes:**

Information on MINI Analog Pro accessories can be found from page 85

To order a product with an order configuration, please enter the desired configuration by referring to the order key.

### Technical data

| | | |
|---|---|---|
| Input data | U input | I input |
| Input signal (configurable using the DIP switch) | 0 V ... 5 V<br>1 V ... 5 V<br>-5 V ... 5 V<br>0 V ... 10 V<br>2 V ... 10 V<br>-10 V ... 10 V<br>0 V ... 20 V<br>4 V ... 20 V<br>-20 V ... 20 V<br>0 V ... 24 V<br>4.8 V ... 24 V<br>-24 V ... 24 V<br>0 V ... 30 V<br>6 V ... 30 V<br>-30 V ... 30 V | 0 mA ... 20 mA<br>4 mA ... 20 mA<br>-20 mA ... 20 mA |
| Input resistance | > 1000 kΩ | approx. 63 Ω |
| Output data | U output | I output |
| Output signal (configurable using the DIP switch) | 0 V ... 5 V<br>1 V ... 5 V<br>-5 V ... 5 V<br>0 V ... 10 V<br>2 V ... 10 V<br>-10 V ... 10 V | 0 mA ... 20 mA<br>4 mA ... 20 mA |
| Maximum output signal | | 22 mA |
| No-load voltage | | < 17 V |
| Short-circuit current | < 32 mA | |
| Load $R_B$ | ≥ 10 kΩ | ≤ 600 Ω (at 20 mA) |
| Ripple | < 20 $mV_{PP}$ (at 600 Ω) | < 20 $mV_{PP}$ (at 600 Ω) |
| General data | U output | I output |
| Supply voltage $U_B$ | 9.6 V DC ... 30 V DC | |
| Nominal supply voltage | 24 V DC | |
| Current consumption | 25 mA (current output, at 24 V DC incl. load) | 54 mA (current output, at 12 V DC incl. load) |
| Power consumption | | ≤ 800 mW (at $I_{OUT}$ = 20 mA, 9.6 V DC, 600 Ω load) |
| Maximum transmission error | ≤ 0.1 % (of final value) | |
| Temperature coefficient | 0.01 %/K | |
| Cut-off frequency (3 dB) | 30 Hz (via DIP switch) | |
| Step response (10-90%) | < 8.5 ms (with 30 Hz filter) | |
| Electrical isolation | Reinforced insulation in accordance with IEC 61010-1 | |
| Test voltage, input/output/supply | 3 kV (50 Hz, 1 min.) | |
| Degree of protection | IP20 | |
| Ambient temperature (operation) | -40 °C ... 70 °C | |
| Mounting | any | |
| Housing material | PBT | |
| Dimensions W / H / D | 6.2 / 110.5 / 120.5 mm | |
| Push-in connection solid / stranded / AWG | 0.14 ... 2.5 $mm^2$ / 0.14 ... 2.5 $mm^2$ / 24 - 12 | |
| Screw connection solid / stranded / AWG | 0.2 ... 1.5 $mm^2$ / 0.2 ... 1.5 $mm^2$ / 24 - 12 | |
| EMC note | Class A product, see page 625 | |
| Conformance / approvals | | |
| Conformance | CE-compliant | |
| ATEX | II 3 G Ex nA IIC T4 Gc X | |
| UL, USA / Canada | UL 508 Listed<br>Class I, Div. 2, Groups A, B, C, D T6<br>Class I, Zone 2, Group IIC T6 | |
| GL | GL applied for | |

### Ordering data

| Description | | Type | Order No. | Pcs. / Pkt. |
|---|---|---|---|---|
| **3-way signal conditioner**, for electrical isolation of analog signals | | | | |
| Standard configuration | Push-in connection | **MINI MCR-2-UI-UI-PT** | **2902040** | 1 |
| Standard configuration | Screw connection | **MINI MCR-2-UI-UI** | **2902037** | 1 |
| Order configuration | Push-in connection | **MINI MCR-2-UI-UI-PT-C** | **2902039** | 1 |
| Order configuration | Screw connection | **MINI MCR-2-UI-UI-C** | **2902036** | 1 |

**Order key for MINI MCR-2-UI-UI(-PT)(-C) 3-way signal conditioner** (standard configuration entered as an example)

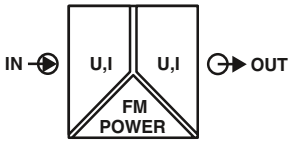
| Order No. | Input | Output | Cut-off frequency |
|---|---|---|---|
| **2902036** / | **IN03** / | **OUT01** / | **5K** |
| 2902036 ≙ MINI MCR-2-UI-UI-C<br><br>2902039 ≙ MINI MCR-2-UI-UI-PT-C | IN 01 ≙ 0 ... 20 mA<br>IN 02 ≙ 4 ... 20 mA<br>IN 03 ≙ 0 ... 10 V<br>IN 04 ≙ 2 ... 10 V<br>IN 05 ≙ 0 ... 5 V<br>IN 06 ≙ 1 ... 5 V<br>IN 21 ≙ -5 ... 5 V<br>IN 22 ≙ -10 ... 10 V<br>IN 23 ≙ -20 ... 20 V<br>IN 32 ≙ 0 ... 20 V<br>IN 35 ≙ -20 ... 20 mA<br>IN 38 ≙ 0 ... 24 V<br>IN 39 ≙ 0 ... 30 V<br>IN 80 ≙ -30 ... 30 V<br>IN 93 ≙ -24 ... 24 V<br>IN 94 ≙ 4.8 ... 24 V<br>IN 95 ≙ 6 ... 30 V<br>IN 96 ≙ 4 ... 20 V | OUT 01 ≙ 0...20 mA<br>OUT 02 ≙ 4 ... 20 mA<br>OUT 03 ≙ 0 ... 10 V<br>OUT 04 ≙ 2 ... 10 V<br>OUT 05 ≙ 0 ... 5 V<br>OUT 06 ≙ 1 ... 5 V<br>OUT 13 ≙ -5 ... 5 V<br>OUT 14 ≙ -10 ... 10 V | 30 Hz<br>5 kHz |

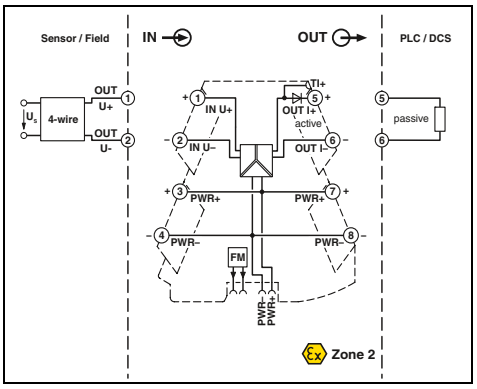
**Signal combination for MINI MCR-2-UI-UI(-PT)(-C) signal conditioner**

| | Output | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Input** | 0 ... 20 mA | 4 ... 20 mA | 0 ... 5 V | 1 ... 5 V | -5 ... 5 V | 0 ... 10 V | 2 ... 10 V | -10 ... 10 V |
| 0 ... 20 mA | X | X | X | X | X | X | X | X |
| 4 ... 20 mA | X | X | X | X | X | X | X | X |
| -20 ... 20 mA | X | X | X | X | X | X | X | X |
| 0 ... 5 V | X | X | X | X | X | X | X | X |
| 1 ... 5 V | X | X | X | X | X | X | X | X |
| -5 ... 5 V | X | X | X | X | X | X | X | X |
| 0 ... 10 V | X | X | X | X | X | X | X | X |
| 2 ... 10 V | X | X | X | X | X | X | X | X |
| -10 ... 10 V | X | X | X | X | X | X | X | X |
| 0 ... 20 V | X | X | X | X | X | X | X | X |
| 4 ... 20 V | X | X | X | X | X | X | X | X |
| -20 ... 20 V | X | X | X | X | X | X | X | X |
| 0 ... 24 V | X | X | X | X | X | X | X | X |
| 4.8 ... 24 V | X | X | X | X | X | X | X | X |
| -24 ... 24 V | X | X | X | X | X | X | X | X |
| 0 ... 30 V | X | X | X | X | X | X | X | X |
| 6 ... 30 V | X | X | X | X | X | X | X | X |
| -30 ... 30 V | X | X | X | X | X | X | X | X |

## Highly compact signal conditioners with plug-in connection technology - MINI Analog Pro

### Analog IN/Analog OUT
### 3-way signal conditioner




Ex n

NFC

**3-way signal conditioner with fixed signal combinations**

Ex:

- Highly compact signal conditioner for electrical isolation, conversion, amplification, and filtering of standard analog signals
- Fixed signal combinations
- Plug-in connection system
- Safe 3-way isolation
- Power supply and fault monitoring possible via DIN rail connector
- Status LED

**Notes:**

Information on MINI Analog Pro accessories can be found from page 85

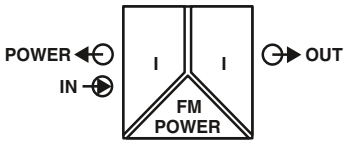
### Technical data

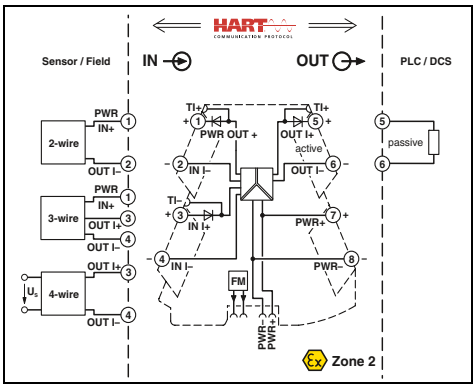
| | | |
|---|---|---|
| Input data | U input | I input |
| Input resistance | approx. 100 kΩ | approx. 63 Ω |
| Output data | U output | I output |
| Maximum output signal | 11 V | 22 mA |
| No-load voltage | | < 17 V |
| Short-circuit current | < 15 mA | |
| Load $R_B$ | ≥ 10 kΩ | ≤ 600 Ω (at 20 mA) |
| Ripple | < 20 $mV_{PP}$ (at 10 kΩ) | < 20 $mV_{PP}$ (at 600 Ω) |
| General data | | |
| Supply voltage $U_B$ | 9.6 V DC ... 30 V DC | |
| Nominal supply voltage | 24 V DC | |
| Typ. current consumption | 25 mA (at 24 V DC) | |
| Maximum transmission error | 0.1 % (of final value) | |
| Temperature coefficient | 0.01 %/K | |
| Cut-off frequency (3 dB) | approx. 30 Hz | |
| Step response (10-90%) | approx. 10 ms | |
| Degree of protection | IP20 | |
| Electrical isolation | Reinforced insulation in accordance with IEC 61010-1 | |
| Test voltage, input/output/supply | 3 kV (50 Hz, 1 min.) | |
| Ambient temperature (operation) | -40 °C ... 70 °C | |
| Housing material | PBT | |
| Dimensions W / H / D | 6.2 / 110.5 / 120.5 mm | |
| Push-in connection solid / stranded / AWG | 0.14 ... 2.5 $mm^2$ / 0.14 ... 2.5 $mm^2$ / 24 - 12 | |
| Screw connection solid / stranded / AWG | 0.2 ... 1.5 $mm^2$ / 0.2 ... 1.5 $mm^2$ / 24 - 12 | |
| EMC note | Class A product, see page 625 | |
| Conformance / approvals | | |
| Conformance | CE-compliant | |
| ATEX | II 3 G Ex nA IIC T4 Gc X | |
| UL, USA / Canada | UL 508 Listed<br>Class I, Div. 2, Groups A, B, C, D T6<br>Class I, Zone 2, Group IIC T6 | |
| GL | GL applied for | |

### Ordering data

| Description | Input signal | Output signal | Type | Order No. | Pcs. / Pkt. |
|---|---|---|---|---|---|
| **3-way signal conditioner**, for electrical isolation of analog signals | | | | | |
| Push-in connection | 0 ... 10 V | 0 ... 20 mA | **MINI MCR-2-U-I0-PT** | **2902023** | 1 |
| Screw connection | 0 ... 10 V | 0 ... 20 mA | **MINI MCR-2-U-I0** | **2902022** | 1 |
| Push-in connection | 0 ... 10 V | 4 ... 20 mA | **MINI MCR-2-U-I4-PT** | **2902030** | 1 |
| Screw connection | 0 ... 10 V | 4 ... 20 mA | **MINI MCR-2-U-I4** | **2902029** | 1 |
| Push-in connection | 0 ... 20 mA | 0 ... 10 V | **MINI MCR-2-I0-U-PT** | **2902001** | 1 |
| Screw connection | 0 ... 20 mA | 0 ... 10 V | **MINI MCR-2-I0-U** | **2902000** | 1 |
| Push-in connection | 4 ... 20 mA | 0 ... 10 V | **MINI MCR-2-I4-U-PT** | **2902003** | 1 |
| Screw connection | 4 ... 20 mA | 0 ... 10 V | **MINI MCR-2-I4-U** | **2902002** | 1 |
| Push-in connection | 0 ... 20 mA,<br>4 ... 20 mA | 0 ... 20 mA,<br>4 ... 20 mA | **MINI MCR-2-I-I-PT** | **2901999** | 1 |
| Screw connection | 0 ... 20 mA,<br>4 ... 20 mA | 0 ... 20 mA,<br>4 ... 20 mA | **MINI MCR-2-I-I** | **2901998** | 1 |
| Push-in connection | 0 ... 10 V,<br>2 ... 10 V | 0 ... 10 V,<br>-10 ... 10 V | **MINI MCR-2-U-U-PT** | **2902043** | 1 |
| Screw connection | 0 ... 10 V,<br>2 ... 10 V | 0 ... 10 V,<br>-10 ... 10 V | **MINI MCR-2-U-U** | **2902042** | 1 |

## Analog IN/Analog OUT
## 3-way repeater power supply




Ex n

NFC

**3-way repeater power supply with HART transmission**

Ex:

Housing width 6.2 mm

- Highly compact repeater power supply for electrical isolation, conversion, 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
- Plug-in connection system
- Safe 3-way isolation
- Bidirectional HART transmission as an option
- Power supply and fault monitoring possible via DIN rail connector
- Status LED

**Notes:**

Information about power bridging, system cabling, and marking components can be found from page 116

### Technical data

| | |
|---|---|
| Input data | |
| Input signal | 0 ... 20 mA, isolator operation / 4 ... 20 mA, repeater power supply and isolator operation |
| Input resistance | approx. 68 Ω |
| Transmitter supply voltage | > 19.5 V |
| Output data | |
| Output signal | 0 ... 20 mA / 4 ... 20 mA |
| Maximum output signal | 24 mA |
| No-load voltage | < 20 V |
| Load $R_B$ | ≤ 600 Ω (at 20 mA) |
| Ripple | < 20 $mV_{PP}$ (at 600 Ω) |
| General data | |
| Supply voltage $U_B$ | 9.6 V DC ... 30 V DC |
| Nominal supply voltage | 24 V DC |
| Current consumption | 25 mA (at 24 V DC and in isolator operation) |
| Power consumption | ≤ 1400 mW (at $I_{OUT}$ = 20 mA, 9.6 V DC, 600 Ω load) |
| Maximum transmission error | 0.1 % (of final value) |
| Temperature coefficient | 0.01 %/K |
| Cut-off frequency (3 dB) | > 1.75 kHz (typ.) |
| Communication | HART specification in both operating modes (RPSS isolator / RPSS repeater power supply) |
| Step response (10-90%) | < 200 µs (typ.) |
| Electrical isolation | Reinforced insulation in accordance with IEC 61010-1 |
| Test voltage, input/output/supply | 3 kV (50 Hz, 1 min.) |
| Degree of protection | IP20 |
| Ambient temperature (operation) | -40 °C ... 70 °C |
| Mounting | any |
| Housing material | PBT |
| Dimensions W / H / D | 6.2 / 110.5 / 120.5 mm |
| Push-in connection solid / stranded / AWG | 0.14 ... 2.5 $mm^2$ / 0.14 ... 2.5 $mm^2$ / 24 - 12 |
| Screw connection solid / stranded / AWG | 0.2 ... 1.5 $mm^2$ / 0.2 ... 1.5 $mm^2$ / 24 - 12 |
| EMC note | Class A product, see page 625 |
| Conformance / approvals | |
| Conformance | CE-compliant |
| ATEX | Ex II 3 G Ex nA IIC T4 Gc X |
| UL, USA / Canada | UL 508 Listed<br>Class I, Div. 2, Groups A, B, C, D T5<br>Class I, Zone 2, Group IIC T5 |
| GL | GL applied for |

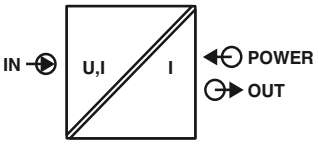
### Ordering data

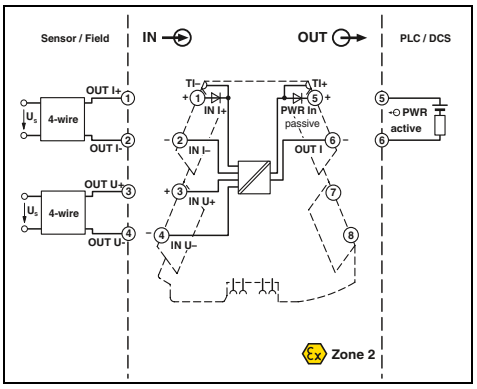
| Description | Type | Order No. | Pcs. / Pkt. |
|---|---|---|---|
| **3-way repeater power supply with HART transmission** | | | |
| Push-in connection | **MINI MCR-2-RPSS-I-I-PT** | **2902015** | 1 |
| Screw connection | **MINI MCR-2-RPSS-I-I** | **2902014** | 1 |

## Highly compact signal conditioners with plug-in connection technology - MINI Analog Pro

### Analog IN/Analog OUT
### 2-way passive isolator, output loop-powered

new




Ex n

NFC

**Configurable, up to 74 signal combinations**

- Highly compact passive isolator for electrical isolation and filtering of standard analog signals
- Safe 2-way isolation
- Supplied by an output loop
- Does not require any additional auxiliary voltage
- Up to 74 signal combinations can be configured using DIP switches
- Plug-in connection technology
- Voltage input from mV voltages up to 30 V
- Current input from 2 mA right up to 40 mA
- Status LED

**Notes:**

To order a product with an order configuration, please enter the desired configuration by referring to the order key.

Information on MINI Analog Pro accessories can be found from page 85

Housing width 6.2 mm

### Technical data

| | | |
|---|---|---|
| **Input data** | | |
| Input signal (configurable using the DIP switch) | 2 ... 10 V, additional ranges can be configured, see table | |
| Maximum input signal | < 30 V | < 40 mA (electric strength up to 30 V) |
| Input resistance | approx. 100 kΩ (at ≤ 1 V, otherwise approximately 1 MΩ) | ≤ 50 Ω |
| **Output data** | | |
| Output signal | 4 ... 20 mA | |
| Maximum output signal | 29 mA | |
| Load $R_B$ | $(U_B - 8\ V) / 22\ mA$ | |
| Ripple | < 20 $mV_{PP}$ (at 600 Ω) | |
| **General data** | | |
| Current consumption | 3 mA | |
| Maximum transmission error | < 0.1 % (of final value) | |
| Temperature coefficient | 0.01 %/K, typ. 0.005 %/K | |
| Cut-off frequency (3 dB) | approx. 30 Hz | |
| Step response (10-90%) | 15 ms | |
| Electrical isolation | Reinforced insulation in accordance with IEC 61010-1 | |
| Test voltage, input/output/supply | 3 kV (50 Hz, 1 min.) | |
| Degree of protection | IP20 | |
| Ambient temperature (operation) | -40 °C ... 70 °C | |
| Housing material | PBT | |
| Dimensions W / H / D | 6.2 / 110.5 / 120.5 mm | |
| Push-in connection solid / stranded / AWG | 0.14 ... 2.5 $mm^2$ / 0.14 ... 2.5 $mm^2$ / 24 - 12 | |
| Screw connection solid / stranded / AWG | 0.2 ... 1.5 $mm^2$ / 0.2 ... 1.5 $mm^2$ / 24 - 12 | |
| **Conformance / approvals** | | |
| Conformance | CE-compliant | |
| ATEX | Ⓔx II 3 G Ex nA IIC T4 Gc X | |
| UL, USA / Canada | UL applied for<br>Class I, Div. 2, Groups A, B, C, D T5 applied for | |

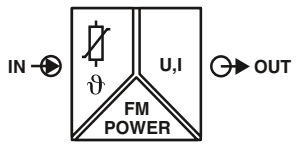
### Ordering data

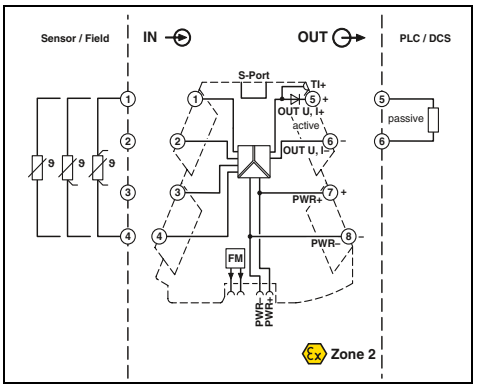
| Description | | Type | Order No. | Pcs. / Pkt. |
|---|---|---|---|---|
| **Output loop-powered 2-way isolator,** for isolating current signals without auxiliary power | | | | |
| Standard configuration | Push-in connection | **MINI MCR-2-UI-I-OLP-PT** | **2902063** | 1 |
| Standard configuration | Screw connection | **MINI MCR-2-UI-I-OLP** | **2902061** | 1 |
| Order configuration | Push-in connection | **MINI MCR-2-UI-I-OLP-PT-C** | **2902062** | 1 |
| Order configuration | Screw connection | **MINI MCR-2-UI-I-OLP-C** | **2902060** | 1 |

**Order key for MINI MCR-2-UI-I-OLP(-PT)(-C)**

| Order No. | Input | | | | |
|---|---|---|---|---|---|
| **2602060** | / **0 mV ... 1000 mV** | | | | |
| 2902060 ≙ MINI MCR-2-UI-I-OLP-C | 0 mV ... 1000 mV | 0 V ... 10 V | -1000 mV ... 1000 mV | -10 V ... 10 V | 0 mA ... 40 mA |
| | 0 mV ... 750 mV | 0 V ... 7.5 V | -750 mV ... 750 mV | -7.5 V ... 7.5 V | 0 mA ... 30 mA |
| | 0 mV ... 500 mV | 0 V ... 5 V | -500 mV ... 500 mV | -5 V ... 5 V | 0 mA ... 20 mA |
| | 0 mV ... 300 mV | 0 V ... 3 V | -300 mV ... 300 mV | -3 V ... 3 V | 0 mA ... 12 mA |
| 2902062 ≙ MINI MCR-2-UI-I-OLP-PT-C | 0 mV ... 250 mV | 0 V ... 2.5 V | -250 mV ... 250 mV | -2.5 V ... 2.5 V | 0 mA ... 10 mA |
| | 0 mV ... 200 mV | 0 V ... 2 V | -200 mV ... 200 mV | -2 V ... 2 V | 0 mA ... 8 mA |
| | 0 mV ... 150 mV | 0 V ... 1.5 V | -125 mV ... 125 mV | -1.25 V ... 1.25 V | 0 mA ... 7.5 mA |
| | 0 mV ... 125 mV | 0 V ... 1.25 V | -120 mV ... 120 mV | -1.2 V ... 1.2 V | 0 mA ... 5 mA |
| | 0 mV ... 120 mV | 0 V ... 1.2 V | -150 mV ... 150 mV | -1.5 V ... 1.5 V | 0 mA ... 6 mA |
| | 0 mV ... 100 mV | 0 V ... 30 V | -100 mV ... 100 mV | -30 V ... 30 V | 0 mA ... 4 mA |
| | 0 mV ... 75 mV | 0 V ... 25 V | -75 mV ... 75 mV | -25 V ... 25 V | 0 mA ... 3 mA |
| | 0 mV ... 60 mV | 0 V ... 20 V | -60 mV ... 60 mV | -20 V ... 20 V | 0 mA ... 2.5 mA |
| | 0 mV ... 50 mV | 0 V ... 12.5 V | -50 mV ... 50 mV | -12.5 V ... 12.5 V | 0 mA ... 2 mA |
| | | 0 V ... 12 V | | -12 V ... 12 V | 4 mA ... 20 mA |
| | | 0 V ... 15 V | | -15 V ... 15 V | 2 mA ... 10 mA |
| | | | | 1 V ... 5 V | 1 mA ... 5 mA |

## Temperature
## Temperature transducer for resistance thermometers



Ex n

**Universal temperature transducer for resistance thermometers**

Ex:
Housing width 6.2 mm

- Universally configurable, highly compact temperature transducer for electrical isolation, conversion, amplification, and filtering of resistance thermometer and remote resistance-type sensor signals
- For 2, 3 or 4-wire sensors according to IEC 751, JIS, GOST

- Plug-in connection system
- Safe 3-way isolation
- Standard signal combinations configurable via DIP switches
- Freely configurable via software or smartphone app
- Power supply and fault monitoring possible via DIN rail connector
- Status and error indicator LEDs

| Notes: |
|---|
| The configuration software can be downloaded from the Internet: phoenixcontact.net/products. |
| Information on the programming adapters can be found on page 89 |
| Information on MINI Analog Pro accessories can be found from page 85 |
| To order a product with an order configuration, please enter the desired configuration by referring to the order key. |

### Technical data

| | | |
|---|---|---|
| **Input data** | | |
| Input signal (can be configured using DIP switches) | Pt, Ni, Cu sensors : 2, 3, 4-wire | |
| Temperature range | -200 °C ... 850 °C (range depends on sensor type, range can be set freely via software or in increments via DIP switches) | |
| Measuring range span | ≥ 20 K | |
| Linear resistance measuring range | 0 Ω ... 4000 Ω (minimum measuring span: 10% of the selected measuring range) | |
| **Output data** | U output | I output |
| Output signal (configurable via DIP switch or freely via software) | 0 ... 5 V / 1 ... 5 V | 0 ... 20 mA / 4 ... 20 mA |
| | 0 ... 10 V / 10 ... 0 V | 20 ... 0 mA / 20 ... 4 mA |
| Maximum output signal | approx. 12.3 V | 24.6 mA |
| No-load voltage | | < 17.5 V |
| Short-circuit current | < 31.5 mA | |
| Load $R_B$ | ≥ 10 kΩ | ≤ 600 Ω (at 20 mA) |
| Ripple | < 20 $mV_{PP}$ | < 20 $mV_{PP}$ (at 600 Ω) |
| **General data** | | |
| Supply voltage $U_B$ | 9.6 V DC ... 30 V DC | |
| Current consumption | 32 mA (at 24 V DC) | |
| Power consumption | ≤ 850 mW (at $I_{OUT}$ = 20 mA, 9.6 V DC, 600 Ω load) | |
| Transmission error | 0.1 % * 350 K / set measuring range; 0.1 % > 350 K (Pt/Ni)<br>0.3 % * 200 K / set measuring range; 0.3 % > 200 K (Cu) | |
| Temperature coefficient | 0.01 %/K | |
| Step response (0–99%) | typ. 200 ms (2-wire)<br>typ. 500 ms (3-wire)<br>typ. 500 ms (4-wire) | |
| Electrical isolation | Reinforced insulation in accordance with IEC 61010-1 | |
| Test voltage, input/output/supply | 3 kV (50 Hz, 1 min.) | |
| Ambient temperature (operation) | -40 °C ... 70 °C | |
| Housing material | PBT | |
| Dimensions W / H / D | 6.2 / 110.5 / 120.5 mm | |
| Push-in connection solid / stranded / AWG | 0.14 ... 2.5 $mm^2$ / 0.14 ... 2.5 $mm^2$ / 24 - 12 | |
| Screw connection solid / stranded / AWG | 0.2 ... 1.5 $mm^2$ / 0.2 ... 1.5 $mm^2$ / 24 - 12 | |
| EMC note | Class A product, see page 625 | |
| **Conformance / approvals** | | |
| Conformance | CE-compliant | |
| ATEX | II 3 G Ex nA IIC T4 Gc X | |
| UL, USA / Canada | UL 508 Listed<br>Class I, Div. 2, Groups A, B, C, D T6<br>Class I, Zone 2, Group IIC T6 | |
| GL | GL applied for | |

### Ordering data

| Description | | Type | Order No. | Pcs. / Pkt. |
|---|---|---|---|---|
| **Temperature transducer for resistance thermometers** | | | | |
| Standard configuration | Push-in connection | **MINI MCR-2-RTD-UI-PT** | **2902052** | 1 |
| Standard configuration | Screw connection | **MINI MCR-2-RTD-UI** | **2902049** | 1 |
| Order configuration | Push-in connection | **MINI MCR-2-RTD-UI-PT-C** | **2902051** | 1 |
| Order configuration | Screw connection | **MINI MCR-2-RTD-UI-C** | **2902048** | 1 |

### Accessories

| | | | |
|---|---|---|---|
| **Programming adapter** for configuring modules with S-PORT interface | **IFS-USB-PROG-ADAPTER** | **2811271** | 1 |
| **Programming adapter** for configuring modules with NFC interface | **NFC-USB-PROG-ADAPTER** | **2900013** | 1 |

**Order key for MINI MCR-2-RTD-UI(-PT)(-C) temperature transducer** (standard configuration entered as example)

| Order No. | Sensor type | Connection technology | Measuring range Start | Measuring range End | Measuring unit | Output Output signal | Output Start | Output End |
|---|---|---|---|---|---|---|---|---|
| 2902048 / | PT100 / | 3 / | -50 / | 150 / | C / | I / | 4.0 / | 20.0 / ... |
| 2902048 ≙ MINI MCR-2-RTD-UI-C<br><br>2902051 ≙ MINI MCR-2-RTD-UI-PT-C | PT100 ≙ Pt 100 IEC 751<br>PT200 ≙ Pt 200 IEC 751<br>PT500 ≙ Pt 500 IEC 751<br>PT1000 ≙ Pt 1000 IEC 751<br>PT100G ≙ Pt 100 GOST 6651-2009 (α = 0.00394)<br>PT1000G ≙ Pt 1000 GOST 6651-2009 (α = 0.00394)<br>PT100J ≙ Pt 100 JIS C1604/1997<br>PT1000J ≙ Pt 1000 JIS C1604/1997<br>NI100 ≙ Ni 100 DIN 43760<br>NI1000 ≙ Ni 1000 DIN 43760<br>CU50 ≙ Cu 50 GOST 6651-2009 (α = 0.00428)<br>CU100 ≙ Cu 100 GOST 6651-2009 (α = 0.00428)<br>CU53 ≙ Cu 53 GOST 6651-2009 (α = 0.00426) | 2 ≙ 2-wire<br>3 ≙ 3-wire<br>4 ≙ 4-wire | freely selectable between -200°C ... 850°C (measuring range limits depend on sensor type) | freely selectable between -200°C ... 850°C (measuring range limits depend on sensor type) | C ≙ °C<br>F ≙ °F | I ≙ I<br>U ≙ U | 0.0 ≙ 0 mA<br>I: freely selectable between 0.0 ... 21 mA<br><br>U: freely selectable between 0.0 ... 10.5 V | 20.0 ≙ 20 mA<br>I: freely selectable between 0.0 ... 21 mA<br><br>U: freely selectable between 0.0 ... 10.5 V |

Minimum measuring span 20 K

Output signal span at least 0.5 V/1 mA
Increment 0.1 V/0.1 mA

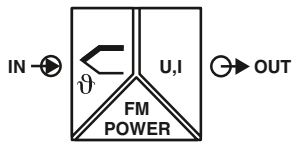
**Failure information**

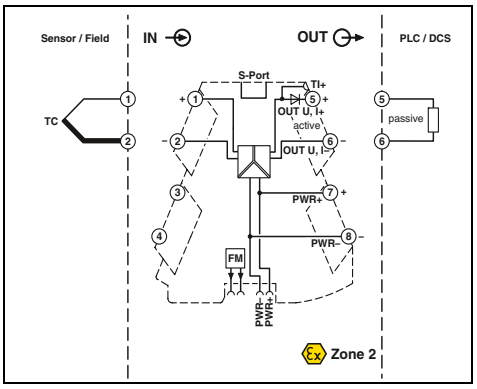
| ... / | Behavior in the event of an error | Open circuit | Short circuit | Overrange | Underrange |
|---|---|---|---|---|---|
| | NE43DO / | 0.0 / | 0.0 / | 0.0 / | 0.0 |
| | FD ≙ freely definable | 0.0 ≙ 0 mA<br>I: freely selectable between 0.0 ... 21.5 mA<br>U: freely selectable between 0.0 ... 11 V<br>(signal type corresponds to selected output signal) | 0.0 ≙ 0 mA<br>I: freely selectable between 0.0 ... 21.5 mA<br>U: freely selectable between 0.0 ... 11 V<br>(signal type corresponds to selected output signal) | 0.0 ≙ 0 mA<br>I: freely selectable between 0.0 ... 21.5 mA<br>U: freely selectable between 0.0 ... 11 V<br>(signal type corresponds to selected output signal) | 0.0 ≙ 0 mA<br>I: freely selectable between 0.0 ... 21.5 mA<br>U: freely selectable between 0.0 ... 11 V<br>(signal type corresponds to selected output signal) |
| | **Note: failure information according to NE 43 can only be selected for 4 ... 20 mA output** | | | | |
| | NE43UP ≙ NE 43 upscale<br>NE43DO ≙ NE 43 downscale<br>NE430 ≙ NE 43 0 mA<br>NE43UD ≙ NE 43 upscale/downscale | 21.5 mA<br>3.5 mA<br>0 mA<br>3.5 mA | 21.5 mA<br>3.5 mA<br>0 mA<br>3.5 mA | 21.5 mA<br>3.5 mA<br>0 mA<br>21.5 mA | 21.5 mA<br>3.5 mA<br>0 mA<br>21.5 mA |

**Sensor types and measuring ranges for MINI MCR-2-RTD-UI(-PT)(-C) temperature transducer**

| Sensor type | Standard | Measuring range | Smallest measuring span | Adjustable using: |
|---|---|---|---|---|
| Pt100 | IEC 751 = GOST 6651-2009 (α = 0.00385) | -200°C ... +850°C | 20 K | DIP switch |
| Pt200 | IEC 751 = GOST 6651-2009 (α = 0.00385) | -200°C ... +850°C | 20 K | DIP switch |
| Pt500 | IEC 751 = GOST 6651-2009 (α = 0.00385) | -200°C ... +850°C | 20 K | Software or smartphone app |
| Pt1000 | IEC 751 = GOST 6651-2009 (α = 0.00385) | -200°C ... +850°C | 20 K | Software or smartphone app |
| Pt100 | GOST 6651-2009 (α = 0.00391) | -200°C ... +850°C | 20 K | Software or smartphone app |
| Pt1000 | GOST 6651-2009 (α = 0.00391) | -200°C ... +850°C | 20 K | Software or smartphone app |
| Pt100 | JIS C1604-1997 | -200°C ... +850°C | 20 K | Software or smartphone app |
| Pt1000 | JIS C1604-1997 | -200°C ... +850°C | 20 K | Software or smartphone app |
| Ni100 | DIN 43760 | -60°C ... +250°C | 20 K | Software or smartphone app |
| Ni1000 | DIN 43760 | -60°C ... +250°C | 20 K | Software or smartphone app |
| Cu50 | GOST 6651-2009 (α = 0.0428) | -180°C ... +200°C | 20 K | Software or smartphone app |
| Cu100 | GOST 6651-2009 (α = 0.0428) | -180°C ... +200°C | 20 K | Software or smartphone app |
| Cu53 | GOST 6651-2009 (α = 0.0426) | -50°C ... +180°C | 20 K | Software or smartphone app |
| Customer-specific characteristic curves | | -200°C ... +850°C | 20 K | Software or smartphone app |

## Temperature
## Temperature transducer for thermocouples



Ex n

**Universal temperature transducer for thermocouples**

Ex:

Housing width 6.2 mm

- Universally configurable, highly compact temperature transducer for electrical isolation, conversion, amplification, and filtering of thermocouple signals
- For thermocouples according to IEC 584 and GOST
- Internal cold junction compensation
- Plug-in connection system
- Safe 3-way isolation
- Standard signal combinations configurable via DIP switches
- Freely configurable via software or smartphone app
- Power supply and fault monitoring possible via DIN rail connector
- Status and error indicator LEDs

| Notes: |
|---|
| The configuration software can be downloaded from the Internet: phoenixcontact.net/products. |
| Information on the programming adapters can be found on page 89 |
| Information on MINI Analog Pro accessories can be found from page 85 |
| To order a product with an order configuration, please enter the desired configuration by referring to the order key. |

### Technical data

| | | |
|---|---|---|
| Input data | | |
| Input signal (can be configured using DIP switches) | B, E, J, K, N, R, S, T, L, U, A-1, A-2, A-3, M, L | |
| Temperature range | -250 °C ... 2500 °C (range depends on sensor type, range can be set freely via software or in increments via DIP switches) | |
| Measuring range span | min. 50 K | |
| Output data | U output | I output |
| Output signal (configurable via DIP switch or freely via software) | 0 ... 5 V / 1 ... 5 V | 0 ... 20 mA / 4 ... 20 mA |
| | 0 ... 10 V / 10 ... 0 V | 20 ... 0 mA / 20 ... 4 mA |
| Maximum output signal | approx. 12.3 V | 24.6 mA |
| No-load voltage | | < 17.5 V |
| Short-circuit current | < 31.5 mA | |
| Load $R_B$ | ≥ 10 kΩ | ≤ 600 Ω (at 20 mA) |
| Ripple | < 20 $mV_{PP}$ | < 20 $mV_{PP}$ (at 600 Ω) |
| General data | | |
| Supply voltage $U_B$ | 9.6 V DC ... 30 V DC | |
| Current consumption | 32.7 mA (at 24 V DC) | |
| Power consumption | ≤ 850 mW (at $I_{OUT}$ = 20 mA, 9.6 V DC, 600 Ω load) | |
| Transmission error | 0.1 % * 600 K / set measuring range; 0.1 % > 600 K (E, J, K, N, T, L, U, M Gost, L Gost) 0.2 % * 600 K / set measuring range; 0.2 % > 600 K (B, R, S, A1, A2, A3) | |
| Cold junction errors | - ( typ. 2 K (2 K + (0.2 K * ΔT)) ) | |
| Temperature coefficient | ≤ 0.01 %/K | |
| Step response (0–99%) | typ. 400 ms | |
| Electrical isolation | Reinforced insulation in accordance with IEC 61010-1 | |
| Test voltage, input/output/supply | 3 kV (50 Hz, 1 min.) | |
| Ambient temperature (operation) | -40 °C ... 70 °C | |
| Housing material | PBT | |
| Dimensions W / H / D | 6.2 / 110.5 / 120.5 mm | |
| Push-in connection solid / stranded / AWG | 0.14 ... 2.5 $mm^2$ / 0.14 ... 2.5 $mm^2$ / 24 - 12 | |
| Screw connection solid / stranded / AWG | 0.2 ... 1.5 $mm^2$ / 0.2 ... 1.5 $mm^2$ / 24 - 12 | |
| EMC note | Class A product, see page 625 | |
| Conformance / approvals | | |
| Conformance | CE-compliant | |
| ATEX | II 3 G Ex nA IIC T4 Gc X | |
| UL, USA / Canada | UL 508 Listed<br>Class I, Div. 2, Groups A, B, C, D T6<br>Class I, Zone 2, Group IIC T6 | |
| GL | GL applied for | |

### Ordering data

| Description | | Type | Order No. | Pcs. / Pkt. |
|---|---|---|---|---|
| **Temperature transducer for resistance thermometers** | | | | |
| Standard configuration | Push-in connection | **MINI MCR-2-TC-UI-PT** | **2905249** | 1 |
| Standard configuration | Screw connection | **MINI MCR-2-TC-UI** | **2902055** | 1 |
| Order configuration | Push-in connection | **MINI MCR-2-TC-UI-PT-C** | **2905248** | 1 |
| Order configuration | Screw connection | **MINI MCR-2-TC-UI-C** | **2902053** | 1 |

### Accessories

| | | | |
|---|---|---|---|
| **Programming adapter** for configuring modules with S-PORT interface | **IFS-USB-PROG-ADAPTER** | **2811271** | 1 |
| **Programming adapter** for configuring modules with NFC interface | **NFC-USB-PROG-ADAPTER** | **2900013** | 1 |

**Order key for MINI MCR-2-TC-UI(-PT)(-C) temperature transducer** (standard configuration entered as an example)

| Order No. | Sensor type | Cold junction error compensation | Measuring range Start | Measuring range End | Measuring unit | Output Output signal | Output Start | Output End |
|---|---|---|---|---|---|---|---|---|
| 2902048 / | J / | 1 / | -200 / | 1200 / | C / | I / | 4.0 / | 20.0 / ... |
| 2902053 ≙ MINI MCR-2-TC-UI-C<br><br>2905248 ≙ MINI MCR-2-TC-UI-PT-C | B ≙ B IEC 584-1 (Pt30Rh-Pt6Rh)<br>E ≙ E IEC 584-1 (NiCr-CuNi)<br>J ≙ J IEC 584-1 (Fe-CuNi)<br>K ≙ K IEC 584-1 (NiCr-Ni)<br>N ≙ N IEC 584-1 (NiCrSi-NiSi)<br>R ≙ R IEC 584-1 (Pt13Rh-Pt)<br>S ≙ S IEC 584-1 (Pt10Rh-Pt)<br>T ≙ T IEC 584-1 (Cu-CuNi)<br>L ≙ L DIN 43760 (Fe-CuNi)<br>U ≙ U DIN 43760 (Cu-CuNi)<br>A1G ≙ A-1 GOST 8.585-2001<br>A2G ≙ A-2 GOST 8.585-2001<br>A3G ≙ A-3 GOST 8.585-2001<br>MG ≙ M GOST 8.585-2001<br>LG ≙ L GOST 8.585-2001 | 0 ≙ OFF<br>1 ≙ ON | freely selectable between -250°C ... 2500°C (measuring range limits depend on sensor type) | freely selectable between -250°C ... 2500°C (measuring range limits depend on sensor type) | C ≙ °C<br>F ≙ °F | I ≙ I<br>U ≙ U | 0.0 ≙ 0 mA<br>I: freely selectable between 0.0 ... 21 mA<br><br>U: freely selectable between 0.0 ... 10.5 V | 20.0 ≙ 20 mA<br>I: freely selectable between 0.0 ... 21 mA<br><br>U: freely selectable between 0.0 ... 10.5 V |

Minimum measuring span 50 K

Output signal span at least 0.5 V/1 mA
Increment 0.1 V/0.1 mA

**Failure information**

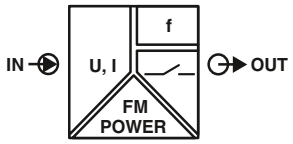
| Behavior in the event of an error | Open circuit | Overrange | Underrange |
|---|---|---|---|
| ... / NE43DO | / 0.0 | / 0.0 | / 0.0 |
| FD ≙ freely definable | 0.0 ≙ 0 mA<br>I: freely selectable between 0.0 ... 21.5 mA<br>U: freely selectable between 0.0 ... 11 V<br>(signal type corresponds to selected output signal) | 0.0 ≙ 0 mA<br>I: freely selectable between 0.0 ... 21.5 mA<br>U: freely selectable between 0.0 ... 11 V<br>(signal type corresponds to selected output signal) | 0.0 ≙ 0 mA<br>I: freely selectable between 0.0 ... 21.5 mA<br>U: freely selectable between 0.0 ... 11 V<br>(signal type corresponds to selected output signal) |
| **Note: failure information according to NE 43 can only be selected for 4 ... 20 mA output** | | | |
| NE43UP ≙ NE 43 upscale | 21.5 mA | 21.5 mA | 21.5 mA |
| NE43DO ≙ NE 43 downscale | 3.5 mA | 3.5 mA | 3.5 mA |
| NE430 ≙ NE 43 0 mA | 0 mA | 0 mA | 0 mA |
| NE43UD ≙ NE 43 upscale/downscale | 3.5 mA | 21.5 mA | 21.5 mA |

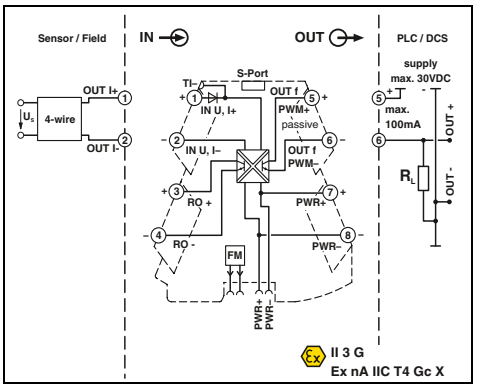
**Sensor types and measuring ranges for MINI MCR-2-TC-UI(-PT)(-C) temperature transducer**

| Sensor type | Standard | Measuring range | Smallest measuring span | Adjustable using: |
|---|---|---|---|---|
| B | IEC 584-1 | +500°C ... +1820 °C | 50 K | Software or smartphone app |
| E | IEC 584-1 | -230°C ... +1000°C | 50 K | Software or smartphone app |
| J | IEC 584-1 | -210°C ... +1200°C | 50 K | DIP switch |
| K | IEC 584-1 | -250°C ... +1372°C | 50 K | DIP switch |
| N | IEC 584-1 | -200°C ... +1300°C | 50 K | Software or smartphone app |
| R | IEC 584-1 | -50°C ... +1768°C | 50 K | Software or smartphone app |
| S | IEC 584-1 | -50°C ... +1768°C | 50 K | Software or smartphone app |
| T | IEC 584-1 | -200°C ... +400°C | 50 K | Software or smartphone app |
| L | DIN 43710 | -200°C ... +900°C | 50 K | Software or smartphone app |
| U | DIN 43710 | -200°C ... +600°C | 50 K | Software or smartphone app |
| A-1 | GOST 8.585 | 0°C ... +2500°C | 50 K | Software or smartphone app |
| A-2 | GOST 8.585 | 0°C ... +1800°C | 50 K | Software or smartphone app |
| A-3 | GOST 8.585 | 0°C ... +1800°C | 50 K | Software or smartphone app |
| M | GOST 8.585 | -200°C ... +100°C | 50 K | Software or smartphone app |
| L | GOST 8.585 | -200°C ... +800°C | 50 K | Software or smartphone app |
| Customer-specific characteristic curves | | -250°C ... +2500°C | 50 K | Software or smartphone app |

## Frequency
## Analog frequency transducer

new




Ex n

**Configurable, frequency, PWM or switching output**

- Universally configurable highly compact analog-to-frequency transducer for electrical isolation, amplification, conversion and filtering of standard analog signals to frequencies or PWM signals
- Plug-in connection technology
- Safe 3-way isolation
- Additional switching output
- Frequency output can be used as second switching output
- Standard signal combinations configurable via DIP switches
- Freely configurable via software or smartphone app
- Power supply and fault monitoring possible via DIN rail connector
- Status and error indicator LEDs

**Notes:**

The configuration software can be downloaded from the Internet: phoenixcontact.net/products.

Information on the programming adapters can be found on page 89

Information on MINI Analog Pro accessories can be found from page 85

To order a product with an order configuration, enter the required configuration by referring to the adjacent order key.

Housing width 6.2 mm

### Technical data

| | | |
|---|---|---|
| Input data | U input | I input |
| Input signal (configurable via DIP switch or freely via software) | 0 V ... 10 V | 0 mA ... 20 mA |
| | 2 V ... 10 V | 4 mA ... 20 mA |
| | 0 V ... 5 V | 0 mA ... 10 mA |
| | 1 V ... 5 V | 2 mA ... 10 mA |
| | 10 V ... 0 V | 20 mA ... 0 mA |
| | 10 V ... 2 V | 20 mA ... 4 mA |
| | 5 V ... 0 V | 10 mA ... 0 mA |
| | 5 V ... 1 V | 10 mA ... 2 mA |
| | 0 V ... 12 V | 0 mA ... 24 mA |
| Maximum input signal | 12 V | 24 mA |
| Input resistance | > 120 kΩ | approx. 50 Ω |
| Output data | Frequency output | PWM output |
| Output signal (configurable via DIP switch or freely via software) | 0 Hz ... 10 kHz / 0 Hz ... 5 kHz | 15.6 kHz (10 bit) / 1.9 kHz (10 bit) |
| | 0 Hz ... 2.5 kHz / 0 Hz ... 1 kHz | 3.9 Hz (12 bit) / 488 Hz (12 bit) |
| | 0 Hz ... 500 Hz / 0 Hz ... 250 Hz | 977 Hz (14 bit) / 122 Hz (14 bit) |
| | 0 Hz ... 100 Hz / 0 Hz ... 50 Hz | 244 Hz (16 bit) / 31 Hz (16 bit) |
| Minimum load | 4 mA ≤ ($U_L$ / $R_L$) ≤ 100 mA | 12 mA ≤ ($U_L$ / $R_L$) ≤ 100 mA |
| Load current maximum | 100 mA | |
| Maximum switching voltage | 30 V | |
| Overrange/underrange | Can be set (via software) | |
| General data | | |
| Supply voltage $U_B$ | 9.6 V DC ... 30 V DC | |
| Nominal supply voltage | 24 V DC | |
| Current consumption | 25 mA (12 V DC) | |
| | 12.5 mA (24 V DC) | |
| Power consumption | ≤ 350 mW (9.6 V DC) | |
| Maximum transmission error | ≤ 0.1 % (> 7 kHz ≤ 0.2 %) | |
| Temperature coefficient | < 0.01 %/K | |
| Step response (0–99%) | 120 ms (15 Hz sample rate) | |
| | Further values can be set via software | |
| Electrical isolation | Reinforced insulation in accordance with IEC 61010-1 | |
| Test voltage, input/output/supply | 3 kV (50 Hz, 1 min.) | |
| Degree of protection | IP20 | |
| Ambient temperature (operation) | -40 °C ... 70 °C | |
| Mounting | any | |
| Housing material | PBT | |
| Dimensions W / H / D | 6.2 / 110.5 / 120.5 mm | |
| Push-in connection solid /stranded / AWG | 0.14 ... 2.5 mm² / 0.14 ... 2.5 mm² / 24 - 12 | |
| Screw connection solid / stranded / AWG | 0.2 ... 1.5 mm² / 0.2 ... 1.5 mm² / 24 - 12 | |
| Conformance / approvals | | |
| Conformance | CE-compliant | |
| ATEX | Ex II 3 G Ex nA IIC T4 Gc X | |
| UL, USA / Canada | UL applied for<br>Class I, Div. 2, Groups A, B, C, D T5 applied for | |
| GL | GL applied for | |

### Ordering data

| Description | | Type | Order No. | Pcs. / Pkt. |
|---|---|---|---|---|
| **Analog frequency converter with limit value function** | | | | |
| Standard configuration | Push-in connection | **MINI MCR-2-UI-FRO-PT** | **2902032** | 1 |
| Standard configuration | Screw connection | **MINI MCR-2-UI-FRO** | **2902031** | 1 |
| Order configuration | Push-in connection | **MINI MCR-2-UI-FRO-PT-C** | **2906202** | 1 |
| Order configuration | Screw connection | **MINI MCR-2-UI-FRO-C** | **2906201** | 1 |

### Accessories

| | | | |
|---|---|---|---|
| **Programming adapter** for configuring modules with S-PORT interface | **IFS-USB-PROG-ADAPTER** | **2811271** | 1 |
| **Programming adapter** for configuring modules with NFC interface | **NFC-USB-PROG-ADAPTER** | **2900013** | 1 |

**Order key for MINI MCR-2-UI-FRO(-PT)(-C) measuring transducer** (standard configuration entered as example)

| Order No. | Input<br>Input signal | Start | End | Sample rate | Output<br>Output signal | Carrier frequency | Start | End | Output limitation |
|---|---|---|---|---|---|---|---|---|---|
| **2906201** / | **I** / | **0.0** / | **20.0** / | **15** / | **I** / | **0** / | **0** / | **1000** / | **15** / . |
| 2906201 ≙<br>MINI MCR-2-UI-FRO-C<br><br>2906202 ≙<br>MINI MCR-2-UI-FRO-PT-C | I ≙ I<br>U ≙ U | 0.0 ≙ 0 mA<br>I: freely selectable between 0.0 ... 24 mA<br><br>U: freely selectable between 0.0 ... 12 V | 20.0 ≙ 20 mA<br>I: freely selectable between 0.0 ... 24 mA<br><br>U: freely selectable between 0.0 ... 12 V | 15 Hz ≙ 15 Hz<br>60 Hz ≙ 60 Hz<br>240 Hz ≙ 240 Hz | f ≙ f<br><br>PWM ≙ PWM | 0 ≙ at frequency output<br><br>15.6 k ≙ 15.6 kHz<br><br>15.6 kHz (10 bits)<br>1.9 kHz (10 bits)<br>7.8 kHz (11 bits)<br>977 Hz (11 bits)<br>3.9 kHz (12 bits)<br>488 Hz (12 bits)<br>1.9 kHz (13 bits)<br>244 Hz (13 bits)<br>977 Hz (14 bits)<br>122 Hz (14 bits)<br>488 Hz (15 bits)<br>61 Hz (15 bits)<br>244 Hz (16 bits)<br>31 Hz (16 bits) | 0 ≙ 0 Hz<br>f: freely selectable between 0...10 kHz<br><br>D: freely selectable between 0.0 ... 100% | 10000 ≙ 10 kHz<br>f: freely selectable between 0...10 kHz<br><br>D: freely selectable between 0.0 ... 100% | 0 ≙ off<br>1 ≙ on |

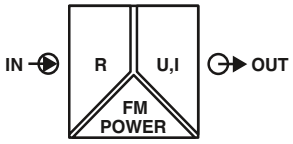
Measuring range span at least 0.5 V/1 mA
Increment 0.1 V/0.1 mA

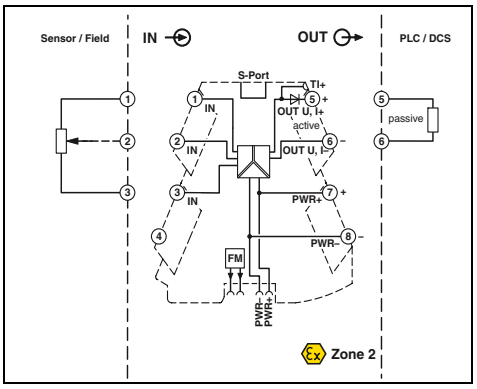
Output signal span at least 10 Hz/1%
Increment 1 Hz/0.1%

**Failure information**

| ... / | Behavior in the event of an error | Open circuit/short circuit | Overrange | Underrange |
|---|---|---|---|---|
| | **FD** / | **0** / | **0** / | **0** |
| | FD ≙ freely definable<br><br>Failure information only adjustable for unlimited output | 0 ≙ 0 Hz<br>f: freely selectable between 0 ... 11 kHz<br>D: freely selectable between 0.0 and 100%<br><br>(free definition only for unlimited output)<br>(signal type corresponds to selected output signal) | 0 ≙ 0 Hz<br>f: freely selectable between 0 ... 11 kHz<br>D: freely selectable between 0.0 and 100%<br><br>(free definition only for unlimited output)<br>(signal type corresponds to selected output signal) | 0 ≙ 0 Hz<br>f: freely selectable between 0 ... 11 kHz<br>D: freely selectable between 0.0 and 100%<br><br>(free definition only for unlimited output)<br>(signal type corresponds to selected output signal) |

## Potentiometer
## Potiposition transducer




Ex n

**Potiposition transducer, configurable**

Ex:
Housing width 6.2 mm

- Universally configurable, highly compact potiposition transducer for electrical isolation, conversion, amplification, and filtering of potentiometer signals
- For potentiometers from 100 Ω to 100 kΩ
- Automatic potentiometer detection without manual adjustment
- Plug-in connection system
- Safe 3-way isolation
- Standard signal combinations configurable via DIP switches
- Freely configurable via software or smartphone app
- Power supply and fault monitoring possible via DIN rail connector
- Status and error indicator LEDs

| Notes: |
|---|
| The configuration software can be downloaded from the Internet: phoenixcontact.net/products. |
| Information on the programming adapters can be found on page 89 |
| Information on MINI Analog Pro accessories can be found from page 85 |
| To order a product with an order configuration, please enter the desired configuration by referring to the order key. |

### Technical data

| | | |
|---|---|---|
| Input data | | |
| Potentiometer | 100 Ω ... 100 kΩ | |
| Output data | U output | I output |
| Output signal (configurable via DIP switch or freely via software) | 1 ... 5 V / 10 ... 0 V<br>0 ... 5 V / 0 ... 10 V | 0 ... 20 mA / 4 ... 20 mA<br>20 ... 0 mA / 20 ... 4 mA |
| Maximum output signal | approx. 12.3 V | 24.6 mA |
| No-load voltage | | < 17.5 V |
| Short-circuit current | < 31.5 mA | |
| Load $R_B$ | ≥ 10 kΩ | ≤ 600 Ω (at 20 mA) |
| Ripple | < 20 $mV_{PP}$ (at 10 kΩ) | < 20 $mV_{PP}$ |
| Behavior in the event of a sensor error | configurable | |
| General data | | |
| Supply voltage $U_B$ | 9.6 V DC ... 30 V DC | |
| Nominal supply voltage | 24 V DC | |
| Current consumption | 33 mA (at 24 V DC) | |
| Power consumption | ≤ 850 mW (at $I_{OUT}$ = 20 mA, 9.6 V DC, 600 Ω load) | |
| Maximum transmission error | < 0.1 % (R < 240 Ω = < 0.2 %) | |
| Temperature coefficient | 0.01 %/K | |
| Step response (0–99%) | < 60 ms | |
| Electrical isolation | Reinforced insulation in accordance with IEC 61010-1 | |
| Test voltage, input/output/supply | 3 kV (50 Hz, 1 min.) | |
| Degree of protection | IP20 | |
| Ambient temperature (operation) | -40 °C ... 70 °C | |
| Mounting | any | |
| Housing material | PBT | |
| Dimensions W / H / D | 6.2 / 110.5 / 120.5 mm | |
| Push-in connection solid / stranded / AWG | 0.14 ... 2.5 $mm^2$ / 0.14 ... 2.5 $mm^2$ / 24 - 12 | |
| Screw connection solid / stranded / AWG | 0.2 ... 1.5 $mm^2$ / 0.2 ... 1.5 $mm^2$ / 24 - 12 | |
| EMC note | Class A product, see page 625 | |
| Conformance / approvals | | |
| Conformance | CE-compliant | |
| ATEX | II 3 G Ex nA IIC T4 Gc X | |
| UL, USA / Canada | UL 508 Listed<br>Class I, Div. 2, Groups A, B, C, D T5<br>Class I, Zone 2, Group IIC T5 | |
| GL | GL applied for | |

### Ordering data

| Description | | Type | Order No. | Pcs. / Pkt. |
|---|---|---|---|---|
| **Potiposition transducer** | | | | |
| Standard configuration | Push-in connection | **MINI MCR-2-POT-UI-PT** | **2902017** | 1 |
| Standard configuration | Screw connection | **MINI MCR-2-POT-UI** | **2902016** | 1 |
| Order configuration | Push-in connection | **MINI MCR-2-POT-UI-PT-C** | **2905006** | 1 |
| Order configuration | Screw connection | **MINI MCR-2-POT-UI-C** | **2905005** | 1 |

### Accessories

| | | | |
|---|---|---|---|
| **Programming adapter** for configuring modules with S-PORT interface | **IFS-USB-PROG-ADAPTER** | **2811271** | 1 |
| **Programming adapter** for configuring modules with NFC interface | **NFC-USB-PROG-ADAPTER** | **2900013** | 1 |

**Order key for MINI MCR-2-POT-UI(-PT)(-C) potiposition transducer** (standard configuration entered as an example)

| Order No. | Automatic potentiometer detection | Output<br>Output signal | Start | End | Filter | Open circuit detect | |
|---|---|---|---|---|---|---|---|
| **2905005** / | **AUTO** / | **I** | **4.0** | **20.0** / | **1** / | **ON** | / ... |
| 2905005 ≙ MINI MCR-2-POT-UI-C<br><br>2905006 ≙ MINI MCR-2-POT-UI-PT-C | AUTO ≙ ON<br>OFF ≙ OFF | I ≙ I<br>U ≙ U | 0.0 ≙ 0 mA<br>I: freely selectable between 0.0 ... 21 mA<br><br>U: freely selectable between 0.0 ... 10.5 V | 20.0 ≙ 20 mA<br>I: freely selectable between 0.0 ... 21 mA<br><br>U: freely selectable between 0.0 ... 10.5 V | 1<br>2<br>3<br>4<br>5<br>6<br>7<br>8<br>9<br>10 | ON ≙ ON<br>OFF ≙ OFF | |

Output signal span at least 0.5 V/1 mA
Increment 0.1 V/0.1 mA

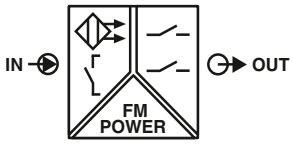
**Failure information**

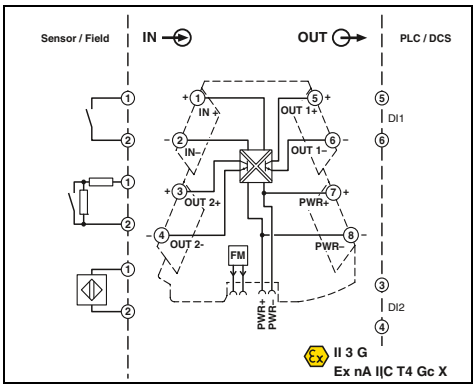
| | Behavior in the event of an error | Open circuit slider | Input open (no potentiometer connected) | Overrange | Underrange |
|---|---|---|---|---|---|
| ... / | **NE43DO** / | **0.0** / | **0.0** / | **0.0** / | **0.0** |
| | FD ≙ freely definable | 0.0 ≙ 0 mA<br>I: freely selectable between 0.0 ... 21.5 mA<br>U: freely selectable between 0.0 ... 11 V<br>(only if open circuit detection is on)<br>(signal type corresponds to selected output signal) | 0.0 ≙ 0 mA<br>I: freely selectable between 0.0 ... 21.5 mA<br>U: freely selectable between 0.0 ... 11 V<br>(signal type corresponds to selected output signal) | 0.0 ≙ 0 mA<br>I: freely selectable between 0.0 ... 21.5 mA<br>U: freely selectable between 0.0 ... 11 V<br>(signal type corresponds to selected output signal) | 0.0 ≙ 0 mA<br>I: freely selectable between 0.0 ... 21.5 mA<br>U: freely selectable between 0.0 ... 11 V<br>(signal type corresponds to selected output signal) |
| | **Note: failure information according to NE 43 can only be selected for 4 ... 20 mA output** | | | | |
| | NE43UP ≙ NE 43 upscale<br>NE43DO ≙ NE 43 downscale<br>NE430 ≙ NE 43 0 mA<br>NE43UD ≙ NE 43 upscale/downscale | 21.5 mA<br>3.5 mA<br>0 mA<br>3.5 mA | 21.5 mA<br>3.5 mA<br>0 mA<br>3.5 mA | 21.5 mA<br>3.5 mA<br>0 mA<br>21.5 mA | 21.5 mA<br>3.5 mA<br>0 mA<br>21.5 mA |

## Highly compact signal conditioners with plug-in connection technology - MINI Analog Pro

### Digital IN
### Signal conditioner

new




Ex n

NFC

**Configurable,**
**for NAMUR sensors and floating contacts**

- Highly compact signal conditioner 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
- Plug-in connection technology
- Input and output signals can be configured via DIP switches
- Transistor switching contacts on the output
- Second output can be used as a doubler or error signaling output
- Safe 3-way isolation
- Switchover between operating current and quiescent current (inverted switching behavior)
- Power supply and fault monitoring possible via DIN rail connector
- Status LEDs

**Notes:**

Information on MINI Analog Pro accessories can be found from page 85

Housing width 6.2 mm

### Technical data

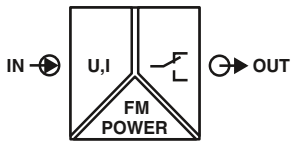
| | |
|---|---|
| **Input data** | |
| Input signal | NAMUR proximity sensors (EN 60947-5-6)<br>open circuit switch contacts<br>Switch contacts with resistance circuit |
| **Control circuit** | |
| No-load voltage | 8.2 V DC ±10 % |
| Switching points (in acc. with IEC 60947-5-6) | < 1.2 mA (blocking)<br>> 2.1 mA (conductive) |
| Line fault detection | > 6 mA (in the event of a short-circuit)<br>< 0.35 mA (in the event of an open circuit) |
| **Switching output** | |
| Transistor output | 2 N/O contacts |
| Max. switching voltage | 30 V DC |
| Max. switching current | 50 mA |
| Switching frequency | 5 kHz |
| **General data** | |
| Supply voltage $U_B$ | 9.6 V DC ... 30 V DC |
| Nominal supply voltage | 24 V DC |
| Current consumption | 35 mA (12 V DC)<br>18 mA (24 V DC) |
| Power consumption | 450 mW (9.6 V DC) |
| Electrical isolation | Reinforced insulation in accordance with IEC 61010-1 |
| Test voltage, input/output/supply | 3 kV (50 Hz, 1 min.) |
| Degree of protection | IP20 |
| Ambient temperature (operation) | -40 °C ... 70 °C |
| Mounting | any |
| Housing material | PBT |
| Dimensions W / H / D | 6.2 / 110.5 / 120.5 mm |
| Push-in connection solid / stranded / AWG | 0.14 ... 2.5 $mm^2$ / 0.14 ... 2.5 $mm^2$ / 24 - 12 |
| Screw connection solid / stranded / AWG | 0.2 ... 1.5 $mm^2$ / 0.2 ... 1.5 $mm^2$ / 24 - 12 |
| **Conformance / approvals** | |
| Conformance | CE-compliant |
| ATEX | Ex II 3 G Ex nA IIC T4 Gc X |
| UL, USA / Canada | UL applied for<br>Class I, Div. 2, Groups A, B, C, D T5 applied for |
| GL | GL applied for |

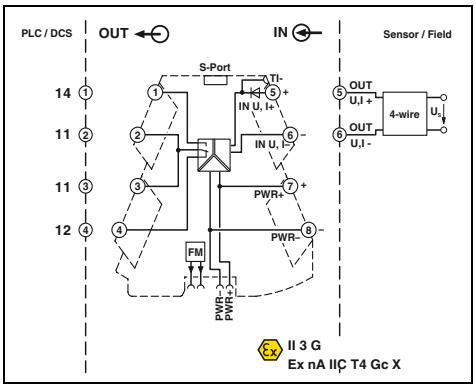
### Ordering data

| Description | Type | Order No. | Pcs. / Pkt. |
|---|---|---|---|
| **NAMUR signal conditioner** | | | |
| Push-in connection | **MINI MCR-2-NAM-2RO-PT** | **2902005** | 1 |
| Screw connection | **MINI MCR-2-NAM-2RO** | **2902004** | 1 |

## Limit values, threshold value switch

new




Ex n

NFC

**Configurable, with relay PDT output**

- Universally configurable highly compact threshold value switch for switching analog limit values
- Plug-in connection technology
- Safe 3-way isolation
- Standard switching behavior can be configured via DIP switches
- Freely configurable via software or smartphone app
- PDT relay at output
- Limiting continuous current up to 6 A
- Power supply and fault monitoring possible via DIN rail connector
- Status and error indicator LEDs

| Notes: |
|---|
| The configuration software can be downloaded from the Internet: phoenixcontact.net/products. |
| Information on the programming adapters can be found on page 89 |
| Information on MINI Analog Pro accessories can be found from page 85 |

Housing width 6.2 mm

### Technical data

| | | |
|---|---|---|
| Input data | U input | I input |
| Input signal (configurable using the DIP switch) | 0 ... 10 V / 0 ... 12 V | 0 ... 20 mA / 0 ... 24 mA |
| Maximum input signal | 12 V | 24 mA |
| Input resistance | > 120 kΩ | approx. 50 Ω |
| Specification of the switching point | Can be set via software or in increments via DIP switches | |
| Switching output | | |
| Relay output | 1 PDT | |
| Contact material | $AgSnO_2$, hard gold-plated | |
| Max. switching voltage | 250 V AC | |
| Limiting continuous current | 6 A | |
| Hysteresis (configurable using the DIP switch) | can be set freely via software | |
| Setting range of the response delay (configurable using the DIP switch) | 0 s ... 10 s (can be set freely via software) | |
| General data | | |
| Supply voltage $U_B$ | 9.6 V DC ... 30 V DC | |
| Nominal supply voltage | 24 V DC | |
| Current consumption | 20 mA (at 24 V DC)<br>40 mA (at 12 V DC) | |
| Power consumption | ≤ 0.5 W | |
| Maximum transmission error | 0.1 % (of final value) | |
| Temperature coefficient | 0.01 %/K | |
| Step response (0–99%) | typ. 140 ms (can be set via software) | |
| Electrical isolation | Reinforced insulation in accordance with IEC 61010-1 | |
| Test voltage, input/output/supply | 3 kV (50 Hz, 1 min.) | |
| Degree of protection | IP20 | |
| Ambient temperature (operation) | -40 °C ... 70 °C | |
| Mounting | any | |
| Housing material | PBT | |
| Dimensions W / H / D | 6.2 / 110.5 / 120.5 mm | |
| Push-in connection solid / stranded / AWG | 0.14 ... 2.5 $mm^2$ / 0.14 ... 2.5 $mm^2$ / 24 - 12 | |
| Screw connection solid / stranded / AWG | 0.2 ... 1.5 $mm^2$ / 0.2 ... 1.5 $mm^2$ / 24 - 12 | |
| Conformance / approvals | | |
| Conformance | CE-compliant | |
| ATEX | Ex II 3 G Ex nA nC IIC T4 Gc X | |
| UL, USA / Canada | UL applied for<br>Class I, Div. 2, Groups A, B, C, D T5 applied for | |
| GL | GL applied for | |

### Ordering data

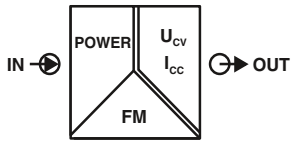
| Description | Type | Order No. | Pcs. / Pkt. |
|---|---|---|---|
| **Threshold value switch with relay PDT output** | | | |
| Push-in connection | **MINI MCR-2-UI-REL-PT** | **2902035** | 1 |
| Screw connection | **MINI MCR-2-UI-REL** | **2902033** | 1 |

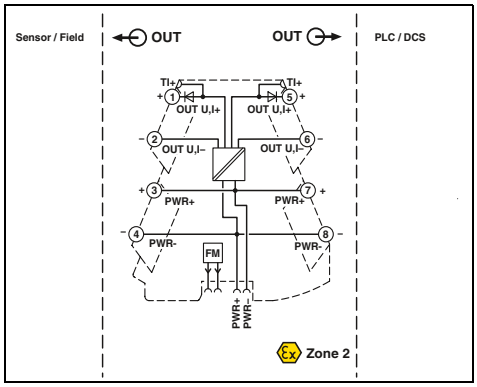
### Accessories

| | | | |
|---|---|---|---|
| **Programming adapter** for configuring modules with S-PORT interface | **IFS-USB-PROG-ADAPTER** | **2811271** | 1 |
| **Programming adapter** for configuring modules with NFC interface | **NFC-USB-PROG-ADAPTER** | **2900013** | 1 |

## Accessories
## Constant voltage/constant current source

new




Ex n

NFC

**Output signals, configurable**

- Constant voltage/constant current source for potentiometers, measuring bridges, encoders, etc.
- Plug-in connection technology
- Highly precise
- Output signals can be configured via DIP switches
- Input signal corresponds to power supply
- Input signal and therefore energy supply and fault monitoring via the DIN rail connector
- For voltages up to 10 V and currents up to 20 mA
- Status LED

Housing width 6.2 mm

### Technical data

| | | |
|---|---|---|
| Input data | | |
| Input signal | 9.6 ... 30 V | |
| Output data | U output | I output |
| Output signal (can be configured using DIP switches) | 10 V DC | 20 mA |
| | 8.75 V DC | 17.5 mA |
| | 7.5 V DC | 15 mA |
| | 6.25 V DC | 12.5 mA |
| | 5 V DC | 10 mA |
| | 3.75 V DC | 7.5 mA |
| | 2.5 V DC | 5 mA |
| | 1.25 V DC | 2.5 mA |
| Short-circuit current | > 32 mA | |
| Ripple | < 20 $mV_{PP}$ (at 600 Ω) | |
| General data | | |
| Supply voltage $U_B$ | 9.6 V DC ... 30 V DC | |
| Power consumption | < 1.1 W (9.6 V DC) | |
| Maximum transmission error | ≤ 0.1 % (of final value) | |
| Temperature coefficient | < 0.01 %/K | |
| Electrical isolation | Reinforced insulation in accordance with IEC 61010-1 | |
| Test voltage, input/output/supply | 3 kV (50 Hz, 1 min.) | |
| Degree of protection | IP20 | |
| Ambient temperature (operation) | -40 °C ... 70 °C | |
| Housing material | PBT | |
| Dimensions W / H / D | 6.2 / 110.5 / 120.5 mm | |
| Push-in connection solid / stranded / AWG | 0.14 ... 2.5 $mm^2$ / 0.14 ... 2.5 $mm^2$ / 24 - 12 | |
| Screw connection solid / stranded / AWG | 0.2 ... 1.5 $mm^2$ / 0.2 ... 1.5 $mm^2$ / 24 - 12 | |
| Conformance / approvals | | |
| Conformance | CE-compliant | |
| ATEX | Ex II 3 G Ex nA IIC T4 Gc X | |
| UL, USA / Canada | UL applied for<br>Class I, Div. 2, Groups A, B, C, D T5 applied for | |

### Ordering data

| Description | Type | Order No. | Pcs. / Pkt. |
|---|---|---|---|
| **Constant voltage/constant current source** | | | |
| Push-in connection | **MINI MCR-2-CVCS-PT** | **2902065** | 1 |
| Screw connection | **MINI MCR-2-CVCS** | **2902064** | 1 |

### Accessories

| | | | |
|---|---|---|---|
| **Setpoint potentiometer**, for individual setpoint definition | | | |
| Resistance value 4.7 kΩ | **EMG 30-SP- 4K7LIN** | **2940252** | 10 |
| Resistance value 10 kΩ | **EMG 30-SP-10K LIN** | **2942124** | 10 |

## Accessories
## Screw connection connector set

new

- FASTCON Pro connector set
- Consisting of four connectors, one each for every position on the module
- Suitable for all MINI Analog Pro modules
- Four-way coding prevents incorrect insertion into the device
- Screw connection technology

| | Ordering data | | |
|---|---|---|---|
| Description | Type | Order No. | Pcs. / Pkt. |
| **FASTCON Pro connector set** with screw connection technology | FASTCON PRO-SET | 2906227 | 1 |

## Accessories
## Push-in connection connector set

new

- FASTCON Pro connector set
- Consisting of four connectors, one each for every position on the module
- Suitable for all MINI Analog Pro modules
- Four-way coding prevents incorrect insertion into the device
- Push-in connection technology

| | Ordering data | | |
|---|---|---|---|
| Description | Type | Order No. | Pcs. / Pkt. |
| **FASTCON Pro connector set** with push-in connection technology | FASTCON PRO-SET-PT | 2906228 | 1 |

## Accessories
## ME 6,2 TBUS... DIN rail connector

- For bridging the supply voltage
- Reduces wiring costs
- Module replacement without interrupting the supply to the remaining modules (hot swappable)
- One DIN rail connector for two MINI Analog Pro modules
- Only distinguished by color coding

For bridging the supply voltage

For bridging the supply voltage

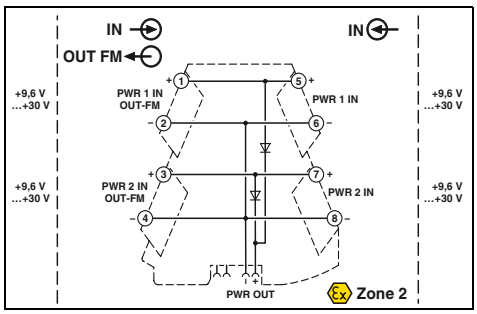
| Description | Ordering data: Type | Order No. | Pcs. / Pkt. | Ordering data: Type | Order No. | Pcs. / Pkt. |
|---|---|---|---|---|---|---|
| **DIN rail connector (TBUS),** for bridging the supply voltage, can be snapped onto 35 mm DIN rails as per EN 60715, with UL approval | | | | | | |
| Color: green | **ME 6,2 TBUS-2 1,5/5-ST-3,81 GN** | **2869728** | 10 | | | |
| Color: gray | | | | **ME 6,2 TBUS-2 1,5/5-ST-3,81 GY** | **2695439** | 10 |

## Accessories
## Power terminal

- Power terminal for supplying the supply voltage to the DIN rail connector
- Plug-in connection system
- Increased output current of 3.2 A
- For up to 115 MINI Analog Pro modules
- Monitoring of supplies in combination with the fault monitoring module
- Flexible redundant supply from one or both module sides
- Status and error indicator LEDs

**Notes:**

Observe the supply instructions for the MINI and MACX modules.




Ex n

NFC

Redundant supply for existing 24 V

| | Technical data |
|---|---|
| Input data/output data | |
| Input voltage range | 9.9 V DC ... 30 V DC |
| Output voltage | Input voltage - 0.3 V |
| Output current | ≤ 3.2 A |
| General data | |
| Ambient temperature (operation) | -40 °C ... 70 °C |
| Housing material | PBT |
| EMC note | Class A product, see page 625 |
| Conformance / approvals | |
| Conformance | CE-compliant |
| ATEX | Ⓔx II 3 G Ex nA IIC T4 Gc X |
| UL, USA / Canada | UL 508 Listed<br>Class I, Div. 2, Groups A, B, C, D T6<br>Class I, Zone 2, Group IIC T6 |
| GL | GL applied for |

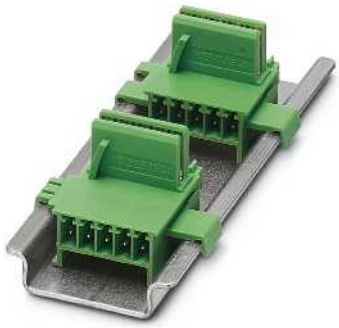
| Description | Ordering data: Type | Order No. | Pcs. / Pkt. |
|---|---|---|---|
| **MINI Analog Pro power terminal** | | | |
| Push-in connection | **MINI MCR-2-PTB-PT** | **2902067** | 1 |
| Screw connection | **MINI MCR-2-PTB** | **2902066** | 1 |

## Accessories
## ME 17,5 TBUS-... DIN rail connector

– For bridging the supply voltage when using a MINI POWER system power supply

**Notes:**

If the system power supply is used, two ME 17,5 TBUS DIN rail connectors are required. This allows you to establish the connection to the ME 6,2 TBUS DIN rail connector 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

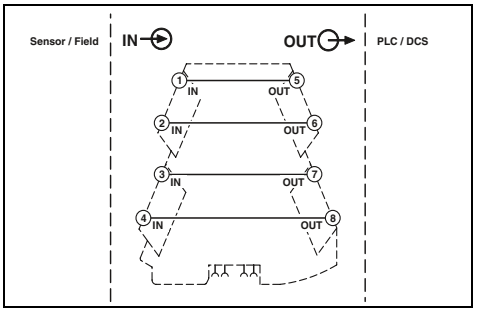
– For supplying the supply voltage via the DIN rail connector where AC voltages are available
– Nominal input voltage range 100 ... 240 V AC
– 24 V DC output voltage
– For up to 60 MINI Analog modules
– For up to 1.5 A, secondary
– Status and error signaling via diagnostics LEDs

For applications with local voltages of over 100 V

| Description | Ordering data: Type | Order No. | Pcs. / Pkt. |
|---|---|---|---|
| **System power supply,** primary-switched, with zone 2 approval. Further information can be found in Catalog 6, Surge protection and power supplies. | **MINI-PS-100-240AC/24DC/1.5/EX** | **2866653** | 1 |
| **System power supply,** primary-switched (not for zone 2) Further information can be found in Catalog 6, Surge protection and power supplies. | **MINI-SYS-PS-100-240AC/24DC/1.5** | **2866983** | 1 |

## Accessories
## Feed-through terminal block

- Feed-through terminal block for 1:1 forwarding of signals that are already electrically isolated in the MINI Analog Pro group
- Plug-in connection system




Ex n

NFC

**For signals already electrically isolated**

### Technical data

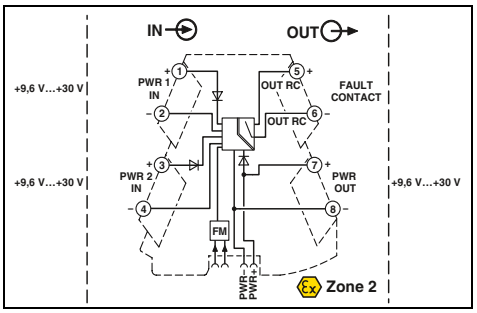
| | |
|---|---|
| General data | |
| Degree of protection | IP20 |
| Ambient temperature (operation) | -40 °C ... 70 °C |
| Mounting | any |
| Housing material | PBT |
| Dimensions W / H / D | 6.2 / 110.5 / 120.5 mm |
| Screw connection solid / stranded / AWG | 0.2 ... 1.5 mm² / 0.2 ... 1.5 mm² / 24 - 12 |
| Conformance / approvals | |
| Conformance | CE-compliant |
| ATEX | Ⓔx II 3 G Ex nA IIC T4 Gc X |
| UL, USA / Canada | UL 508 Listed<br>Class I, Div. 2, Groups A, B, C, D T6<br>Class I, Zone 2, Group IIC T6 |
| GL | GL applied for |

### Ordering data

| Description | Type | Order No. | Pcs. / Pkt. |
|---|---|---|---|
| **MINI Analog Pro feed-through terminal block** | | | |
| Screw connection | **MINI MCR-2-TB** | **2902068** | 1 |

## Accessories
## Fault signaling module

- Fault monitoring module for evaluating and reporting group errors from the fault monitoring system
- Monitoring of up to 115 connected MINI Analog Pro modules
- Plug-in connection system
- Monitoring of supply voltages of MINI MCR-2-PTB(-PT) power terminals
- Drawing off the supply is possible
- Fault signaling via an N/C contact
- Status and error indicator LEDs
- CE-compliant




Ex n

NFC

**For group error indication and supply monitoring**

### Technical data

| | |
|---|---|
| Input data/output data | |
| Input signal | 9.9 V DC ... 30 V DC |
| Output signal | 9.6 V DC ... 29.7 V DC |
| Switching output | |
| Max. switching voltage | 30 V DC |
| Max. switching current | 50 mA |
| General data | |
| Test voltage input/output | 1.5 kV AC (50 Hz, 1 min.) |
| EMC note | Class A product, see page 625 |
| Conformance / approvals | |
| ATEX | Ⓔx II 3 G Ex nA IIC T4 Gc X |
| UL, USA / Canada | UL 508 Listed<br>Class I, Div. 2, Groups A, B, C, D T6<br>Class I, Zone 2, Group IIC T6 |
| GL | GL applied for |

### Ordering data

| Description | Type | Order No. | Pcs. / Pkt. |
|---|---|---|---|
| **MINI Analog Pro fault signaling module** | | | |
| Push-in connection | **MINI MCR-2-FM-RC-PT** | **2904508** | 1 |
| Screw connection | **MINI MCR-2-FM-RC** | **2904504** | 1 |

## Accessories
## Programming adapters

IFS-USB-PROG-ADAPTER and NFC-USB-PROG-ADAPTER programmable adapters for configuring Phoenix Contact interface modules with S-PORT or NFC interface.

The adapters are used with the FDT/DTM or the ANALOG-CONF software.
For programming MACX Analog, MINI Analog Pro, and MINI Analog.

| | Technical data |
|---|---|
| General data | |
| EMC note | Class A product, see page 625 |

| Description | Type | Order No. | Pcs. / Pkt. |
|---|---|---|---|
| **Programming adapter** for configuring modules with S-PORT interface | IFS-USB-PROG-ADAPTER | 2811271 | 1 |
| **Programming adapter** for configuring modules with NFC interface | NFC-USB-PROG-ADAPTER | 2900013 | 1 |

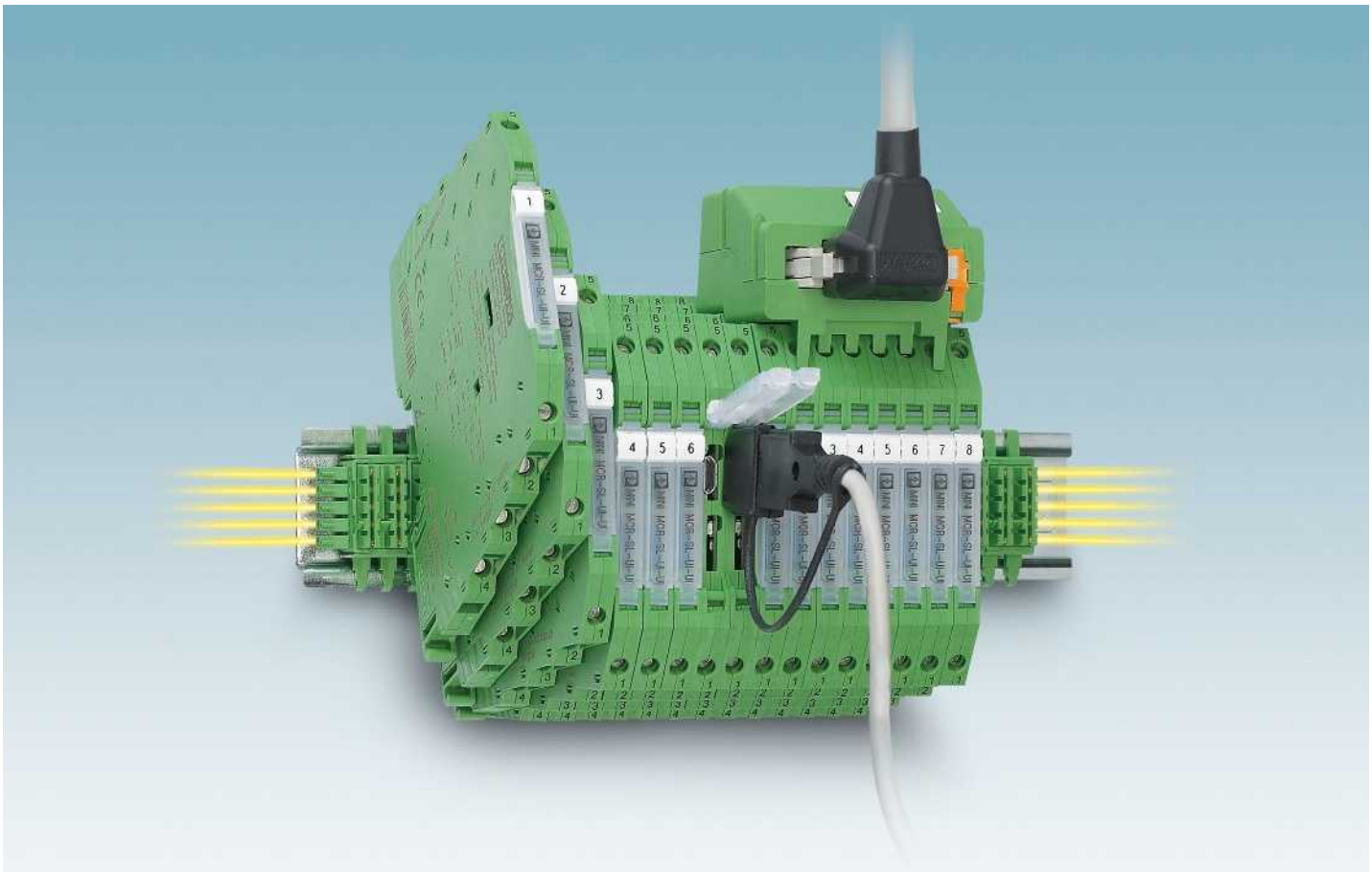
## Accessories
## Marking labels for transparent cover

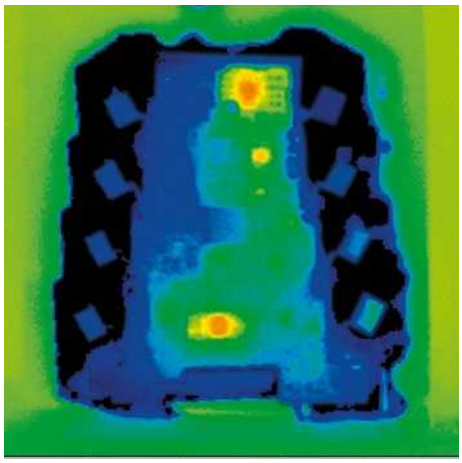
- Snap-in labels and adhesive labels with large area for marking
- For snapping-into or sticking onto MINI Analog Pro covers, without overlapping the status and error LEDs
- The sheets can be marked quickly and easily using the BLUEMARK CLED and the THERMOMARK CARD...
- They can also be custom printed according to customer requirements

**Unmarked and marked according to customer specifications**

| Description | Color | Type | Order No. | Pcs. / Pkt. | Type | Order No. | Pcs. / Pkt. |
|---|---|---|---|---|---|---|---|
| **UniCard,** can be marked with THERMOMARK CARD and BLUEMARK, 24-section, 8 individual labels per strip, lettering field size: 30 x 5 mm | | | | | | | |
| | white | UCT-EM (30X5) | 0801505 | 10 | | | |
| Lettering field size: 30 x 5 mm | white | UCT-EM (30X5) CUS | 0801589 | 1 | | | |
| 10-section, lettering field size: 15 x 5 mm | white | UC-EMLP (15X5) | 0819301 | 10 | | | |
| 10-section, lettering field size: 15 x 5 mm | white | UC-EMLP (15X5) CUS | 0824550 | 1 | | | |
| **Self-adhesive marker strips, unprinted, continuous,** material off the roll, for marking with thermal transfer printer, can be separated using cutter, pitch as desired, strip length of up to 1000 mm, 10 strips, strip height of 5.0 mm, 1 roll = 90 m | | | | | | | |
| | white | | | | SK 5,0 WH:REEL | 0805221 | 1 |

## Highly compact signal conditioners - MINI Analog





**Extremely compact and efficient**

The signal conditioners from the MINI Analog range offer the full spectrum of analog signal conditioning. They are therefore extremely efficient with regard to saving costs, space, and energy.

**Choose the right MINI Analog signal conditioner for your application:**

– Analog IN/OUT
– Temperature
– Frequency
– Potentiometer/resistor
– Digital IN
– Threshold values
– Accessories

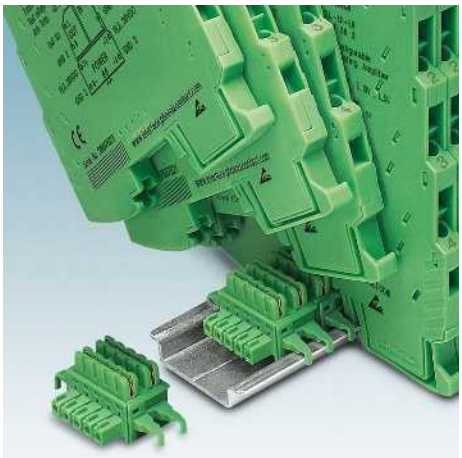
**Low power consumption**

– The resulting minimal self-heating ensures long service life and a high degree of operational reliability

**Clearly arranged wiring**

– Eight connections with a choice of screw or spring-cage terminal blocks

**DIN rail connector-compatible**
The DIN rail connector enables modular bridging of the 24 V supply voltage.



**Fault monitoring and power bridging**
– The DIN rail connector simplifies supply and enables group error monitoring

**High operational reliability**
– 3-way electrical isolation increases the operational reliability against system disturbances

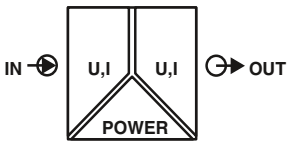
**Easy configuration**
– Can be configured easily via DIP switches or software, for extended functionality and monitoring

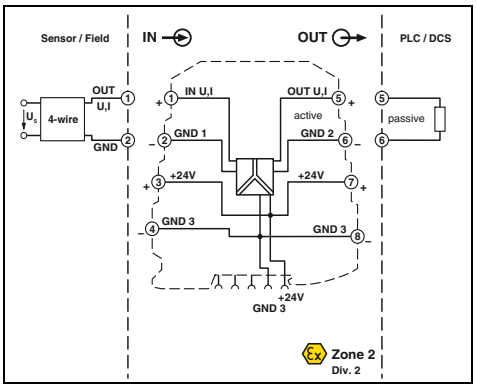
**Reduction in analog inputs on controllers**
– The MINI Analog multiplexer reduces up to eight analog signals to a 4 ... 20 mA signal

**Time-saving system cabling**
– Plug and Play – for eight channels on the signal conditioner and controller side

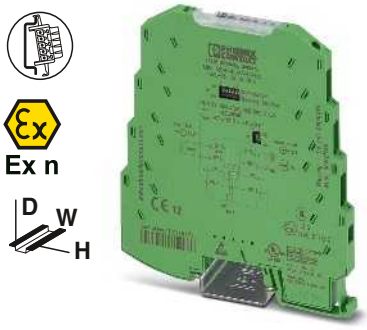
**Fast and error-free signal connection**
– Compact Termination Carriers connect MINI Analog devices to the automation systems – Plug and Play and hot-swap-capable

## Analog IN/Analog OUT
## 3-way signal conditioner




Ex n



**Configurable,**
**up to 36 signal combinations**

Ex:
Housing width 6.2 mm

- Highly compact signal conditioner 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 (DIN rail 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 from page 116

### Technical data

| | | |
|---|---|---|
| Input data | U input | I input |
| Input signal | 0 ... 5 V / 1 ... 5 V<br>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<br>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 | |
| Cut-off 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 | 0.2 ... 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 | |
| EMC note | Class A product, see page 625 | |
| Conformance / approvals | | |
| Conformance | CE-compliant | |
| ATEX | II 3 G Ex nA IIC T4 Gc X | |
| UL, USA / Canada | UL 508 Recognized<br>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 signal conditioner**, for electrical isolation of analog signals | | | | |
| Order configuration | Screw connection | **MINI MCR-SL-UI-UI** | **2864383** | 1 |
| Order configuration | Spring-cage connection | **MINI MCR-SL-UI-UI-SP** | **2864710** | 1 |
| Standard configuration | Screw connection | **MINI MCR-SL-UI-UI-NC** | **2864150** | 1 |
| Standard configuration | Spring-cage connection | **MINI MCR-SL-UI-UI-SP-NC** | **2864163** | 1 |

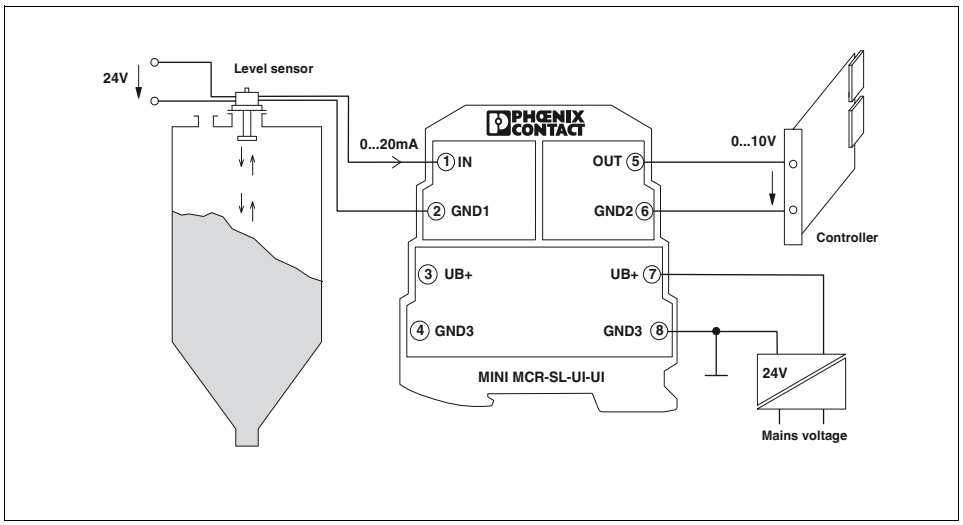
**Order key MINI MCR-SL-UI-UI(-SP)** (standard configuration entered as an example)

| Order No. | Input | Output | Factory calibration certificate (FCC) |
|---|---|---|---|
| 2864383 / | IN03 / | OUT01 / | NONE |
| 2864383 ≙ MINI MCR-SL-UI-UI<br><br>2864710 MINI MCR-SL-UI-UI-SP | IN01 ≙ 0 ... 20 mA<br>IN02 ≙ 4 ... 20 mA<br>IN03 ≙ 0 ... 10 V<br>IN04 ≙ 2 ... 10 V<br>IN05 ≙ 0 ... 5 V<br>IN06 ≙ 1 ... 5 V | OUT01 ≙ 0 ... 20 mA<br>OUT02 ≙ 4 ... 20 mA<br>OUT03 ≙ 0 ... 10 V<br>OUT04 ≙ 2 ... 10 V<br>OUT05 ≙ 0 ... 5 V<br>OUT06 ≙ 1 ... 5 V | NONE ≙ without FCC<br>Yes ≙ with FCC (a fee is charged)<br><br>YESPLUS ≙ FCC with 5 measuring points (a fee is charged) |

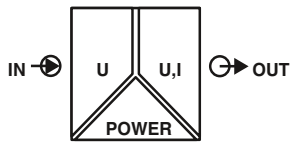
**Configuration table for input and output signals**

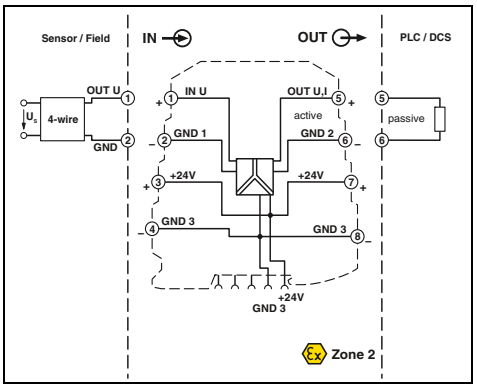
| | | DIP switch SW 2 | | | | | | DIP switch SW 1 | |
|---|---|---|---|---|---|---|---|---|---|
| **Input** | **Output** | **DIP 1** | **DIP 2** | **DIP 3** | **DIP 4** | **DIP 5** | **DIP 6** | **DIP 1** | **DIP 2** |
| 0 - 10 V | 0 - 20 mA | OFF | OFF | OFF | OFF | OFF | OFF | OFF | OFF |
| | 4 - 20 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 signal conditioner



Ex n

**Configurable, for shunt measurements**

Ex:

Housing width 6.2 mm

- Highly compact signal conditioner 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 (DIN rail 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 from page 116

### Technical data

| | | |
|---|---|---|
| Input data | | |
| Input signal (can be configured using DIP switches) | 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<br>0 ... 10 V / 2 ... 10 V<br>-5 ... 5 V / -10 ... 10 V<br>(the bipolar output can only be used 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 | |
| Cut-off 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 | 0.2 ... 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 | |
| EMC note | Class A product, see page 625 | |
| Conformance / approvals | | |
| Conformance | CE-compliant | |
| ATEX | II 3 G Ex nA IIC T4 Gc X | |
| UL, USA / Canada | UL 508 Recognized<br>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 3-way signal conditioner**, for converting mV voltages to standard signals | | | | |
| Order configuration | Screw connection | **MINI MCR-SL-SHUNT-UI** | **2810858** | 1 |
| Order configuration | Spring-cage connection | **MINI MCR-SL-SHUNT-UI-SP** | **2810874** | 1 |
| Standard configuration | Screw connection | **MINI MCR-SL-SHUNT-UI-NC** | **2810780** | 1 |
| Standard configuration | Spring-cage connection | **MINI MCR-SL-SHUNT-UI-SP-NC** | **2810793** | 1 |

**Order key for MINI MCR-SL-SHUNT-UI(-SP)** (standard configuration entered as an example)

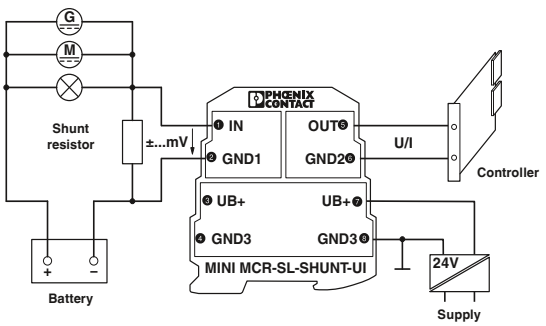
| Order No. | Input | Output | Cut-off frequency | Factory calibration certificate (FCC) |
|---|---|---|---|---|
| 2810858 / | IN40 / | OUT01 / | 100 / | NONE |
| 2810858 ≙ MINI MCR-SL-SHUNT-UI<br><br>2810874 ≙ MINI MCR-SL-SHUNT-UI-SP | IN40 ≙ 0 ... 50 mV<br>IN24 ≙ 0..60 mV<br>IN41 ≙ 0..75 mV<br>IN42 ≙ 0..80 mV<br>IN25 ≙ 0..100 mV<br>IN43 ≙ 0..120 mV<br>IN44 ≙ 0..150 mV<br>IN26 ≙ 0..200 mV<br>IN45 ≙ 0..240 mV<br>IN27 ≙ 0..300 mV<br><br>IN28 ≙ 0..500 mV<br>IN46 ≙ 0..600 mV<br>IN47 ≙ 0..750 mV<br>IN48 ≙ 0..800 mV<br>IN29 ≙ 0 ... 1.0 V<br>IN49 ≙ 0 ... 1.2 V<br>IN50 ≙ 0 ... 1.5 V<br>IN30 ≙ 0 ... 2.0 V<br>IN51 ≙ 0 ... 2.4 V<br>IN52 ≙ 0 ... 3.0 V<br><br>IN53 ≙ -50..+50 mV<br>IN13 ≙ -60..+60 mV<br>IN54 ≙ -75..+75 mV<br>IN55 ≙ -80..+80 mV<br>IN14 ≙ -100..+100 mV<br>IN56 ≙ -120..+120 mV<br>IN57 ≙ -150..+150 mV<br>IN15 ≙ -200..+200 mV<br>IN58 ≙ -240..+240 mV<br>IN16 ≙ -300..+300 mV<br><br>IN17 ≙ -500..+500 mV<br>IN59 ≙ -600..+600 mV<br>IN60 ≙ -750..+750 mV<br>IN61 ≙ -800..+800 mV<br>IN18 ≙ -1.0 ... +1.0 V<br>IN62 ≙ -1.2 ... +1.2 V<br>IN63 ≙ -1.5 ... +1.5 V<br>IN19 ≙ -2.0 ... +2.0 V<br>IN64 ≙ -2.4 ... +2.4 V<br>IN65 ≙ -3.0 ... +3.0 V | OUT01 ≙ 0 ... 20 mA<br>OUT02 ≙ 4 ... 20 mA<br>OUT03 ≙ 0 ... 10 V<br>OUT04 ≙ 2 ... 10 V<br>OUT05 ≙ 0 ... 5 V<br>OUT06 ≙ 1 ... 5 V<br><br>OUT13 ≙ -5 ... +5 V<br>OUT14 ≙ -10 ... +10 V | 30 ≙ 30 Hz<br>100 ≙ 100 Hz | NONE ≙ without FCC<br>YES ≙ with FCC (a fee is charged)<br><br>YESPLUS ≙ FCC 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.

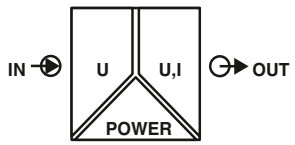
**Combination table for input and output signals**

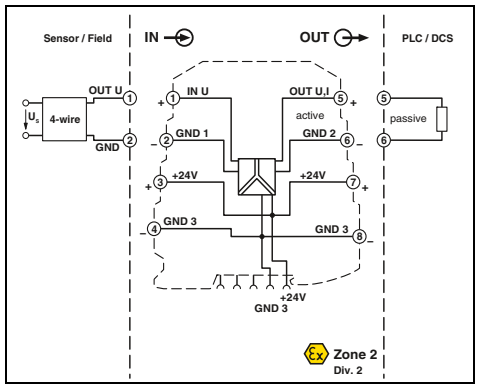
| Input | Voltage output | | | | | | Current output | |
|---|---|---|---|---|---|---|---|---|
| | -10 ... +10 V | 0 ... 10 V | 2 ... 10 V | -5 ... +5 V | 0 ... 5 V | 1 ... 5 V | 0 ... 20 mA | 4 ... 20 mA |
| 0 ... 50 mV | | x | x | | x | x | x | x |
| 0..60 mV | | x | x | | x | x | x | x |
| 0..75 mV | | 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 |

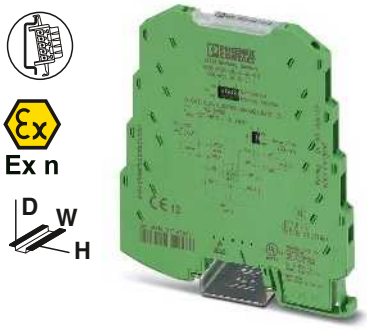
**Application example: monitoring of loading and unloading currents**



## Analog IN/Analog OUT
## 3-way signal conditioner




**Configurable,**
**for 0 ... 24 V / 0 ... 30 V input signals**

Ex:
Housing width 6.2 mm

- Highly compact signal conditioner 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 (DIN rail 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.

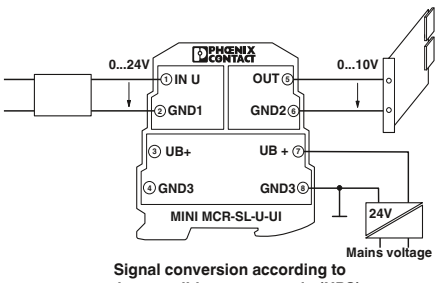
Information about power bridging, system cabling, and marking components can be found from page 116

### 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 ... 20 mA / 4 ... 20 mA |
| | 0 ... 10 V / 2 ... 10 V | |
| 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 | |
| Cut-off 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 | 0.2 ... 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 | |
| EMC note | Class A product, see page 625 | |
| Conformance / approvals | | |
| Conformance | CE-compliant | |
| ATEX | II 3 G Ex nA IIC T4 Gc X | |
| UL, USA / Canada | UL 508 Recognized<br>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 signal conditioner**, for electrical isolation of analog signals | | | | |
| Order configuration | Screw connection | **MINI MCR-SL-U-UI** | **2864053** | 1 |
| Order configuration | Spring-cage connection | **MINI MCR-SL-U-UI-SP** | **2811213** | 1 |
| Standard configuration | Screw connection | **MINI MCR-SL-U-UI-NC** | **2865007** | 1 |
| Standard configuration | Spring-cage connection | **MINI MCR-SL-U-UI-SP-NC** | **2810078** | 1 |

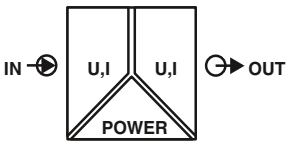


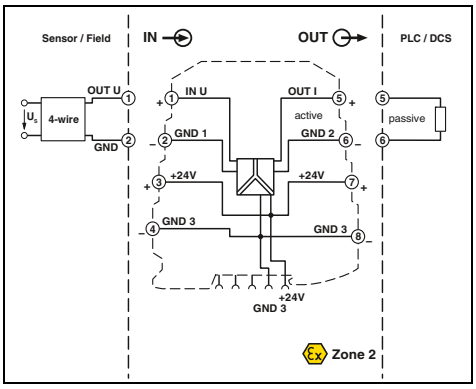

**Signal conversion according to uninterruptible power supply (UPS)**

**Order key MINI MCR-SL-U-UI(-SP)** (standard configuration entered as an example)

| Order No. | Input | Output |
|---|---|---|
| **2864053** | **IN39** | **OUT01** |
| 2864053 = MINI MCR-SL-UI-UI | IN38 ≙ 0...24 V<br>IN39 ≙ 0...30 V | OUT01 ≙ 0 ... 20<br>OUT02 ≙ 4 ... 20<br>OUT03 ≙ 0...10 V<br>OUT04 ≙ 2...10 V<br>OUT05 ≙ 0...5 V<br>OUT06 ≙ 1...5 V |
| 2811213 ≙ MINI MCR-SL-UI-UI-SP | | |

## Analog IN/Analog OUT
## 3-way signal conditioner



**With fixed signal combinations**

Ex:

- Highly compact signal conditioner for electrical isolation, conversion, amplification, and filtering of standard analog signals
- Fixed signal combinations
- Entry-level alternative to configurable signal conditioners
- 3-way isolation
- Low power consumption
- Power supply possible through the foot element (DIN rail connector)

**Notes:**

Information about power bridging, system cabling, and marking components can be found from page 116

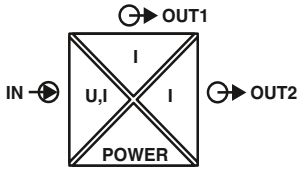
### Technical data

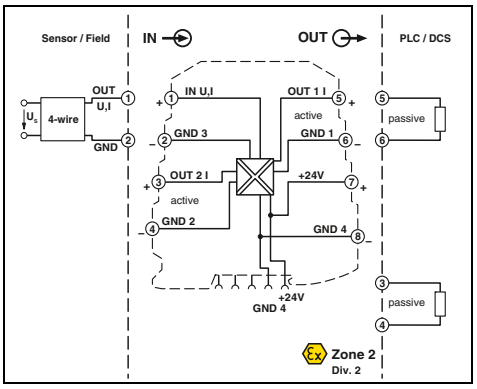
| | | |
|---|---|---|
| Input data | U input | I input |
| Input resistance | approx. 100 kΩ | approx. 50 Ω |
| Output data | U output | I output |
| Maximum output signal | 12.5 V | 28 mA |
| No-load voltage | | approx. 12.5 V |
| Short-circuit current | approx. 2 mA | |
| Load $R_B$ | ≥ 10 kΩ | ≤ 500 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 | |
| Cut-off 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 | 0.2 ... 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 | |
| EMC note | Class A product, see page 625 | |
| Conformance / approvals | | |
| Conformance | CE-compliant | |
| ATEX | Ex II 3 G Ex nA IIC T4 Gc X | |
| UL, USA / Canada | UL 508 Recognized<br>Class I, Div. 2, Groups A, B, C, D T5 applied for | |
| GL | GL EMC 2 D | |

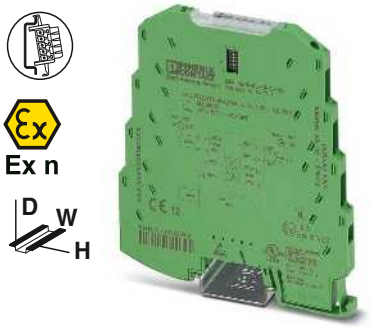
### Ordering data

| Description | Input signal | Output signal | Type | Order No. | Pcs. / Pkt. |
|---|---|---|---|---|---|
| **MCR 3-way signal conditioner**, for electrical isolation of analog signals | | | | | |
| Screw connection | 0 ... 10 V | 0 ... 20 mA | **MINI MCR-SL-U-I-0** | **2813512** | 1 |
| Spring-cage connection | 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 connection | 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 connection | 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 connection | 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 connection | 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 connection | 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 duplicator




**Configurable, with two current output signals**

Ex:

Housing width 6.2 mm

- Highly compact signal conditioner 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 (DIN rail connector)
- Standard configuration: Input: 0 ... 10 V, output 1: 0 ... 20 mA, output 2: 0 ... 20 mA

**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 from page 116

### 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 | |
| Cut-off 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 | 0.2 ... 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 | |
| EMC note | Class A product, see page 625 | |
| Conformance / approvals | | |
| Conformance | CE-compliant | |
| ATEX | II 3 G Ex nA IIC T4 Gc X | |
| UL, USA / Canada | UL 508 Recognized<br>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 duplication and electrical isolation of analog signals | | | | |
| Order configuration | Screw connection | **MINI MCR-SL-UI-2I** | **2864794** | 1 |
| Order configuration | Spring-cage connection | **MINI MCR-SL-UI-2I-SP** | **2864804** | 1 |
| Standard configuration | Screw connection | **MINI MCR-SL-UI-2I-NC** | **2864176** | 1 |
| Standard configuration | Spring-cage connection | **MINI MCR-SL-UI-2I-SP-NC** | **2864189** | 1 |

**Order key MINI MCR-SL-UI-2I(-SP)** (standard configuration entered as an example)

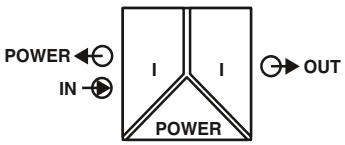
| Order No. | Input | Output combination [1] | Behavior of the analog outputs | Factory calibration certificate (FCC) |
|---|---|---|---|---|
| 2864794 | IN03 | A | 0 | NONE |
| 2864794 ≙ MINI MCR-SL-UI-2I<br>2864804 ≙ MINI MCR-SL-UI-2I-SP | IN01 ≙ 0 ... 20 mA<br>IN02 ≙ 4 ... 20 mA<br>IN03 ≙ 0 ... 10 V<br>IN06 ≙ 1...5 V | A<br>B<br>C | 0 ≙ Analog behavior<br>1 ≙ Limitation | NONE ≙ without FCC<br>Yes ≙ with FCC (a fee is charged)<br>YESPLUS ≙ FCC with 5 measuring points (a fee is charged) |

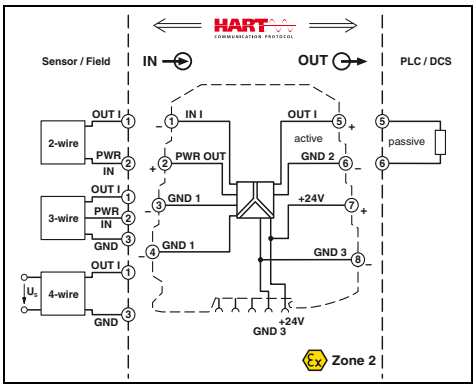
Explanation for output combination:

| | 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.net/products

## Analog IN/Analog OUT repeater power supply



Ex n

**Available with HART transmission as an option**

Ex:
Housing width 6.2 mm

- Highly compact repeater power supply 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
- Bidirectional HART transmission as an option
- Power supply possible through the foot element (DIN rail connector)

**Notes:**

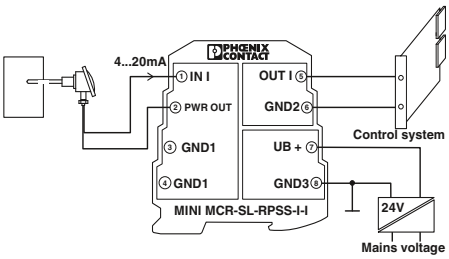
Information about power bridging, system cabling, and marking components can be found from page 99

### Technical data

| | | |
|---|---|---|
| Input data | MINI MCR-SL-RPSS-I-I | MINI MCR-SL-RPS-I-I |
| Input signal | 0 ... 20 mA,<br>isolator operation / 4 ... 20 mA | 0 ... 20 mA,<br>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<br>$U_B$ - max. 4.5 V for load<br>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),<br>typ. ≤ 0.1 % (of final value) | ≤ 0.2 % (of final value),<br>typ. ≤ 0.1 % (of final value) |
| Temperature coefficient | < 0.005 %/K, typ. < 0.002 %/K | < 0.01 %/K, typ. < 0.002 %/K |
| Cut-off frequency (3 dB) | 175 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 | 0.2 ... 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 | |
| EMC note | Class A product, see page 625 | |
| Conformance / approvals | | |
| Conformance | CE-compliant | CE-compliant |
| ATEX | II 3 G Ex nA IIC T4 Gc X | II 3 G Ex nA IIC T4 Gc X |
| UL, USA / Canada | UL 508 Recognized applied for<br>Class I, Div. 2, Groups A, B, C, D<br>T5 applied for | UL 508 Recognized<br>Class I, Div. 2, Groups A, B, C, D<br>T5 |
| GL | GL EMC 2 D | GL EMC 2 D |

### Ordering data

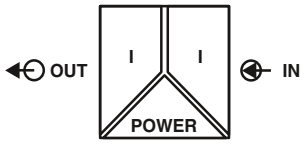
| Description | | Type | Order No. | Pcs. / Pkt. |
|---|---|---|---|---|
| **MCR repeater power supply** | | | | |
| with HART® protocol | Screw connection | **MINI MCR-SL-RPSS-I-I** | **2864079** | 1 |
| with HART® protocol | Spring-cage connection | **MINI MCR-SL-RPSS-I-I-SP** | **2810230** | 1 |
| | Screw connection | **MINI MCR-SL-RPS-I-I** | **2864422** | 1 |
| | Spring-cage connection | **MINI MCR-SL-RPS-I-I-SP** | **2864752** | 1 |

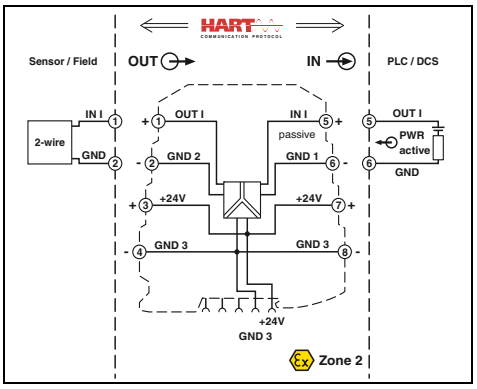



**Repeater power supply operation with a passive sensor**

## Analog IN/Analog OUT
## 3-way output isolator

new



Ex n

HART transmission

Housing width 6.2 mm

- Highly compact output signal conditioner for electrical isolation, conversion, amplification, and filtering of standard analog signals
- For controlling I/P converters, control valves, and displays
- 3-way isolation
- Bidirectional HART transmission
- Power supply possible through the foot element (DIN rail connector)

**Notes:**

Information about power bridging, system cabling, and marking components can be found from page 116

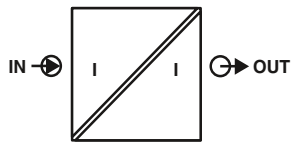
### Technical data

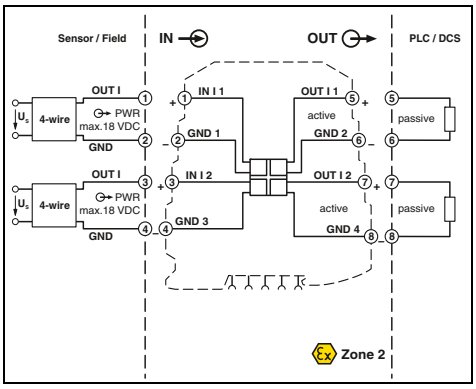
| | |
|---|---|
| Input data | |
| Input signal | 0 ... 20 mA / 4 ... 20 mA |
| Maximum input signal | 20 mA |
| Input voltage limitation | < 2 V (20 mA) |
| Output data | |
| Output signal | 0 ... 20 mA / 4 ... 20 mA |
| Load $R_B$ | ≤ 800 Ω (at 20 mA) |
| Ripple | < 20 $mV_{rms}$ |
| General data | |
| Supply voltage $U_B$ | 19.2 V DC ... 30 V DC |
| Nominal supply voltage | 24 V DC |
| Power consumption | < 600 mW (at 24 V DC) |
| Maximum transmission error | ≤ 0.1 % (of final value) |
| Temperature coefficient | typ. < 0.01 %/K |
| Cut-off frequency (3 dB) | > 175 Hz |
| Communication | HART specification |
| Step response (10-90%) | < 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 ... 60 °C |
| Mounting | any |
| Housing material | PBT |
| Dimensions W / H / D | 6.2 / 93.1 / 102.5 mm |
| Screw connection solid / stranded / AWG | 0.2 ... 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 IIC T4 Gc X |
| UL, USA / Canada | UL 508 Recognized applied for<br>Class I, Div. 2, Groups A, B, C, D T5 applied for |
| GL | GL applied for |

### Ordering data

| Description | Type | Order No. | Pcs. / Pkt. |
|---|---|---|---|
| **3-way output isolator** | | | |
| Screw connection | **MINI MCR-SL-IDS-I-I** | **2905577** | 1 |
| Spring-cage connection | **MINI MCR-SL-IDS-I-I-SP** | **2905578** | 1 |

## Analog IN/Analog OUT
## 2-way passive isolator, input loop-powered




Ex n

D W H

Either 1 or 2-channel

Ex:

Housing width 6.2 mm

- Highly compact 2-wire passive isolator for electrical isolation and filtering of standard analog signals
- Input loop-supplied
- Does not require any additional auxiliary voltage
- 2 channels in conj. with an overall width of just 6.2 mm
- Voltage drop on signal conditioner 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 $R_B$**

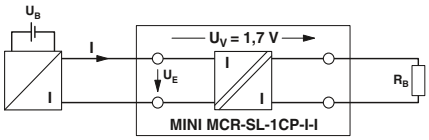
Information on components for power bridging, system cabling, and marking can be found in Catalog 7, Interface technology and switching devices or at phoenixcontact.net/products

### Technical data

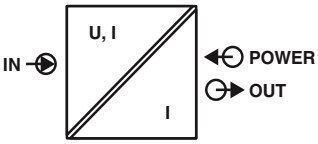
| | |
|---|---|
| Input data | |
| Input signal | 0 ... 20 mA / 4 ... 20 mA |
| Voltage drop | 1.7 V (at I = 20 mA) |
| Response current | approx. 190 µA |
| Maximum input current / overload | 40 mA |
| Maximum input voltage | 18 V |
| Output data | |
| Output signal | 0 ... 20 mA / 4 ... 20 mA |
| Load $R_B$ | < 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) |
| Cut-off 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 | 0.2 ... 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<br>Class I, Div. 2, Groups A, B, C, D |
| GL | GL EMC 2 D |

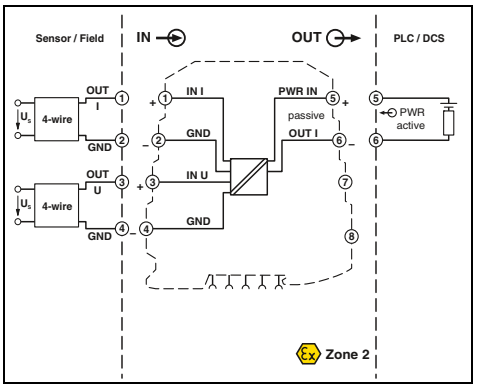
### Ordering data

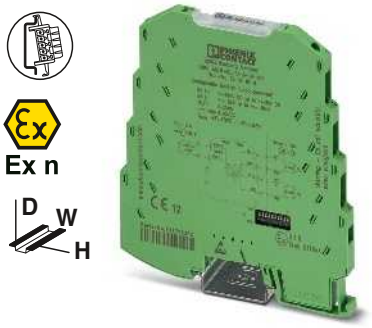
| Description | | Type | Order No. | Pcs. / Pkt. |
|---|---|---|---|---|
| **MCR passive isolator,** for electrical isolation of current signals without auxiliary power | | | | |
| two-channel | Screw connection | **MINI MCR-SL-2CP-I-I** | **2864655** | 1 |
| two-channel | Spring-cage connection | **MINI MCR-SL-2CP-I-I-SP** | **2864781** | 1 |
| single-channel | Screw connection | **MINI MCR-SL-1CP-I-I** | **2864419** | 1 |
| single-channel | Spring-cage connection | **MINI MCR-SL-1CP-I-I-SP** | **2864749** | 1 |



## Analog IN/Analog OUT
## 2-way isolator, output loop-powered




**Configurable,**
**up to 74 signal combinations,**
**output loop-powered**

Ex:
Housing width 6.2 mm

- Highly compact signal conditioner for electrical isolation, conversion, and filtering of standard analog signals
- Supplied by an output loop
- Does not require any additional auxiliary voltage
- Up to 74 signal combinations can be configured using DIP switches
- Voltage input from mV voltages right up to 30 volts
- Current input from 2 mA right up to 40 mA
- 2-way isolation
- Standard configuration:
  Input 2...10 V, output 4...20 mA

**Notes:**

Other input signals that have not been listed can be provided on request.

Information on components for power bridging, system cabling, and marking can be found in Catalog 7, Interface technology and switching devices or at phoenixcontact.net/products

### Technical data

| | | |
|---|---|---|
| Input data | U input | I input |
| Input signal (configurable using the DIP switch) | 2 ... 10 V, additional ranges can be configured, see table | |
| Maximum input signal | < 40 V | < 50 mA (electric strength up to 30 V) |
| Input resistance | approx. 100 kΩ (at ≤ 1 V, otherwise approximately 1 MΩ) | ≤ 50 Ω |
| Output data | | |
| Output signal | 4 ... 20 mA | |
| Maximum output signal | 35 mA | |
| Load $R_B$ | $(U_B - 8\ V) / 22\ mA$ | |
| Ripple | < 20 $mV_{PP}$ (at 500 Ω) | |
| General data | | |
| Current consumption | < 3.5 mA (without signal current) | |
| Power consumption | 28 mW (without signal) | |
| Maximum transmission error | < 0.1 % (of final value) | |
| Temperature coefficient | 0.01 %/K, typ. 0.005 %/K | |
| ZERO / SPAN adjustment | ± 2 % / ± 2 % | |
| Cut-off frequency (3 dB) | approx. 30 Hz | |
| Step response (10-90%) | approx. 16 ms | |
| 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) | -25 °C ... 70 °C | |
| Mounting | any | |
| Housing material | PBT | |
| Dimensions W / H / D | 6.2 / 93.1 / 102.5 mm | |
| Screw connection solid / stranded / AWG | 0.2 ... 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 | |
| EMC note | Class A product, see page 625 | |
| Conformance / approvals | | |
| Conformance | CE-compliant | |
| ATEX | II 3 G Ex nA IIC T4 Gc X | |
| UL, USA / Canada | UL 508 Listed<br>Class I, Div. 2, Groups A, B, C, D T5<br>Class I, Zone 2, Group IIC | |

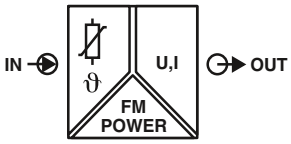
### Ordering data

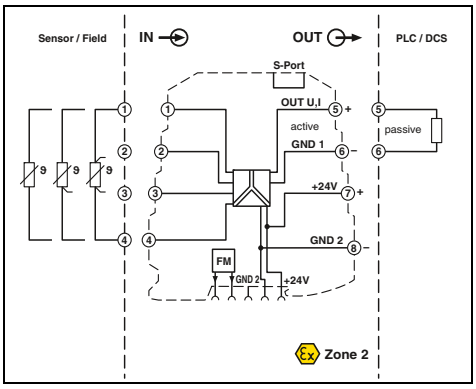
| Description | Type | Order No. | Pcs. / Pkt. |
|---|---|---|---|
| **MCR isolator,** output loop-powered | | | |
| Screw connection | **MINI MCR-SL-UI-I-LP-NC** | **2902829** | 1 |
| Spring-cage connection | **MINI MCR-SL-UI-I-LP-SP-NC** | **2902830** | 1 |

**Possible input signal ranges** (configurable via DIP switch)

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 0...40 mA | | 0...30 V | 0...10 V | 2...10 V | 0...1000 mV | ±30 V | ±10 V | ±1000 mV |
| 0...30 mA | | 0...25 V | 0...7.5 V | | 0...750 mV | ±25 V | ±7.5 V | ±750 mV |
| 0...20 mA | 4...20 mA | 0...20 V | 0...5 V | 1...5 V | 0...500 mV | ±20 V | ±5 V | ±500 mV |
| 0...12 mA | | 0...15 V | 0...3 V | | 0...300 mV | ±15 V | ±3 V | ±300 mV |
| 0...10 mA | 2...10 mA | 0...12.5 V | 0...2.5 V | | 0...250 mV | ±12.5 V | ±2.5 V | ±250 mV |
| 0...8 mA | | 0...12 V | 0...2 V | | 0...200 mV | ±12 V | ±2 V | ±200 mV |
| 0...7.5 mA | | | 0...1.5 V | | 0...150 mV | | ±1.5 V | ±150 mV |
| 0...6 mA | | | 0...1.25 V | | 0...125 mV | | ±1.25 V | ±125 mV |
| 0...5 mA | 1...5 mA | | 0...1.2 V | | 0...120 mV | | ±1.2 V | ±120 mV |
| 0...4 mA | | | | | 0...100 mV | | | ±100 mV |
| 0...3 mA | | | | | 0...75 mV | | | ±75 mV |
| 0...2.5 mA | | | | | 0...60 mV | | | ±60 mV |
| 0...2 mA | | | | | 0...50 mV | | | ±50 mV |

## Temperature
## Temperature transducer
## for resistance thermometers



Ex n

**Universal measuring transducer for resistance thermometers**

Ex:
Housing width 6.2 mm

Universal temperature transducer for electrical isolation, conversion, amplification, and filtering of resistance thermometers and remote resistance-type sensors

- High level of accuracy over the entire measuring range
- For 2, 3 or 4-wire sensors according to IEC 751, JIS, GOST
- Configurable via DIP switches and software
- Software available free of charge on the Internet
- Power supply possible through the foot element (DIN rail connector)
- Supports fault monitoring
- Standard configuration: Pt 100 IEC 751 sensor; 3-wire; -50 ... 150°C; output 4 ... 20 mA; error evaluation according to NE43 (downscale); fault monitoring contact responds to any errors

**Notes:**

The configuration software can be downloaded from the Internet: phoenixcontact.net/products.

Information on the programming adapters can be found on page 89

Information about power bridging, system cabling, and marking components can be found from page 116

### Technical data

| | | |
|---|---|---|
| **Input data** | | |
| Input signal (can be configured using DIP switches) | Pt, Ni, Cu sensors : 2, 3, 4-wire | |
| Temperature range | -200 °C ... 850 °C (range depends on sensor type, range can be set freely via software or in increments via DIP switches) | |
| Measuring range span | min. 50 K | |
| Linear resistance measuring range | 0 Ω ... 4000 Ω (minimum measuring span: 10% of the selected measuring range) | |
| **Output data** | U output | I output |
| Output signal | 0 ... 5 V / 1 ... 5 V | 0 ... 20 mA / 4 ... 20 mA |
| | 0 ... 10 V / 10 ... 0 V | 20 ... 0 mA / 20 ... 4 mA |
| Maximum output signal | approx. 12.3 V | 24.6 mA |
| Load $R_B$ | 10 kΩ | 500 Ω (at 20 mA) |
| Ripple | < 20 $mV_{PP}$ | < 20 $mV_{PP}$ (at 500 Ω) |
| **General data** | | |
| Supply voltage $U_B$ | 9.6 V DC ... 30 V DC | |
| Current consumption | < 27 mA (at 24 V DC) | |
| Power consumption | ≤ 700 mW (at $I_{OUT}$ = 20 mA, 9.6 V DC, load 500 Ω) | |
| Transmission error | 0.1 % * 350 K / set measuring range; 0.1 % > 350 K (Pt/Ni)<br>0.3 % * 200 K / set measuring range; 0.3 % > 200 K (Cu) | |
| Temperature coefficient | 0.01 %/K | |
| Step response (0–99%) | typ. 200 ms (2-wire)<br>typ. 500 ms (3-wire)<br>typ. 500 ms (4-wire) | |
| 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 | |
| Dimensions W / H / D | 6.2 / 93.1 / 102.5 mm | |
| Screw connection solid / stranded / AWG | 0.2 ... 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 | |
| EMC note | Class A product, see page 625 | |
| **Conformance / approvals** | | |
| Conformance | CE-compliant | |
| ATEX | Ex II 3 G Ex nA IIC T4 Gc X | |
| UL, USA / Canada | UL 508 Listed<br>Class I, Div. 2, Groups A, B, C, D T4<br>Class I, Zone 2, Group IIC | |
| GL | GL applied for | |

### Ordering data

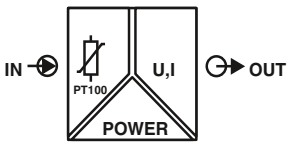
| Description | | Type | Order No. | Pcs. / Pkt. |
|---|---|---|---|---|
| **Temperature transducer for resistance thermometers** | | | | |
| Standard configuration | Screw connection | **MINI MCR-RTD-UI-NC** | **2902849** | 1 |
| Standard configuration | Spring-cage connection | **MINI MCR-RTD-UI-SP-NC** | **2902850** | 1 |

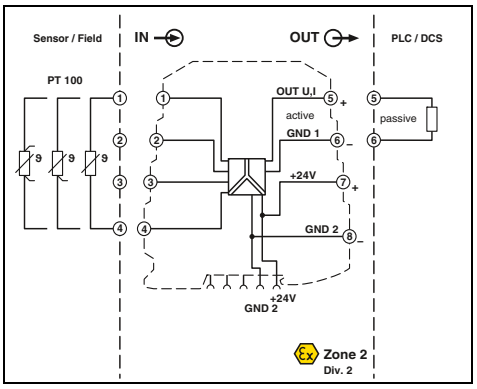
### Accessories

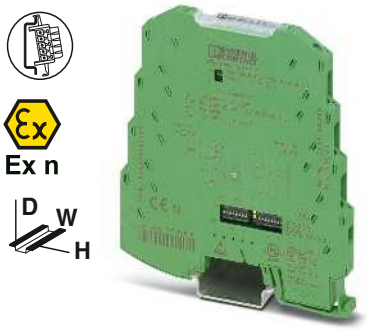
| | | | |
|---|---|---|---|
| **Programming adapter** for configuring modules with S-PORT interface | **IFS-USB-PROG-ADAPTER** | **2811271** | 1 |

| Sensor type | Standard | Measuring range | Smallest measuring range span |
|---|---|---|---|
| Pt100 | IEC 751 = GOST 6651-2009 (α = 0.00385) | -200°C ... +850°C | 50 K |
| Pt200 | IEC 751 = GOST 6651-2009 (α = 0.00385) | -200°C ... +850°C | 50 K |
| Pt500 | IEC 751 = GOST 6651-2009 (α = 0.00385) | -200°C ... +850°C | 50 K |
| Pt1000 | IEC 751 = GOST 6651-2009 (α = 0.00385) | -200°C ... +850°C | 50 K |
| Pt100 | GOST 6651-2009 (α = 0.00391) | -200°C ... +850°C | 50 K |
| Pt1000 | GOST 6651-2009 (α = 0.00391) | -200°C ... +850°C | 50 K |
| Pt100 | JIS C1604-1997 | -200°C ... +850°C | 50 K |
| Pt1000 | JIS C1604-1997 | -200°C ... +850°C | 50 K |
| Ni100 | DIN 43760 | -60°C ... +250°C | 50 K |
| Ni1000 | DIN 43760 | -60°C ... +250°C | 50 K |
| Cu50 | GOST 6651-2009 (α = 1.428) | -180°C ... +200°C | 50 K |
| Cu100 | GOST 6651-2009 (α = 1.428) | -180°C ... +200°C | 50 K |
| Cu53 | GOST 6651-2009 (α = 1.426) | -50°C ... +180°C | 50 K |
| Customer-specific characteristic curves | | | |

## Temperature
## Temperature transducer for Pt 100




**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 diagnostics LED and analog signal
- Power supply possible through the foot element (DIN rail 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 from page 116

### 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<br>0 ... 10 V / 10 ... 0 V | 0 ... 20 mA / 4 ... 20 mA<br>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 measuring 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 | 0.2 ... 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 | |
| EMC note | Class A product, see page 625 | |
| Conformance / approvals | | |
| Conformance | CE-compliant | |
| ATEX | Ex II 3 G Ex nA IIC T4 Gc X | |
| UL, USA / Canada | UL 508 Recognized<br>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 transducer**, for Pt 100 temperature sensors | | | | |
| Order configuration | Screw connection | **MINI MCR-SL-PT100-UI-200** | **2864309** | 1 |
| Order configuration | Spring-cage connection | **MINI MCR-SL-PT100-UI-200-SP** | **2864192** | 1 |
| Unconfigured | Screw connection | **MINI MCR-SL-PT100-UI-200-NC** | **2864370** | 1 |
| Unconfigured | Spring-cage connection | **MINI MCR-SL-PT100-UI-200-SP-NC** | **2864202** | 1 |

**Order key MINI MCR-SL-PT100-UI-200(-SP)** (standard configuration entered as an example)

| Order No. | Connection technology | Measuring range [°C] Start | End | Output | Failure information [1] | Factory calibration certificate (FCC) |
|---|---|---|---|---|---|---|
| **2864309** | **3** | **0** | **100** | **OUT01** | **A** | **NONE** |
| 2864309 ≙ MINI MCR-SL-PT100-UI-200<br>2864192 ≙ MINI MCR-SL-PT100-UI-200-SP | 2 ≙ 2-wire<br>3 ≙ 3-wire<br>4 ≙ 4-wire | 0<br>-5<br>-10<br>-15<br>-20<br>-30<br>-40<br>-50 | **Range** (increment)<br>0...200 (5 K) | OUT01 ≙ 0 ... 20 mA<br>OUT02 ≙ 4 ... 20 mA<br>OUT03 ≙ 0...10 V<br>OUT05 ≙ 0...5 V<br>OUT06 ≙ 1...5 V<br>OUT07 ≙ 20 ... 0 mA<br>OUT08 ≙ 20 ... 4 mA<br>OUT09 ≙ 10...0 V | A<br>B<br>C<br>D | NONE ≙ without FCC<br>Yes ≙ with FCC (a fee is charged)<br>YESPLUS ≙ FCC with 5 measuring points (a fee is charged) |

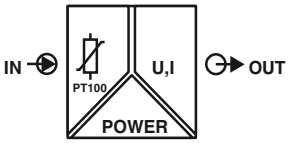
[1]) For explanations, see adjacent text on the right; for further details, see data sheet: www.phoenixcontact.net/products

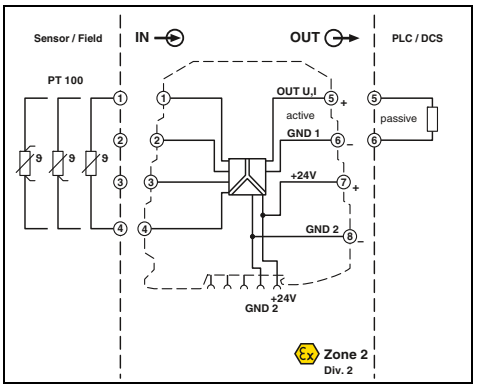
Failure information (depends on the output signal range):

| | 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 diagnostics LED and analog signal
- Power supply possible through the foot element (DIN rail 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 from page 116

### 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<br>0 ... 10 V / 10 ... 0 V | 0 ... 20 mA / 4 ... 20 mA<br>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 measuring range | ≤ 0.2%; ((100 K / set measuring 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 | 0.2 ... 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 | |
| EMC note | Class A product, see page 625 | |
| Conformance / approvals | | |
| Conformance | CE-compliant | |
| ATEX | II 3 G Ex nA IIC T4 Gc X | |
| UL, USA / Canada | UL 508 Recognized<br>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 transducer**, for Pt 100 temperature sensors | | | | |
| Order configuration | Screw connection | **MINI MCR-SL-PT100-UI** | **2864435** | 1 |
| Order configuration | Spring-cage connection | **MINI MCR-SL-PT100-UI-SP** | **2864736** | 1 |
| Unconfigured | Screw connection | **MINI MCR-SL-PT100-UI-NC** | **2864273** | 1 |
| Unconfigured | Spring-cage connection | **MINI MCR-SL-PT100-UI-SP-NC** | **2864286** | 1 |

**Order key MINI MCR-SL-PT100-UI(-SP)** (standard configuration entered as an example)

| Order No. | Connection technology | Measuring range [°C] Start | End | Output | Failure information [1] | Factory calibration certificate (FCC) |
|---|---|---|---|---|---|---|
| **2864435** / | **3** / | **0** / | **100** / | **OUT01** / | **A** / | **NONE** |
| 2864435 ≙ MINI MCR-SL-PT100-UI<br>2864736 ≙ MINI MCR-SL-PT100-UI-SP | 2 ≙ 2-wire<br>3 ≙ 3-wire<br>4 ≙ 4-wire | 0<br>-10<br>-20<br>-30<br>-40<br>-50<br>-100<br>-150 | **Range** (increment)<br>0...100 (5 K)<br>110...300 (10 K)<br>320...700 (20 K)<br>750...850 (50 K) | OUT01 ≙ 0 ... 20 mA<br>OUT02 ≙ 4 ... 20 mA<br>OUT03 ≙ 0 ... 10 V<br>OUT05 ≙ 0...5 V<br>OUT06 ≙ 1...5 V<br>OUT07 ≙ 20 ... 0 mA<br>OUT08 ≙ 20 ... 4 mA<br>OUT09 ≙ 10...0 V | A<br>B<br>C<br>D | NONE ≙ without FCC<br>Yes ≙ with FCC (a fee is charged)<br>YESPLUS ≙ FCC with 5 measuring points (a fee is charged) |

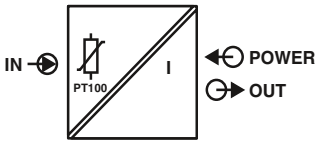
[1] For explanations, see adjacent text on the right; for further details, see data sheet: www.phoenixcontact.net/products

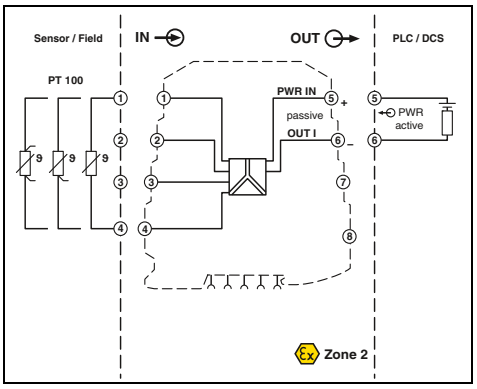
Failure information (depends on the output signal range):

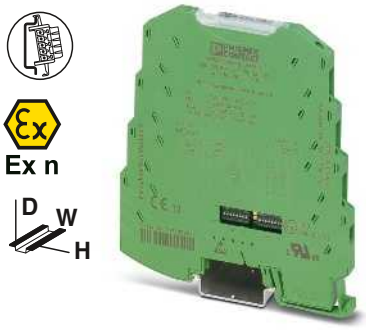
| | Overrange | | | Open circuit | | |
|---|---|---|---|---|---|---|
| | 0 ... 20 mA | 4 ... 20 mA | 0 ... 10 V | 0 ... 20 mA | 4 ... 20 mA | 0 ... 10 V |
| A | 20.5 mA | 20.5 mA | 10.25 V | 21 mA | 21 mA | 10.5 V |
| B | 20.5 mA | 20.5 mA | 10.25 V | 21 mA | 21 mA | 10.5 V |
| C | 20 mA | 20 mA | 10 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




**Configurable,**
**for temperature measuring range -150 ... 300°C,**
**output loop-powered**

Ex:
Housing width 6.2 mm

- Highly compact output 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 diagnostics 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.

Information about power bridging, system cabling, and marking components can be found from page 116

### 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 measuring 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 | 0.2 ... 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 |
| EMC note | Class A product, see page 625 |
| Conformance / approvals | |
| Conformance | CE-compliant |
| ATEX | II 3 G Ex nA IIC T4 Gc X |
| UL, USA / Canada | UL 508 Recognized<br>Class I, Div. 2, Groups A, B, C, D T5 applied for |

### Ordering data

| Description | | Type | Order No. | Pcs. / Pkt. |
|---|---|---|---|---|
| **MCR temperature transducer**, for Pt 100 temperature sensors, output loop-powered | | | | |
| Order configuration | Screw connection | **MINI MCR-SL-PT100-LP** | **2810298** | 1 |
| Order configuration | Spring-cage connection | **MINI MCR-SL-PT100-LP-SP** | **2810382** | 1 |
| Unconfigured | Screw connection | **MINI MCR-SL-PT100-LP-NC** | **2810308** | 1 |
| Unconfigured | Spring-cage connection | **MINI MCR-SL-PT100-LP-NC-SP** | **2810395** | 1 |

**Order key for MINI MCR-SL-PT100-LP(-SP)** (standard configuration entered as an example)

| Order No. | Connection technology | Measuring range [°C] Start | End | Output | Failure information [1] | Factory calibration certificate (FCC) |
|---|---|---|---|---|---|---|
| **2810298** / | **3** / | **0** / | **100** / | **OUT02** / | **1** / | **NONE** |
| 2810298 ≙ MINI MCR_SL-PT100-LP<br>2810382 ≙ MINI MCR_SL-PT100-LP-SP | 2 ≙ 2-wire<br>3 ≙ 3-wire<br>4 ≙ 4-wire | 0<br>-10<br>-20<br>-30<br>-40<br>-50<br>-100<br>-150 | **Range** (increment)<br>0 ... 300 (5 K) | OUT02 ≙ 4 ... 20 mA<br>OUT08 ≙ 20 ... 4 mA | 1<br>2<br>3<br>4 | NONE ≙ without FCC<br>YES ≙ with FCC (a fee is charged)<br>YESPLUS ≙ FCC with 5 measuring points (a fee is charged) |

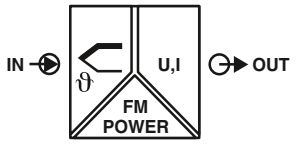
[1]) For explanations, see adjacent text on the right; for further details, see data sheet: www.phoenixcontact.net/products

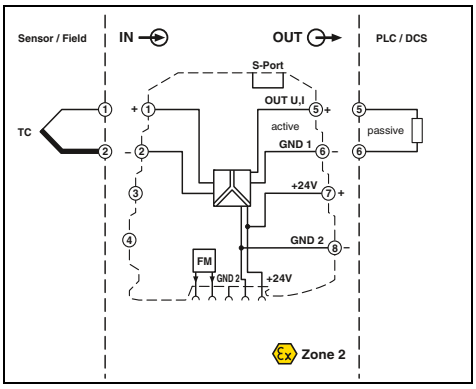
Failure information:

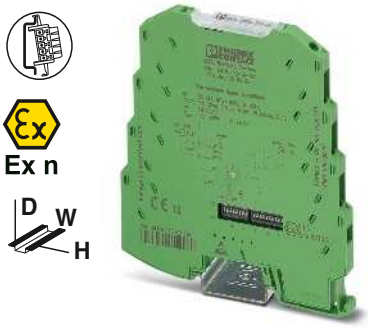
| | Overrange | Open circuit |
|---|---|---|
| 1 | - | Start of range |
| 2 | 21.5 mA | 21.5 mA |
| 3 | 3.5 mA | 3.5 mA |
| 4 | 21.5 mA | 21.5 mA |

| | 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 thermocouples



Ex n

D W H

**Universal measuring transducer for thermocouples**

Ex:

Housing width 6.2 mm

Highly compact temperature transducer for electrical isolation, conversion, amplification, and filtering of thermocouple signals.

- For thermocouples according to IEC 584 and GOST
- Internal cold junction compensation
- Configurable via DIP switches and software
- Software available free of charge on the Internet
- Power supply possible through the foot element (DIN rail connector)
- Supports fault monitoring
- Standard configuration: TC sensor type J IEC 584 TC; cold junction compensation "ON"; -200 ... 1200°C; 4 ... 20 mA output; error evaluation according to NE43 (downscale); fault monitoring contact responds on any error.

**Notes:**

Information on the programming adapters can be found on page 89

The configuration software can be downloaded from the Internet: phoenixcontact.net/products.

Information about power bridging, system cabling, and marking components can be found from page 116

### Technical data

| | | |
|---|---|---|
| Input data | | |
| Input signal (can be configured using DIP switches) | B, E, J, K, N, R, S, T, L, U, A-1, A-2, A-3, M, L | |
| Temperature range | -250 °C ... 2500 °C (range depends on sensor type, range can be set freely via software or in increments via DIP switches) | |
| 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<br>0 ... 10 V / 10 ... 0 V | 0 ... 20 mA / 4 ... 20 mA<br>20 ... 0 mA / 20 ... 4 mA |
| Maximum output signal | approx. 12.3 V | 24.6 mA |
| No-load voltage | | < 17.5 V |
| Short-circuit current | < 31.5 mA | |
| Load $R_B$ | ≥ 10 kΩ | < 500 Ω (at 20 mA) |
| Ripple | < 20 $mV_{PP}$ | < 20 $mV_{PP}$ (at 500 Ω) |
| General data | | |
| Supply voltage $U_B$ | 9.6 V DC ... 30 V DC | |
| Current consumption | < 27 mA (at 24 V DC) | |
| Power consumption | ≤ 700 mW (at $I_{OUT}$ = 20 mA, 9.6 V DC, load 500 Ω) | |
| Transmission error | 0.1 % * 600 K / set measuring range; 0.1 % > 600 K (E, J, K, N, T, L, U, M Gost, L Gost) 0.2 % * 600 K / set measuring range; 0.2 % > 600 K (B, R, S, A1, A2, A3) | |
| Cold junction errors | < 3 K ( typ. < 2 K ) | |
| Temperature coefficient | ≤ 0.01 %/K | |
| Step response (0–99%) | typ. 400 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 | 0.2 ... 2.5 $mm^2$ / 0.2 ... 2.5 $mm^2$ / 26 - 12 | |
| EMC note | Class A product, see page 625 | |
| Conformance / approvals | | |
| Conformance | CE-compliant | |
| ATEX | Ex II 3 G Ex nA IIC T4 Gc X | |
| UL, USA / Canada | UL 508 Listed<br>Class I, Div. 2, Groups A, B, C, D T4<br>Class I, Zone 2, Group IIC | |
| GL | GL applied for | |

### Ordering data

| Description | | Type | Order No. | Pcs. / Pkt. |
|---|---|---|---|---|
| **Universal temperature transducer for thermocouples** | | | | |
| Standard configuration | Screw connection | **MINI MCR-TC-UI-NC** | **2902851** | 1 |

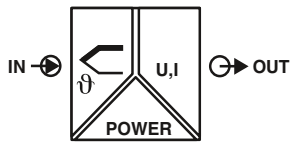
### Accessories

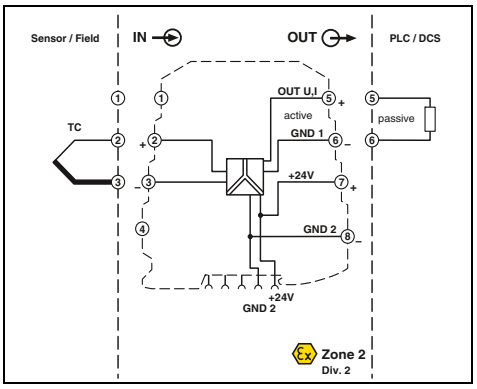
| | | | |
|---|---|---|---|
| **Programming adapter** for configuring modules with S-PORT interface | **IFS-USB-PROG-ADAPTER** | **2811271** | 1 |

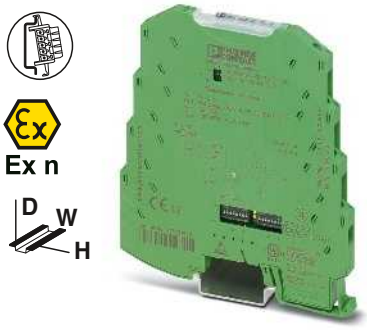
| Sensor type | Standard | Measuring range |
|---|---|---|
| B | IEC 584-1 | +500°C ... +1820°C |
| E | IEC 584-1 | -230°C ... +1000°C |
| J | IEC 584-1 | -210°C ... +1200°C |
| K | IEC 584-1 | -250°C ... +1372°C |
| N | IEC 584-1 | -200°C ... +1300°C |
| R | IEC 584-1 | -50°C ... +1768°C |
| S | IEC 584-1 | -50°C ... +1768°C |
| T | IEC 584-1 | -200°C ... +400°C |

| Sensor type | Standard | Measuring range |
|---|---|---|
| L | DIN 43710 | -200°C ... +900°C |
| U | DIN 43710 | -200°C ... +600°C |
| A-1 | GOST 8.585 | 0°C ... +2500°C |
| A-2 | GOST 8.585 | 0°C ... +1800°C |
| A-3 | GOST 8.585 | 0°C ... +1800°C |
| M | GOST 8.585 | -200°C ... +100°C |
| L | GOST 8.585 | -200°C ... +800°C |
| Customer-specific characteristic curves | | |

# Temperature, temperature transducer for type J and K 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 584-1
- Internal cold junction compensation
- Input and output signals can be configured via DIP switches
- 3-way isolation
- Error signaling via diagnostics LED and analog signal
- Power supply possible through the foot element (DIN rail 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 from page 116

## 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)<br>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<br>0 ... 10 V / 10 ... 0 V | 0 ... 20 mA / 4 ... 20 mA<br>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 measuring range | ≤ 0.2%; ((150 K / set measuring 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 | 0.2 ... 2.5 $mm^2$ / 0.2 ... 2.5 $mm^2$ / 26 - 12 | |
| EMC note | Class A product, see page 625 | |
| **Conformance / approvals** | | |
| Conformance | CE-compliant | |
| ATEX | Ex II 3 G Ex nA IIC T4 Gc X | |
| UL, USA / Canada | UL 508 Recognized<br>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 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 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 |
| MINI MCR-SL-TC-UI | J ≙ Type J<br>K ≙ Type K | 0<br>-10<br>-20<br>-30<br>-40<br>-50<br>-100<br>-150 | **Range** (increment)<br>0 ... 300 (10 K)<br>320 ... 700 (20 K)<br>750 ... 1350 (50 K) | OUT01 ≙ 0 ... 20 mA<br>OUT02 ≙ 4 ... 20 mA<br>OUT03 ≙ 0 ... 10 V<br>OUT05 ≙ 0 ... 5 V<br>OUT06 ≙ 1...5 V<br>OUT07 ≙ 20 ... 0 mA<br>OUT08 ≙ 20 ... 4 mA<br>OUT09 ≙ 10 ... 0 V | A<br>B<br>C<br>D | NONE ≙ without FCC<br>Yes ≙ with FCC (a fee is charged)<br>YESPLUS ≙ FCC with 5 measuring points (a fee is charged) |

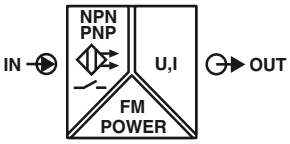
[1]) For explanations, see adjacent text on the right; for further details, see data sheet: www.phoenixcontact.net/products

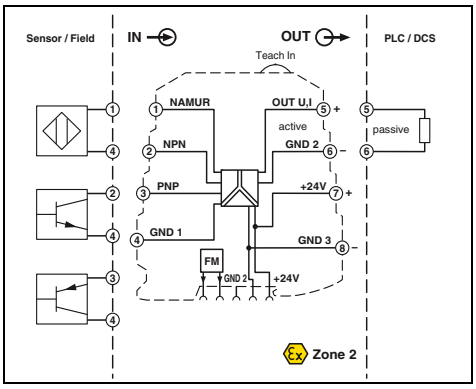
Failure information (depends on the output signal range):

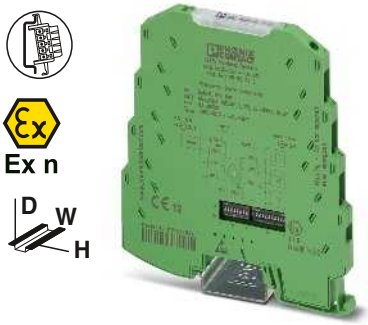
| | Overrange 0 ... 20 mA | Overrange 4 ... 20 mA | Overrange 0 ... 10 V | Open circuit 0 ... 20 mA | Open circuit 4 ... 20 mA | Open circuit 0 ... 10 V |
|---|---|---|---|---|---|---|
| A | 20.5 mA | 20.5 mA | 10.25 V | 21 mA | 21 mA | 10.5 V |
| B | 20.5 mA | 20.5 mA | 10.25 V | 21 mA | 21 mA | 10.5 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 | Underrange 4 ... 20 mA | Underrange 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
## Frequency transducer for up to 80 kHz




Frequency transducer for up to 80 kHz

Ex:
Housing width 6.2 mm

Configurable 3-way isolated frequency transducer.

- Suitable for the connection of NAMUR proximity sensors (IEC 60947-5-6 and EN 50227) as well as for sensors with NPN and PNP outputs that generate a frequency signal
- The device is configured via DIP switches
- Frequency range is freely adjustable via a press/slide button ("teach-in wheel")
- Supports fault monitoring
- Standard configuration:
  NAMUR sensor; mean-value generation "OFF"; 0.002 Hz ... 20 kHz frequency range; 4 ... 20 mA output; error evaluation NE43 (downscale); fault monitoring contact responds on any error

**Notes:**

Information about power bridging, system cabling, and marking components can be found from page 116

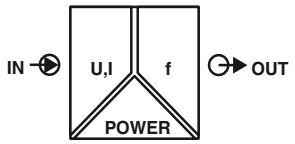
### Technical data

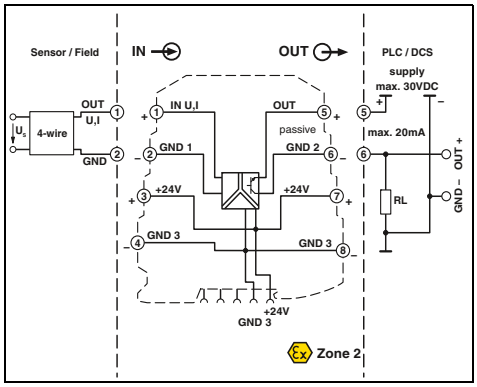
| | | |
|---|---|---|
| Input data | | |
| Input sources | NPN/PNP transistor outputs<br>NAMUR initiators<br>Floating relay contact (dry contact) | |
| Frequency measuring range | 0.002 Hz ... 20 kHz (DIP switch)<br>0.002 Hz ... 80 kHz (teach-in wheel) | |
| Maximum input signal | 30 V (incl. DC voltage) | |
| Output data | U output | I output |
| Output signal | 0 ... 5 V / 1 ... 5 V<br>0 ... 10 V / 10 ... 0 V | 0 ... 20 mA / 4 ... 20 mA<br>20 ... 0 mA / 20 ... 4 mA |
| Maximum output signal | approx. 12.3 V | 24.6 mA |
| Load $R_B$ | ≥ 10 kΩ | 500 Ω (at 20 mA) |
| Ripple | < 20 $mV_{PP}$ | < 20 $mV_{PP}$ (at 500 Ω) |
| General data | | |
| Supply voltage $U_B$ | 9.6 V DC ... 30 V DC | |
| Power consumption | < 800 mW (at $I_{OUT}$ = 20 mA, 9.6 V DC, load 500 Ω) | |
| Transmission error of the set measuring span | 0.1 % | |
| Temperature coefficient | 0.01 %/K | |
| Step response (0–99%) | < 35 ms (at f > 500 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 | 0.2 ... 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 | |
| EMC note | Class A product, see page 625 | |
| Conformance / approvals | | |
| Conformance | CE-compliant | |
| ATEX | II 3 G Ex nA IIC T4 Gc X | |
| UL, USA / Canada | UL 508 Listed<br>Class I, Div. 2, Groups A, B, C, D T4<br>Class I, Zone 2, Group IIC | |
| GL | GL applied for | |

### Ordering data

| Description | | Type | Order No. | Pcs. / Pkt. |
|---|---|---|---|---|
| **MCR frequency transducer** | | | | |
| Standard configuration | Screw connection | **MINI MCR-SL-F-UI-NC** | **2902832** | 1 |
| Standard configuration | Spring-cage connection | **MINI MCR-SL-F-UI-SP-NC** | **2902833** | 1 |

## 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 suppression filter
- Input and output signals can be configured via DIP switches
- 3-way isolation
- Error signaling via diagnostics LED and analog signal
- Power supply possible through the foot element (DIN rail connector)
- PWM output of 5 ... 95%

**Notes:**

Information about power bridging, system cabling, and marking components can be found from page 116

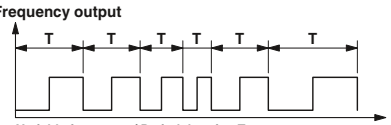
### Technical data

| | | |
|---|---|---|
| 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 |
| | 0 ... 10 V / 2 ... 10 V | 0 ... 10 mA / 2 ... 10 mA - |
| Maximum input signal | 30 V DC | 100 mA |
| Input resistance | approx. 110 kΩ | approx. 50 Ω |
| Output data | Frequency output | PWM output |
| Output signal (can be configured using DIP switches) | 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 | ≤ 0.1 % (> 7 kHz ≤ 0.2 %) | |
| Temperature coefficient | < 0.02 %/K | |
| Step response (0–99%) | < 15 ms (+ (1/f) smallest filter)<br>< 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 | 0.2 ... 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 | |
| EMC note | Class A product, see page 625 | |
| Conformance / approvals | | |
| Conformance | CE-compliant | |
| ATEX | II 3 G Ex nA IIC T4 Gc X | |
| UL, USA / Canada | UL 508 Recognized<br>Class I, Div. 2, Groups A, B, C, D T5 applied for | |
| GL | GL EMC 2 D | |

### Ordering data

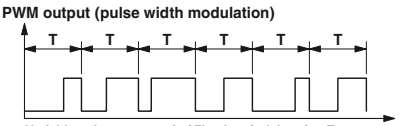
| Description | Type | Order No. | Pcs. / Pkt. |
|---|---|---|---|
| **MCR Analog frequency transducer** | | | |
| Screw connection | **MINI MCR-SL-UI-F** | **2864082** | 1 |
| Spring-cage connection | **MINI MCR-SL-UI-F-SP** | **2810243** | 1 |

**Frequency output**



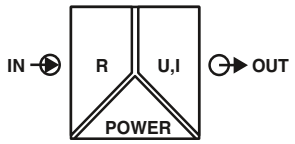

**Variable frequency / Period duration T**

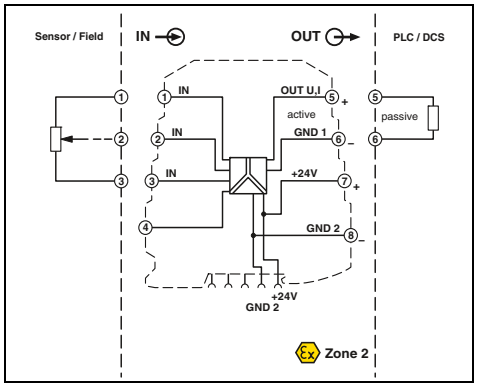
**PWM output (pulse width modulation)**




**Variable pulse-pause ratio / Fixed period duration T**

## Potentiometers
## Potiposition transducer



**Configurable, automatic potentiometer detection**

Ex:
Housing width 6.2 mm

- Highly compact potiposition transducer for electrical isolation, conversion, amplification, and filtering of potentiometer positions 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 diagnostics LED and analog signal
- Power supply possible through the foot element (DIN rail connector)

**Notes:**

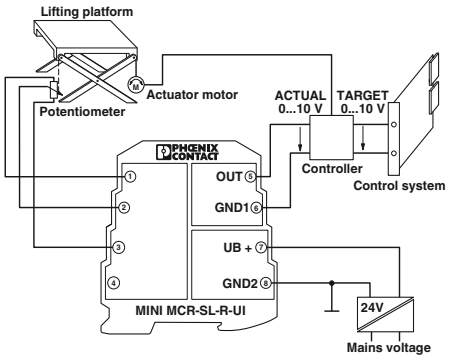
Information about power bridging, system cabling, and marking components can be found from page 116

### 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<br>0 ... 10 V / 10 ... 0 V | 0 ... 20 mA / 4 ... 20 mA<br>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 | 0 % ... 105 % (configurable) | |
| 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 | 0.2 ... 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 | |
| EMC note | Class A product, see page 625 | |
| Conformance / approvals | | |
| Conformance | CE-compliant | |
| ATEX | II 3 G Ex nA IIC T4 Gc X | |
| UL, USA / Canada | UL 508 Recognized<br>Class I, Div. 2, Groups A, B, C, D T5 applied for | |
| GL | GL EMC 2 D | |

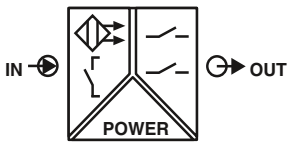
### Ordering data

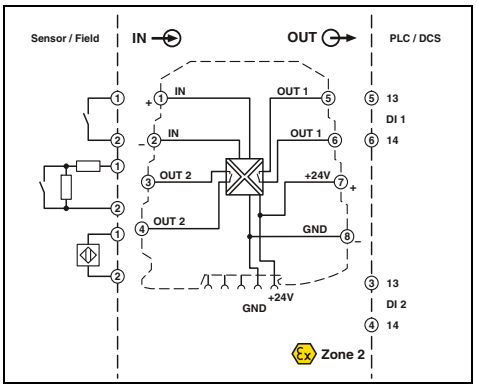
| Description | Type | Order No. | Pcs. / Pkt. |
|---|---|---|---|
| **MCR potiposition transducer** | | | |
| Screw connection | **MINI MCR-SL-R-UI** | **2864095** | 1 |
| Spring-cage connection | **MINI MCR-SL-R-UI-SP** | **2810256** | 1 |




**Height adjustment of a lifting platform with setpoint and actual value control**

## Digital IN
## NAMUR signal conditioner



Ex n

D W H

**Configurable, for NAMUR sensors and floating contacts**

Ex:

Housing width 6.2 mm

- Highly compact signal conditioner 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 diagnostics LED and analog signal
- Power supply possible through the foot element (DIN rail connector)

**Notes:**

Information about power bridging, system cabling, and marking components can be found from page 116

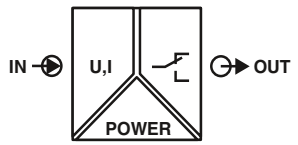
### Technical data

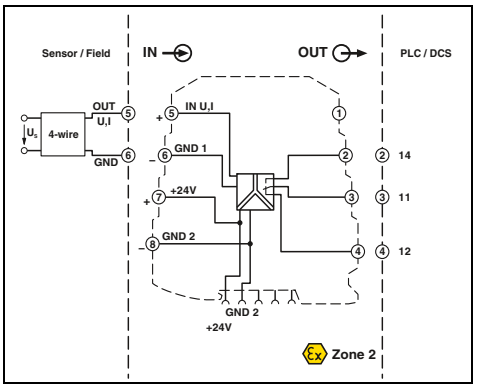
| | |
|---|---|
| **Input data** | |
| Input signal | NAMUR proximity sensors (EN 60947-5-6)<br>open circuit switch contacts<br>Switch contacts with resistance circuit |
| **Control circuit** | |
| No-load voltage | 8.2 V DC ±10 % |
| Switching points (in acc. with IEC 60947-5-6) | < 1.2 mA (blocking)<br>> 2.1 mA (conductive) |
| Line fault detection | > 6 mA (in the event of a short-circuit)<br>< 0.35 mA (in the event of an open circuit) |
| **Switching output** | |
| Relay output | 2 N/O contacts |
| Contact material | Hard gold-plated AgNi |
| Max. switching voltage | 250 V AC |
| Max. switching current | 2 A |
| Min. contact current | 1 mA (at 5 V DC) |
| Switching frequency | 0.5 Hz (240 V AC / 30 V DC / 2 A)<br>10 Hz (without load) |
| **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 ... 65 °C |
| Mounting | any |
| Housing material | PBT |
| Dimensions W / H / D | 6.2 / 93.1 / 102.5 mm |
| Screw connection solid / stranded / AWG | 0.2 ... 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 |
| EMC note | Class A product, see page 625 |
| **Conformance / approvals** | |
| Conformance | CE-compliant |
| ATEX | II 3 G Ex nA nC IIC T4 Gc X |
| UL, USA / Canada | UL 508 Recognized<br>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 signal conditioner** | | | |
| Screw connection | **MINI MCR-SL-NAM-2RNO** | **2864105** | 1 |
| Spring-cage connection | **MINI MCR-SL-NAM-2RNO-SP** | **2810269** | 1 |

## Limit values, threshold value switch



Ex n

**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 switchover
- Status and error signaling via two diagnostics LEDs
- Power supply possible through the foot element (DIN rail connector)

**Notes:**

Information about power bridging, system cabling, and marking components can be found from page 116

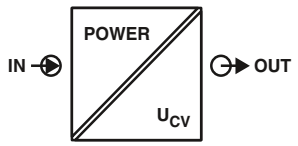
### Technical data

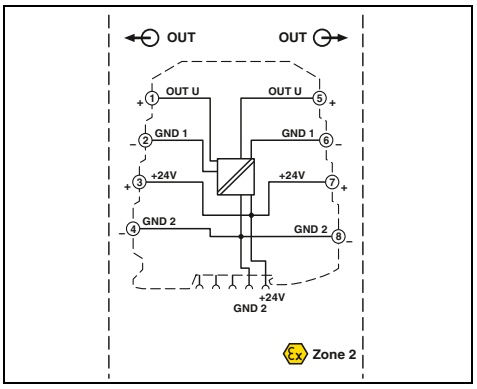
| | | |
|---|---|---|
| Input data | U input | I input |
| Input signal (configurable using the DIP switch) | 0 ... 10 V | 0 ... 20 mA |
| Maximum input signal | 30 V | 100 mA |
| Input resistance | > 100 kΩ | 50 Ω |
| Specification of the switching point | With 25-speed potentiometer | |
| Switching 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 | Can be selected via 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 ±15 % | |
| Current consumption | < 14 mA (at 24 V DC) | |
| Power consumption | < 330 mW (at 24 V DC) | |
| Linearity error | - | |
| 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 | 0.2 ... 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 | |
| EMC note | Class A product, see page 625 | |
| Conformance / approvals | | |
| Conformance | CE-compliant | |
| ATEX | Ex II 3 G Ex nA nC IIC T4 Gc X | |
| UL, USA / Canada | UL 508 Recognized | |
| UL, USA | Class I, Zone 2, AEx nA nC IIC T5 | |
| UL, Canada | Class I, Zone 2, Ex nA nC IIC T5 Gc | |
| GL | GL EMC 2 D | |

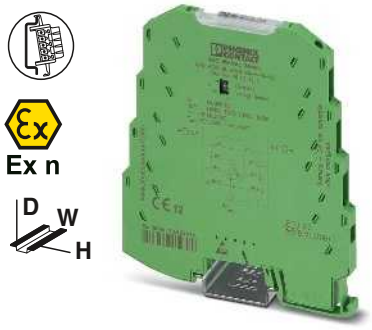
### Ordering data

| Description | Type | Order No. | Pcs. / Pkt. |
|---|---|---|---|
| **MCR threshold value switch** | | | |
| Screw connection | **MINI MCR-SL-UI-REL** | **2864480** | 1 |
| Spring-cage connection | **MINI MCR-SL-UI-REL-SP** | **2864493** | 1 |

## Accessories, constant voltage source




**Configurable, output signals: 2.5 V / 5 V / 7.5 V / 10 V**

Ex:
Housing width 6.2 mm

- Constant voltage source for potentiometers, measuring bridges, encoders
- Highly precise
- Input signal corresponds to power supply
- Input signal and, in turn, the power supply can be provided via the foot element (DIN rail connector)
- Standard configuration: Output 10 V DC

### Technical data

| | |
|---|---|
| Input data | |
| Input signal | 9.6 ... 30 V |
| Output data | |
| Output signal (can be configured using DIP switches) | 10 V DC<br>7.5 V DC<br>5 V DC<br>2.5 V DC |
| Short-circuit current | approx. 32 mA |
| Ripple | < 20 $mV_{PP}$ |
| General data | |
| Supply voltage $U_B$ | 9.6 V DC ... 30 V DC |
| Power consumption | < 600 mW (at 24 V IN) |
| Maximum transmission error | ≤ 0.1 % (of final value) |
| Temperature coefficient | < 0.01 %/K, typ. < 0.002 %/K |
| 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 |
| Housing material | PBT |
| Dimensions W / H / D | 6.2 / 93.1 / 102.5 mm |
| Screw connection solid / stranded / AWG | 0.2 ... 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 |
| EMC note | Class A product, see page 625 |
| Conformance / approvals | |
| Conformance | CE-compliant |
| ATEX | II 3 G Ex nA IIC T4 Gc X |
| UL, USA / Canada | UL 508 Listed<br>Class I, Div. 2, Groups A, B, C, D T6<br>Class I, Zone 2, Group IIC |

### Ordering data

| Description | Type | Order No. | Pcs. / Pkt. |
|---|---|---|---|
| **MCR constant voltage source** | | | |
| Screw connection | **MINI MCR-SL-CVS-24-5-10-NC** | **2902822** | 1 |
| Spring-cage connection | **MINI MCR-SL-CVS-24-5-10-SP-NC** | **2902823** | 1 |

### Accessories

| | | | |
|---|---|---|---|
| **Setpoint potentiometer**, for individual setpoint definition | | | |
| Resistance value 4.7 kΩ | **EMG 30-SP- 4K7LIN** | **2940252** | 10 |
| Resistance value 10 kΩ | **EMG 30-SP-10K LIN** | **2942124** | 10 |

## Accessories
## Programming adapter

The IFS-USB-PROG-ADAPTER programming adapter is used for configuring Phoenix Contact INTERFACE modules with S-Port interface.

The adapter is used with FDT/DTM software or ANALOG-CONF software. For programming MACX Analog, MINI Analog Pro, and MINI Analog.

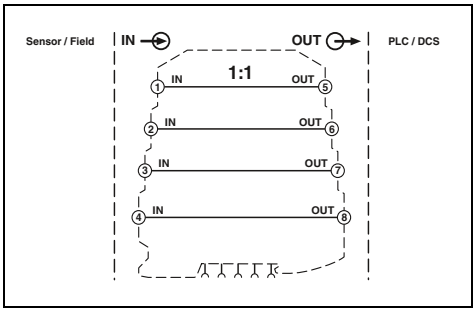
Ex:

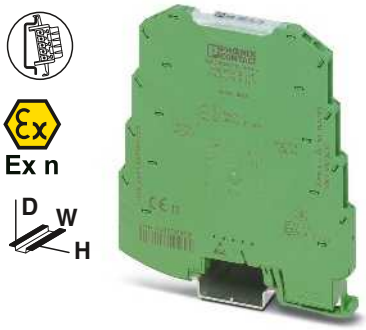
| | Technical data |
|---|---|
| General data | |
| EMC note | Class A product, see page 625 |

| | Ordering data | | |
|---|---|---|---|
| Description | Type | Order No. | Pcs. / Pkt. |
| **Programming adapter** for configuring modules with S-PORT interface | IFS-USB-PROG-ADAPTER | 2811271 | 1 |

## Accessories
## Feed-through terminal block

- 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 | 0.2 ... 2.5 mm² / 0.2 ... 2.5 mm² / 24 - 12 |
| Conformance / approvals | |
| ATEX | Ex II 3 G Ex nA IIC T4 Gc X |
| GL | GL EMC 2 D |

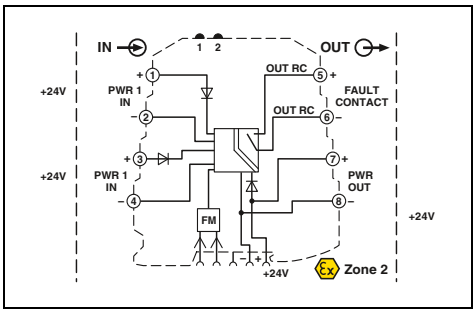
### Ordering data

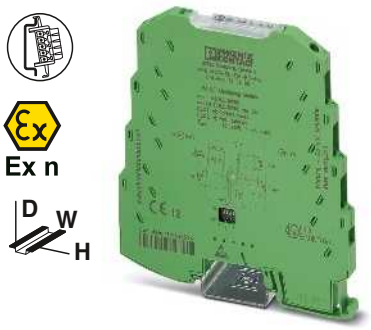
| Description | Type | Order No. | Pcs. / Pkt. |
|---|---|---|---|
| **MINI Analog feed-through terminal block** | | | |
| Screw connection | **MINI MCR-SL-TB** | **2811420** | 1 |

## Accessories
## Fault signaling module

Fault monitoring module for evaluating and reporting group errors from the fault monitoring system.

- Monitoring of supply voltages of MINI MCR-SL-PTB-FM(-SP) power terminals
- Drawing off the supply is possible
- The error is reported via an N/C contact
- Standard configuration: group error detection “ON”; redundancy monitoring “ON“; relay “active”




Group error indication and supply monitoring

### Technical data

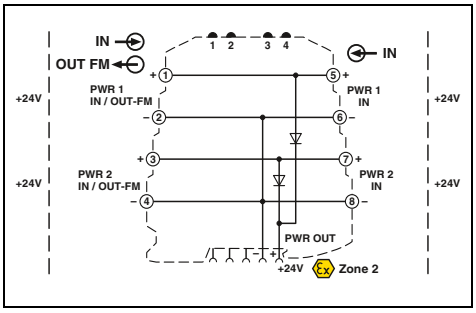
| | |
|---|---|
| Input data/output data | |
| Input signal | 9.6 V DC ... 30 V DC |
| Output signal | 8.8 V DC ... 29.2 V DC |
| Output signal maximum current | 2 A |
| Switching output | |
| Max. switching voltage | 30 V AC/DC |
| Max. switching current | 50 mA |
| Test voltage input/output | 1.5 kV AC (50 Hz, 1 min.) |
| EMC note | Class A product, see page 625 |
| Conformance / approvals | |
| ATEX | Ex II 3 G Ex nA nC IIC T4 Gc X |
| UL, USA / Canada | UL 508 Listed<br>Class I, Div. 2, Groups A, B, C, D T4<br>Class I, Zone 2, Group IIC |
| GL | GL applied for |

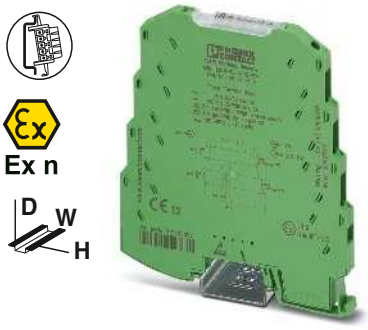
### Ordering data

| Description | Type | Order No. | Pcs. / Pkt. |
|---|---|---|---|
| **MINI Analog fault signaling module** | | | |
| Standard configuration, Screw connection | **MINI MCR-SL-FM-RC-NC** | **2902961** | 1 |
| Standard configuration, Spring-cage connection | **MINI MCR-SL-FM-RC-SP-NC** | **2902962** | 1 |

## Accessories
## Power terminal

- For up to 80 MINI Analog modules
- The MINI MCR-SL-PTB-FM(-SP) power terminal is used to supply the supply voltage to the DIN rail connector
- Monitoring of supplies in combination with the fault monitoring module
- Flexible redundant supply from one or both module sides
- Extended supply voltage range from 0 ... 30 V DC




Power terminal, can be monitored

| | Technical data |
|---|---|
| Input data/output data | |
| Input voltage range | 0 V DC ... 30 V DC |
| Output voltage | Input voltage - 0.8 V |
| Output current | ≤ 2 A |
| General data | |
| EMC note | Class A product, see page 625 |
| Conformance / approvals | |
| Conformance | CE-compliant |
| ATEX | Ex II 3 G Ex nA IIC T4 Gc X |
| UL, USA / Canada | UL 508 Listed<br>Class I, Div. 2, Groups A, B, C, D T4<br>Class I, Zone 2, Group IIC |
| GL | GL applied for |

| Description | Ordering data<br>Type | Order No. | Pcs. / Pkt. |
|---|---|---|---|
| **MINI Analog power terminal** | | | |
| Screw connection | **MINI MCR-SL-PTB-FM** | **2902958** | 1 |
| Spring-cage connection | **MINI MCR-SL-PTB-FM-SP** | **2902959** | 1 |

## Accessories
## Marking material

- Flexible marking system with hinged 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<br>Type | Order No. | Pcs. / Pkt. |
|---|---|---|---|
| **Hinged transparent cover,** for marking 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 (see Catalog 5)** | | |
| **UniCard sheets, for marker groove** | **UC-TMF 6 (see Catalog 5)** | | |

## Accessories
## ME 6,2 TBUS... DIN rail connector

- For bridging the supply voltage
- Reduces wiring costs
- Module replacement without interrupting the supply to the remaining modules (hot swappable)
- One DIN rail connector for two MINI Analog modules

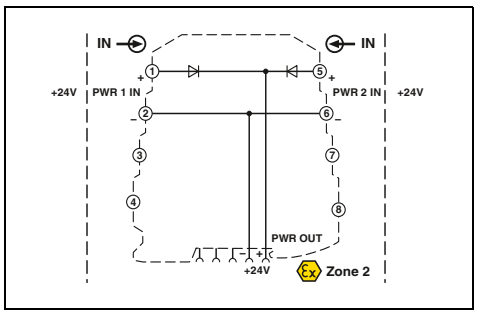
**For bridging the supply voltage**

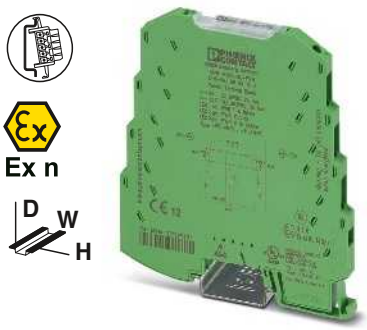
### Ordering data

| 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<br>Color: green | **ME 6,2 TBUS-2 1,5/5-ST-3,81 GN** | **2869728** | 10 |

## Accessories
## Power terminal

- For supplying the supply voltage via the foot element (DIN rail 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 diagnostics LEDs




**Redundant supply for existing 24 V**

**Notes:**

**Recommended fuse for power terminal:**
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)

### Technical data

| | |
|---|---|
| Input data | |
| Input voltage range | 20 V DC ... 30 V DC |
| Output data | |
| Output voltage | Input voltage - 0.8 V |
| Output current | ≤ 2 A |
| General data | |
| Ambient temperature (operation) | -20 °C ... 65 °C |
| Housing material | PBT |
| EMC note | Class A product, see page 625 |
| Conformance / approvals | |
| Conformance | CE-compliant |
| ATEX | Ex II 3 G Ex nA IIC T4 Gc X |
| UL, USA / Canada | UL 508 Recognized<br>Class I, Div. 2, Groups A, B, C, D T5 |
| GL | GL EMC 2 D |

### Ordering data

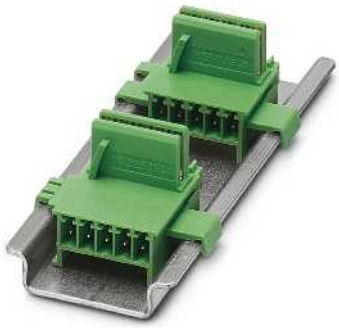
| Description | Type | Order No. | Pcs. / Pkt. |
|---|---|---|---|
| **MCR power terminal** | | | |
| Screw connection | **MINI MCR-SL-PTB** | **2864134** | 1 |
| Spring-cage connection | **MINI MCR-SL-PTB-SP** | **2864147** | 1 |

## Accessories
## ME 17,5 TBUS-... DIN rail connector

– For bridging the supply voltage when using a MINI POWER system power supply

**Notes:**

If the system power supply is used, two ME 17,5 TBUS DIN rail connectors are required. This allows you to establish the connection to the ME 6,2 TBUS DIN rail connector 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 DIN rail connector where AC voltages are available
– Nominal input voltage range 100 ... 240 V AC
– 24 V DC output voltage
– For up to 60 MINI Analog modules
– For up to 1.5 A, secondary
– Status and error signaling via diagnostics LEDs

**For applications with local voltages of over 100 V**

| Description | Ordering data | | |
|---|---|---|---|
| | Type | Order No. | Pcs. / Pkt. |
| **System power supply,** primary-switched, with zone 2 approval. Further information can be found in Catalog 6, Surge protection and power supplies. | MINI-PS-100-240AC/24DC/1.5/EX | 2866653 | 1 |
| **System power supply,** primary-switched (not for zone 2) Further information can be found in Catalog 6, Surge protection and power supplies. | 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 in a confined space 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 includes:

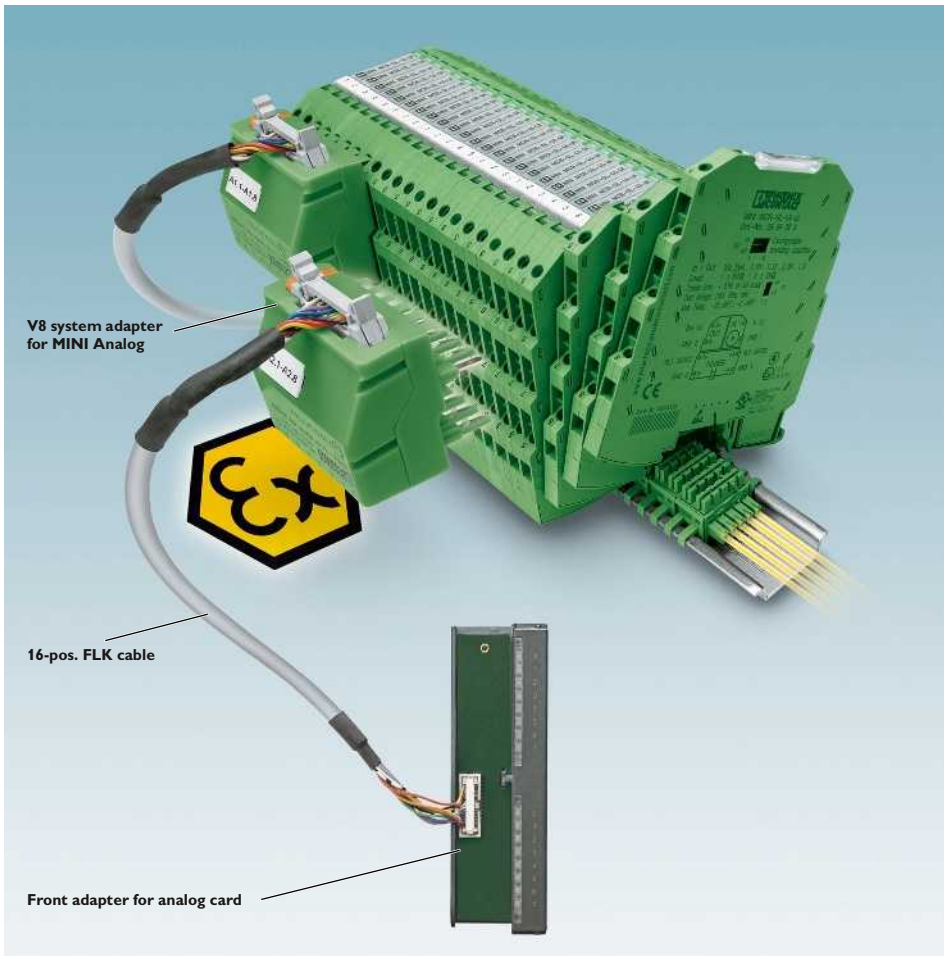
– A 16-pos. FLK cable
– The V8 system adapter for MINI Analog modules
– A front adapter that needs to be specifically selected based on the analog card of the controller

With this solution, all you need to do is connect the components together. There is virtually no wiring effort involved. What's more, it completely rules out wiring errors, as the pre-assembled components ensure correct assignment by virtue of their 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-pos. FLK cable with open ends on one side. The open ends are fitted with ferrules and are numbered. This allows you to create a system cabling connection to virtually 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.

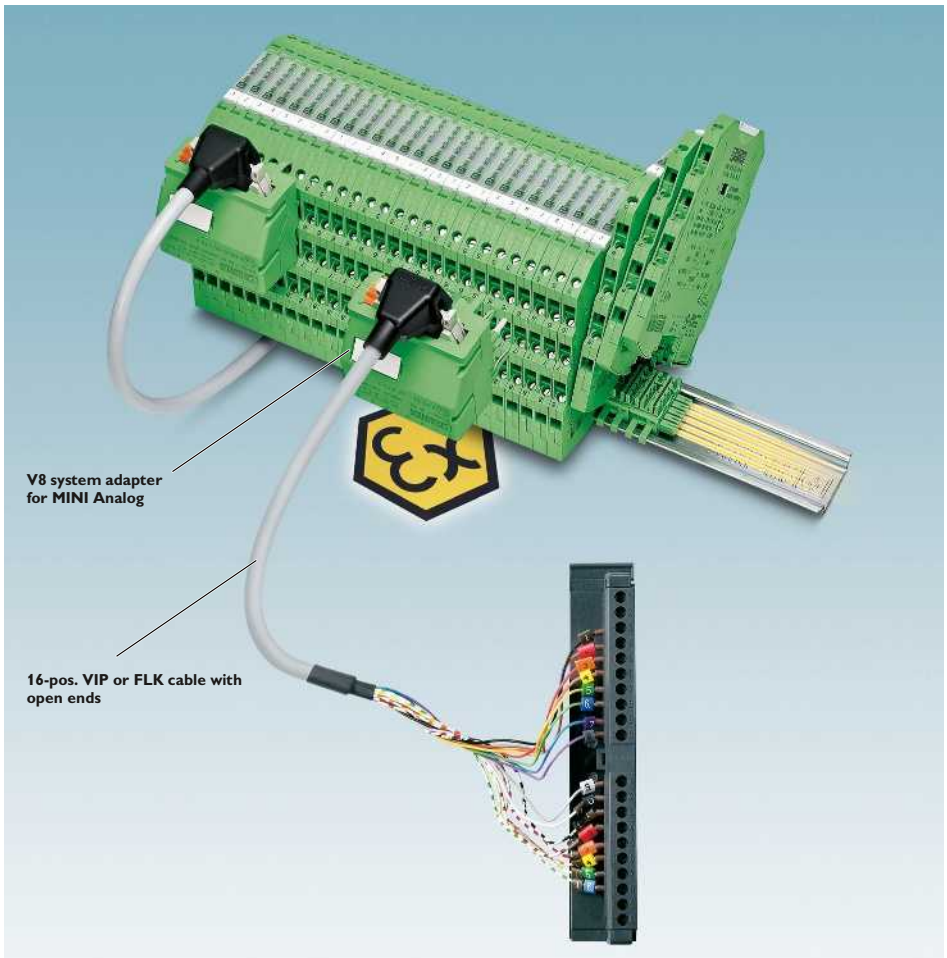



System cabling with a front adapter

The tables below are designed to serve as a configuration aid. Details of other solutions are available on the Internet 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<br>6ES7-331-7KB02-0AB0<br>6ES7-331-7KB81-0AB0<br>6ES7-331-7TF00-0AB0<br>6ES7-332-8TF01-0AB0 | **FLKM 16-PA-S300/MINI-MCR**<br>(in the catalog on page 522) | **FLK 16/EZ-DR/.../KONFEK**<br>(non-molded plugs,<br>in the catalog on page 606) | **MINI MCR-SL-V8-FLK 16-A**<br>(in the catalog on page 122) |
| | 6ES7-331-1KF01-0AB0<br>(for current signals) | **FLKM 16-PA-331-1KF/I/MINI-MCR**<br>(in the catalog on page 523) | | |
| | 6ES7-331-5HF00-0AB0<br>(for current signals) | **FLKM 16-PA-332-5HF/I/MINI-MCR**<br>(in the catalog on page 523) | | |
| **Yokogawa Centum CS 3000 R3** | AAI 141<br>AAI 143 | Not required | **CABLE-40/2/FLK16/.../YUC**<br>(non-molded plugs,<br>in the catalog on page 535) | **2 x MINI MCR-SL-V8-FLK 16-A**<br>(in the catalog on page 122) |
| **Miscellaneous controllers / actuators / sensors** | All cards | Not required | **CABLE-FLK16/OE/0,14/...M**<br>(non-molded plugs,<br>in the catalog on page 602)<br>or alternatively<br>**VIP-CAB-FLK16/FR/OE/0,14/...M**<br>(molded plugs,<br>in the catalog on page 602) | **MINI MCR-SL-V8-FLK 16-A**<br>(in the catalog on page 122) |




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 side. 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 plug connections mean that the products can be easily installed in any analog module.

## Increased protection

The new VIP cables with molded FLK plugs offer enhanced protection in 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 116) 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

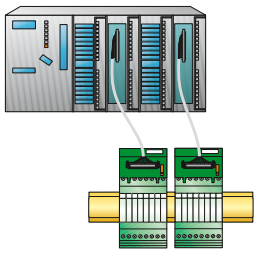
Ex:
Housing width 50.4 mm

### Technical data

| | |
|---|---|
| General data | |
| Contact resistance | < 10 mΩ |
| Current carrying capacity | ≤ 1 A |
| Test voltage | - |
| Vibration resistance | ≤ 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 connector in acc. with IEC 60603-13 |
| Insertion/withdrawal cycles (system adapter / FLK 16) | 10 / ≥ 200 |
| Conformance / approvals | |
| ATEX | II 3 G Ex nA IIC T4 Gc X |
| UL, USA / Canada | UL 508 Recognized<br>Class I, Div. 2, Groups A, B, C, D T5 applied for |
| GL | GL EMC 2 D |

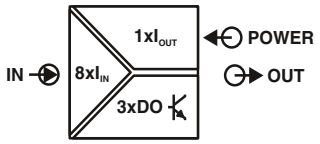
### Ordering data

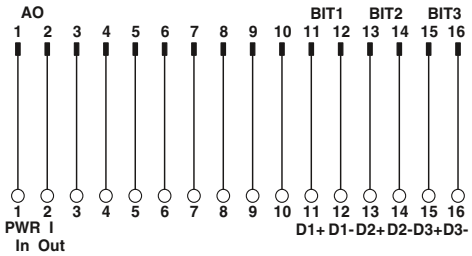
| Description | Type | Order No. | Pcs. / Pkt. |
|---|---|---|---|
| **System adapter,** for MINI Analog modules with screw connection | **MINI MCR-SL-V8-FLK 16-A** | **2811268** | 1 |



MINI Analog system cabling

## Accessories, MINI Analog multiplexer




FLK pin strip assignment

Ex: 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 technology
- 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

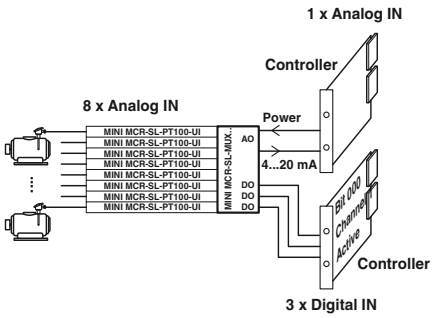
| | |
|---|---|
| Input data | |
| Description | 2, 4, 6 or 8-channel (can be selected) |
| Can be configured/parameterized | Via DIP switches |
| Input signal | 4 ... 20 mA |
| Maximum input signal | < 30 mA |
| Switching cycles | 2 or 1 sec. (can be selected) |
| Output data | |
| Output signal | 4 ... 20 mA |
| Maximum output signal | < 30 mA |
| Load $R_B$ | $(U_{supply} - 7\ V) / I_{max}$ |
| Status indication active input | 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 connector in acc. with IEC 60603-13 |
| Insertion/withdrawal cycles (system adapter / FLK 16) | 10 / ≥ 200 |
| EMC note | Class A product, see page 625 |
| Conformance / approvals | |
| Conformance | CE-compliant |
| ATEX | Ex II 3 G Ex nA IIC T4 Gc X |
| UL, USA / Canada | UL 508 Recognized applied for<br>Class I, Div. 2, Groups A, B, C, D T5 applied for |

### 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 |
| **For round cable with one open end, see "System cabling for controllers" section** | **VIP-CAB-FLK16/FR/OE/0,14/...** | | |
| **For round cable with one open end, see "System cabling for controllers" section** | **CABLE-FLK16/OE/0,14/...** | | |




**Monitoring of eight motor temperatures with just one analog control input**

## Termination Carriers for MINI Analog signal conditioners

Select standard DIN rail device

Select module carrier

Select controller-specific front adapter and system cable

Solutions are also available for MACX Analog, MACX Analog Ex, and Safety

**TC... Termination Carriers** are compact solutions for conveniently and smoothly connecting standard DIN rail signal conditioners from the MINI Analog series to input/output cards of automation systems using system cables.

The most compact signal conditioners combined with the most compact and flexible module carriers on the market enable you to achieve a hitherto unparalleled packing density in your control cabinet together with professional system cabling.

### Compact

– The compact design associated with MINI Analog saves up to 65% of space in the control cabinet

### Robust and reliable

– Stable, vibration-resistant aluminum carrier device profile
– PCB is completely decoupled from signal conditioners
– PCB without active electronics
– Redundant supply via separate DIN rail module
– Horizontal or vertical DIN rail mounting

### Flexible

– Profile sections without pitch markings
– Quick and safe module connection with plug-in cable sets
– Horizontal or vertical DIN rail mounting
– Can be flexibly adapted to suit any controller or higher-level control system
– Solutions tailored to your requirements on request
– Available pre-assembled with modules and wired, or for self-assembly

## Termination Carriers for MINI Analog signal conditioners

The **TC-D37SUB-ADIO16-M-P-UNI** universal Termination Carrier is a compact solution which connects signal conditioners from the MINI Analog series to analog or binary input/output cards of automation systems.

In conjunction with the MACX MCR-S-MUX HART multiplexer, the **TC-D37SUB-AIO16-M-PS-UNI** Termination Carrier version also allows communication between HART-capable field devices and a management system.

- Connection of up to 16 single-channel signal conditioners
- Universal 1:1 signal routing to a 37-pos. D-SUB connector
- For system cables with D-SUB socket and open ends for universal connection
- Redundant supply and monitoring via separate MINI MCR-SL-PTB-FM power terminal and MINI MCR-SL-FM-RC-NC fault signaling module

**Notes:**

Contact us: together, we can develop optimum solutions for your automation system with the Termination Carrier for MINI Analog.

TC-D37SUB-ADIO16-M-P-UNI (Order No. 2902933) is not a class A product.

EAC
Ex: Ex
Housing width 136 mm

### Technical data

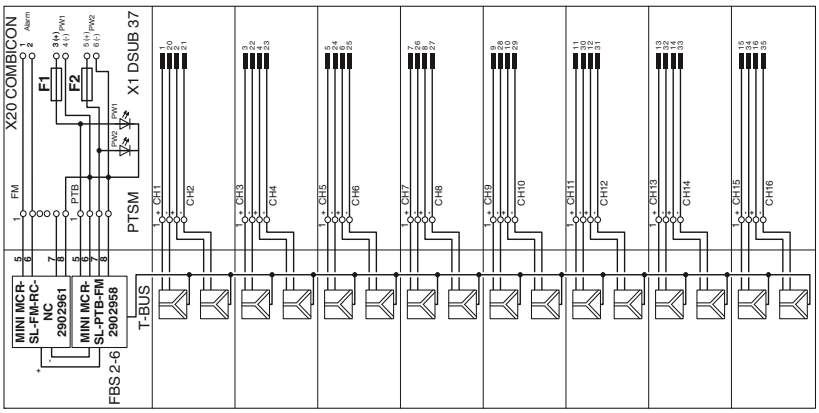
| | |
|---|---|
| General data | |
| Connection to the control system level | D-SUB pin strip |
| Number of positions | 37 |
| Max. operating voltage | < 50 V DC (per signal/channel) |
| Max. permissible current | 23 mA (signal/channel) |
| Rated insulation voltage | 50 V |
| Pollution degree | 2 |
| Surge voltage category | II |
| Rated surge voltage | 0.5 kV |
| Clearance and creepage distances | DIN EN 50178 (basic insulation) |
| Ambient temperature range | -20 °C ... 60 °C (please observe module specifications) |
| Shock | 15g, according to IEC 60068-2-27 |
| Vibration (operation) | 2g, according to IEC 60068-2-6 |
| Dimensions W / H / D | 136 / 170 / 160 mm |
| EMC note | Class A product, see page 625 |
| Power supply via power module | |
| Input voltage range | 19.2 V DC ... 30 V DC |
| Redundant supply | yes, decoupled from diodes |
| Polarization and surge protection | Yes |
| Fuse | 2x 2.5 A on PCB, slow-blow (replaceable) |
| Status indication | 2 x red LED (error)<br>2x green LEDs (PWR1 and PWR2) |
| Switching output | 1 N/C contact (alarm = open) |

### Ordering data

| Description | Type | Order No. | Pcs. / Pkt. |
|---|---|---|---|
| **Module carrier** for 16 MINI Analog channels, power and feed-through module | | | |
| | **TC-D37SUB-ADIO16-M-P-UNI** | **2902933** | 1 |
| - With connection for MACX MCR-S-MUX HART multiplexer | **TC-D37SUB-AIO16-M-PS-UNI** | **2902934** | 1 |

### Accessories

| | | | |
|---|---|---|---|
| **MINI Analog power terminal** | **MINI MCR-SL-PTB-FM** | **2902958** | 1 |
| **MINI Analog fault signaling module** | **MINI MCR-SL-FM-RC-NC** | **2902961** | 1 |
| **HART multiplexer,** 32-chanel, including two 14-wire flat-ribbon cables | **MACX MCR-S-MUX** | **2865599** | 1 |




**TC-D37SUB-ADIO16-M-P-UNI and TC-D37SUB-AIO16-M-PS-UNI connection scheme**

## Accessories
## Surge protection
## LINETRAB LIT

The ideal addition to MINI Analog - the innovative surge protection solution in 6.2 mm housing.

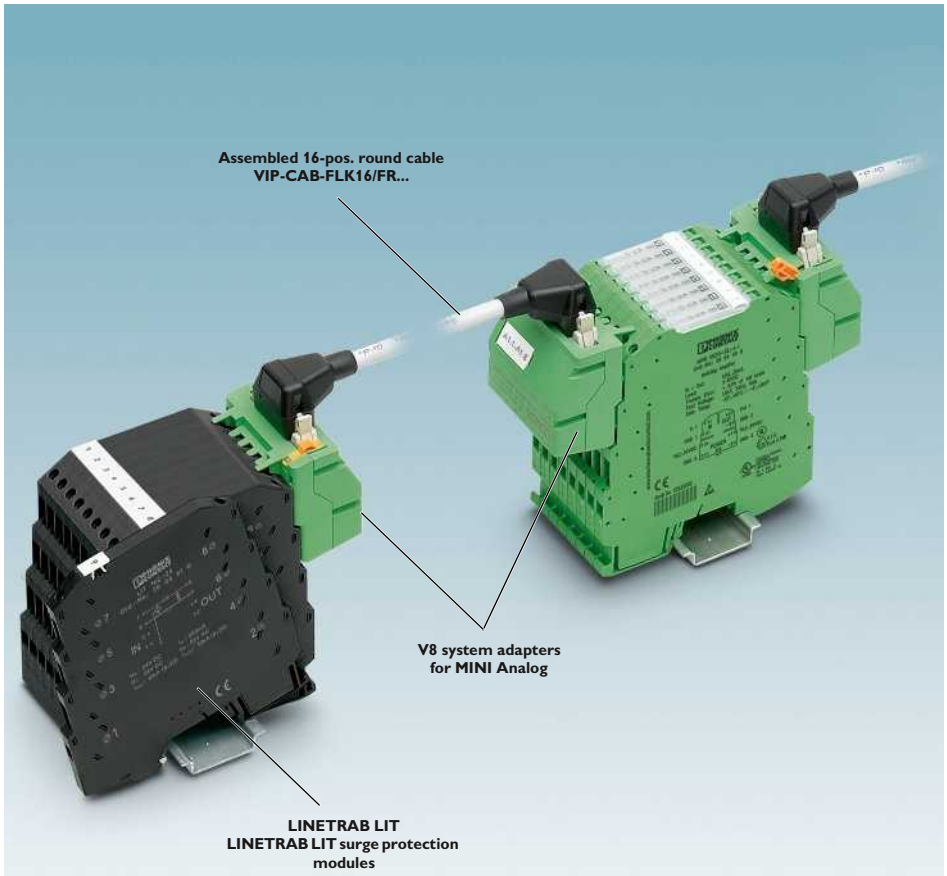
Since the LINETRAB LIT and MINI Analog housing is the same shape, you can benefit from the numerous advantages of system cabling. The advantage of combining MINI Analog and LINETRAB LIT products is that it enables you to set up a space-saving, protected, and optimally coordinated signal chain from the sensor right up 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 120.

For more detailed information on LINETRAB LIT surge protection modules, please see the TRABTECH catalog.




Reliable and systematic measurements - LINETRAB LIT and MINI Analog

### Configuration aid for LINETRAB LIT - MINI Analog

**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-IDS-I-I | 2905577 |
| | | 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 16-pos. VIP... 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 the catalog on page 122) |
| 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 cable

The new VIP cables provide a way of setting up secure and robust connections, even in harsh industrial environments.

## Innovative concept

The MINI Analog system adapter does not just 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 an overall width of just 6.2 mm.

VIP system cable

Innovative concept

Increased protection

Surge protection

## Configuration aid for LINETRAB LIT - MINI Analog

**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-IDS-I-I-SP** | 2905578 |
| | | **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-conductor connection technology) | 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 |
| | | **MINI MCR-SL-PT100-UI** | 2864435 |
| | | **MINI MCR-SL-PT100-UI-NC** | 2864273 |
| **LIT 4-12** (for 3 and 4-conductor connection technology) | 2804678 | **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 |

## Signal conditioners, head transducers, and process indicators - MCR Analog

**MCR signal conditioners, head transducers, and process indicators**

The MCR signal conditioners in conjunction with proven DIN rail housings and plug-in connection technology offer you a large number of input signal types which can be converted to standard signals.

When using off the DIN rail, you can display or specify your process values with the process indicators and the head transducers convert your temperature values directly into a standard signal.

Choose the right MCR Analog signal conditioner for your application:

**Analog IN/Analog OUT**
- Configurable signal multipliers to double standard analog signals

**Temperature**
- Temperature relay for 2-wire Pt100
- Output loop-powered temperature transducer for thermocouples and resistance thermometers
- Head transducers for thermocouples and resistance thermometers

**Frequency**
- Programmable frequency transducer for frequencies up to 120 kHz

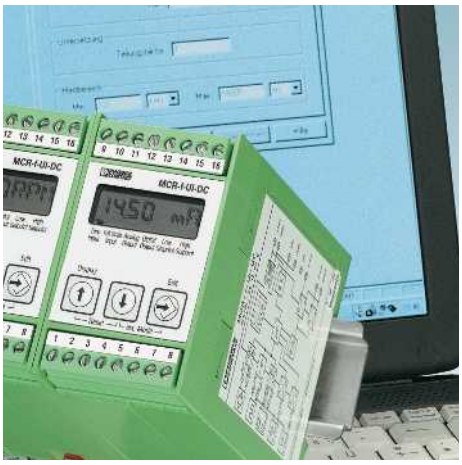
**Limit values**
- Universal threshold value switch for temperature sensors and standard signals

**Process indicators**
- Programmable process indicators for standard signals
- Setpoint adjuster

**Accessories**
- Setpoint potentiometers

**Your advantages:**
- High operational reliability in the event of disturbances, thanks to electrical isolation
- Configuration via software, DIP switches or display keypad
- Process indicators including mounting accessories and IP65 protection
- Clearly legible LED 7-segment display

– High operational reliability in the event of disturbances, thanks to electrical isolation

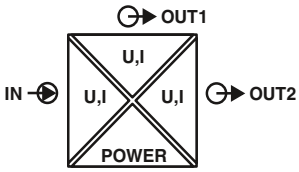


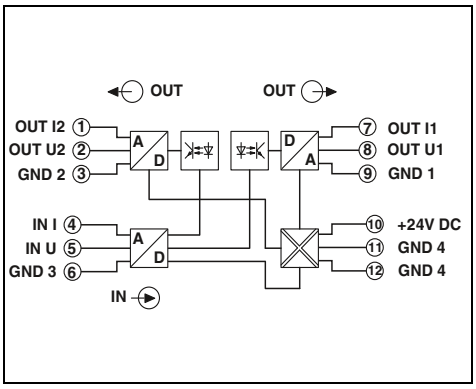

– Configuration via software, DIP switches or display keypad

– Process indicators including mounting accessories and IP65 protection
– Convenient reading of process indicators thanks to LED 7-segment display
– Process indicator programming without software

– Convert temperature signals directly into standard analog signals with temperature head transmitters

## 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 increments) | 0 mA ... 24 mA (freely selectable in 0.1 mA increments) |
| 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) | refer to the order key | refer to the 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 mm² / 0.2 ... 2.5 mm² / 24 - 14 | |
| EMC note | Class A product, see page 625 | |
| 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 multiplication 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 for MCR-FL-C-UI-2UI-DCI** (standard configuration entered as an example)

| Order No. | Input signal | Input signal (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<br>U ≙ Voltage | 0.0 ≙ 0.0 mA<br>I : freely selectable between 0.0 ... 24.0 mA<br>U : freely selectable between 0.0 ... 12.0 V | 20.0 ≙ 20.0 mA<br>I : freely selectable between 0.0 ... 24.0 mA<br>U : freely selectable between 0.0 ... 12.0 V | OUT01 ≙ 0...20 mA<br>OUT02 ≙ 4...20 mA<br>OUT03 ≙ 0...10 V<br>OUT04 ≙ 2...10 V<br>OUT05 ≙ 0...5 V<br>OUT06 ≙ 1...5 V<br>OUT16 ≙ 0...10 mA | OUT01 ≙ 0...20 mA<br>OUT02 ≙ 4...20 mA<br>OUT03 ≙ 0...10 V<br>OUT04 ≙ 2...10 V<br>OUT05 ≙ 0...5 V<br>OUT06 ≙ 1...5 V<br>OUT16 ≙ 0...10 mA | NONE ≙ without FCC<br>YES ≙ with FCC (a fee is charged)<br>YESPLUS ≙ FCC with 5 measuring points (a fee is charged) |

**8.0 mA/4.0 V min. measuring range span**
**0.1 mA/0.1 V increment**

**Ordering examples:**

| | | Input signal (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 |

**8.0 mA measuring range span, i.e., can be ordered.**

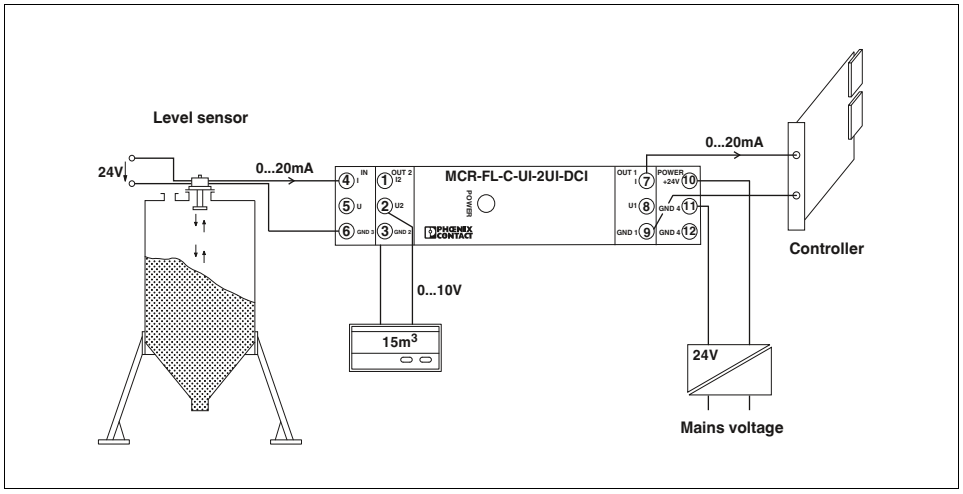
| | | | | | | |
|---|---|---|---|---|---|---|
| 2814854 / | U / | 7.8 / | 11.8 / | OUT01 / | OUT03 / | NONE |
| | U ≙ Voltage | U ≙ 7.8 V | U ≙ 11.8 V | OUT01 ≙ 0...20 mA | OUT03 ≙ 0...10 V | NONE ≙ without FCC |

**4.0 V measuring range span, i.e., can be ordered.**

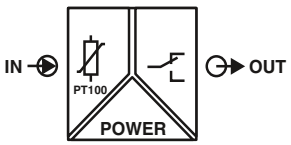
**Combination table for input and output signals that can be set via DIP switches**

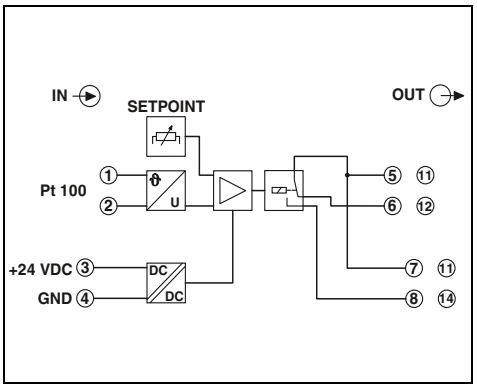
| Input | Output 1 | | | | | | | Output 2 | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 0...20 mA | 4...20 mA | 0...10 mA | 0...10 V | 0...5 V | 1...5 V | 2...10 V | 0...20 mA | 4...20 mA | 0...10 mA | 0...10 V | 0...5 V | 1...5 V | 2...10 V |
| 0...20 mA | x | x | x | 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**



## Temperature, temperature relay



For Pt 100

- Switching point in the temperature range from -100°C ... +700°C freely selectable
- Changeover relay output
- Electrically isolated
- Adjustable switch hysteresis

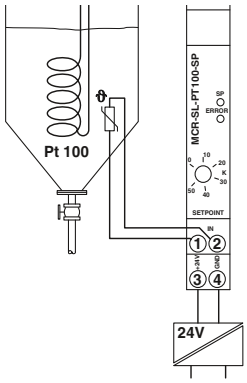
Housing width 12.5 mm

### 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 (for gold layer, 30 V AC/ 36 V DC)<br>2 A (in case of a destroyed 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/open circuit) / 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 $mm^2$ / 0.2 ... 2.5 $mm^2$ / 24 - 14 |
| EMC note | Class A product, see page 625 |
| Conformance / approvals | |
| Conformance | CE-compliant |
| UL, USA / Canada | UL 508 Recognized |

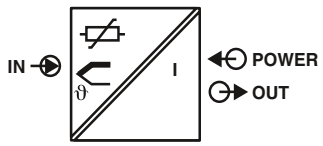
### Ordering data

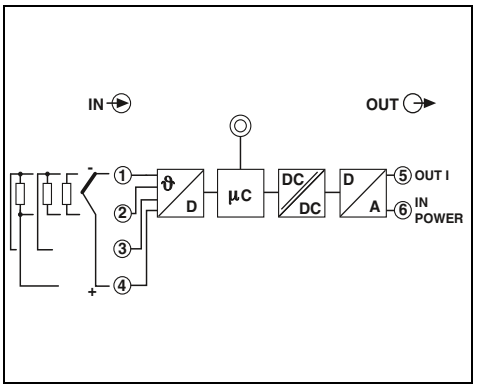
| Description | Type | Order No. | Pcs. / Pkt. |
|---|---|---|---|
| **MCR temperature relay**, for Pt 100 in 2-wire system | **MCR-SL-PT100-SP** | **2814948** | 1 |

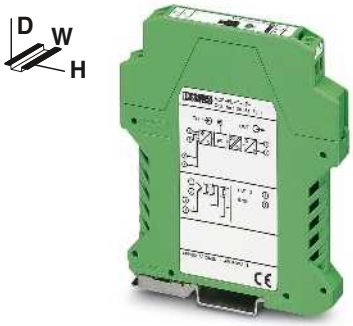



**Application example - Temperature control of a heated medium**
**1 = mains voltage**

## Temperature, temperature transducer




**Loop-powered, programmable**

Ex:
Housing width 12.5 mm

- Output loop-powered temperature transducer
- Freely configurable
- Software available free of charge on the Internet

**Notes:**

The devices are supplied with the standard configuration: Pt 100 sensor, measuring range 0 ... 100°C, 3-wire connection.

The configuration software can be downloaded from the Internet: phoenixcontact.net/products.

### Technical data

| | | |
|---|---|---|
| **Input data** | | |
| Resistance thermometers | | Pt, Ni (100, 500, 1000); minimum measuring range 10 K : 2, 3, 4-wire |
| Thermocouple sensors | | B, C, D, E, J, K, L, N, R, S, T, U; minimum measuring range 50 K/500 K |
| Resistor | | Resistance-type sensor from 10 Ω to 400 Ω and from 10 Ω to 2000 Ω; minimum measuring range 10 Ω/100 Ω |
| Voltage | | -10 mV ... 100 mV (min. measuring 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 mm² / 0.2 ... 2.5 mm² / 24 - 14 |
| **Conformance / approvals** | | |
| Conformance | | CE-compliant |
| UL, USA / Canada | | Class I, Div. 2, Groups A, B, C, D |

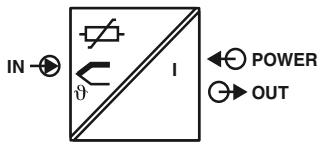
### Ordering data

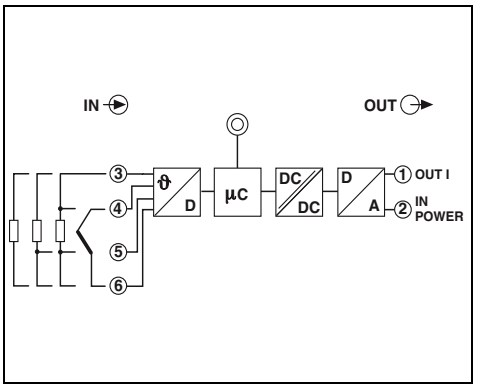
| Description | Type | Order No. | Pcs. / Pkt. |
|---|---|---|---|
| **MCR temperature transducer,** loop-powered for resistance thermometers, thermocouples, resistance-type and voltage sensors | **MCR-FL-T-LP-I** | **2864561** | 1 |

### Accessories

| | | | |
|---|---|---|---|
| **Software adapter cable,** 2.4 m in length, with USB connection, for programming MCR-...-LP-... and MCR-...-HT-... modules | **MCR-PAC-T-USB** | **2309000** | 1 |

## Temperature, temperature head transmitter



**Loop-powered, programmable**

Ex:

- Output loop-powered temperature head transmitter
- Freely configurable
- Software available free of charge on the Internet
- For mounting in the connecting head, form B

**Notes:**

The devices are supplied with the standard configuration: Pt 100 sensor, measuring range 0 ... 100°C, 3-wire connection.

The configuration software can be downloaded from the Internet: phoenixcontact.net/products.

### Technical data

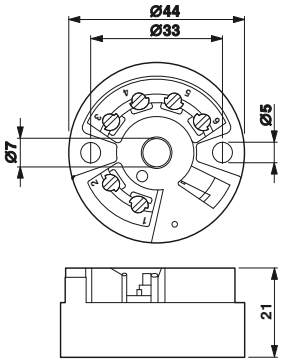
| | | |
|---|---|---|
| **Input data** | | |
| Resistance thermometers | | Pt, Ni (100, 500, 1000); minimum measuring range 10 K : 2, 3, 4-wire |
| Thermocouple sensors | | B, C, D, E, J, K, L, N, R, S, T, U; minimum measuring range 50 K/500 K |
| Resistor | | Resistance-type sensor from 10 Ω to 400 Ω and from 10 Ω to 2000 Ω; minimum measuring range 10 Ω/100 Ω |
| Voltage | | -10 mV ... 75 mV (min. measuring 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 $mm^2$ / 0.2 ... 1.75 $mm^2$ / 24 - 15 |
| **Conformance / approvals** | | |
| Conformance | | CE-compliant |
| UL, USA / Canada | | Class I, Div. 2, Groups A, B, C, D |

### Ordering data

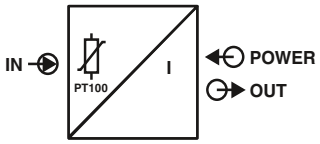
| Description | Type | Order No. | Pcs. / Pkt. |
|---|---|---|---|
| **MCR temperature head transmitter,** loop-powered | | | |
| for resistance thermometers, thermocouples, resistance-type and voltage sensors | **MCR-FL-HT-T-I** | **2864529** | 1 |

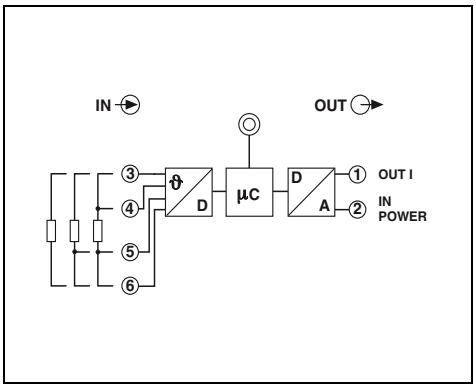
### Accessories

| | | | |
|---|---|---|---|
| **Software adapter cable,** 2.4 m in length, with USB connection, for programming MCR-...-LP-... and MCR-...-HT-... modules | **MCR-PAC-T-USB** | **2309000** | 1 |



## Temperature, temperature head transmitter



**Loop-powered, programmable**

Ex:

- Output loop-powered temperature head transmitter for Pt 100 sensors
- Freely configurable
- Software available free of charge on the Internet
- For mounting in the connecting head, form B

| Notes: |
|---|
| The devices are supplied with the standard configuration: Pt 100 sensor, measuring range 0 ... 100°C, 3-wire connection. |
| The configuration software can be downloaded from the Internet: phoenixcontact.net/products. |

### Technical data

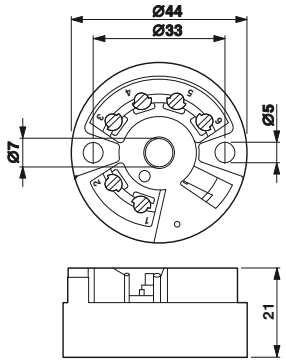
| | | |
|---|---|---|
| **Input data** | | |
| Resistance thermometers | | Pt 100; minimum measuring range 10 K : 2, 3, 4-wire |
| **Output data** | | |
| Output signal | | 4 ... 20 mA / 20 ... 4 mA |
| Load $R_B$ | | Max ($V_{supply}$ - 10 V) / 0.023 A (current output) |
| Output signal with short-circuit | | ≤ 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

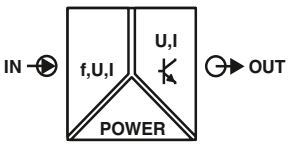
| Description | Type | Order No. | Pcs. / Pkt. |
|---|---|---|---|
| **MCR temperature head transmitter,** loop-powered | | | |
| for Pt 100 resistance thermometer | **MCR-SL-HT-PT 100-I** | **2864516** | 1 |

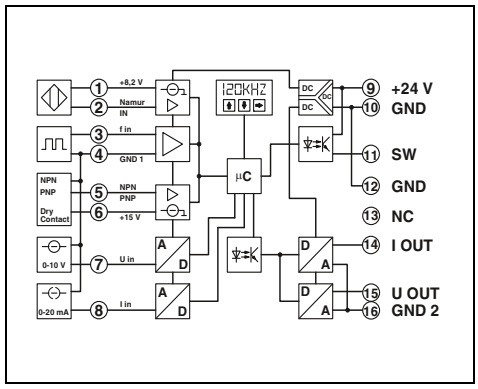
### Accessories

| | | | |
|---|---|---|---|
| **Software adapter cable,** 2.4 m in length, with USB connection, for programming MCR-...-LP-... and MCR-...-HT-... modules | **MCR-PAC-T-USB** | **2309000** | 1 |



## Frequency, frequency transducer



**Frequencies up to 120 kHz, configurable**

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
- Configurable via membrane keypad or software
- Software available free of charge on the Internet
- Display of input or output signal

**Notes:**

The configuration software can be downloaded from the Internet: phoenixcontact.net/products.

### Technical data

| | | |
|---|---|---|
| Input data | Frequency input | |
| Frequency range | 0.1 Hz ... 120 kHz | |
| Input sources | NPN/PNP transistor outputs<br>NAMUR initiators<br>Floating relay contact (dry contact)<br>Frequency generator | |
| Transducer supply | approx. 15 V DC / max. 25 mA (constant) | |
| Signal level | 2 $V_{PP}$ (in case of square 0.1 Hz ... 120 kHz)<br>2 $V_{PP}$ (in case of sine 8 Hz ... 120 kHz)<br>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 | Signal conditioner 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 | |
| EMC note | Class A product, see page 625 | |
| 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

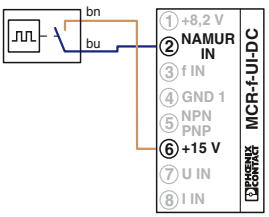
| Description | Type | Order No. | Pcs. / Pkt. |
|---|---|---|---|
| **MCR frequency transducer,** for conversion of frequencies into analog signals 0(4)...20 mA, 0...(5)10 V and their inverse signals | **MCR-F-UI-DC** | **2814605** | 1 |

### Accessories

| | | | |
|---|---|---|---|
| **Software adapter cable** (stereo jack plug/25-pos. D-SUB), 1.2 m long, for programming MCR-T-..., MCR-S-..., and MCR-F-... modules | **MCR-TTL-RS232-E** | **2814388** | 1 |
| **Connecting cable,** D-9-SUB to USB, with adapter D-9-SUB to D-25-SUB | **CM-KBL-RS232/USB** | **2881078** | 1 |

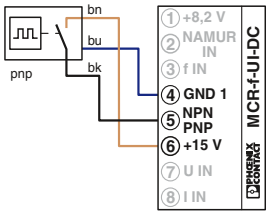
## Example connections for common frequency transmitters

**2-wire DC (mechanical contact)**

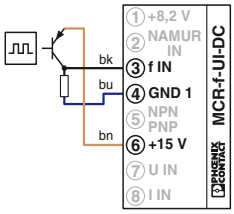



Alternatively instead of terminal block ⑥ terminal block ① possible.

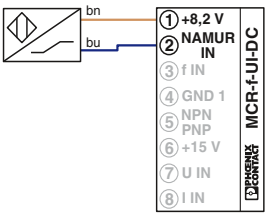
**3-wire DC**
**• With PNP transistor output**



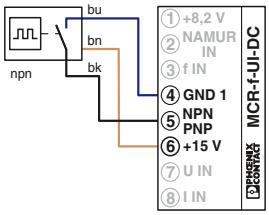

**3-wire DC**
**• PNP transistor with pull-down resistor**



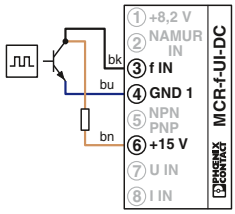

**2-wire DC NAMUR sensor**



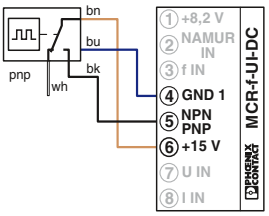

**• With NPN transistor output**



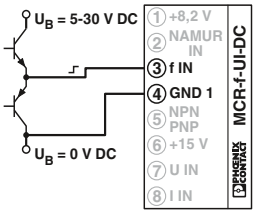

**• NPN transistor with pull-up resistor**



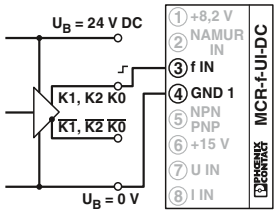

**4-wire DC**
**• With PNP transistor output**



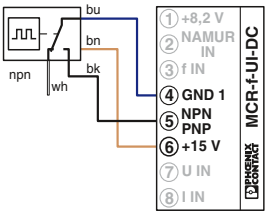

**Incremental rotary transducer with push-pull:**
**• External supply of signal generator**



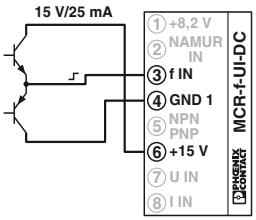

**Incremental rotary transducer with HTL logic:**
**• External supply of signal generator**




**• With NPN transistor output**

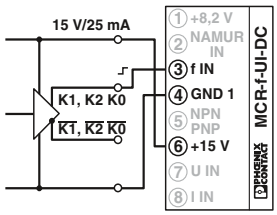



**• Supply of signal generator from the module**




The external supply can also be tapped from terminal blocks ⑨ +24VDC and ⑩ GND. 3-way isolation is then no longer provided.

**• Supply of signal generator from the module**



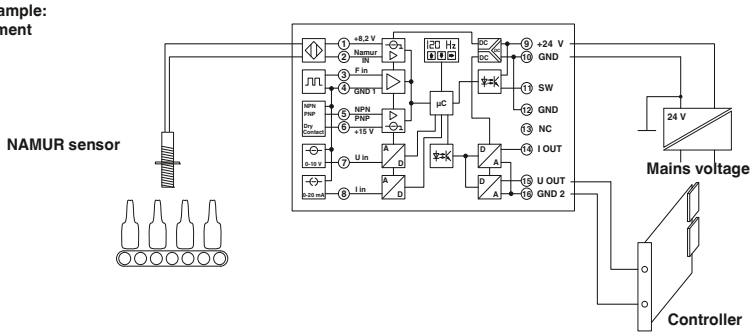

## Application examples:

The **MCR-F-UI-DC** frequency transducer converts the pulse signal into a standard analog signal, which, for example, corresponds to the number of bottles filling systems recorded during a specified time unit.

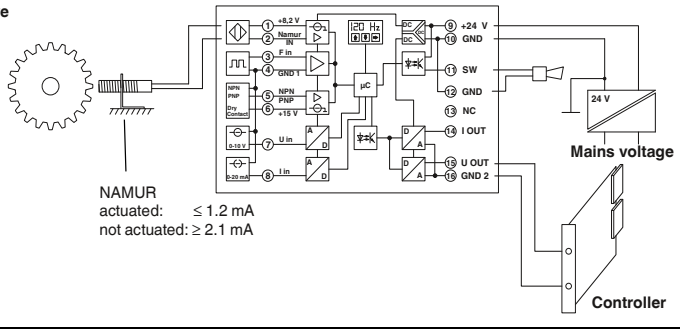
For speed detection, it is possible to enter the measuring range in revolutions per minute (RPM) and display the current measured value on the unit.

The frequency 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.

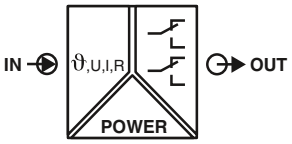
**Application example:**
**Flow measurement**

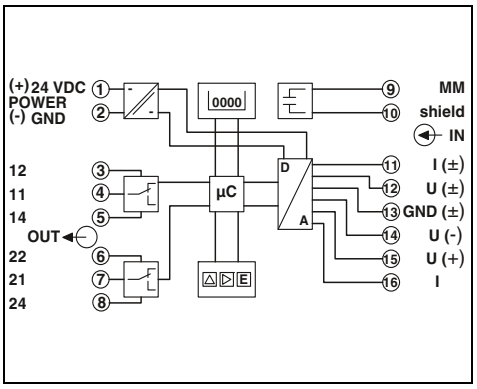



**Application example:**
**Speed detection of a drive**



## Threshold values
## Programmable threshold value switch



**Configurable threshold value switch for standard and temperature signals**

- For thermocouple sensors, resistance thermometers, and linear resistors
- For current or voltage signals
- Four independently adjustable switching thresholds
- With or without electrical isolation of input signals
- Configuration via membrane keypad or software
- Software available free of charge on the Internet
- Continuous measured value display

**Notes:**

The configuration software can be downloaded from the Internet: phoenixcontact.net/products.

Housing width 45 mm

### Technical data

| | | |
|---|---|---|
| Input data | | |
| Input sources | | Resistance thermometer 2, 3 or 4-wire system (in acc. with DIN 43760/DIN IEC 751 or SAMA RC 21-4-1966), e.g. PT sensors, Ni sensors etc.<br>Thermocouple sensors (in acc. with DIN IEC 584-1/DIN 43710): B, E, J, K, L, N, R, S, T, U<br>Resistance: 0 kΩ ... 8 kΩ (only 2-wire connection)<br>Current: - 30 mA...+ 30 mA<br>Voltage: - 30 V...+ 30 V |
| Measuring rate | | 2 Hz |
| Input resistance | Current / voltage | 50 Ω / 200 kΩ |
| Discontinuous control resolution | | 0.1 °C / 0.01 V / 0.01 mA / 0.1 Ω |
| Switching output | | |
| Contact type | | 2 x PDT contact, / 2 switching points each, pick-up/drop-out (can be switched) |
| Contact material | | AgNi 0.15 + HTV (hard gold-plated) |
| Max. switching voltage | | 250 V AC |
| Max. switching current | | 2 A AC |
| Response delay | | 0 s ... 2 s (adjustable) |
| Mechanical service life | | 2 x $10^7$ cycles |
| Error/status indicator | | LED display |
| General data | | |
| Supply voltage $U_B$ | | 20 V DC ... 30 V DC |
| Current consumption | | < 60 mA |
| Maximum transmission error | | 0.1 % (of final value) |
| Temperature coefficient | | ≤ 0.01 %/K |
| Test voltage input/power supply | | 1 kV AC (50 Hz, 1 min.) |
| Ambient temperature (operation) | | -20 °C ... 65 °C |
| Status indication | | 5-position 7-segment display and LEDs |
| Mounting | | any |
| Housing material | | ABS |
| 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 |
| EMC note | | Class A product, see page 625 |
| Conformance / approvals | | |
| Conformance | | CE-compliant |
| UL, USA / Canada | | cULus |

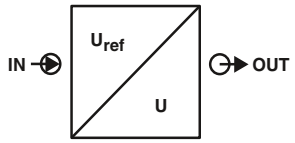
### Ordering data

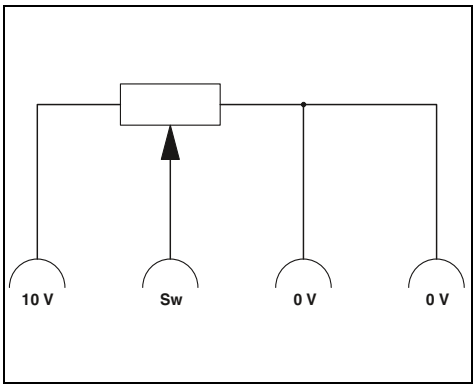
| Description | Type | Order No. | Pcs. / Pkt. |
|---|---|---|---|
| **MCR threshold value switch,** with two relay contacts | | | |
| With electrically isolated input | **MCR-PSP-DC** | **2811925** | 1 |
| | **MCR-PSP** | **2811912** | 1 |

### Accessories

| | | | |
|---|---|---|---|
| **Software adapter cable** (6-pos./D-SUB 25-pos.), 1.5 m in length, for programming MCR-PSP modules | **MCR-TTL-RS232** | **2814391** | 1 |
| **Connecting cable,** D-9-SUB to USB, with adapter D-9-SUB to D-25-SUB | **CM-KBL-RS232/USB** | **2881078** | 1 |

## Accessories
## Setpoint potentiometer



– For direct setpoint definition in combination with a constant voltage source

Housing width 30 mm

### 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 capacity | 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 | |

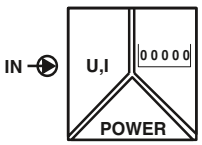
### Ordering data

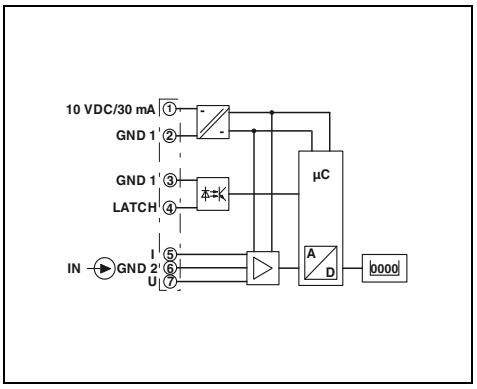
| Description | Type | Order No. | Pcs. / Pkt. |
|---|---|---|---|
| **Setpoint potentiometer**, for individual setpoint definition | | | |
| Resistance value 4.7 kΩ | **EMG 30-SP- 4K7LIN** | **2940252** | 10 |
| Resistance value 10 kΩ | **EMG 30-SP-10K LIN** | **2942124** | 10 |

### Accessories

| | | | |
|---|---|---|---|
| **MCR constant voltage source** | | | |
| | **MINI MCR-SL-CVS-24-5-10-NC** | **2902822** | 1 |
| | **MINI MCR-SL-CVS-24-5-10-SP-NC** | **2902823** | 1 |

## Analog IN, standard signals



**For standard analog signals, configurable**

- For 0 ... 10 V and 0(4) ... 20 mA standard analog signals
- Configurable
- 5 positions displayed
- 8 mm LED, 7-segment
- Electrically isolated
- Min./max. value saved
- Latch/hold function for storing the display value
- Display 48 x 24 mm

Housing width 48 mm

### Technical data

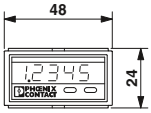
| | | | |
|---|---|---|---|
| Input data | | U input | I input |
| Input signal | | 0 ... 10 V | 0 ... 20 mA / 4 ... 20 mA |
| Maximum input signal | | 30 V DC | 50 mA |
| Input resistance | | > 1 MΩ | approx. 100 Ω with 5 mA / approx. 70 Ω with 20 mA |
| Resolution | | 1 mV | 2 µA |
| Measuring rate | | 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 positions displayed | | 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 | |
| Mass storage | | 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)x45(+0.8) 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 | |

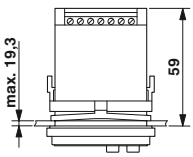
### Ordering data

| Description | Type | Order No. | Pcs. / Pkt. |
|---|---|---|---|
| **MCR process display,** for measuring and displaying standard signals | **MCR-SL-D-U-I** | **2864011** | 1 |

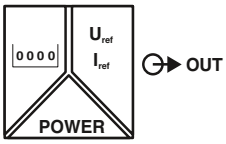
### Accessories

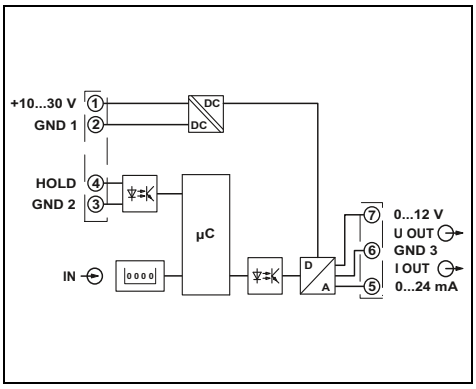
| | | | |
|---|---|---|---|
| **MCR DIN rail adapter** for digital displays in a 24 x 48 mm housing | **MCR-SL-D-RA** | **2810081** | 1 |



## Analog OUT, setpoint adjuster



**With manual and automatic ramp function**

- Manual setpoint definition with increment setting
- Manual setpoint definition via direct input
- Automatic setpoint definition with hold function and 20 support points
- Flexibly 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

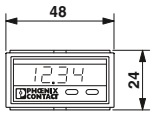
| | | |
|---|---|---|
| Input data | | |
| Display | 7-segment, 8 mm, red | |
| Number of positions displayed | 4 | |
| Switching level | 1 signal ("H") | 4 V DC ... 30 V DC |
| | 0 signal ("L") | 0 V DC ... 2 V DC |
| Output data | U output | I output |
| Output signal | 0 ... 12 V | 0 ... 24 mA |
| Length of step | 10 mV | 10 µA |
| Load $R_B$ | ≥ 2 kΩ | ≤ 500 Ω (up to 20 mA)<br>≤ 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)x22.2(+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 | |

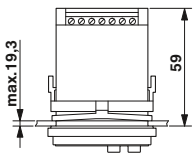
### Ordering data

| Description | Type | Order No. | Pcs. / Pkt. |
|---|---|---|---|
| **MCR digital setpoint adjuster,** for presetting current and voltage signals | **MCR-SL-D-SPA-UI** | **2710314** | 1 |

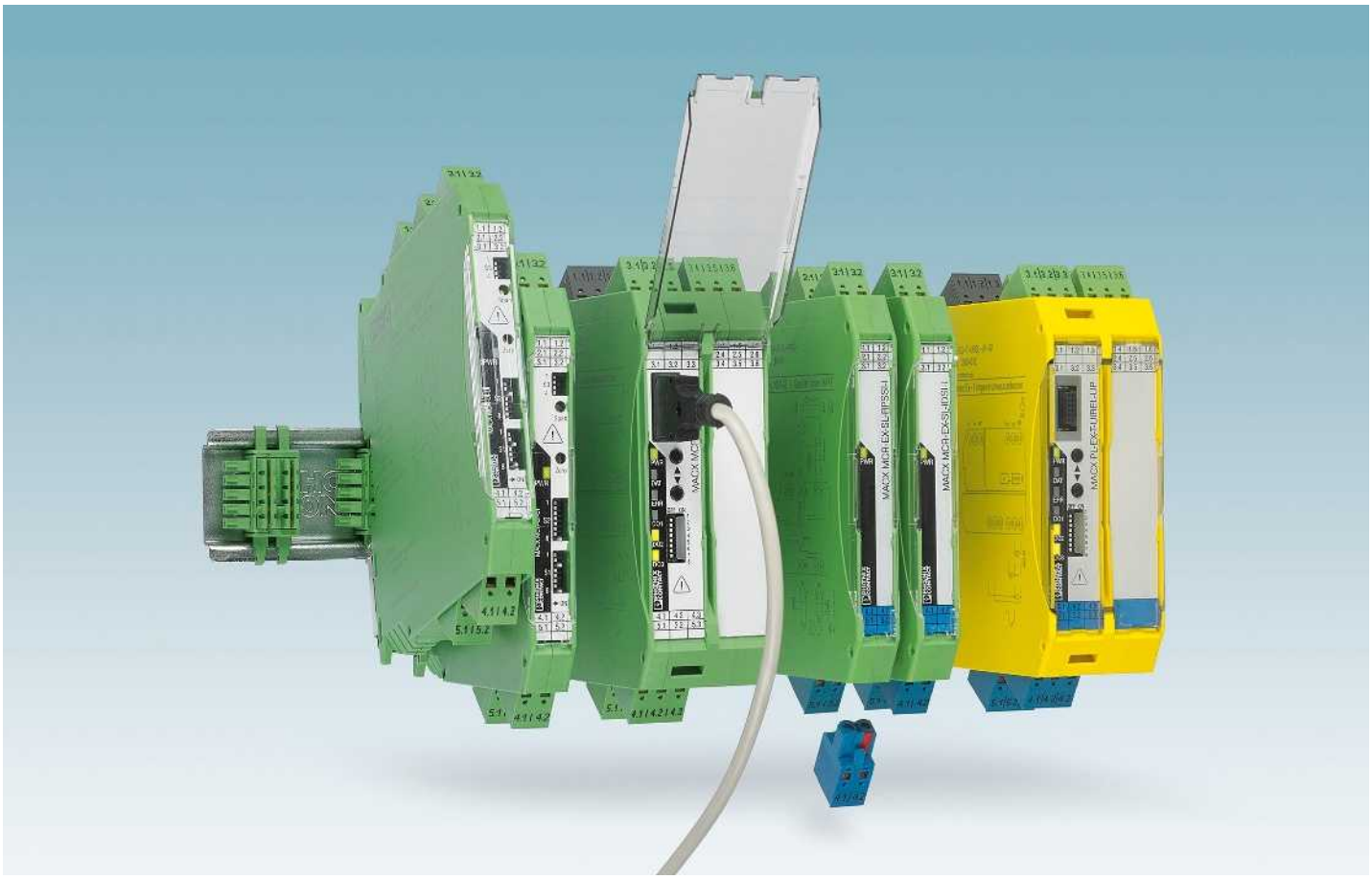
### Accessories

| | | | |
|---|---|---|---|
| **MCR DIN rail adapter** for digital displays in a 24 x 48 mm housing | **MCR-SL-D-RA** | **2810081** | 1 |



## Signal conditioners with functional safety and explosion protection - the MACX ranges



**Machine building/process industry**
EN ISO 13849-1
EN 62061
IEC 61508
EN 60511

**Process industry**
IEC 61508
EN 60511

PL
EN ISO 13849

**Signal conditioner with PL functional safety**
MACX Safety

PL
EN ISO 13849

**Ex i signal conditioner with PL functional safety**
MACX Safety Ex

SIL
IEC 61508

**Signal conditioner with SIL functional safety**
MACX Analog

SIL
IEC 61508

**Ex i signal conditioner with SIL functional safety**
MACX Analog Ex

**No intrinsic safety**

**Intrinsic safety**
ATEX/IECEx
EN 60079-11

**Reliable and safe**

Maximum safety for your machines and systems.

Phoenix Contact meets the requirements of functional safety according to IEC 61508 in a standardized development process. We take measures for fault avoidance and fault control into consideration, from the development and production of a device up to device operation.

**Tested quality and safety**

Independent test centers are involved throughout the entire development cycle and audit the measures as part of a full assessment. The certificates, technical information, and the safety manual are available for you to download.

**A solution for every type of signal**

Safely isolate, condition, filter, and amplify: MACX Analog offers comprehensive solutions for analog signal processing.

**Analog signals with performance level**

MACX Safety is also equipped with performance level PL d. This means that you can integrate analog signals easily into your safety application according to the Machinery Directive.

**Maximum explosion protection**

Highly compact and leading technology: with an overall width of just 12.5 mm, MACX Analog Ex offers single and two-channel signal isolators for intrinsically safe circuits in the hazardous area.

**Analog Ex i signals with performance level**

Also for intrinsically safe circuits in the hazardous area: in addition to PL d. MACX Safety Ex also has ATEX and IECEx approvals.

## 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, and 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

European Parliament directive 94/9/EC of March 23, 1994 (ATEX manufacturer directive) 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 of potentially explosive areas, but which are necessary for, or contribute towards, the safe operation of devices and protective systems with respect to explosion hazards.

The term **device** includes machines, equipment, stationary or mobile devices, control components, and system accessories. The directive 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**<br>A mixture of combustible gases, steam, vapors or dust and air in atmospheric conditions that allow the entire mixture to combust once ignited.<br>**Potentially explosive area**<br>An area where the atmosphere has the potential to explode due to local or operational conditions ("Ex area").<br>**Electrical equipment**<br>The entire set of components, electric circuits or parts of electric circuits that are usually located within a single housing.<br>**Intrinsically safe electrical equipment**<br>An electrical device in which all circuits are intrinsically safe.<br>Note: these devices may be used directly in the Ex area.<br>**Associated equipment**<br>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.<br>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 wastewater 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 regard 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 event of errors. Parallel to this, the gases are classified according to their different ignition temperatures.

| Temperature class | Maximum permissible surface temperature of equipment<br>°C | Ignition temperatures of combustible substances<br>°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 2 | 82 | II B |
| Ammonia | 630 | T 1 | 14000 | 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 present for continuous or long periods.

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 area surrounding zone 0, as well as areas close to filling and emptying equipment.

**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 period.

Zone 2 includes areas that are used exclusively for storage, areas around pipe connections that can be disconnected, and generally the immediate area surrounding zone 1.

Areas that are potentially explosive as a result of **combustible dusts** are divided into the following zones according to EN 60079-10-2 (formerly: EN 61241-10):

**Zone 20:**

Area in which an explosive atmosphere is present for continuous, frequent or long periods 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 period.

## 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 different 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.
– In the event of two independent errors, the necessary safety is guaranteed.

**Category 2:**

Devices constructed to guarantee a very high degree of safety.

The explosion protection measures associated with this category guarantee the required degree of safety, even in the case of frequent device failures or common error states.

**Category 3:**

Devices constructed to guarantee a standard degree of safety.

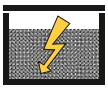
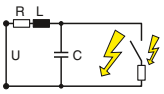
Devices in this category guarantee an adequate degree of safety in normal operation.

The table below shows which categories are assigned to which zones:

| Category | For zone | Also possible |
|---|---|---|
| 1 | 0<br>20 | 1 and 2<br>21 and 22 |
| 2 | 1<br>21 | 2<br>22 |
| 3 | 2<br>22 | |

## Signal conditioners with functional safety and explosion protection - the MACX ranges

### Protection types

| Protection principle | Protection type | | Usage range (selection) | Standard |
|---|---|---|---|---|
|  Isolation | Oil immersion | o | Transformers, relays, startup controls, switching devices | EN 60079-6 |
| | Sand filling | q | Transformers, relays, capacitors | EN 60079-5 |
| | Molded encapsulation | m* | Coils of relays and motors, electronics, solenoid valves, connection systems | EN 60079-18 |
| Exclusion | Pressurized enclosure | 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, measurement and control | EN 60079-11 |
| | Intrinsically safe systems | | Electronic systems | EN 60079-25 |
| | Intrinsically safe fieldbus systems | | Fieldbus systems | EN 60079-27 |
| Improved industrial quality<br>nA: non-sparking<br>nC: sparking equipment<br>nR: restricted breathing housing<br>nL: energy-limited<br>nP: simplified pressurized enclosures | Protection type "n" | 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

### Marking according to ATEX Directive

Current year of manufacture

Conformity assessment according to ATEX Directive 94/9/EC

Associated electrical equipment

CE 0344 10 Ex II (1) G

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

Associated electrical equipment

Intrinsic safety

[Ex ia Ga] IIC

Increased 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

### 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

## Signal conditioners with functional safety and explosion protection - the MACX ranges

### Safety-related function for the hazardous area

The term SIL (safety integrity level) is becoming more and more significant in the field of process technology. It defines the requirements that a device or a system is expected to fulfill so that the probability of failure can be established. The aim is to achieve the 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 IEC 61508 and IEC 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 Ex standards EN 60079-0 ff.

### IEC 61508: "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.

### IEC 61511: "Functional safety - Safety instrumented systems for the process industry sector"

The IEC 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 marking on devices

The products in the MACX range from Phoenix Contact, which have been developed according to IEC 61508, are marked with the designation SIL 2 or SIL 3. This indicates clearly that the devices may be suitable for safety instrumented functions (SIF).

To determine whether they can actually be used, you need to calculate the sum of the probability of failure values for all the devices in the signal circuit. The values required for this can be found in the safety user manual accompanying any SIL product.

### Overview of terms from SIL standards IEC 61508 and IEC 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, materials processing or 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.
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 simple electrical devices and all types of programmable logic controllers (PLCs).

**PFH** — **Probability of dangerous Failure per Hour**
Describes the probability of 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 in relation to the total failure rate of the system.

**SIF** — **Safety Instrumented Function**
Describes the safety instrumented functions of a system.

**SIS** — **Safety Instrumented System**
An SIS (safety instrumented system) consists 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 in a typical safety application the calculation is based on average failure probabilities of individual devices.

Table 2 of the IEC 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 is used as an example; the average PFD value is 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: failure limit values for a safety function which is operated in an operating 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:**

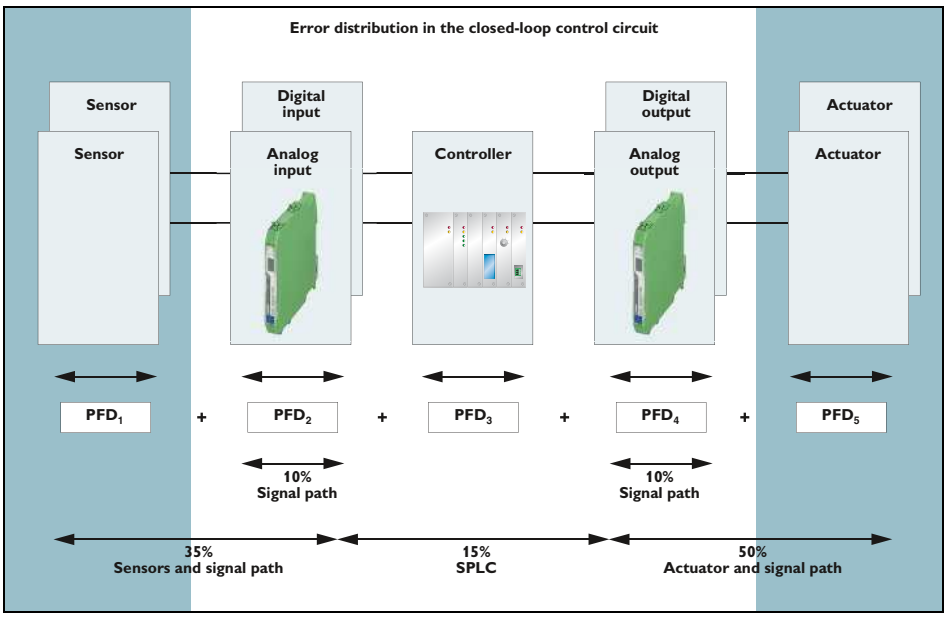
A sensor and actuator are assembled in the field and are exposed to chemical and physical loads (process medium, pressure, temperature, vibration, etc.). Accordingly, these components have a high risk of failure:

- 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 both 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.



## Functional Safety Performance Level (PL) according to EN ISO 13849-1 and EN 62061

### General

In modern industrial systems, the amount of complex technical equipment used is constantly increasing. The purpose of safety technology is to reduce the risk as far as possible but at least to a reasonable degree. At the same time, the availability of production equipment should not be restricted any more than is absolutely necessary.

The Machinery Directive defines the requirements machinery must meet before it can be placed on the market and operated in the European Economic Area. It also contains essential health and safety requirements for the planning and construction of machinery and safety components.

However, the number of systems subject to the directive that do not belong to classical machine building is increasing continually. For example, this includes wind power plants. However, biogas systems, distributed energy generation in general and other process engineering systems also focus on the statutory requirements.

For this reason, analog signals are increasingly being handled according to the specifications of the Machinery Directive.

Every "machine" or system poses a risk. According to the requirements of the Machinery Directive, a risk assessment must be carried out for every machine. If the risk is greater than the level of risk that can be tolerated, risk reduction must be implemented.

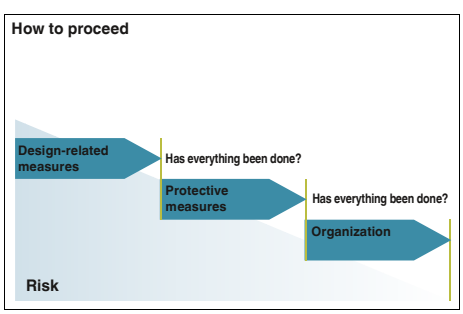



Figure 1:
Risk reduction according to EN ISO 12100

### Functional Safety

In order to achieve the necessary "functional safety" of a system, it is essential for the safety-related parts of the safety equipment and control devices to operate correctly and, in the event of failure, for the system to remain in the safe state or enter a safe state. The requirements for achieving functional safety are based on the following objectives:

- Avoidance of systematic errors
- Control of systematic errors
- Control of random faults or failures

The EN ISO 13849 (and EN 62061) standard specifies the various safety levels in the form of the Performance Level "PL" (and the Safety Integrity Level "SIL") depending on the extent of the risk and describes the characteristics of the safety functions.

### Practical procedure according to EN ISO 13849

In practice, the following steps have proved to be effective:

1. Definition of the safety function
   The information is derived from the risk assessment.
2. Determination of the required Performance Level (PL)
   For each safety function, the required performance level is estimated using the adjacent risk graph (Fig. 3).
3. Technical implementation
   This step involves the technical pre-planning of the safety function, taking possible technologies and components into account.
4. Dividing the safety function into subsystems
   Implementation takes place in block diagrams. As a rule, a safety function consists of a sensor-logic actuator.

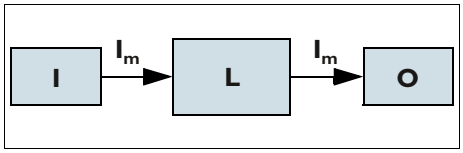



Figure 2:
Safety technology
block diagram (according to EN 13849-1)

5. Determination of the achieved PL for each subsystem
   A characteristic value when determining the performance level is the so-called PFHd value, the statistical "probability of dangerous failure per hour". The safety technology characteristics are in the product data sheet, the FUNCTIONAL SAFETY CHARACTERISTICS data sheet or the SISTEMA library (Fig. 4).
   Further safety technology characteristic data is in the category, the DC value, and the MTTFD value (Fig. 5).
6. Determination of the achieved PL
   The manufacturer of subsystems states the category and makes the specifications on the achieved PFHd value and the PL available.
7. Verification of the achieved PL
   Each individual subsystem and the entire safety chain must both meet the requirements of the necessary PL. This includes both the quantitative evaluation and the consideration of systematic aspects, such as proven components and safety principles.
8. Validation
   Finally, it is necessary to check whether the selected measures achieve the required risk reduction and therefore, the protection objectives of the risk assessment. The result is included in the final risk assessment.

**Definitions:**

$PFH_D$: probability of dangerous failure per hour
DC: diagnostic coverage
$MTTF_d$: mean time to dangerous failure

**Category:**

$B10_d$: number of operating cycles, after which 10% of the devices have failed
CCF: common cause failure

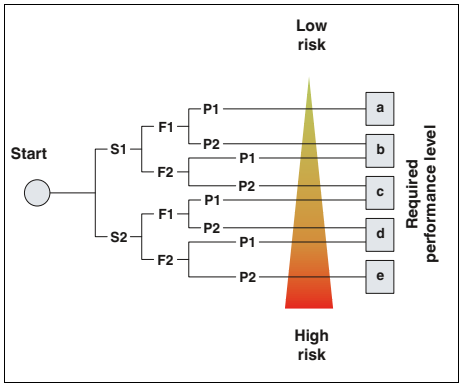



Figure 3: Risk graph

Meaning of individual parameters:
S: severity of injury
– S1: slight (reversible) injuries
– S2: severe (irreversible) injuries
F: frequency and duration of exposure to the hazard
– F1: seldom to not very frequent
– F2: frequent to continuous or long
P: possibility of avoiding or limiting damage
– P1: possible under certain conditions
– P2: hardly possible

Phoenix Contact offers a series of services surrounding the topic of functional safety.

It covers everything from initial planning and startup to the modernization of the safety lifecycle. There is also a training concept. Dates are published on the homepage.

In addition, all questions are answered via the free safety hotline.

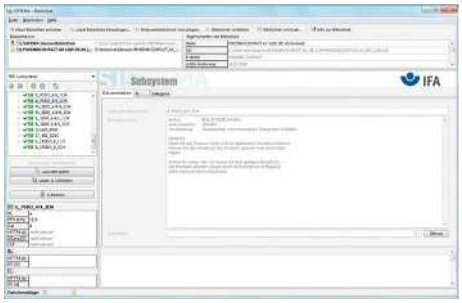



Figure 4: SISTEMA library

SISTEMA is a product library with which safety functions can be easily calculated. The products from MACX Safety and MACX Safety Ex are included in a SISTEMA library. It is available from the product download area on the Phoenix Contact homepage.

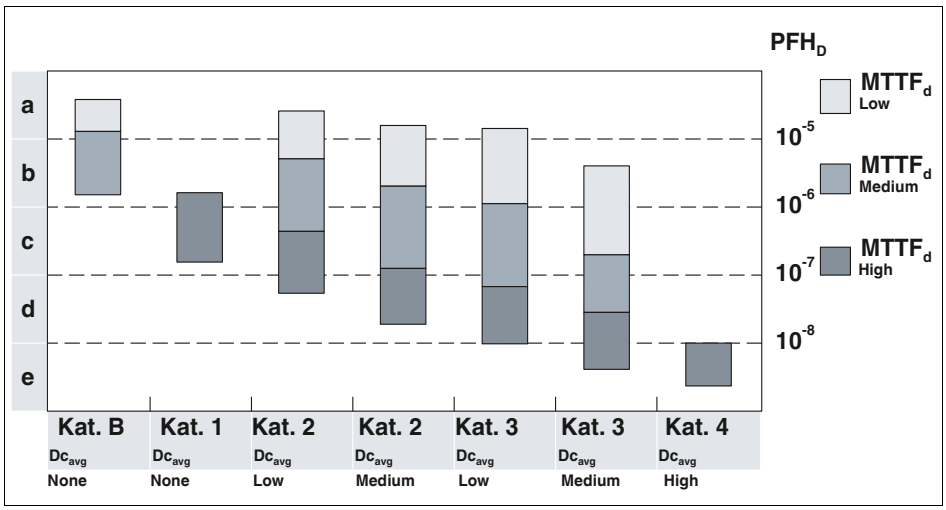
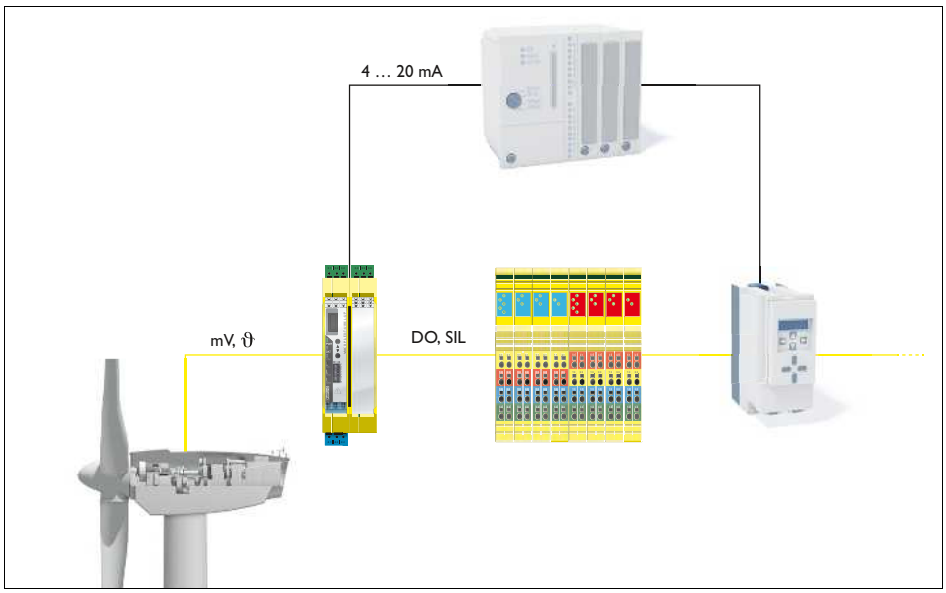
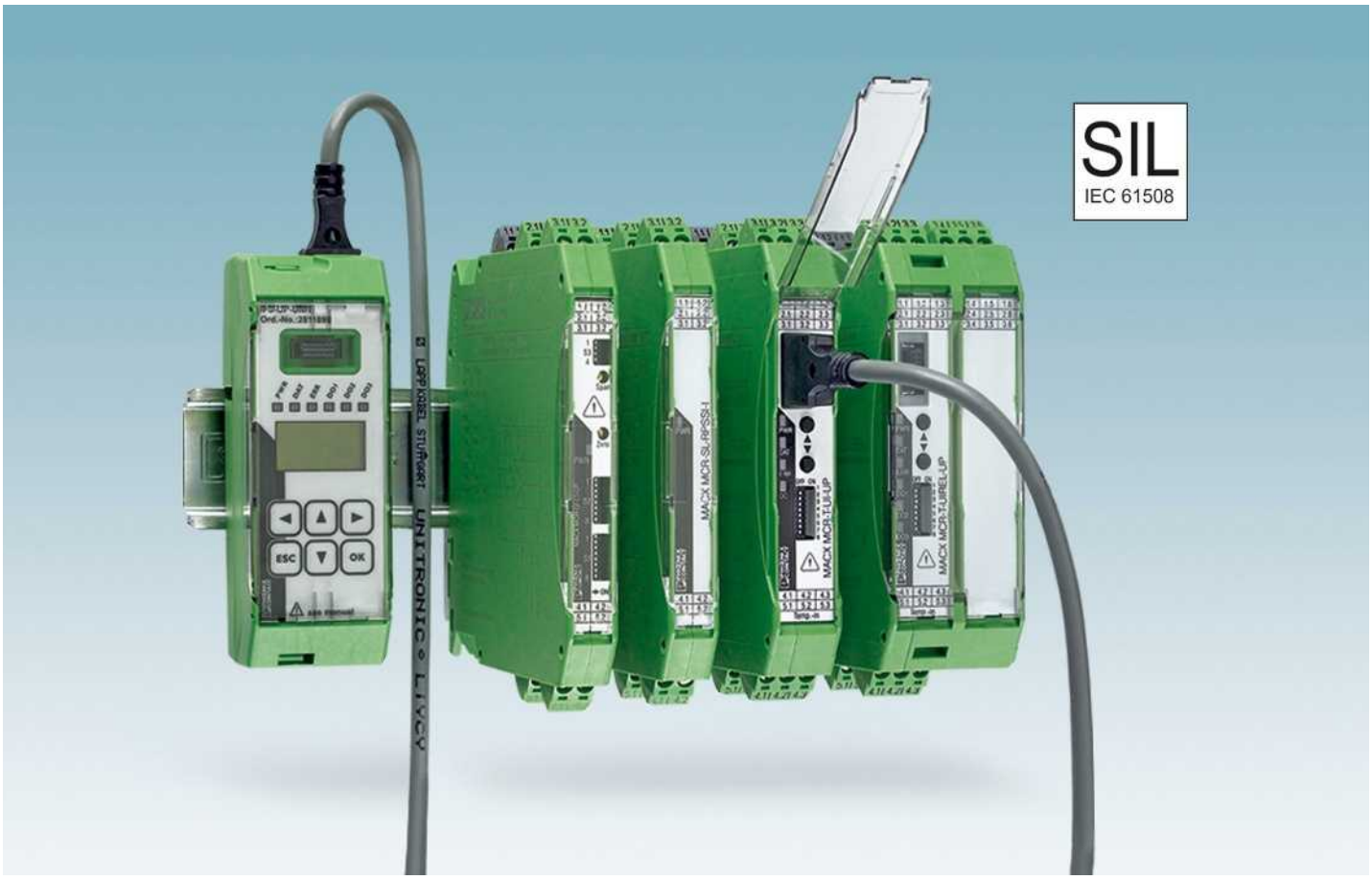



Figure 5:
Relationship between PL, category, DC, and MTTFd (according to EN 13849-1)




Application example:
safety-related temperature monitoring in a wind power plant

## Signal conditioners with SIL functional safety - MACX Analog




### Reliable and safe

MACX Analog - safe and high-performance signal conditioners. This product range enables you to safely isolate, condition, filter, and amplify all the signals of your system.

In all phases of the product life cycle, the MACX Analog range has been consistently developed and produced according to standards for functional safety. Save planning and operating costs – by combining high signal flexibility with safe isolation and SIL evaluation.

### Even for the hazardous area

The devices of the MACX Analog range are approved according to the Ex n protection type for use in Ex zone 2.

### Choose the right MACX Analog signal conditioner for your application:

The universal nature of the product range provides you with a solution for all applications using analog signal transmission. You are free to choose between either multifunctional high-end devices or reasonably-priced standard modules with exactly the right functions.

### Analog IN/OUT

- Universal configurable 3-way signal conditioners
- Repeater power supply and signal duplicator with HART signal transmission
- Output signal conditioners with HART signal transmission

### Temperature

- Universal temperature transducers for resistance thermometers, resistance-type sensors, potentiometers, thermocouples, and mV sources – also with safe limit value relays as an option
- Configurable temperature transducer for resistance thermometers and resistance-type sensors
- Configurable temperature transducer for thermocouples and mV sources

### Digital IN

- NAMUR signal conditioner with input for NAMUR proximity sensors or switches.
- Different versions in single or two-channel design, with relay or transistor output or for signal duplication.

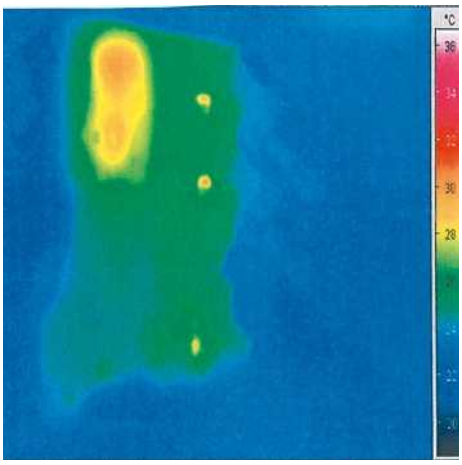
**Flexible energy supply**

**DIN rail connector-compatible**
The DIN rail connector enables modular bridging of the 24 V supply voltage.

**Wide range supply**
The modules featuring a wide range supply (...-UP) can be used in all power supply networks the world over without the need for additional power supply units.

**Precise, interference-free signal transmission**

– Precise and interference-free signal transmission due to a patented transmission concept with safe electrical isolation.

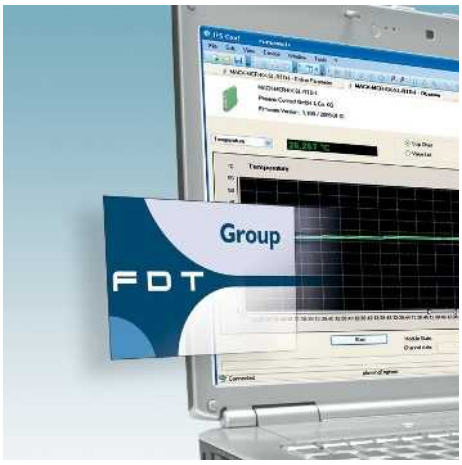


**Long service life and high operational reliability**

– Long service life and high operational reliability over the entire operating temperature range, thanks to low power consumption and self-heating

**Easy configuration**

– Without software via DIP switches on the device front or with the operator interface and display unit.




**Easy configuration and monitoring**

– Either via FDT/DTM or user-friendly stand-alone software – with integrated monitoring function

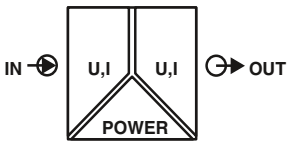
**Easy installation, power bridging, and diagnostics**

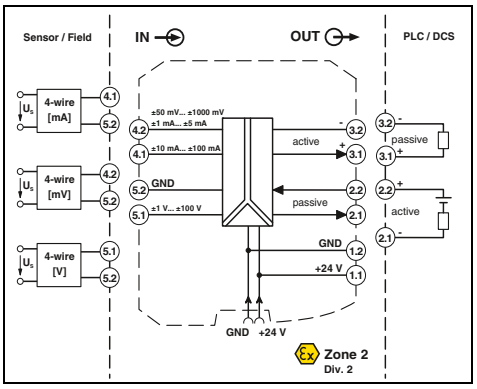
– Flexible supply voltage bridging and the option of redundant, diode-decoupled supply and error indication.
– Plug-in, coded connection terminal blocks with test sockets; with screw connection or with fast push-in connection technology as an option

**Fast and error-free signal connection**

– Compact Termination Carriers connect MACX Analog devices to the automation system – Plug and Play

## Analog IN/Analog OUT
## 3-way signal conditioner



Ex n

SIL IEC 61508

**Universal,**
**more than 1600 signal combinations**

Functional Safety
Ex:
Housing width 12.5 mm

Universal signal conditioner for operating 4-wire measuring transducers

- Analog signal conditioner 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 cut-off frequency for time-critical applications
- Output active or passive
- Plug-in screw or push-in connection technology
- Power supply via DIN rail connector possible
- Status indicator for supply voltage
- Up to SIL 2 according to IEC 61508
- Installation in zone 2 permitted

**Notes:**

To order a product with an order configuration, enter the required configuration by referring to the adjacent order key.

Information about the power and fault signaling module as well as about the DIN rail connectors and marking material can be found from page 178

### Technical data

| | | |
|---|---|---|
| **Input data** | | |
| Input signal (configurable using the DIP switch) | U input | I input |
| | 0 ... 10 V, please indicate if different setting when ordering 0 ... 1 mA, configurable via DIP switches | |
| 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** | | |
| Output signal (configurable using the DIP switch) | U output | I output |
| | 0 ... 10 V, configurable via DIP switches<br>0 ... 20 mA, please indicate if different setting when ordering | |
| Load $R_B$ | ≥ 1 kΩ (10 V) | ≤ 600 Ω (20 mA; active)<br>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 % | |
| Cut-off frequency (3 dB) | 10 kHz (can be switched to 30 Hz) | |
| Step response (10-90%) | 35 µs (at 10 kHz)<br>11 ms (at 30 Hz) | |
| Electrical isolation | | |
| Input/output/power supply | 2.5 kV (50 Hz, 1 min., test voltage)<br>300 $V_{rms}$ (rated insulation voltage (surge voltage category II; pollution degree 2, safe isolation as per EN 61010-1)) | |
| Test voltage, input/output/supply | 2.5 kV (50 Hz, 1 min.) | |
| 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 | |
| Push-in connection solid / stranded / AWG | 0.2 ... 1.5 mm² / 0.2 ... 1.5 mm² / 24 - 16 | |
| EMC note | Class A product, see page 625 | |
| **Conformance / approvals** | | |
| Conformance | CE-compliant | |
| ATEX | Ex II 3 G Ex nA IIC T4 Gc | |
| IECEx | Ex nA IIC T4 Gc | |
| UL, USA / Canada | UL 61010 Listed<br>Class I, Div. 2, Groups A, B, C, D T6<br>Class I, Zone 2, Group IIC | |
| SIL in accordance with IEC 61508 | 2 | |

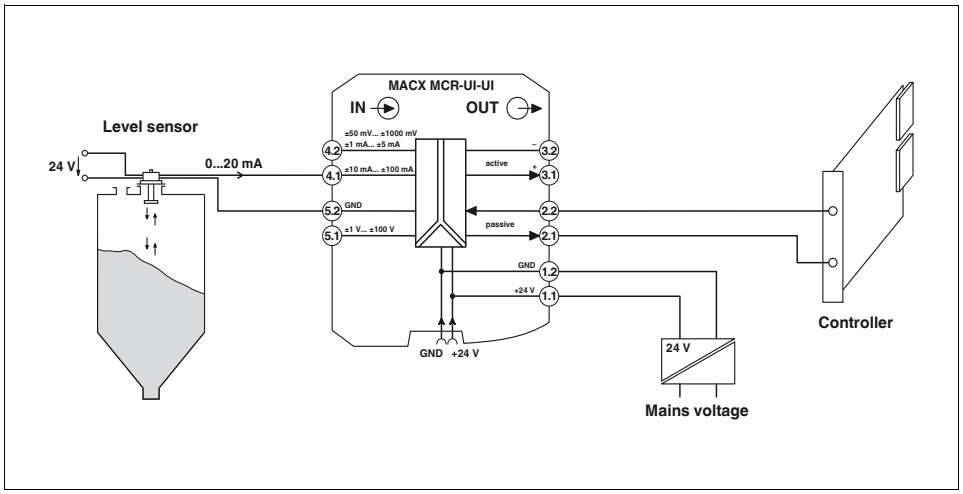
### Ordering data

| Description | | Type | Order No. | Pcs. / Pkt. |
|---|---|---|---|---|
| **3-way signal conditioner**, for electrical isolation of analog signals | | | | |
| Order configuration | Screw connection | **MACX MCR-UI-UI** | **2811284** | 1 |
| Order configuration | Push-in connection | **MACX MCR-UI-UI-SP** | **2811572** | 1 |
| Standard configuration | Screw connection | **MACX MCR-UI-UI-NC** | **2811446** | 1 |
| Standard configuration | Push-in connection | **MACX MCR-UI-UI-SP-NC** | **2811556** | 1 |

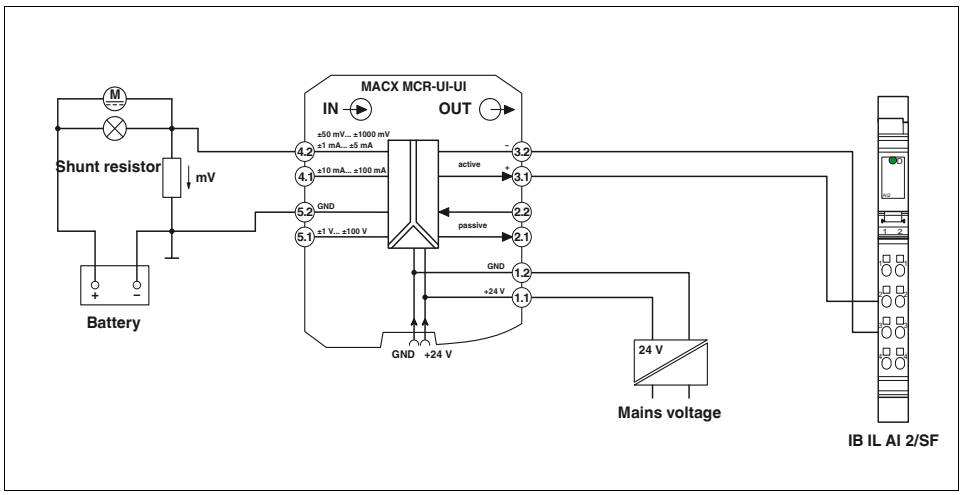
**Order key for MACX MCR-UI-UI(-SP)** (standard configuration entered as an example)

| Order No. | Input | | | Output | | Cut-off frequency | Factory calibration certificate (FCC) |
|---|---|---|---|---|---|---|---|
| 2811284 / | IN03 | | | OUT01 | | 10K / | NONE |
| 2811284 ≙ MACX MCR-UI-UI<br>2811572 ≙ MACX MCR-UI-UI-SP | IN40 ≙ 0..50 mV<br>IN24 ≙ 0..60 mV<br>IN41 ≙ 0..75 mV<br>IN25 ≙ 0..100 mV<br>IN43 ≙ 0..120 mV<br>IN44 ≙ 0..150 mV<br>IN26 ≙ 0..200 mV<br>IN27 ≙ 0..300 mV<br>IN28 ≙ 0..500 mV<br>IN66 ≙ 0..1000 mV<br>IN29 ≙ 0 ... 1.0 V<br>IN50 ≙ 0 ... 1.5 V<br>IN30 ≙ 0 ... 2.0 V<br>IN52 ≙ 0 ... 3.0 V<br>IN05 ≙ 0 ... 5 V<br>IN03 ≙ 0 ... 10 V<br>IN67 ≙ 0 ... 15 V<br>IN32 ≙ 0 ... 20 V<br>IN39 ≙ 0 ... 30 V<br>IN68 ≙ 0 ... 50 V<br>IN69 ≙ 0 ... 100 V<br><br>IN06 ≙ 1 ... 5 V<br>IN04 ≙ 2 ... 10 V | IN53 ≙ -50..+50 mV<br>IN13 ≙ -60..+60 mV<br>IN54 ≙ -75..+75 mV<br>IN14 ≙ -100..+100 mV<br>IN56 ≙ -120..+120 mV<br>IN57 ≙ -150..+150 mV<br>IN15 ≙ -200..+200 mV<br>IN16 ≙ -300..+300 mV<br>IN17 ≙ -500..+500 mV<br>IN78 ≙ -1000..+1000 mV<br>IN18 ≙ -1.0 ... +1.0 V<br>IN63 ≙ -1.5 ... +1.5 V<br>IN19 ≙ -2.0 ... +2.0 V<br>IN65 ≙ -3.0 ... +3.0 V<br>IN21 ≙ -5 ... +5 V<br>IN22 ≙ -10 ... +10 V<br>IN79 ≙ -15 ... +15 V<br>IN23 ≙ -20 ... +20 V<br>IN80 ≙ -30 ... +30 V<br>IN81 ≙ -50 ... +50 V<br>IN82 ≙ -100 ... +100 V | IN70 ≙ 0 ... 1.0 mA<br>IN71 ≙ 0 ... 1.5 mA<br>IN72 ≙ 0 ... 2.0 mA<br>IN73 ≙ 0 ... 3.0 mA<br>IN36 ≙ 0 ... 5 mA<br>IN37 ≙ 0 ... 10 mA<br>IN74 ≙ 0 ... 15 mA<br>IN01 ≙ 0 ... 20 mA<br>IN75 ≙ 0 ... 30 mA<br>IN76 ≙ 0 ... 50 mA<br>IN77 ≙ 0 ... 100 mA<br><br>IN83 ≙ -1.0 ... +1.0 mA<br>IN84 ≙ -1.5 ... +1.5 mA<br>IN85 ≙ -2.0 ... +2.0 mA<br>IN86 ≙ -3.0 ... +3.0 mA<br>IN33 ≙ -5 ... +5 mA<br>IN34 ≙ -10 ... +10 mA<br>IN87 ≙ -15 ... +15 mA<br>IN35 ≙ -20 ... +20 mA<br>IN88 ≙ -30 ... +30 mA<br>IN89 ≙ -50 ... +50 mA<br>IN90 ≙ -100 ... +100 mA<br><br>IN91 ≙ 1 ... 5 mA<br>IN92 ≙ 2 ... 10 mA<br>IN02 ≙ 4 ... 20 mA | OUT19 ≙ 0 ... 2.5 V<br>OUT05 ≙ 0 ... 5 V<br>OUT03 ≙ 0 ... 10 V<br><br>OUT20 ≙ -2.5 ... +2.5 V<br>OUT13 ≙ -5 ... +5 V<br>OUT14 ≙ -10 ... +10 V<br><br>OUT24 ≙ 0.5 ... +2.5 V<br>OUT06 ≙ 1 ... 5 V<br>OUT04 ≙ 2 ... 10 V<br><br>OUT27 ≙ 2.5 ... 0 V<br>OUT11 ≙ 5 ... 0 V<br>OUT09 ≙ 10 ... 0 V | OUT15 ≙ 0 ... 5 mA<br>OUT16 ≙ 0 ... 10 mA<br>OUT01 ≙ 0 ... 20 mA<br><br>OUT21 ≙ -5 ... +5 mA<br>OUT22 ≙ -10 ... +10 mA<br>OUT23 ≙ -20 ... +20 mA<br><br>OUT25 ≙ 1 ... 5 mA<br>OUT26 ≙ 2 ... 10 mA<br>OUT02 ≙ 4 ... 20 mA<br><br>OUT28 ≙ 5 ... 0 mA<br>OUT29 ≙ 10 ... 0 mA<br>OUT07 ≙ 20 ... 0 mA | 30 ≙ 30 Hz<br>10K ≙ 10 kHz | NONE ≙ without FCC<br>YES ≙ with FCC (a fee is charged)<br><br>YESPLUS ≙ FCC with 5 measuring points (a fee is charged) |

**Application example: level measurement and active analog input card**

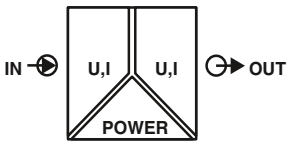


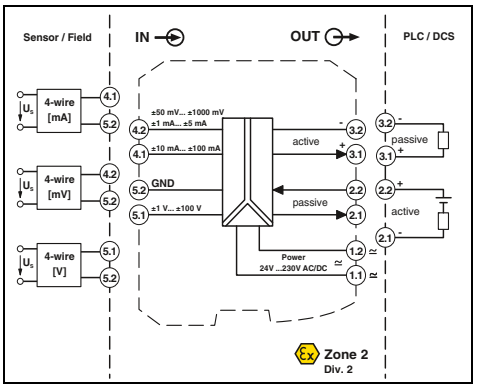

**Application example: shunt measurement and Inline terminal with passive analog input channels within an Inline station**




(Information on automation solutions from Phoenix Contact can be found in Catalog 8 or at www.phoenixcontact.net/products)

## Analog IN/Analog OUT
## 3-way signal conditioner



Ex n

SIL IEC 61508

**Universal,**
**more than 1600 signal combinations,**
**wide range power supply**

Functional Safety
Ex:
Housing width 12.5 mm

- Analog signal conditioner 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 push-in connection technology
- Wide range power supply: 19.2 ... 253 V AC/DC
- Status indicator for supply voltage
- Up to SIL 2 according to IEC 61508
- Installation in zone 2 permitted

**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) | ≤ 600 Ω (20 mA; active)<br>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)<br>< 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)<br>300 $V_{rms}$ (rated insulation voltage (surge voltage category II; pollution degree 2, safe isolation as per EN 61010-1)) | |
| 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 $mm^2$ / 0.2 ... 2.5 $mm^2$ / 24 - 14 | |
| Push-in connection solid / stranded / AWG | 0.2 ... 1.5 $mm^2$ / 0.2 ... 1.5 $mm^2$ / 24 - 16 | |
| EMC note | Class A product, see page 625 | |
| **Conformance / approvals** | | |
| Conformance | CE-compliant | |
| ATEX | II 3 G Ex nA IIC T4 Gc | |
| SIL in accordance with IEC 61508 | 2 | |

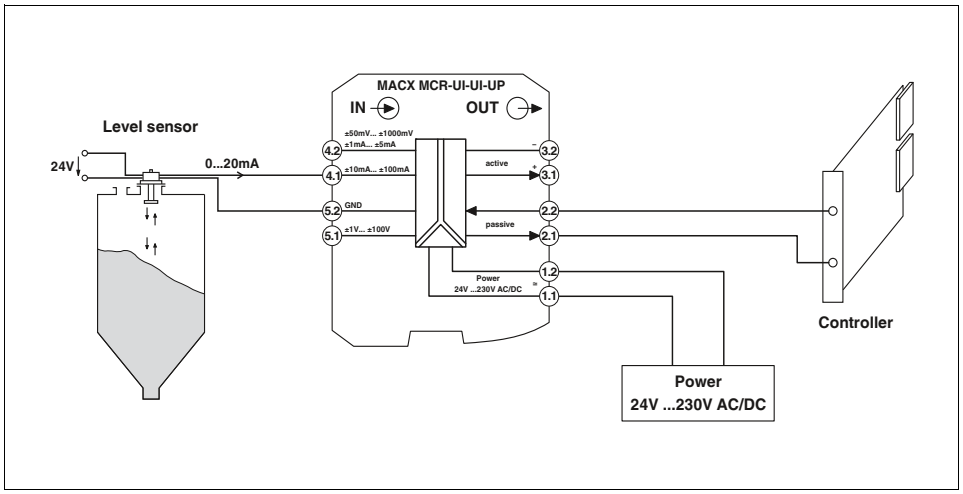
### Ordering data

| Description | | Type | Order No. | Pcs. / Pkt. |
|---|---|---|---|---|
| **3-way signal conditioner,** for electrical isolation of analog signals with long-range power supply | | | | |
| Order configuration | Screw connection | **MACX MCR-UI-UI-UP** | **2811459** | 1 |
| Order configuration | Push-in connection | **MACX MCR-UI-UI-UP-SP** | **2811585** | 1 |
| Standard configuration | Screw connection | **MACX MCR-UI-UI-UP-NC** | **2811297** | 1 |
| Standard configuration | Push-in connection | **MACX MCR-UI-UI-UP-SP-NC** | **2811569** | 1 |

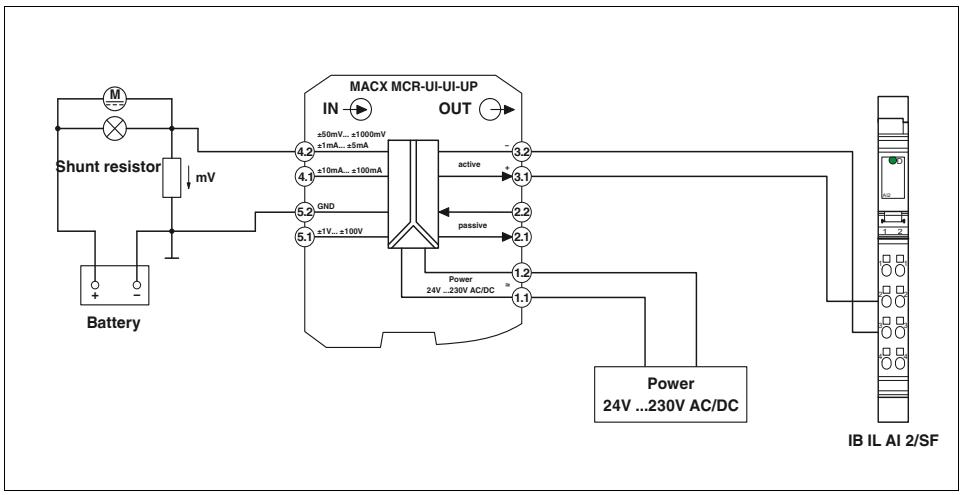
**Order key for MACX MCR-UI-UI(-SP)** (standard configuration entered as an example)

| Order No. | Input | | | Output | | Cut-off frequency | Factory calibration certificate (FCC) |
|---|---|---|---|---|---|---|---|
| 2811459 / | IN03 | | | OUT01 | | 10K / | NONE |
| 2811459 ≙ MACX MCR-UI-UI-UP<br><br>2811585 ≙ MACX MCR-UI-UI-UP-SP | IN40 ≙ 0..50 mV<br>IN24 ≙ 0..60 mV<br>IN41 ≙ 0..75 mV<br>IN25 ≙ 0..100 mV<br>IN43 ≙ 0..120 mV<br>IN44 ≙ 0..150 mV<br>IN26 ≙ 0..200 mV<br>IN27 ≙ 0..300 mV<br>IN28 ≙ 0..500 mV<br>IN66 ≙ 0..1000 mV<br>IN29 ≙ 0 ... 1.0 V<br>IN50 ≙ 0 ... 1.5 V<br>IN30 ≙ 0 ... 2.0 V<br>IN52 ≙ 0 ... 3.0 V<br>IN05 ≙ 0 ... 5 V<br>IN03 ≙ 0 ... 10 V<br>IN67 ≙ 0 ... 15 V<br>IN32 ≙ 0 ... 20 V<br>IN39 ≙ 0 ... 30 V<br>IN68 ≙ 0 ... 50 V<br>IN69 ≙ 0 ... 100 V<br><br>IN06 ≙ 1...5 V<br>IN04 ≙ 2...10 V | IN53 ≙ -50..+50 mV<br>IN13 ≙ -60..+60 mV<br>IN54 ≙ -75..+75 mV<br>IN14 ≙ -100..+100 mV<br>IN56 ≙ -120..+120 mV<br>IN57 ≙ -150..+150 mV<br>IN15 ≙ -200..+200 mV<br>IN16 ≙ -300..+300 mV<br>IN17 ≙ -500..+500 mV<br>IN78 ≙ -1000..+1000 mV<br>IN18 ≙ -1.0 ... +1.0 V<br>IN63 ≙ -1.5...+1.5 V<br>IN19 ≙ -2.0 ... +2.0 V<br>IN65 ≙ -3.0 ... +3.0 V<br>IN21 ≙ -5...+5 V<br>IN22 ≙ -10 ... +10 V<br>IN79 ≙ -15...+15 V<br>IN23 ≙ -20 ... +20 V<br>IN80 ≙ -30 ... +30 V<br>IN81 ≙ -50 ... +50 V<br>IN82 ≙ -100 ... +100 V | IN70 ≙ 0 ... 1.0 mA<br>IN71 ≙ 0 ... 1.5 mA<br>IN72 ≙ 0 ... 2.0 mA<br>IN73 ≙ 0 ... 3.0 mA<br>IN36 ≙ 0 ... 5 mA<br>IN37 ≙ 0 ... 10 mA<br>IN74 ≙ 0 ... 15 mA<br>IN01 ≙ 0 ... 20 mA<br>IN75 ≙ 0 ... 30 mA<br>IN76 ≙ 0 ... 50 mA<br>IN77 ≙ 0 ... 100 mA<br><br>IN83 ≙ -1.0 ... +1.0 mA<br>IN84 ≙ -1.5...+1.5 mA<br>IN85 ≙ -2.0 ... +2.0 mA<br>IN86 ≙ -3.0 ... +3.0 mA<br>IN33 ≙ -5 ... +5 mA<br>IN34 ≙ -10 ... +10 mA<br>IN87 ≙ -15 ... +15 mA<br>IN35 ≙ -20 ... +20 mA<br>IN88 ≙ -30 ... +30 mA<br>IN89 ≙ -50 ... +50 mA<br>IN90 ≙ -100 ... +100 mA<br><br>IN91 ≙ 1 ... 5 mA<br>IN92 ≙ 2 ... 10 mA<br>IN02 ≙ 4 ... 20 mA | OUT19 ≙ 0 ... 2.5 V<br>OUT05 ≙ 0 ... 5 V<br>OUT03 ≙ 0 ... 10 V<br><br>OUT20 ≙ -2.5...+2.5 V<br>OUT13 ≙ -5...+5 V<br>OUT14 ≙ -10 ... +10 V<br><br>OUT24 ≙ 0.5...+2.5 V<br>OUT06 ≙ 1...5 V<br>OUT04 ≙ 2...10 V<br><br>OUT27 ≙ 2.5...0 V<br>OUT11 ≙ 5...0 V<br>OUT09 ≙ 10 ... 0 V | OUT15 ≙ 0 ... 5 mA<br>OUT16 ≙ 0 ... 10 mA<br>OUT01 ≙ 0 ... 20 mA<br><br>OUT21 ≙ -5 ... +5 mA<br>OUT22 ≙ -10 ... +10 mA<br>OUT23 ≙ -20 ... +20 mA<br><br>OUT25 ≙ 1 ... 5 mA<br>OUT26 ≙ 2 ... 10 mA<br>OUT02 ≙ 4 ... 20 mA<br><br>OUT28 ≙ 5 ... 0 mA<br>OUT29 ≙ 10 ... 0 mA<br>OUT07 ≙ 20 ... 0 mA | 30 ≙ 30 Hz<br>10K ≙ 10 kHz | NONE ≙ without FCC<br>YES ≙ with FCC (a fee is charged)<br><br>YESPLUS ≙ FCC with 5 measuring points (a fee is charged) |

**Application example: level measurement and active analog input card**

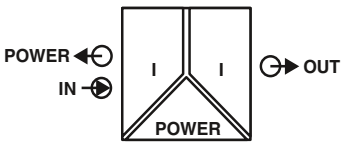


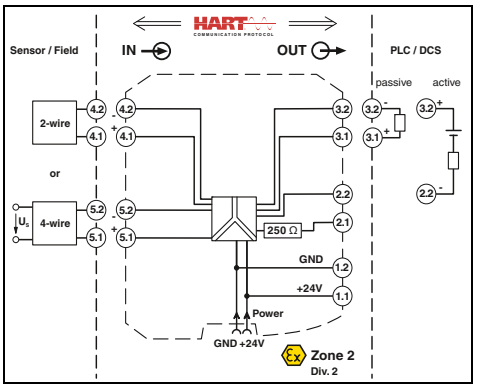

**Application example: shunt measurement and Inline terminal with analog input channels within an Inline station**




(Information on automation solutions from Phoenix Contact can be found in Catalog 8 or at www.phoenixcontact.net/products)

## Analog IN/Analog OUT repeater power supply



Ex n

**Repeater power supply and input signal conditioner**

Functional Safety
Ex:
Housing width 12.5 mm

Repeater power supply and input signal conditioner for the operation of 2-wire measuring transducers, 4-wire measuring transducers, and mA current sources

- Input 0/4...20 mA (powered or not powered)
- 0/4...20 mA output (active or passive)
- Bidirectional transmission of digital HART communication signals
- Plug-in screw or push-in connection technology, 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 IEC 61508
- Installation in zone 2 permitted

| Notes: |
|---|
| Information about the power and fault signaling module as well as about the DIN rail connectors and marking material can be found from page 178 |
| Test plugs for test sockets can be found on page 180 |
| Information on Plug and Play connection using system cabling can be found from page 182 |

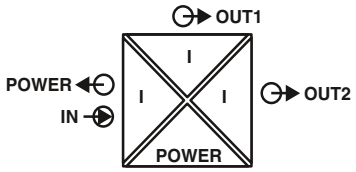
### Technical data

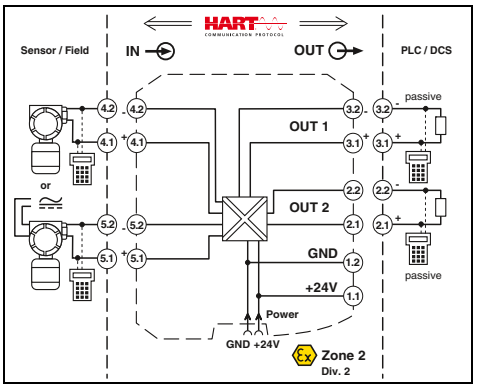
| | |
|---|---|
| Input data | |
| Input signal | 4 mA ... 20 mA |
| Transmitter supply voltage | > 21.5 V (20 mA) |
| Voltage drop | < 3.5 V |
| Output data | |
| Output signal | 4 mA ... 20 mA (active)<br>4 mA ... 20 mA (14 ... 26 V ext. source voltage) |
| Load | < 1000 Ω (20 mA) |
| Output ripple | < 20 $mV_{rms}$ |
| General data | |
| Supply voltage range | 19.2 V DC ... 30 V DC (24 V DC (-20% ... +25%)) |
| Current consumption | < 76 mA (24 V DC / 20 mA / 1000 Ω);<br>< 55 mA (24 V DC / 20 mA / 250 Ω) |
| Power dissipation | < 1.1 W (24 V DC/ 20 mA)<br>< 0.95 W (24 V DC / 20 mA / 250 Ω)<br>< 1.2 W (24 V DC / 20 mA / 0 Ω) |
| Temperature coefficient | < 0.01 %/K |
| Step response (10-90%) | < 200 µs (for 4 mA ... 20 mA step, load 600) |
| Transmission error, typical | < 0.05 % (of final value) |
| Maximum transmission error | < 0.1 % (of final value) |
| Underload/overload range | according to NE 43 |
| Electrical isolation | |
| Input/output/power supply | 300 $V_{rms}$ (rated insulation voltage (surge voltage category II; pollution degree 2, safe isolation as per EN 61010-1))<br>2.5 kV (50 Hz, 1 min., test voltage) |
| 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 / 112.5 / 114.5 mm |
| Screw connection solid / stranded / AWG | 0.2 ... 2.5 $mm^2$ / 0.2 ... 2.5 $mm^2$ / 24 - 14 |
| Push-in connection solid / stranded / AWG | 0.2 ... 1.5 $mm^2$ / 0.2 ... 1.5 $mm^2$ / 24 - 16 |
| EMC note | Class A product, see page 625 |
| Conformance / approvals | |
| Conformance | CE-compliant, additionally EN 61326 |
| ATEX | II 3 G Ex nA IIC T4 Gc |
| UL, USA / Canada | UL 61010 Listed<br>Class I, Div. 2, Groups A, B, C, D T4<br>Class I, Zone 2, Group IIC T4 |
| SIL in accordance with IEC 61508 | 2 |

### Ordering data

| Description | Type | Order No. | Pcs. / Pkt. |
|---|---|---|---|
| **Repeater power supply,** with HART® protocol | | | |
| Screw connection | **MACX MCR-SL-RPSSI-I** | **2865955** | 1 |
| Push-in connection | **MACX MCR-SL-RPSSI-I-SP** | **2924207** | 1 |

## Analog IN/Analog OUT repeater power supply




Ex n

SIL IEC 61508

**Repeater power supply and input signal conditioner, with two electrically isolated outputs**

Functional Safety

Ex:

Housing width 12.5 mm

Repeater power supply and input signal conditioner for the operation of 2-wire measuring transducers, 4-wire measuring transducers, and mA current sources

- Input 0/4...20 mA (powered or not powered)
- Two electrically isolated 0/4 ... 20 mA (active) outputs
- Bidirectional transmission of digital HART communication signals (both outputs)
- Plug-in screw or push-in connection technology, with integrated sockets for HART communicators
- 4-way electrical isolation
- Power supply via DIN rail connector possible
- Up to SIL 2 according to IEC 61508
- Installation in zone 2 permitted

| Notes: |
|---|
| Information about the power and fault signaling module as well as about the DIN rail connectors and marking material can be found from page 178 |
| Test plugs for test sockets can be found on page 180 |
| Information on Plug and Play connection using system cabling can be found from page 182 |

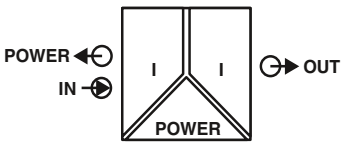
### Technical data

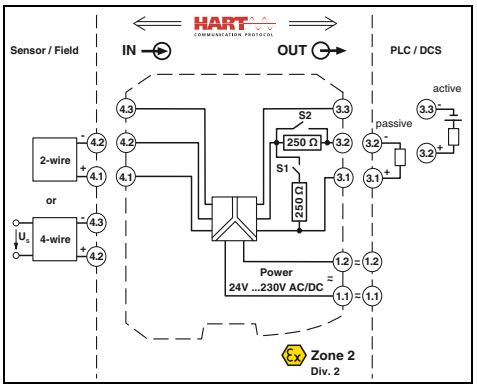
| | |
|---|---|
| **Input data** | |
| Input signal | 4 mA ... 20 mA / 0 mA ... 20 mA |
| Transmitter supply voltage | > 21.5 V (at 20 mA) |
| Voltage drop | < 3.9 V (in input signal conditioner operation) |
| **Output data** | |
| Output signal (per output) | 0 mA ... 20 mA (active)<br>4 mA ... 20 mA (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) |
| Underload/overload range | according to NE 43 |
| Electrical isolation | |
| Input/output/power supply | 300 $V_{rms}$ (rated insulation voltage (surge voltage category II; pollution degree 2, safe isolation as per EN 61010-1))<br>2.5 kV (50 Hz, 1 min., test voltage) |
| 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 |
| Push-in connection solid / stranded / AWG | 0.2 ... 1.5 $mm^2$ / 0.2 ... 1.5 $mm^2$ / 24 - 16 |
| EMC note | Class A product, see page 625 |
| **Conformance / approvals** | |
| Conformance | CE-compliant, additionally EN 61326 |
| ATEX | II 3 G Ex nA IIC T4 Gc X |
| SIL in accordance with IEC 61508 | 2 |

### Ordering data

| Description | Type | Order No. | Pcs. / Pkt. |
|---|---|---|---|
| **Repeater power supply,** with HART® protocol | | | |
| Screw connection | **MACX MCR-SL-RPSSI-2I** | **2924825** | 1 |
| Push-in connection | **MACX MCR-SL-RPSSI-2I-SP** | **2924838** | 1 |

## Analog IN/Analog OUT repeater power supply



Ex n

SIL IEC 61508

**Repeater power supply and input signal conditioner, wide range power supply**

Functional Safety

Ex:

Housing width 17.5 mm

Repeater power supply and input signal conditioner for the operation of 2-wire measuring transducers, 4-wire measuring transducers, and mA current sources

- Input 0/4...20 mA (powered or not powered)
- 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 push-in connection technology, 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 IEC 61508
- Installation in zone 2 permitted

**Notes:**

Information about the power and fault signaling module as well as about the DIN rail connectors and marking material can be found from page 178

Test plugs for test sockets can be found on page 180

### Technical data

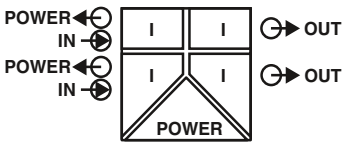
| | |
|---|---|
| **Input data** | |
| Input signal | 4 mA ... 20 mA |
| Transmitter supply voltage | > 16 V (20 mA) |
| Voltage drop | < 3.5 V (in input signal conditioner operation) |
| **Output data** | |
| Output signal | 4 mA ... 20 mA (active)<br>4 mA ... 20 mA (14 ... 26 V ext. source voltage)<br>1 V ... 5 V (internal resistance, 250 Ω, 0.1%) |
| Load | < 600 Ω (20 mA) |
| Output ripple | < 20 $mV_{rms}$ |
| **General data** | |
| Supply voltage range | 24 V ... 230 V AC/DC (-20%/+10%, 50/60 Hz) |
| Current consumption | < 80 mA (24 V DC/ 20 mA) |
| Power dissipation | < 1.6 W (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) |
| Underload/overload range | according to NE 43 |
| Electrical isolation | |
| Input/output/power supply | 300 $V_{rms}$ (rated insulation voltage (surge voltage category II; pollution degree 2, safe isolation as per EN 61010-1))<br>2.5 kV (50 Hz, 1 min., test voltage) |
| 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 |
| Push-in connection solid / stranded / AWG | 0.2 ... 1.5 $mm^2$ / 0.2 ... 1.5 $mm^2$ / 24 - 16 |
| EMC note | Class A product, see page 625 |
| **Conformance / approvals** | |
| Conformance | CE-compliant, additionally EN 61326 |
| ATEX | II 3 G Ex nA IIC T4 Gc X |
| UL, USA / Canada | UL 508 Listed<br>UL 61010 Listed<br>Class I, Div. 2, Groups A, B, C, D T4<br>Class I, Zone 2, Group IIC T4 |
| SIL in accordance with IEC 61508 | 2 |

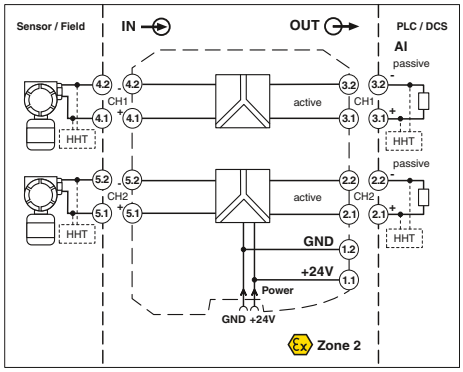
### Ordering data

| Description | Type | Order No. | Pcs. / Pkt. |
|---|---|---|---|
| **Repeater power supply,** with HART® protocol | | | |
| Screw connection | **MACX MCR-SL-RPSSI-I-UP** | **2865968** | 1 |
| Push-in connection | **MACX MCR-SL-RPSSI-I-UP-SP** | **2924210** | 1 |

new

## Analog IN/Analog OUT repeater power supply



2-channel repeater power supply

Ex n

SIL IEC 61508

Repeater power supply for the operation of 2-wire measuring transducers.

- 2-channel
- Input: 4 ... 20 mA (powered)
- Output: 4 ... 20 mA (active)
- Bidirectional transmission of digital HART communication signals
- Plug-in screw or push-in connection technology, with integrated sockets for HART communicators
- Safe 3-way electrical isolation
- Power supply via DIN rail connector possible
- Up to SIL 3 according to IEC 61508
- Installation in zone 2 permitted

| Notes: |
|---|
| Information about the power and fault signaling module as well as about the DIN rail connectors and marking material can be found from page 178 |
| Test plugs for test sockets can be found on page 180 |
| Information on Plug and Play connection using system cabling can be found from page 182 |

Housing width 12.5 mm

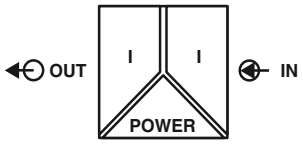
### Technical data

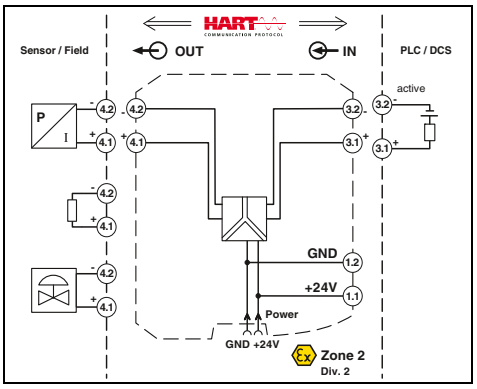
| | |
|---|---|
| Input data | per channel |
| Input signal | 4 mA ... 20 mA |
| Transmitter supply voltage | > 16 V (at 20 mA) |
| Underload/overload signal range | 0 mA ... 24 mA |
| Output data | per channel |
| Output signal | 4 mA ... 20 mA (active) |
| Load | ≤ 450 Ω (20 mA) |
| Underload/overload signal range | 0 mA ... 24 mA |
| General data | |
| Supply voltage range | 19.2 V DC ... 30 V DC (24 V DC (-20% ... +25%)) |
| Current consumption | < 100 mA (24 V / 20 mA) |
| Power dissipation | < 1.4 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) |
| Electrical isolation | |
| Input/output, power supply | 300 $V_{rms}$ (rated insulation voltage (surge voltage category II; pollution degree 2, safe isolation as per EN 61010-1)) 2.5 kV (50 Hz, 1 min., test voltage) |
| 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/ power supply | 1.5 kV (50 Hz, 1 min., test voltage) |
| 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 ... 1.5 $mm^2$ / 0.2 ... 1.5 $mm^2$ / 24 - 16 |
| Push-in 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 IIC T4 Gc |
| IECEx | - |
| UL, USA / Canada | UL 61010 Listed<br>Class I, Div. 2, Groups A, B, C, D T4<br>Class I, Zone 2, Group IIC T4 |
| SIL in accordance with IEC 61508 | 3 |

### Ordering data

| Description | Type | Order No. | Pcs. / Pkt. |
|---|---|---|---|
| **Repeater power supply**, 2-channel | | | |
| Screw connection | **MACX MCR-SL-RPSS-2I-2I** | **2904089** | 1 |
| Push-in connection | **MACX MCR-SL-RPSS-2I-2I-SP** | **2904090** | 1 |

## Analog OUT
## Output signal conditioner



Ex n

SIL
IEC 61508

Functional Safety
Ex:
Housing width 12.5 mm

Output signal conditioner 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 push-in connection technology, with integrated sockets for HART communicators
- Line fault detection (LF)
- 3-way electrical isolation
- Power supply via DIN rail connector possible
- Up to SIL 2 according to IEC 61508
- Installation in zone 2 permitted

| Notes: |
|---|
| Information about the power and fault signaling module as well as about the DIN rail connectors and marking material can be found from page 178 |
| Test plugs for test sockets can be found on page 180 |
| Information on Plug and Play connection using system cabling can be found from page 182 |

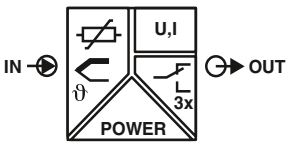
### Technical data

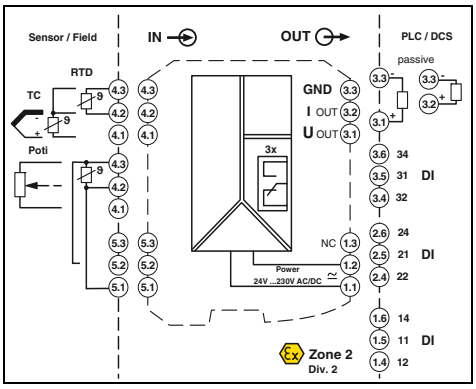
| | |
|---|---|
| **Input data** | |
| Input signal | 0 mA ... 20 mA / 4 mA ... 20 mA |
| Input voltage | 5.4 V (at 20 mA) |
| Input impedance in the event of a cable break at the output | > 100 kΩ (If there is a line fault) |
| **Output data** | |
| Output signal | 0 mA ... 20 mA / 4 mA ... 20 mA |
| Load | < 800 Ω (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 | < 46 mA (24 V DC / 20 mA) |
| Power dissipation | < 1.1 W (24 V DC / 20 mA) |
| Temperature coefficient | < 0.01 %/K |
| Step response (10-90%) | < 140 µs (for 4 mA ... 20 mA step) |
| Maximum transmission error | < 0.1 % (of final value) |
| Electrical isolation | |
| Input/output/power supply | 1.5 kV (50 Hz, 1 min., test voltage)<br>300 $V_{rms}$ (rated insulation voltage (surge voltage category II, pollution degree 2)) |
| Ambient temperature range | -20 °C ... 60 °C (any mounting position) |
| Humidity | 10 % ... 95 % (non-condensing) |
| SMART communication | Yes |
| Signal bandwidth | as per HART specifications |
| Protocols supported | HART |
| Housing material | PA 66-FR |
| Inflammability class in acc. with 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 |
| Push-in connection solid / stranded / AWG | 0.2 ... 1.5 $mm^2$ / 0.2 ... 1.5 $mm^2$ / 24 - 16 |
| EMC note | Class A product, see page 625 |
| **Conformance / approvals** | |
| Conformance | CE-compliant, additionally EN 61326 |
| ATEX | II 3 G Ex nA IIC T4 Gc X |
| UL, USA / Canada | UL 508 Listed<br>UL 61010 Listed<br>Class I, Div. 2, Groups A, B, C, D T4<br>Class I, Zone 2, Group IIC T4 |
| SIL in accordance with IEC 61508 | 2 |

### Ordering data

| Description | Type | Order No. | Pcs. / Pkt. |
|---|---|---|---|
| **Output signal conditioner** | | | |
| Screw connection | **MACX MCR-SL-IDSI-I** | **2865971** | 1 |
| Push-in connection | **MACX MCR-SL-IDSI-I-SP** | **2924223** | 1 |

## Temperature, temperature transducer



Ex n

SIL IEC 61508

**Universal, with three limit value relays, wide range power supply**

Functional Safety
Ex:
Housing width 35 mm

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 push-in connection technology
- 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 IEC 61508
- Installation in zone 2 permitted

| Notes: |
|---|
| To order a product with an order configuration, enter the required configuration by referring to the adjacent order key. |
| The configuration software can be downloaded from the Internet (phoenixcontact.net/products). |
| Information on the IFS-OP-UNIT operating and display unit and the associated IFS-OP-CRADLE DIN rail cradle can be found on page 170 |
| For information on the programming adapter, refer to page 89 |

### 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 | 0 mA ... 20 mA ±10 V (in the case of SIL; further free configuration without SIL) | |
| 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 | - | |
| Electrical isolation | | |
| Input/output/power supply | 300 $V_{rms}$ (rated insulation voltage (surge voltage category II; pollution degree 2, safe isolation as per EN 61010-1)) 2.5 kV (50 Hz, 1 min., test voltage) | |
| 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) | |
| Ambient temperature range | -20 °C ... 65 °C | |
| Humidity | typ. 5 % ... 95 % (non-condensing) | |
| Housing material | PA 66-FR | |
| Inflammability class in acc. with 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 | |
| Push-in connection solid / stranded / AWG | 0.2 ... 1.5 $mm^2$ / 0.2 ... 1.5 $mm^2$ / 24 - 16 | |
| EMC note | Class A product, see page 625 | |
| Conformance / approvals | | |
| Conformance | CE-compliant | |
| ATEX | Ex II 3 G Ex nA nC ic IIC T4 Gc X | |
| IECEx | Ex nA nC ic IIC T4 Gc X | |
| UL, USA / Canada | UL 508 Listed<br>Class I, Div. 2, Groups A, B, C, D T6<br>Class I, Zone 2, Group IIC T6 | |
| SIL in accordance with IEC 61508 | 2 | |

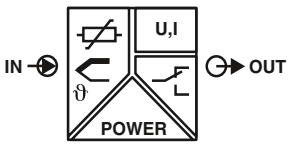
### Ordering data

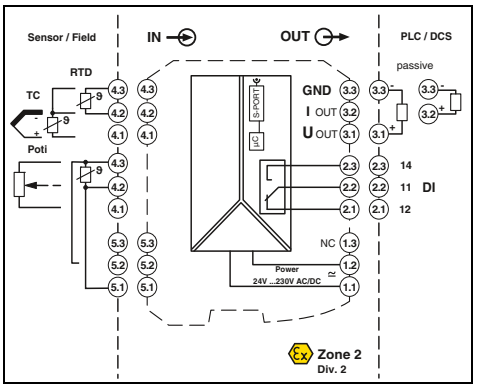
| Description | | Type | Order No. | Pcs. / Pkt. |
|---|---|---|---|---|
| **Temperature transducer** | | | | |
| Standard configuration | Screw connection | **MACX MCR-T-UIREL-UP** | **2811378** | 1 |
| Standard configuration | Push-in connection | **MACX MCR-T-UIREL-UP-SP** | **2811828** | 1 |

### Accessories

| | | | |
|---|---|---|---|
| **Programming adapter** for configuring modules with S-PORT interface | **IFS-USB-PROG-ADAPTER** | **2811271** | 1 |
| **Cold junction compensation connector** for thermocouples | **MACX MCR-CJC** | **2924993** | 1 |

## Temperature, temperature transducer



Ex n

SIL IEC 61508

**Universal, with switching output, wide range power supply**

Functional Safety
Ex:
Housing width 17.5 mm

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 push-in connection technology
- 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 IEC 61508
- Installation in zone 2 permitted

| Notes: |
|---|
| To order a product with an order configuration, enter the required configuration by referring to the adjacent order key. |
| The configuration software can be downloaded from the Internet (phoenixcontact.net/products). |
| Information on the IFS-OP-UNIT operating and display unit and the associated IFS-OP-CRADLE DIN rail cradle can be found on page 170 |
| For information on the programming adapter, refer to page 89 |

### 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 | 0 mA ... 20 mA ±10 V (in the case of SIL; further free configuration without SIL) | |
| Maximum output signal | ± 11 V | 22 mA |
| Load $R_B$ | ≥ 10 kΩ | ≤ 600 Ω (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 % (e.g., for Pt 100, 300 K span, 4 ... 20 mA) | |
| Electrical isolation | | |
| Input/output/power supply | 300 $V_{rms}$ (rated insulation voltage (surge voltage category II; pollution degree 2, safe isolation as per EN 61010-1)) 2.5 kV (50 Hz, 1 min., test voltage) | |
| 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) | |
| Ambient temperature range | -20 °C ... 65 °C | |
| Humidity | typ. 5 % ... 95 % (non-condensing) | |
| Housing material | PA 66-FR | |
| Inflammability class in acc. with 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 | |
| Push-in connection solid / stranded / AWG | 0.2 ... 1.5 $mm^2$ / 0.2 ... 1.5 $mm^2$ / 24 - 16 | |
| EMC note | Class A product, see page 625 | |
| Conformance / approvals | | |
| Conformance | CE-compliant | |
| ATEX | II 3 G Ex nA nC ic IIC T4 Gc X | |
| IECEx | Ex nA nC ic IIC T4 Gc X | |
| SIL in accordance with IEC 61508 | 2 | |

### Ordering data

| Description | | Type | Order No. | Pcs. / Pkt. |
|---|---|---|---|---|
| **Temperature transducer** | | | | |
| Standard configuration | Screw connection | **MACX MCR-T-UI-UP** | **2811394** | 1 |
| Standard configuration | Push-in connection | **MACX MCR-T-UI-UP-SP** | **2811860** | 1 |
| Order configuration | Screw connection | **MACX MCR-T-UI-UP-C** | **2811873** | 1 |
| Order configuration | Push-in connection | **MACX MCR-T-UI-UP-SP-C** | **2811970** | 1 |

### Accessories

| | | | |
|---|---|---|---|
| **Programming adapter** for configuring modules with S-PORT interface | **IFS-USB-PROG-ADAPTER** | **2811271** | 1 |
| **Cold junction compensation connector** for thermocouples | **MACX MCR-CJC** | **2924993** | 1 |

**Order key for MACX MCR-T-UI-UP(-SP)-C** temperature transducer (standard configuration entered as an example)

| Order No. | Safety integrity level (SIL) | Sensor type | Connection technology | 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<br>2811970 ≙ MACX MCR-T-UI-UP-SP-C | ON ≙ active<br>NONE ≙ not active<br>ON only with output range = OUT02 | See below | 2 ≙ 2-wire<br>3 ≙ 3-wire<br>4 ≙ 4-wire | 0 ≙ off, e.g., with RTD, R, potentiometer, mV<br>1 ≙ on, e.g., with TC | see below | see below | C ≙ °C<br>F ≙ °F<br>O ≙ Ω<br>P ≙ %<br>V ≙ mV | OUT15 ≙ 0 ... 5 mA<br>OUT16 ≙ 0 ... 10 mA<br>OUT01 ≙ 0 ... 20 mA<br>OUT15 ≙ 0 ... 5 mA<br>OUT25 ≙ 1 ... 5 mA<br>OUT26 ≙ 2 ... 10 mA<br>OUT02 ≙ 4 ... 20 mA<br>OUT05 ≙ 0 ... 5 V<br>OUT03 ≙ 0 ... 10 V<br>OUT06 ≙ 1 ... 5 V<br>OUT04 ≙ 2 ... 10 V<br>OUT13 ≙ -5 ... +5 V<br>OUT14 ≙ -10...+10 V<br>Others can be freely configured in the software | NONE ≙ without FCC<br>YES ≙ with FCC (a fee is charged)<br>YESPLUS ≙ FCC with 5 measuring points (a fee is charged) |

| | | | | | | Smallest measuring range span |
|---|---|---|---|---|---|---|
| **Resistance thermometers (RTD)**<br>Others can be selected or freely configured in the software. | PT100 | ≙ Pt 100 acc. to IEC 751 | -200 | 850 | °C | 20 K |
| | PT200 | ≙ Pt 200 acc. to IEC 751 | -200 | 850 | °C | 20 K |
| | PT500 | ≙ Pt 500 acc. to IEC 751 | -200 | 850 | °C | 20 K |
| | PT1000 | ≙ Pt 1000 acc. to IEC 751 | -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 6651-2009 (α = 0.00385) | -200 | 850 | °C | 20 K |
| | PT1000G | ≙ Pt 1000 acc. to GOST 6651-2009 (α = 0.00385) | -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 | ≙ Cu50 acc. to GOST 6651-2009 (α = 0.00428) | -50 | 200 | °C | 100 K |
| | CU100 | ≙ Cu100 acc. to GOST 6651-2009 (α = 0.00428) | -50 | 200 | °C | 100 K |
| | CU53 | ≙ Cu53 acc. to GOST 6651-2009 (α = 0.00426) | -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)**<br>Others can be selected in the software. | B | ≙ acc. to IEC 584-1 (Pt30Rh-Pt6Rh) | 500 | 1820 | °C | 50 K |
| | E | ≙ acc. to IEC 584-1 (NiCr-CuNi) | -230 | 1000 | °C | 50 K |
| | J | ≙ acc. to IEC 584-1 (Fe-CuNi) | -210 | 1200 | °C | 50 K |
| | K | ≙ acc. to IEC 584-1 (NiCr-Ni) | -250 | 1372 | °C | 50 K |
| | N | ≙ acc. to IEC 584-1 (NiCrSi-NiSi) | -250 | 1300 | °C | 50 K |
| | R | ≙ acc. to IEC 584-1 (Pt13Rh-Pt) | -50 | 1768 | °C | 50 K |
| | S | ≙ acc. to IEC 584-1 (Pt10Rh-Pt) | -50 | 1768 | °C | 50 K |
| | T | ≙ acc. to IEC 584-1 (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)**<br>Others can be selected in the software. | RES03 | ≙ 0 ... 150 Ω resistor | 0 | 150 | Ω | 10% of the selected measuring range |
| | RES05 | ≙ 0 ... 600 Ω resistor | 0 | 600 | Ω | |
| | RES06 | ≙ 0 ... 1200 Ω resistor | 0 | 1200 | Ω | |
| | RES09 | ≙ 0 ... 6250 Ω resistor | 0 | 6250 | Ω | |
| | RES10 | ≙ 0 ... 12500 Ω resistor | 0 | 12500 | Ω | |
| | RES12 | ≙ 0 ... 50000 Ω resistor | 0 | 50000 | Ω | |
| **Potentiometers (3-wire)**<br>Others can be selected in the software. | POT03 | ≙ 0 ... 150 Ω potentiometer | 0 | 100 | % | 10% of the selected measuring range |
| | POT05 | ≙ 0 ... 600 Ω potentiometer | 0 | 100 | % | |
| | POT06 | ≙ 0 ... 1200 Ω potentiometer | 0 | 100 | % | |
| | POT09 | ≙ 0 ... 6250 Ω potentiometer | 0 | 100 | % | |
| | POT10 | ≙ 0 ... 12500 Ω potentiometer | 0 | 100 | % | |
| | POT12 | ≙ 0 ... 50000 Ω potentiometer | 0 | 100 | % | |
| **Voltage signals (mV)**<br>Others can be selected in the software. | V04 | ≙ Voltage (mV) | -1000 | +1000 | mV | 10% of nominal span |

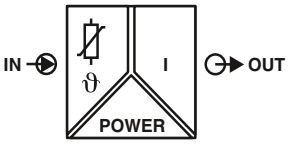
**Other setting options can be configured with the IFS-CONF software:**

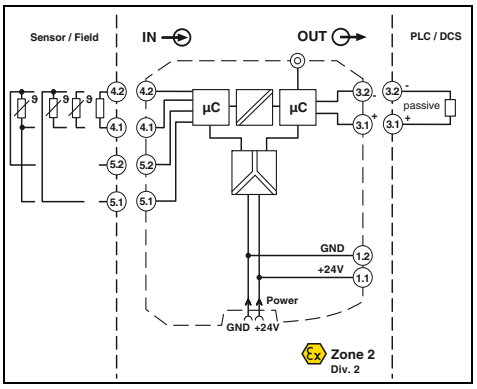
- Freely configurable user characteristic curve with 30 interpolation points
- Output behavior in the event of a short circuit, sensor break or overrange/underrange can be freely configured or set acc. to NE43 (standard configuration: NE43 upscale)
- Filter setting (standard configuration: 1)
- Restart 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, temperature transducer




Ex n

SIL IEC 61508

**For resistance thermometers and resistance-type sensors**

Ex:

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 IEC 61508
- Installation in zone 2 permitted

| Notes: |
|---|
| To order a product with an order configuration, enter the required configuration by referring to the adjacent order key. |
| The configuration software can be downloaded from the Internet (phoenixcontact.net/products). |
| Information about the power and fault signaling module as well as about the DIN rail connectors and marking material can be found from page 178 |
| For information on the programming adapter, refer to page 89 |
| Test plugs for test sockets can be found on page 180 |
| Information on Plug and Play connection using system cabling can be found from page 182 |

### 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 | | > 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 $\mu A_{PP}$ |
| 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)<br>max. 1200 ms (with SIL)<br>typ. 700 ms (without SIL)<br>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)<br>300 $V_{rms}$ (rated insulation voltage (surge voltage category II; pollution degree 2, safe isolation as per EN 61010-1)) |
| | 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 % (non-condensing) |
| Housing material | | PA 66-FR |
| Inflammability class in acc. with 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 |
| Push-in connection solid / stranded / AWG | | 0.2 ... 1.5 $mm^2$ / 0.2 ... 1.5 $mm^2$ / 24 - 16 |
| EMC note | | Class A product, see page 625 |
| Conformance / approvals | | |
| Conformance | | CE-compliant, additionally EN 61326 |
| ATEX | | II 3G Ex nA ic IIC T4 Gc X |
| UL, USA / Canada | | UL 508 Listed<br>UL 61010 Listed<br>Class I, Div. 2, Groups A, B, C, D T4<br>Class I, Zone 2, Group IIC T4 |
| SIL in accordance with IEC 61508 | | 2 |

### Ordering data

| Description | | Type | Order No. | Pcs. / Pkt. |
|---|---|---|---|---|
| **Temperature transducer** | | | | |
| Order configuration | Screw connection | **MACX MCR-SL-RTD-I** | **2865065** | 1 |
| Order configuration | Push-in connection | **MACX MCR-SL-RTD-I-SP** | **2924317** | 1 |
| Standard configuration | Screw connection | **MACX MCR-SL-RTD-I-NC** | **2865078** | 1 |
| Standard configuration | Push-in connection | **MACX MCR-SL-RTD-I-SP-NC** | **2924320** | 1 |

### Accessories

| | | | |
|---|---|---|---|
| **Programming adapter** for configuring modules with S-PORT interface | **IFS-USB-PROG-ADAPTER** | **2811271** | 1 |

## Order key and temperature ranges for the MACX MCR-SL-RTD-I(-SP) temperature transducer

**Order key for MACX MCR-SL-RTD-I(-SP)** temperature transducer (standard configuration entered as an example)

| Order No. | Sensor type | Safety integrity level (SIL) | Connection technology | Measuring range: Start | Measuring range: End | Measuring unit | Output range | Filter Oversampling | Filter Moving mean value |
|---|---|---|---|---|---|---|---|---|---|
| 2865065 / | Pt100 / | ON / | 3 / | 0 / | 100 / | C / | OUT02 / | 10 / | 1 / ... |
| 2865065 ≙ MACX MCR-SL-RTD-I<br>2924317 ≙ MACX MCR-SL-RTD-I-SP | See below | ON ≙ Active<br>NONE ≙ not active<br>ON only with output range = OUT02 | 2 ≙ 2-wire<br>3 ≙ 3-wire<br>4 ≙ 4-wire | see below | see below | C ≙ °C<br>F ≙ °F<br>O ≙ Ω | OUT01 ≙ 0 ... 20 mA<br>OUT02 ≙ 4...20 mA | 1 ≙ 1 value<br>3 ≙ 3 values<br>5 ≙ 5 values<br>7 ≙ 7 values<br>10 ≙ 10 values<br>20 ≙ 20 values | 1 ≙ 1 value<br>2 ≙ 2 values<br>3 ≙ 3 values<br>4 ≙ 4 values |

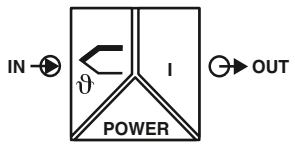
| | | | | | Smallest measuring range span |
|---|---|---|---|---|---|
| RES01 | ≙ Resistor | 0 | 2000 | Ω | 25 Ω |
| PT50 | ≙ Pt 50 acc. to IEC 751 | -200 | 850 | °C | 50 K |
| Pt100 | ≙ Pt 100 acc. to IEC 751 | -200 | 850 | °C | 50 K |
| Pt200 | ≙ Pt 200 acc. to IEC 751 | -200 | 850 | °C | 50 K |
| Pt500 | ≙ Pt 500 acc. to IEC 751 | -200 | 850 | °C | 50 K |
| PT100S | ≙ Pt 100 acc. to Sama RC21-4-1966 | -200 | 600 | °C | 50 K |
| PT500S | ≙ Pt 500 acc. to Sama RC21-4-1966 | -200 | 600 | °C | 50 K |
| NI100DIN | ≙ Ni 100 acc. to DIN 43760 | -60 | 250 | °C | 50 K |
| NI500DIN | ≙ Ni 500 acc. to DIN 43760 | -60 | 250 | °C | 50 K |
| CU50 | ≙ Cu 50 acc. to GOST 6651-2009 ($\alpha$ = 0.00428) | -50 | 200 | °C | 50 K |
| CU53 | ≙ Cu 53 acc. to GOST 6651-2009 ($\alpha$ = 0.00426) | -50 | 180 | °C | 50 K |

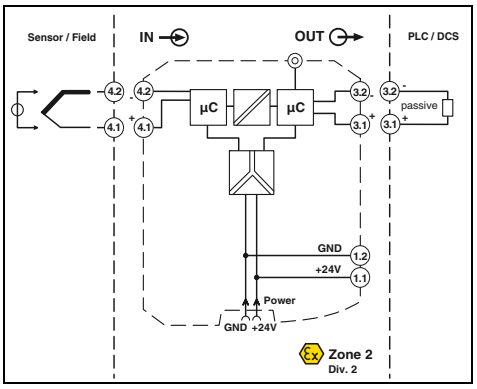
| ... / | Alarm signal Short circuit/ Overrange | Alarm signal Sensor break/ Underrange | Factory calibration certificate = FCC |
|---|---|---|---|
| | I035 / | I215 / | NONE |
| | I000 ≙ 0 mA<br>I035 ≙ 3.5 mA<br>I215 ≙ 21.5 mA<br>I035 only with output range = OUT02<br>Alarm signals can also be configured individually using software. | I000 ≙ 0 mA<br>I035 ≙ 3.5 mA<br>I215 ≙ 21.5 mA | NONE ≙ without FCC<br>YES ≙ with FCC (a fee is charged)<br>YESPLUS ≙ FCC with 5 measuring points (a fee is charged) |

**Temperature conversion guide for °C to °F:**

$$T\,[°F] = \frac{9}{5}\,T\,[°C] + 32$$

## Temperature, temperature transducer




Ex n

SIL IEC 61508

**For thermocouples and mV sources**

Ex:

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 IEC 61508
- Installation in zone 2 permitted

| Notes: |
|---|
| To order a product with an order configuration, enter the required configuration by referring to the adjacent order key. |
| The configuration software can be downloaded from the Internet (phoenixcontact.net/products). |
| Information about the power and fault signaling module as well as about the DIN rail connectors and marking material can be found from page 178 |
| For information on the programming adapter, refer to page 89 |
| Information on Plug and Play connection using system cabling can be found from page 182 |

### 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 $\mu A_{PP}$ |
| **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)<br>max. 1200 ms (with SIL)<br>typ. 700 ms (without SIL)<br>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 | 300 $V_{rms}$ (rated insulation voltage (surge voltage category II; pollution degree 2, safe isolation as per EN 61010-1))<br>2.5 kV (50 Hz, 1 min., test voltage) |
| 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 % (non-condensing) |
| Housing material | PA 66-FR |
| Inflammability class in acc. with 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 |
| EMC note | Class A product, see page 625 |
| **Conformance / approvals** | |
| Conformance | CE-compliant, additionally EN 61326 |
| ATEX | II 3G Ex nA ic IIC T4 Gc X |
| UL, USA / Canada | UL 508 Listed<br>UL 61010 Listed<br>Class I, Div. 2, Groups A, B, C, D T4<br>Class I, Zone 2, Group IIC T4 |
| SIL in accordance with IEC 61508 | 2 |

### 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** for configuring modules with S-PORT interface | | **IFS-USB-PROG-ADAPTER** | **2811271** | 1 |

## Order key and temperature ranges for the MACX MCR-SL-TC-I temperature transducer

**Order key for MACX MCR-SL-TC-I temperature transducer** (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 mean value |
|---|---|---|---|---|---|---|---|---|---|
| 2924333 / | J / | ON / | 1 / | 0 / | 1000 / | C / | OUT02 / | 10 / | 1 / ... |
| MACX MCR-SL-TC-I | see below | ON ≙ active<br>NONE ≙ not active<br>ON only with output range = OUT02 | 1 ≙ switched on<br>0 ≙ switched off (e.g., for mV voltage measurement) | see below | see below | C ≙ °C<br>F ≙ °F<br>V ≙ mV | OUT01 ≙ 0 ... 20 mA<br>OUT02 ≙ 4 ... 20 mA | 1 ≙ 1 value<br>3 ≙ 3 values<br>5 ≙ 5 values<br>7 ≙ 7 values<br>10 ≙ 10 values<br>20 ≙ 20 values | 1 ≙ 1 value<br>2 ≙ 2 values<br>3 ≙ 3 values<br>4 ≙ 4 values |

| | | | | | Smallest measuring range span |
|---|---|---|---|---|---|
| V03 | ≙ Voltage (mV) | -20 | +70 | mV | 3 mV |
| E | ≙ acc. to IEC 584-1 (NiCr-CuNi) | -250 | 1000 | °C | 50 K |
| J | ≙ acc. to IEC 584-1 (Fe-CuNi) | -210 | 1200 | °C | 50 K |
| K | ≙ acc. to IEC 584-1 (NiCr-Ni) | -250 | 1372 | °C | 50 K |
| N | ≙ acc. to IEC 584-1 (NiCrSi-NiSi) | -250 | 1300 | °C | 50 K |
| L | ≙ acc. 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<br>I035 ≙ 3.5 mA<br>I215 ≙ 21.5 mA | I000 ≙ 0 mA<br>I035 ≙ 3.5 mA<br>I215 ≙ 21.5 mA | NONE ≙ without FCC<br>YES ≙ with FCC (a fee is charged)<br>YESPLUS ≙ FCC 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, operating and display unit

- 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 permitted

Ex n

**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, non-condensing) |
| Housing material | | PA 6.6 |
| Dimensions W / H / D | | 35 / 99 / 20 mm |
| Connection method | PC side | S port (socket) |
| | Measuring transducer side | S port (connector) |
| EMC note | | Class A product, see page 625 |
| Conformance / approvals | | |
| Conformance | | CE-compliant |
| ATEX | | Ⓔx II 3G Ex nA ic IIC T4 Gc 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

- For snapping onto the DIN rail
- For control cabinet mounting of the operating and display unit

Ex n

**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, non-condensing) |
| Housing material | | PA 6.6 |
| Dimensions W / H / D | | 35.2 / 29 / 99 mm |
| Connection method | IFS-OP-UNIT operator interface | S port (socket) |
| | Measuring transducer side | S port (connector) |
| EMC note | | Class A product, see page 625 |
| Conformance / approvals | | |
| Conformance | | CE-compliant |
| ATEX | | Ⓔx II 3G Ex nA ic IIC T4 Gc 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 |

## Accessories
## Programming adapter

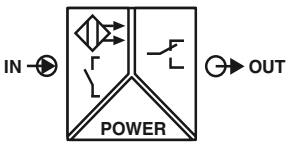
The IFS-USB-PROG-ADAPTER programming adapter is used for configuring Phoenix Contact INTERFACE modules with S-Port interface.

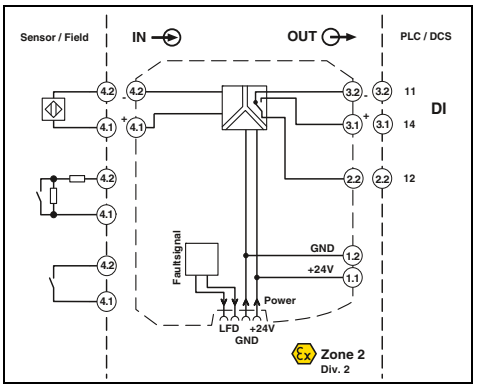
The adapter is used with FDT/DTM software or ANALOG-CONF software. For programming MACX Analog, MINI Analog Pro, and MINI Analog.

Ex:

| | Ordering data | | |
|---|---|---|---|
| Description | Type | Order No. | Pcs. / Pkt. |
| **Programming adapter** for configuring modules with S-PORT interface | IFS-USB-PROG-ADAPTER | 2811271 | 1 |

## Digital IN
## NAMUR signal conditioner




Ex n

SIL
IEC 61508

**Signal output: PDT relay**

Functional Safety
Ex:
Housing width 12.5 mm

NAMUR signal conditioner 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 IEC 61508
- Installation in zone 2 permitted

**Notes:**

Information about the power and fault signaling module as well as about the DIN rail connectors and marking material can be found from page 178

Information about resistance circuits is given on page 180

Information on Plug and Play connection using system cabling can be found from page 182

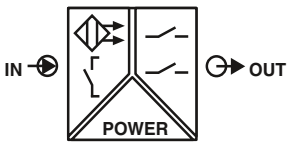
### Technical data

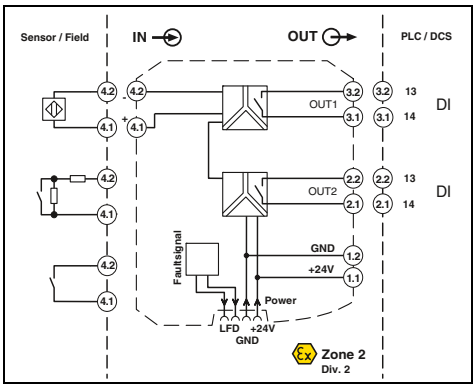
| | |
|---|---|
| **Input data** | |
| Input signal | NAMUR proximity sensors (EN 60947-5-6)<br>Floating switch contacts<br>Switch contacts with resistance circuit |
| No-load voltage | ~ 8 V DC |
| Switching points | > 2.1 mA (conductive) / < 1.2 mA (blocking) |
| Switching hysteresis | < 0.2 mA |
| Line fault detection | Break 0.05 mA < IIN < 0.35 mA<br>Short circuit 100 Ω < RSensor < 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/output | 375 V (peak value in accordance with EN 60079-11) |
| Input/output/supply, DIN rail connector | 300 $V_{rms}$ (rated insulation voltage (surge voltage category II; pollution degree 2, safe isolation as per EN 61010-1))<br>2.5 kV (50 Hz, 1 min., test voltage) |
| Output/input, supply, TBUS | 300 $V_{rms}$ (rated insulation voltage (surge voltage category III; pollution degree 2, safe isolation as per EN 61010-1))<br>2.5 kV (50 Hz, 1 min., test voltage) |
| Input/supply, DIN rail connector | 375 V (peak value in accordance with EN 60079-11) |
| Ambient temperature range | -20 °C ... 60 °C (any mounting position) |
| Humidity | 10 % ... 95 % (non-condensing) |
| Housing material | PA 66-FR |
| Inflammability class in acc. with 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 |
| Push-in connection solid / stranded / AWG | 0.2 ... 1.5 $mm^2$ / 0.2 ... 1.5 $mm^2$ / 24 - 16 |
| EMC note | Class A product, see page 625 |
| **Conformance / approvals** | |
| Conformance | CE-compliant, additionally EN 61326 |
| ATEX | Ex II 3 G Ex nA nC IIC T4 Gc X |
| UL, USA / Canada | UL 508 Listed<br>UL 61010 Listed<br>Class I, Div. 2, Groups A, B, C, D T4<br>Class I, Zone 2, Group IIC T4 |
| SIL in accordance with IEC 61508 | 2 |

### Ordering data

| Description | Type | Order No. | Pcs. / Pkt. |
|---|---|---|---|
| **NAMUR signal conditioner** | | | |
| Screw connection | **MACX MCR-SL-NAM-R** | **2865997** | 1 |
| Push-in connection | **MACX MCR-SL-NAM-R-SP** | **2924252** | 1 |

## Digital IN
## NAMUR signal conditioner




Ex n

SIL IEC 61508

**2 signal outputs: N/O contact relay**

Functional Safety
Ex:
Housing width 12.5 mm

NAMUR signal conditioner 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 IEC 61508
- Installation in zone 2 permitted

| Notes: |
|---|
| Information about the power and fault signaling module as well as about the DIN rail connectors and marking material can be found from page 178 |
| Information about resistance circuits is given on page 180 |
| Information on Plug and Play connection using system cabling can be found from page 182 |

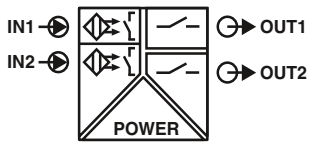
### Technical data

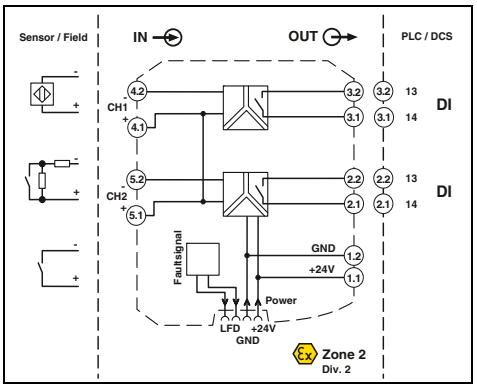
| | |
|---|---|
| **Input data** | |
| Input signal | NAMUR proximity sensors (EN 60947-5-6)<br>Floating switch contacts<br>Switch contacts with resistance circuit |
| No-load voltage | ~ 8 V DC |
| Switching points | > 2.1 mA (conductive) / < 1.2 mA (blocking) |
| Switching hysteresis | < 0.2 mA |
| Line fault detection | Break 0.05 mA < IIN < 0.35 mA<br>Short circuit 100 Ω < RSensor < 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/output/supply, DIN rail connector | 300 $V_{rms}$ (rated insulation voltage (surge voltage category II; pollution degree 2, safe isolation as per EN 61010-1))<br>2.5 kV (50 Hz, 1 min., test voltage) |
| Output 1/output 2/input, power supply, DIN rail connector | 300 $V_{rms}$ (rated insulation voltage (surge voltage category III; pollution degree 2, safe isolation as per EN 61010-1))<br>2.5 kV (50 Hz, 1 min., test voltage) |
| Ambient temperature range | -20 °C ... 60 °C (any mounting position) |
| Humidity | 10 % ... 95 % (non-condensing) |
| Housing material | PA 66-FR |
| Inflammability class in acc. with 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 |
| Push-in connection solid / stranded / AWG | 0.2 ... 1.5 $mm^2$ / 0.2 ... 1.5 $mm^2$ / 24 - 16 |
| EMC note | Class A product, see page 625 |
| **Conformance / approvals** | |
| Conformance | CE-compliant, additionally EN 61326 |
| ATEX | Ex II 3 G Ex nA nC IIC T4 Gc X |
| UL, USA / Canada | UL 508 Listed<br>UL 61010 Listed<br>Class I, Div. 2, Groups A, B, C, D T4<br>Class I, Zone 2, Group IIC T4 |
| SIL in accordance with IEC 61508 | 2 |

### Ordering data

| Description | Type | Order No. | Pcs. / Pkt. |
|---|---|---|---|
| **NAMUR signal conditioner** | | | |
| Screw connection | **MACX MCR-SL-NAM-2RO** | **2865010** | 1 |
| Push-in connection | **MACX MCR-SL-NAM-2RO-SP** | **2924265** | 1 |

## Digital IN
## NAMUR signal conditioner




Ex n

SIL IEC 61508

**2-channel, signal output: N/O contact relay**

Functional Safety
Ex:
Housing width 12.5 mm

NAMUR signal conditioner 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 IEC 61508
- Installation in zone 2 permitted

**Notes:**

Information about the power and fault signaling module as well as about the DIN rail connectors and marking material can be found from page 178

Information about resistance circuits is given on page 180

Information on Plug and Play connection using system cabling can be found from page 182

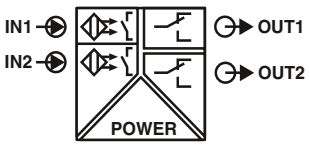
### Technical data

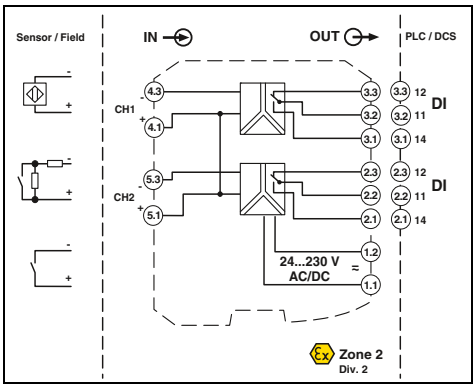
| | |
|---|---|
| **Input data** | |
| Input signal | NAMUR proximity sensors (EN 60947-5-6)<br>Floating switch contacts<br>Switch contacts with resistance circuit |
| No-load voltage | ~ 8 V DC |
| Switching points | > 2.1 mA (conductive) / < 1.2 mA (blocking) |
| Switching hysteresis | < 0.2 mA |
| Line fault detection | Break 0.05 mA < IIN < 0.35 mA<br>Short circuit 100 Ω < RSensor < 360 Ω |
| **Switching output** | **Relay output** |
| Contact type | 1 N/O contact per channel |
| 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, DIN rail connector | 300 $V_{rms}$ (rated insulation voltage (surge voltage category II; pollution degree 2, safe isolation as per EN 61010-1))<br>2.5 kV (50 Hz, 1 min., test voltage) |
| Output 1/output 2/input, power supply, DIN rail connector | 300 $V_{rms}$ (rated insulation voltage (surge voltage category III; pollution degree 2, safe isolation as per EN 61010-1))<br>2.5 kV (50 Hz, 1 min., test voltage) |
| Ambient temperature range | -20 °C ... 60 °C (any mounting position) |
| Humidity | 5 % ... 95 % (non-condensing) |
| Housing material | PA 66-FR |
| Inflammability class in acc. with 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 |
| Push-in connection solid / stranded / AWG | 0.2 ... 1.5 $mm^2$ / 0.2 ... 1.5 $mm^2$ / 24 - 16 |
| EMC note | Class A product, see page 625 |
| **Conformance / approvals** | |
| Conformance | CE-compliant, additionally EN 61326 |
| ATEX | II 3 G Ex nA nC IIC T4 Gc X |
| UL, USA / Canada | UL 508 Listed<br>UL 61010 Listed<br>Class I, Div. 2, Groups A, B, C, D T4<br>Class I, Zone 2, Group IIC T4 |
| SIL in accordance with IEC 61508 | 2 |

### Ordering data

| Description | Type | Order No. | Pcs. / Pkt. |
|---|---|---|---|
| **NAMUR signal conditioner** | | | |
| Screw connection | **MACX MCR-SL-2NAM-RO** | **2865049** | 1 |
| Push-in connection | **MACX MCR-SL-2NAM-RO-SP** | **2924294** | 1 |

## Digital IN
## NAMUR signal conditioner




Ex n

SIL
IEC 61508

**2-channel, signal output: PDT relay, wide range power supply**

Functional Safety
Ex:
Housing width 17.5 mm

NAMUR signal conditioner 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 IEC 61508
- Installation in zone 2 permitted

**Notes:**

Information on resistance circuits and marking material can be found on page 180

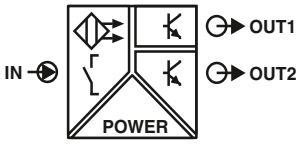
### Technical data

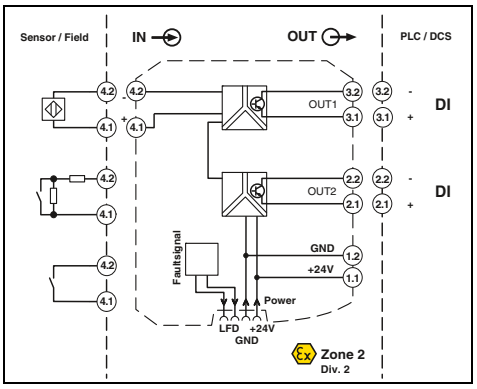
| | |
|---|---|
| **Input data** | |
| Input signal | NAMUR proximity sensors (EN 60947-5-6)<br>open circuit switch contacts<br>Switch contacts with resistance circuit |
| No-load voltage | ~ 8 V DC |
| Switching points | > 2.1 mA (conductive) / < 1.2 mA (blocking) |
| Switching hysteresis | approx. 0.2 mA |
| Line fault detection | Break 0.05 mA < IIN < 0.35 mA<br>Short circuit 100 Ω < RSensor < 360 Ω |
| **Switching output** | **Relay output** |
| Contact type | 1 PDT per channel |
| 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 ... 230 V AC/DC (-20 % ... +10 %, 50 Hz ... 60 Hz) |
| Current consumption | < 80 mA ; < 42 mA (24 V DC) |
| Power dissipation | ≤ 1.3 W |
| Electrical isolation | |
| Input/power supply | 300 $V_{rms}$ (rated insulation voltage (surge voltage category II; pollution degree 2, safe isolation as per EN 61010-1))<br>2.5 kV (50 Hz, 1 min., test voltage) |
| Output 1/output 2/input, power supply | 300 $V_{rms}$ (rated insulation voltage (surge voltage category III; pollution degree 2, safe isolation as per EN 61010-1))<br>2.5 kV (50 Hz, 1 min., test voltage) |
| Ambient temperature range | -20 °C ... 60 °C |
| Humidity | 10 % ... 95 % (non-condensing) |
| Housing material | PA 66-FR |
| Inflammability class in acc. with 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 |
| Push-in connection solid / stranded / AWG | 0.2 ... 1.5 $mm^2$ / 0.2 ... 1.5 $mm^2$ / 24 - 16 |
| EMC note | Class A product, see page 625 |
| **Conformance / approvals** | |
| Conformance | CE-compliant, additionally EN 61326 |
| ATEX | Ex II 3 G Ex nA nC IIC T4 Gc X |
| UL, USA / Canada | UL 508 Listed<br>UL 61010 Listed<br>Class I, Div. 2, Groups A, B, C, D T4<br>Class I, Zone 2, Group IIC T4 |
| SIL in accordance with IEC 61508 | 2 |

### Ordering data

| Description | Type | Order No. | Pcs. / Pkt. |
|---|---|---|---|
| **NAMUR signal conditioner** | | | |
| Screw connection | **MACX MCR-SL-2NAM-R-UP** | **2865052** | 1 |
| Push-in connection | **MACX MCR-SL-2NAM-R-UP-SP** | **2924304** | 1 |

# Digital IN
# NAMUR signal conditioner



Ex n

SIL IEC 61508

**2 signal outputs: transistor (passive)**

Functional Safety
Ex:
Housing width 12.5 mm

NAMUR signal conditioner 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 IEC 61508
- Installation in zone 2 permitted

| Notes: |
|---|
| Information about the power and fault signaling module as well as about the DIN rail connectors and marking material can be found from page 178 |
| Information about resistance circuits is given on page 180 |
| Information on Plug and Play connection using system cabling can be found from page 182 |

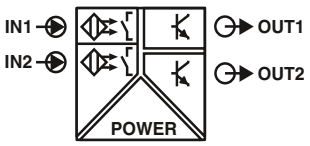
## Technical data

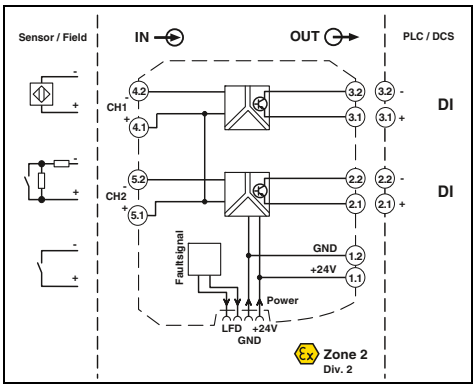
| | |
|---|---|
| **Input data** | |
| Input signal | NAMUR proximity sensors (EN 60947-5-6)<br>Floating switch contacts<br>Switch contacts with resistance circuit |
| No-load voltage | ~ 8 V DC |
| Switching points | > 2.1 mA (conductive) / < 1.2 mA (blocking) |
| Line fault detection | Break 0.05 mA < IIN < 0.35 mA<br>Short circuit 100 Ω < RSensor < 360 Ω |
| **Switching output** | 2 transistor outputs, passive |
| Max. switching voltage | 30 V DC (per output) |
| Max. switching current | 50 mA (short-circuit resistant) |
| 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 (24 V DC (-20% ... +25%)) |
| Current consumption | < 28 mA (24 V DC) |
| Power dissipation | 800 mW |
| Electrical isolation | |
| Input/output | 375 V (peak value in accordance with EN 60079-11) |
| Input/output/supply, DIN rail connector | 300 $V_{rms}$ (rated insulation voltage (surge voltage category II; pollution degree 2, safe isolation as per EN 61010-1))<br>2.5 kV (50 Hz, 1 min., test voltage) |
| Input/supply, DIN rail connector | 375 V (peak value in accordance with EN 60079-11) |
| Output 1/output 2 | 50 $V_{rms}$ (rated insulation voltage (surge voltage category II; pollution degree 2, safe isolation as per EN 61010-1))<br>1 kV (50 Hz, 1 min., test voltage) |
| Ambient temperature range | -20 °C ... 60 °C (any mounting position) |
| Humidity | 10 % ... 95 % (non-condensing) |
| Housing material | PA 66-FR |
| Inflammability class in acc. with 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 |
| Push-in connection solid / stranded / AWG | 0.2 ... 1.5 $mm^2$ / 0.2 ... 1.5 $mm^2$ / 24 - 16 |
| EMC note | Class A product, see page 625 |
| **Conformance / approvals** | |
| Conformance | CE-compliant, additionally EN 61326 |
| ATEX | II 3 G Ex nA IIC T4 Gc X |
| UL, USA / Canada | UL 508 Listed<br>UL 61010 Listed<br>Class I, Div. 2, Groups A, B, C, D T4<br>Class I, Zone 2, Group IIC T4 |
| SIL in accordance with IEC 61508 | 2 |

## Ordering data

| Description | Type | Order No. | Pcs. / Pkt. |
|---|---|---|---|
| **NAMUR signal conditioner** | | | |
| Screw connection | **MACX MCR-SL-NAM-2T** | **2865023** | 1 |
| Push-in connection | **MACX MCR-SL-NAM-2T-SP** | **2924278** | 1 |

## Digital IN
## NAMUR signal conditioner



Ex n

**2-channel, signal output transistor (passive)**

Functional Safety
Ex:
Housing width 12.5 mm

NAMUR signal conditioner 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 IEC 61508
- Installation in zone 2 permitted

| Notes: |
|---|
| Information about the power and fault signaling module as well as about the DIN rail connectors and marking material can be found from page 178 |
| Information about resistance circuits is given on page 180 |
| Information on Plug and Play connection using system cabling can be found from page 182 |

### Technical data

| | |
|---|---|
| **Input data** | |
| Input signal | NAMUR proximity sensors (EN 60947-5-6)<br>Floating switch contacts<br>Switch contacts with resistance circuit |
| No-load voltage | ~ 8 V DC |
| Switching points | > 2.1 mA (conductive) / < 1.2 mA (blocking) |
| Line fault detection | Break 0.05 mA < IIN < 0.35 mA<br>Short circuit 100 Ω < RSensor < 360 Ω |
| **Switching output** | Transistor output, passive |
| Max. switching voltage | 30 V DC (per output) |
| Max. switching current | 50 mA (short-circuit resistant) |
| 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 | 375 V (peak value in accordance with EN 60079-11) |
| Input/output/supply, DIN rail connector | 300 $V_{rms}$ (rated insulation voltage (surge voltage category II; pollution degree 2, safe isolation as per EN 61010-1))<br>2.5 kV (50 Hz, 1 min., test voltage) |
| Input/supply, DIN rail connector<br>Output 1/output 2 | 375 V (peak value in accordance with EN 60079-11)<br>50 $V_{rms}$ (rated insulation voltage (surge voltage category II; pollution degree 2, safe isolation as per EN 61010-1))<br>1 kV (50 Hz, 1 min., test voltage) |
| Ambient temperature range | -20 °C ... 60 °C (any mounting position) |
| Humidity | 10 % ... 95 % (non-condensing) |
| Housing material | PA 66-FR |
| Inflammability class in acc. with 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 |
| Push-in connection solid / stranded / AWG | 0.2 ... 1.5 $mm^2$ / 0.2 ... 1.5 $mm^2$ / 24 - 16 |
| EMC note | Class A product, see page 625 |
| **Conformance / approvals** | |
| Conformance | CE-compliant, additionally EN 61326 |
| ATEX | Ex II 3 G Ex nA IIC T4 Gc X |
| UL, USA / Canada | UL 508 Listed<br>UL 61010 Listed<br>Class I, Div. 2, Groups A, B, C, D T4<br>Class I, Zone 2, Group IIC T4 |
| SIL in accordance with IEC 61508 | 2 |

### Ordering data

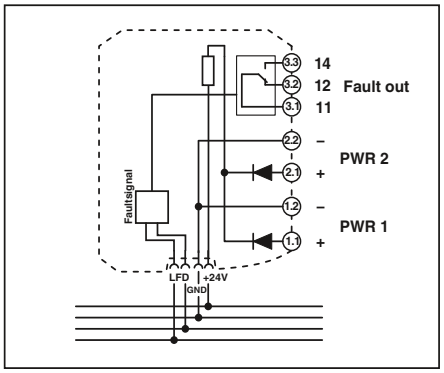
| Description | Type | Order No. | Pcs. / Pkt. |
|---|---|---|---|
| **NAMUR signal conditioner** | | | |
| Screw connection | **MACX MCR-SL-2NAM-T** | **2865036** | 1 |
| Push-in connection | **MACX MCR-SL-2NAM-T-SP** | **2924281** | 1 |

## Accessories

### Power and fault signaling 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 permitted



Ex:

Housing width 17.5 mm

## Technical data

| | |
|---|---|
| Input data | |
| Input signal | 19.2 V DC ... 30 V DC (24 V DC (-20% ... +25%)) |
| 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 (50 V DC (0.3 A) / 50 V DC (2 A) / 33 V AC (2 A)) |
| General data | |
| Ambient temperature range | -20 °C ... 60 °C (any mounting position) |
| Humidity | 5 % ... 95 % (non-condensing) |
| Fuse | 5 A (replaceable), slow-blow 250 V AC |
| Status indication | 1 x red LED (error)<br>2 x green LEDs (PWR1 and PWR2) |
| Housing material | Polyamide (PA 6.6) |
| Inflammability class in acc. with 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 |
| Push-in connection solid / stranded / AWG | 0.2 ... 1.5 $mm^2$ / 0.2 ... 1.5 $mm^2$ / 24 - 16 |
| Conformance / approvals | |
| Conformance | CE-compliant |
| ATEX | II 3 G Ex nA nC IIC T4 Gc X |
| IECEx | Ex nA nC IIC T4 Gc X |
| UL, USA / Canada | UL 61010 Listed<br>Class I, Div. 2, Groups A, B, C, D T5<br>Class I, Zone 2, Group IIC |

## Ordering data

| Description | Type | Order No. | Pcs. / Pkt. |
|---|---|---|---|
| **Power and fault signaling 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 |
| Push-in connection | **MACX MCR-PTB-SP** | **2924184** | 1 |

## Accessories

### ME 6,2 TBUS... DIN rail connector

DIN rail connector (5-pos.) 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

| | 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<br>Color: green | **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

| | | Ordering data | | |
|---|---|---|---|---|
| Description | Color | Type | Order No. | Pcs. / Pkt. |
| **UniCard,** with self-adhesive plastic labels<br>10-part, lettering field size: 11 x 9 mm | white | **UC-EMLP (11X9)** | **0819291** | 10 |
| **UniCard,** with self-adhesive plastic labels, **marked according to customer specifications**<br>For ordering details, see Catalog 5 or phoenixcontact.net/product.<br>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

| | | Ordering data | | |
|---|---|---|---|---|
| Description | Color | 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 |

## Accessories

### Test plug

| | | Ordering data | | |
|---|---|---|---|---|
| Description | Color | Type | Order No. | Pcs. / Pkt. |
| **Test plug,** consisting of: | | | | |
| **Metal part** for 2.3 mm Ø socket hole and | silver | **MPS-MT** | **0201744** | 10 |
| **Insulating sleeve,** for MPS metal part | red | **MPS-IH RD** | **0201676** | 10 |
| | black | **MPS-IH BK** | **0201731** | 10 |
| | gray | **MPS-IH GY** | **0201728** | 10 |
| | green | **MPS-IH GN** | **0201702** | 10 |
| | yellow | **MPS-IH YE** | **0201692** | 10 |
| | blue | **MPS-IH BU** | **0201689** | 10 |
| | white | **MPS-IH WH** | **0201663** | 10 |

## Termination Carriers for MACX Analog Ex signal conditioners

Select standard DIN rail device

Select module carrier

Select controller-specific front adapter and system cable

Solutions are also available for MINI Analog, MACX Analog Ex, and Safety

**TC... Termination Carriers** are compact solutions for quickly and smoothly connecting DIN rail devices from the MACX Analog Ex series to input/output cards of automation systems using system cabling.

The Termination Carriers combine the advantages of modular DIN rail devices with those offered by Plug and Play rapid cabling solutions to provide a consistent solution for system technology.

### Compact
– Saves up to 30% of space due to compact design

### Robust and reliable
– Stable, vibration-resistant aluminum carrier device profile
– PCB is completely decoupled from modules
– PCB without active components
– Redundant supply and monitoring in separate DIN rail module

### Easy maintenance
– Use of standard DIN rail devices
– Easy access to connection points
– Quick and safe module connection with plug-in and coded cable sets

### Flexible
– Horizontal or vertical DIN rail mounting
– Profile section without pitch markings for I/O cards with specific number of channels
– Can be specifically adapted for I/O cards of various automation systems with different system plug types

## Termination Carriers for MACX Analog Ex signal conditioners

The **TC-D37SUB-ADIO16-EX-P-UNI** universal Termination Carrier is a compact solution which connects signal conditioners from the MACX Analog series to analog or binary input/output cards of automation systems.

The **TC-D37SUB-AIO16-EX-PS-UNI** Termination Carrier design, when combined with the MACX MCR-S-MUX HART multiplexer, also enables communication between HART-capable field devices and a management system.

- Connection of up to 16 single-channel (Ex i) signal conditioners
- Universal 1:1 signal routing to a 37-pos. D-SUB connector
- For system cables with D-SUB socket and open ends for universal connection
- Redundant supply and monitoring in separate DIN rail module

**Notes:**

Contact us: specific Termination Carrier designs for I/O modules of various automation systems are available, planned or can be implemented according to your specifications.

EAC
Ex: Ex
Housing width 242 mm

### Technical data

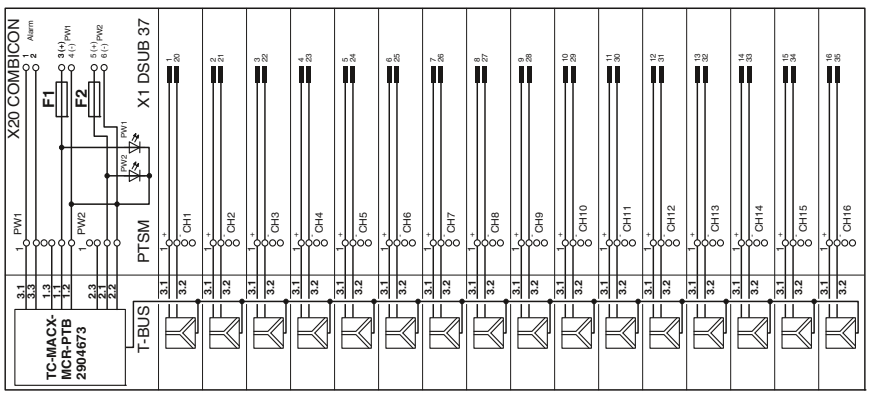
| | |
|---|---|
| General data | |
| Connection to the control system level | D-SUB pin strip |
| Number of positions | 37 |
| Max. operating voltage | < 50 V DC (per signal/channel) |
| Max. permissible current | 23 mA (signal/channel) |
| Rated insulation voltage | 50 V |
| Pollution degree | 2 |
| Surge voltage category | II |
| Rated surge voltage | 0.5 kV (basic insulation) |
| Clearance and creepage distances | DIN EN 50178 |
| Ambient temperature range | -20 °C ... 60 °C (please observe module specifications) |
| Shock | 15g, according to IEC 60068-2-27 |
| Vibration (operation) | 2g, according to IEC 60068-2-6 |
| Dimensions W / H / D | 242 / 170 / 160 mm |
| EMC note | Class A product, see page 625 |
| Power supply via power module | |
| Input voltage range | 19.2 V DC ... 30 V DC |
| Redundant supply | yes, decoupled from diodes |
| Polarization and surge protection | Yes |
| Fuse | 2x 2.5 A on PCB, slow-blow (replaceable) |
| Status indication | 1 x red LED (error)<br>2x green LEDs (PWR1 and PWR2) |
| Switching output | 1 N/C contact (alarm = open) |
| Maximum switching voltage | 50 V DC (0.3 A) / 30 V DC (2 A) / 33 V AC (2 A) |

### Ordering data

| Description | Type | Order No. | Pcs. / Pkt. |
|---|---|---|---|
| **Universal Termination Carrier** for 16 MACX MCR-EX isolators | | | |
| | **TC-D37SUB-ADIO16-EX-P-UNI** | **2924854** | 1 |
| - With connection for MACX MCR-S-MUX HART multiplexer | **TC-D37SUB-AIO16-EX-PS-UNI** | **2902932** | 1 |

### Accessories

| | | | |
|---|---|---|---|
| **Power and fault signaling module** | **TC-MACX-MCR-PTB** | **2904673** | 1 |
| **HART multiplexer,** 32-chanel, including two 14-wire flat-ribbon cables | **MACX MCR-S-MUX** | **2865599** | 1 |




**TC-D37SUB-ADIO16-EX-P-UNI and TC-D37SUB-AIO16-EX-PS-UNI connection scheme**

## Signal conditioners with PL and SIL functional safety - MACX Safety

**Integrate analog signals safely**

Integrate analog signals easily into your safety application according to the Machinery Directive. The MACX Safety analog signal conditioners are certified according to EN ISO 13849-1 with performance level PL d.

**Choose the right MACX Safety signal conditioner for your application:**

**Analog IN**

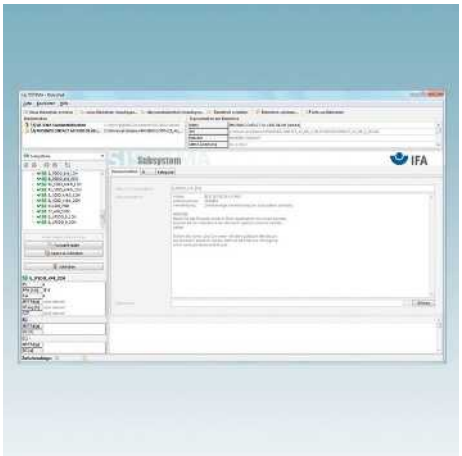
– 4...20 mA repeater power supplies and input signal conditioners with 2 electrically isolated outputs

**Temperature**

– Universal temperature transducers

**Direct switching of limit values possible without an additional safety controller**

– Cost savings: direct, safe switching of limit values possible without an additional safety controller
– Easy to combine active or passive analog signals with other safety modules

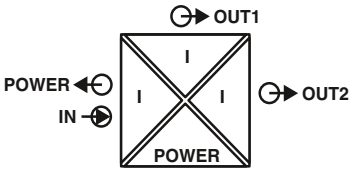


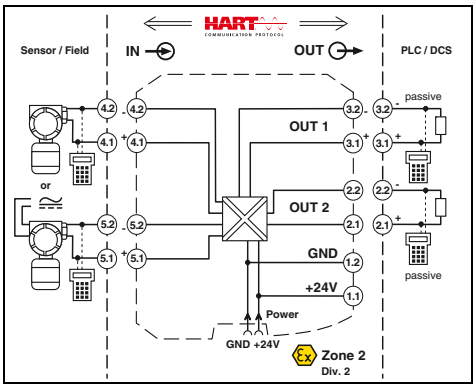
**Easy planning of the safety application with SISTEMA**

– Easy planning of the safety application with SISTEMA: the required data is already stored there

**DIN rail connector-compatible**
The DIN rail connector enables the modular bridging of the 24 V supply voltage.

## Analog IN
## Repeater power supply



Ex n

PL EN ISO 13849

**Repeater power supply and input signal conditioner, with two electrically isolated outputs**

Housing width 12.5 mm

- 4...20 mA input, powered and not powered
- Two electrically isolated 4...20 mA (active) outputs
- PL d according to EN ISO 13849-1
- Up to SIL 2 according to IEC 61508
- Installation in zone 2 possible
- Plug-in screw and push-in connection technology
- 4-way electrical isolation
- Bidirectional HART communication possible
- Power supply via DIN rail connector possible

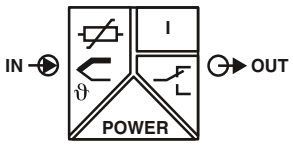
### Technical data

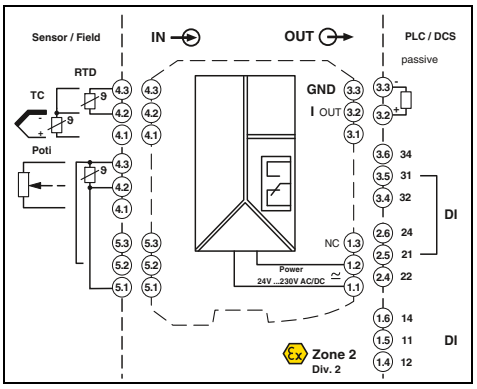
| | |
|---|---|
| Input data | |
| Input signal | 4 mA ... 20 mA / 4 mA ... 20 mA |
| Transmitter supply voltage | > 21.5 V (20 mA) |
| Voltage drop | - |
| Output data | |
| Output signal (per output) | 4 mA ... 20 mA (active) |
| Load | < 450 Ω (20 mA) |
| Output ripple | < 20 $mV_{rms}$ |
| General data | |
| Supply voltage range | 19.2 V DC ... 30 V DC (24 V DC (-20% ... +25%)) |
| Current consumption | < 75 mA (24 V DC) |
| 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) |
| Underload/overload range | according to NE 43 |
| Electrical isolation | |
| Input/output/power supply | 300 $V_{rms}$ (rated insulation voltage (surge voltage category II; pollution degree 2, safe isolation as per EN 61010-1)) 2.5 kV (50 Hz, 1 min., test voltage) |
| 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 |
| Push-in connection solid / stranded / AWG | 0.2 ... 1.5 $mm^2$ / 0.2 ... 1.5 $mm^2$ / 24 - 16 |
| EMC note | Class A product, see page 625 |
| Conformance / approvals | |
| Conformance | CE-compliant, additionally EN 61326 |
| ATEX | Ex II 3 G Ex nA IIC T4 Gc X |
| SIL in accordance with IEC 61508 | 2 |
| Performance level according to ISO 13849 | PLd |

### Ordering data

| Description | Type | Order No. | Pcs. / Pkt. |
|---|---|---|---|
| **Repeater power supply and input signal conditioner, signal duplicator,** with performance level | | | |
| Screw connection | **MACX PL-RPSSI-2I** | **2904961** | 1 |
| Push-in connection | **MACX PL-RPSSI-2I-SP** | **2904962** | 1 |

## Temperature, temperature transducer



**Universal, with limit value relay, wide range power supply**

Ex n

PL EN ISO 13849

Functional Safety

Ex:

Housing width 35 mm

- Input for resistance thermometers, thermocouples, resistance-type sensors, potentiometers, mV sources
- A safety-related limit value relay, by bridging two relays
- Differential measurement possible with Pt 100
- An additional limit value relay for non-safety-related function
- PL d according to EN ISO 13849-1
- Up to SIL 2 according to IEC 61508
- Configuration via software (ANALOG-CONF or FDT/DTM)
- Cold junction compensation with separate connector
- Wide range power supply 19.2...253 V AC/DC
- Status indicators for supply voltage, cable, sensor, and module errors
- Installation in zone 2 possible
- Plug-in screw and push-in connection technology

### 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** | |
| Output signal | 4 mA ... 20 mA |
| Maximum output signal | 22 mA |
| Load $R_B$ | ≤ 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 | 2 PDT |
| 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 |
| Maximum transmission error | 0.1 % (e.g. for Pt 100, 300 K span, 4 ... 20 mA) |
| Electrical isolation | |
| Input/output/power supply | 300 $V_{rms}$ (rated insulation voltage (surge voltage category II; pollution degree 2, safe isolation as per EN 61010-1)) 2.5 kV (50 Hz, 1 min., test voltage) |
| 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) |
| Ambient temperature range | -20 °C ... 65 °C |
| Humidity | typ. 5 % ... 95 % (non-condensing) |
| Housing material | PA 66-FR |
| Inflammability class in acc. with 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 |
| Push-in connection solid / stranded / AWG | 0.2 ... 1.5 $mm^2$ / 0.2 ... 1.5 $mm^2$ / 24 - 16 |
| EMC note | Class A product, see page 625 |
| **Conformance / approvals** | |
| Conformance | CE-compliant |
| ATEX | II 3 G Ex nA nC ic IIC T4 Gc X |
| IECEx | Ex nA nC ic IIC T4 Gc X |
| SIL in accordance with IEC 61508 | 2 |
| Performance level according to ISO 13849 | PLd |

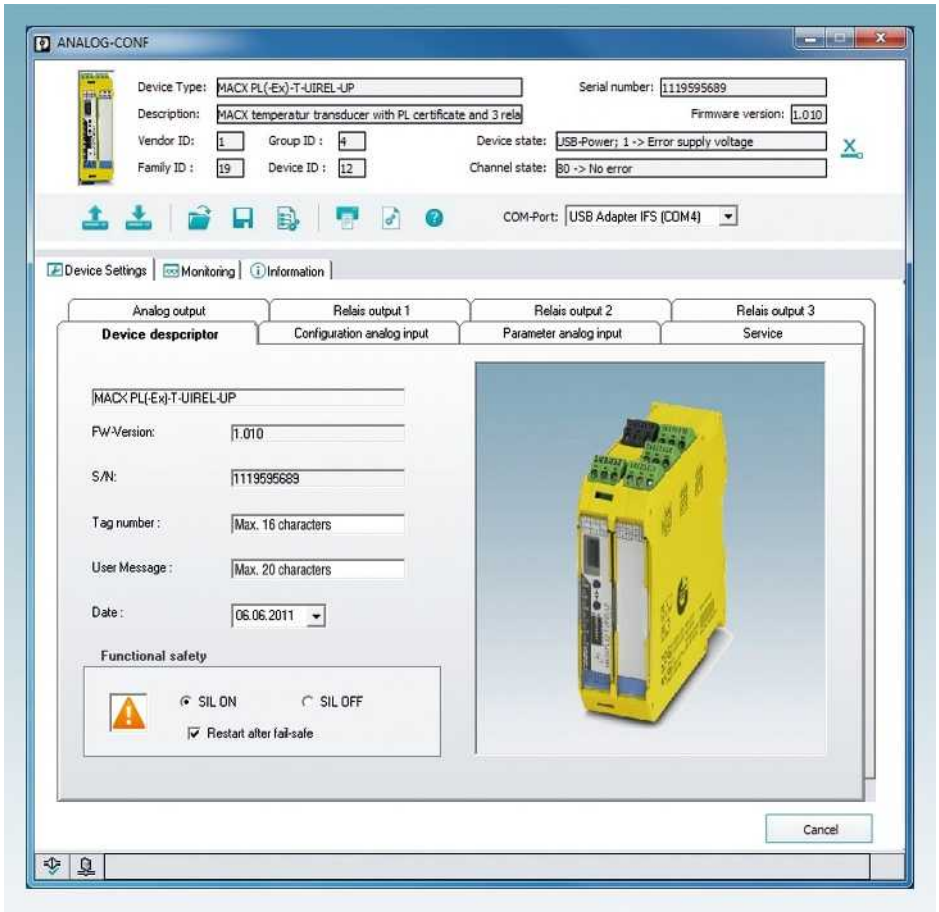
### Ordering data

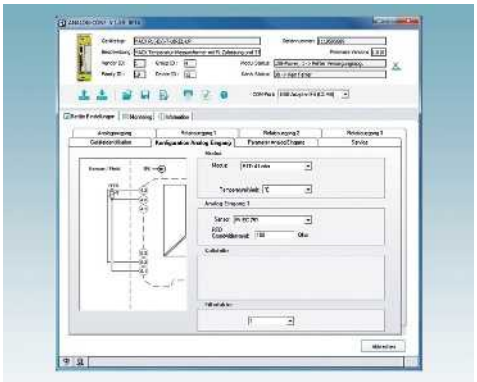
| Description | Type | Order No. | Pcs. / Pkt. |
|---|---|---|---|
| **Temperature transducer and threshold value switch** with performance level | | | |
| Screw connection | **MACX PL-T-UIREL-UP** | **2904901** | 1 |
| Push-in connection | **MACX PL-T-UIREL-UP-SP** | **2904903** | 1 |

### Accessories

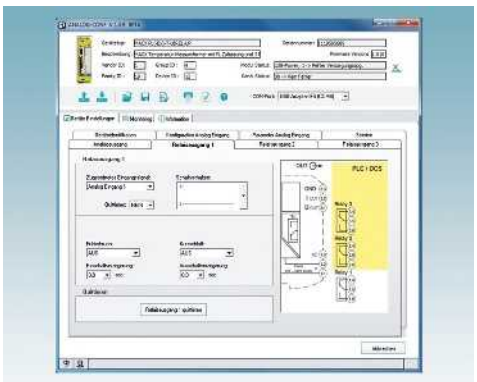
| | | | |
|---|---|---|---|
| **Programming adapter** for configuring modules with S-PORT interface | **IFS-USB-PROG-ADAPTER** | **2811271** | 1 |
| **Connector**, for current signals between +20 mA and -20 mA | **MACX MCR-I20** | **2905680** | 1 |

## Configuration software
## ANALOG-CONF and FDT/DTM

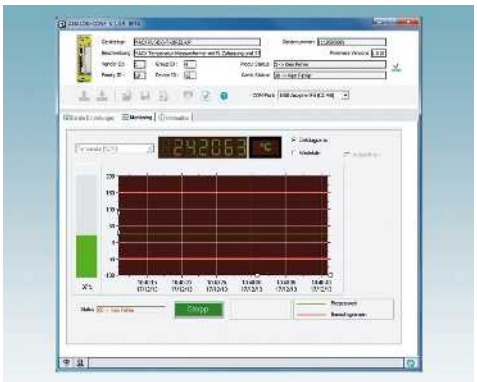


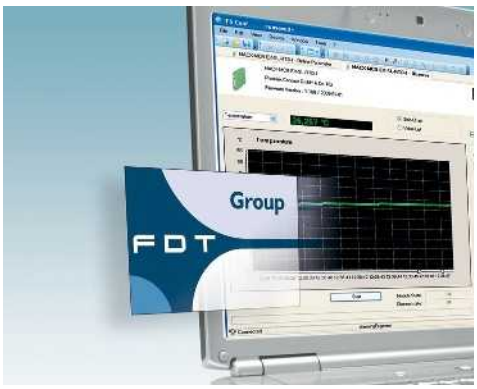
Input configuration with indication of the pin assignment



Relay configuration



Monitoring function




Configuration with FDT/DTM

### ANALOG-CONF

The user-friendly ANALOG-CONF software allows you to quickly and clearly configure the temperature modules. The pin assignment for the input and output is directly displayed. You have access to the complete range of configurable parameters. You have the option to pre-configure parameters and then import them into any number of temperature transducers or read the data from the device and directly display the settings and measured values.

### FDT/DTM

Configuration is also possible via the FDT/DTM universal configuration tool. The DTM files can simply be downloaded in the download area for the item.

### The following parameters can be configured:

– Restart following failsafe

**Input:**
– Resistance thermometer
– Thermocouples
– Potentiometer
– Remote resistance-type sensor
– Voltage signals ±1 V
– User characteristic curve
– Additional analog signals
– Filter
– Cold junction

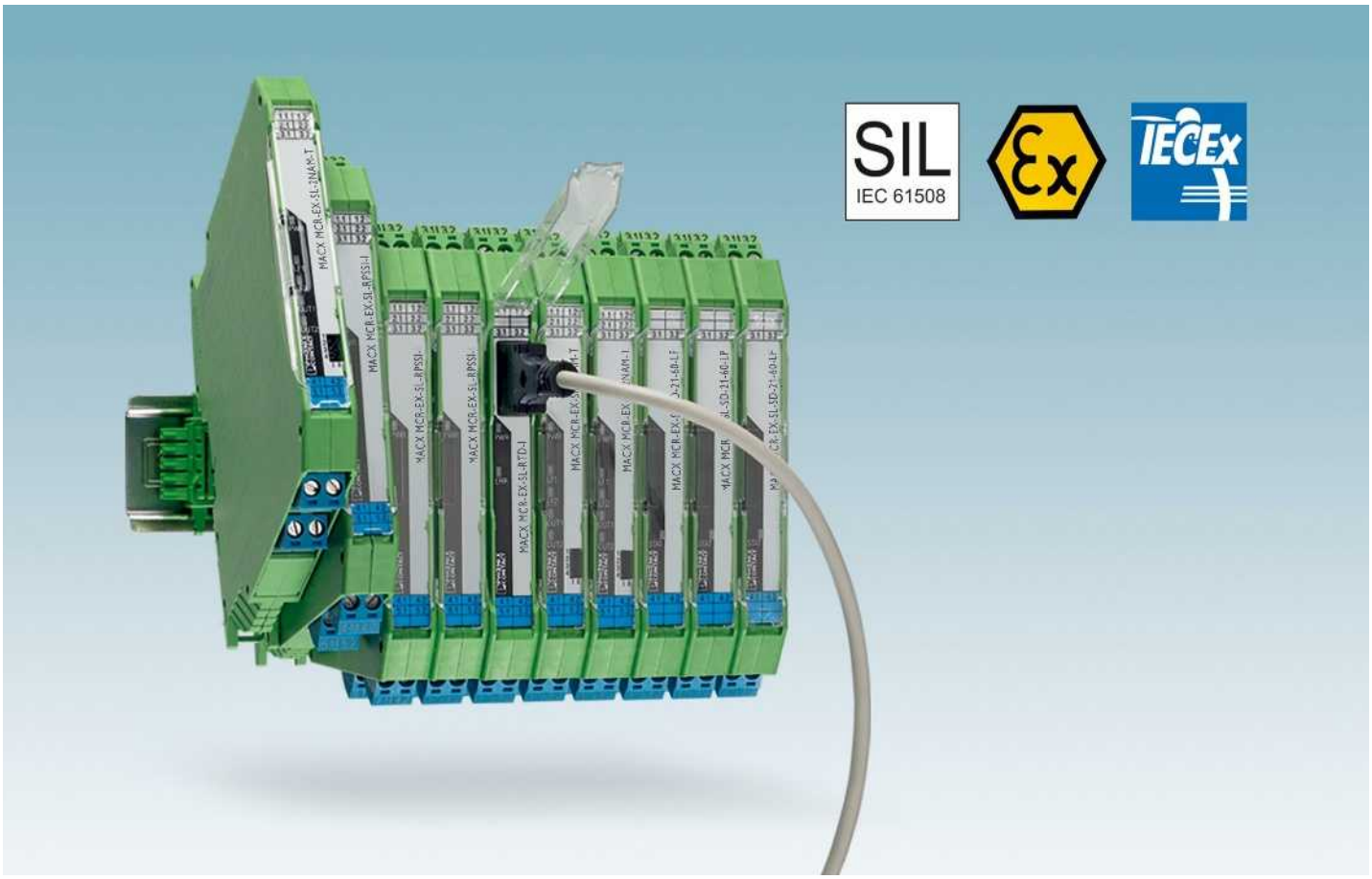
**Analog output:**
– Type of fault signaling

**Switching outputs:**
– Acknowledgment, switching behavior
– Switch-on/off delay

**Monitoring:**
– Representation in diagram or value list, recording possible

**Service:**
– Reset, password protection, display DIP switch position
– And much more

## Ex i signal conditioners with SIL functional safety - MACX Analog Ex




### Highly compact – leading technology

MACX Analog Ex – single and two-channel signal conditioners for intrinsically safe circuits in the Ex area. The MACX Analog Ex signal conditioners ensure maximum system safety and explosion protection within a minimum amount of space. With an overall width of just 12.5 mm, this comprehensive range for analog signal conditioning is approved according to ATEX and IECEx and consistently SIL-certified.

### Safe and reliable functions

Consistent SIL certification. The MACX Analog Ex signal conditioners are developed and produced according to functional safety and IEC 61508 standards. This ensures the highest level of reliability and safety for your systems.

### Maximum explosion protection for all Ex zones and gas groups

As associated equipment according to the intrinsic safety (Ex i) protection type, the MACX Analog Ex signal conditioners isolate intrinsically safe circuits from non-intrinsically safe circuits and ensure safe limitation of the energy supplied to the Ex area. Furthermore, they handle extensive signal conditioning tasks.

All MACX Analog Ex signal conditioners are approved in accordance with the applicable ATEX/IECEx standards:

- [Ex ia] – for intrinsically safe circuits up to Ex zone 0 and Ex zone 20
- Ex n – for installing devices in Ex zone 2
- In addition, relevant national approvals such as UL and GOST are available

### Choose the right MACX Analog Ex signal conditioner for your application:

### Analog IN

Measuring transducer repeater power supply and input signal conditioner for the intrinsically safe operation of 2-wire transmitters, 4-wire measuring transducers, and current sources.

### Analog OUT

Output signal conditioners for the intrinsically safe operation of control valves, I/P converters, and displays.

### Temperature

Configurable temperature transducers for the intrinsically safe operation of resistance thermometers, remote resistance-type sensors, thermocouples, and mV sources – with safe limit value relays as an option.

### Digital IN

NAMUR signal conditioners for the intrinsically safe operation of proximity sensors and switches.

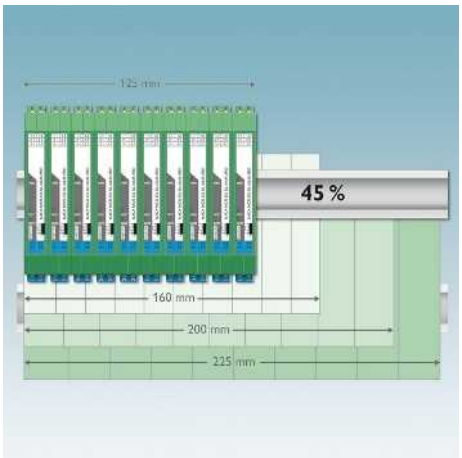
### Digital OUT

Solenoid drivers for the intrinsically safe operation of solenoid valves and alarm transmitters.

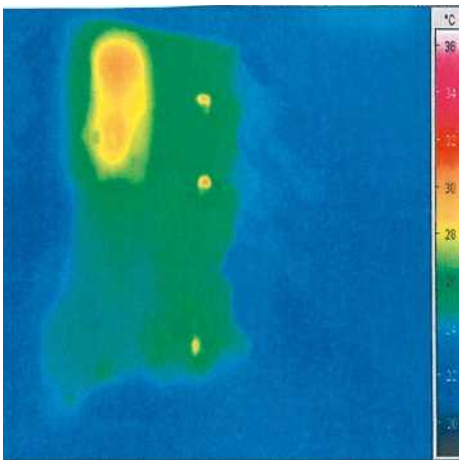
**Flexible energy supply**

**DIN rail connector-compatible**
The DIN rail connector enables the modular bridging of the 24 V supply voltage.

**Wide range supply**
The modules featuring a wide range supply (...-UP) can be used in all power supply networks the world over without the need for additional power supply units.




**Significant space savings**
– Housing width of just 12.5 mm for all single and two-channel devices with DIN rail connector connection
– Space saving of up to 45% compared to other Ex i signal conditioners on the market



**Long service life and high operational reliability**
– Long service life and high operational reliability over the entire operating temperature range, thanks to low power consumption and self-heating

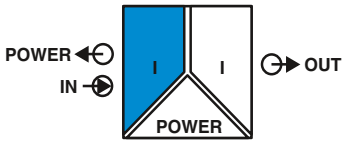
**Precise, interference-free signal transmission**
– Precise and interference-free signal transmission due to a patented transmission concept with safe electrical isolation.

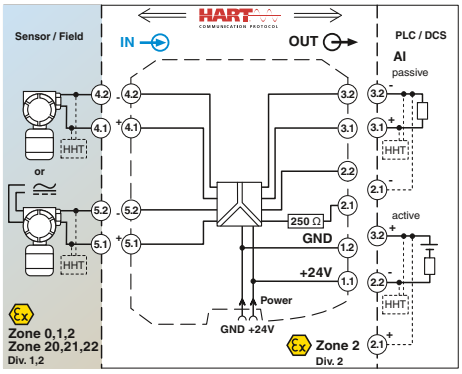
**Easy installation, power bridging, and diagnostics**
– Flexible supply voltage bridging and the option of redundant, diode-decoupled supply and error indication.
– Plug-in, coded connection terminal blocks with test sockets; with screw connection or with fast push-in connection technology as an option

**Easy configuration and monitoring**
– Either via FDT/DTM or alternatively via user-friendly stand-alone software – with integrated monitoring function
– Or without software via DIP switches on the housing front or with the operator interface and display unit

**Fast and error-free signal connection**
– Compact Termination Carriers connect MACX Analog Ex devices to the automation system – Plug and Play

## Analog IN
## Repeater power supply, Ex i



**Repeater power supply and input signal conditioner**

Functional Safety
Ex: EAC Ex
Housing width 12.5 mm

Repeater power supply and input signal conditioner for the operation of intrinsically safe (Ex i) 2-wire measuring transducers, 4-wire measuring transducers, and mA current sources installed in Ex areas.

- 0/4 ... 20 mA input, [Ex ia] (powered or not powered)
- 0/4...20 mA output (active or passive)
- Bidirectional transmission of digital HART communication signals
- Plug-in screw or push-in connection technology, 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 IEC 61508
- Installation in zone 2 permitted

| Notes: |
|---|
| Information about the power and fault signaling module as well as about the DIN rail connectors and marking material can be found from page 213 |
| Test plugs for test sockets can be found on page 180 |
| Information on Plug and Play connection using system cabling can be found from page 216 |

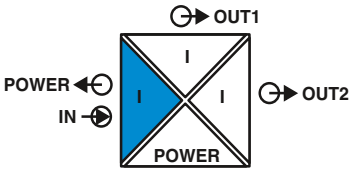
### Technical data

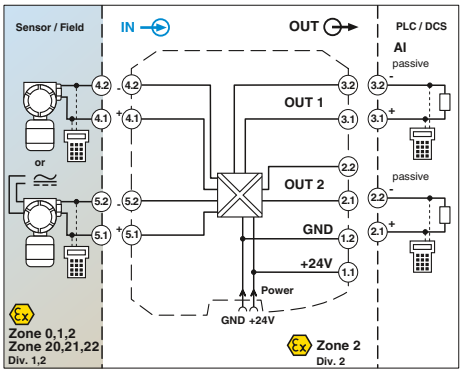
| | |
|---|---|
| **Input data** | |
| Input signal | 4 mA ... 20 mA |
| Transmitter supply voltage | > 16 V (20 mA) |
| Voltage drop | - |
| **Output data** | |
| Output signal | 4 mA ... 20 mA (active)<br>4 mA ... 20 mA (14 ... 26 V ext. source voltage) |
| Load | < 1000 Ω (20 mA) |
| Output ripple | < 20 $mV_{rms}$ |
| **General data** | |
| Supply voltage range | 19.2 V DC ... 30 V DC (24 V DC (-20% ... +25%)) |
| Current consumption | < 76 mA (24 V DC / 20 mA / 1000 Ω);<br>< 55 mA (24 V DC / 20 mA / 250 Ω) |
| Power dissipation | < 1.1 W (24 V DC / 20 mA / 1000 Ω)<br>< 0.95 W (24 V DC / 20 mA / 250 Ω)<br>< 1.2 W (24 V DC / 20 mA / 0 Ω) |
| Temperature coefficient | < 0.01 %/K |
| Step response (10-90%) | < 200 µs (for 4 mA ... 20 mA step, load 600) |
| Transmission error, typical | < 0.05 % (of final value) |
| Maximum transmission error | < 0.1 % (of final value) |
| Underload/overload range | according to NE 43 |
| Electrical isolation | |
| Input/output/power supply | 300 $V_{rms}$ (rated insulation voltage (surge voltage category II; pollution degree 2, safe isolation as per EN 61010-1))<br>2.5 kV (50 Hz, 1 min., test voltage) |
| 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 % (non-condensing) |
| 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 in acc. with UL 94 | V0 |
| Dimensions W / H / D | 12.5 / 112.5 / 114.5 mm |
| Screw connection solid / stranded / AWG | 0.2 ... 2.5 $mm^2$ / 0.2 ... 2.5 $mm^2$ / 24 - 14 |
| Push-in connection solid / stranded / AWG | 0.2 ... 1.5 $mm^2$ / 0.2 ... 1.5 $mm^2$ / 24 - 16 |
| EMC note | Class A product, see page 625 |
| **Safety data as per ATEX** | |
| Max. output voltage $U_o$ | 25.2 V |
| Max. output current $I_o$ | 93 mA |
| Max. output 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 Ga] IIC/IIB<br>II (1) D [Ex ia Da] IIIC<br>II 3 (1) G Ex nA [ia Ga] IIC/IIB T4 Gc<br>I (M1) [Ex ia Ma] I |
| IECEx | [Ex ia Ga] IIC/IIB, [Ex ia Da] IIIC, Ex nA [ia Ga] IIC/IIB T4 Gc |
| UL, USA / Canada | UL 61010 Listed<br>Class I Div 2; IS for Class I, II, III Div 1 |
| SIL in accordance with IEC 61508 | 2 |

### 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 |
| Push-in connection | **MACX MCR-EX-SL-RPSSI-I-SP** | **2924016** | 1 |

## Analog IN
## Repeater power supply, Ex i



**Repeater power supply and input signal conditioner, with two electrically isolated outputs**

Functional Safety
Ex: EAC Ex
Housing width 12.5 mm

Repeater power supply and input signal conditioner for the operation of intrinsically safe (Ex i) 2-wire measuring transducers, 4-wire measuring transducers, and mA current sources installed in Ex areas.

- 0/4 ... 20 mA input, [Ex ia] (powered or not powered)
- Two electrically isolated 0/4 ... 20 mA (active) outputs
- Bidirectional transmission of digital HART communication signals (both outputs)
- Plug-in screw or push-in connection technology, with integrated sockets for HART communicators
- 4-way electrical isolation
- Power supply via DIN rail connector possible
- Up to SIL 2 according to IEC 61508
- Installation in zone 2 permitted

| Notes: |
|---|
| Information about the power and fault signaling module as well as about the DIN rail connectors and marking material can be found from page 213 |
| Test plugs for test sockets can be found on page 180 |
| Information on Plug and Play connection using system cabling can be found from page 216 |

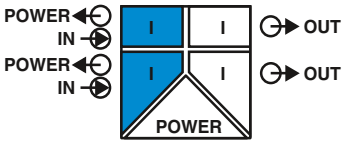
### Technical data

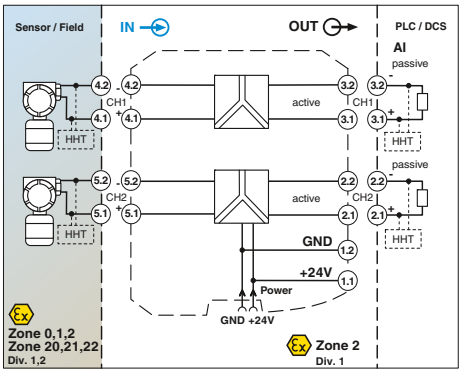
| | |
|---|---|
| **Input data** | |
| Input signal | 4 mA ... 20 mA / 0 mA ... 20 mA |
| Transmitter supply voltage | > 16 V (at 20 mA) |
| Voltage drop | < 3.9 V (in input signal conditioner) |
| **Output data** | |
| Output signal (per output) | 4 mA ... 20 mA (active) |
| Load | < 450 Ω (at 20 mA) |
| 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) |
| Underload/overload range | according to NE 43 |
| Electrical isolation | |
| Input/output/power supply | 300 $V_{rms}$ (rated insulation voltage (surge voltage category II; pollution degree 2, safe isolation as per EN 61010-1)) 2.5 kV (50 Hz, 1 min., test voltage) |
| 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 |
| Push-in connection solid / stranded / AWG | 0.2 ... 1.5 $mm^2$ / 0.2 ... 1.5 $mm^2$ / 24 - 16 |
| EMC note | Class A product, see page 625 |
| **Safety data as per ATEX** | |
| Max. output voltage $U_o$ | 25.2 V |
| Max. output current $I_o$ | 93 mA |
| Max. output 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 Ga] IIC/IIB<br>II (1) D [Ex ia Da] IIIC<br>II 3 (1) G Ex nA [ia Ga] IIC/IIB T4 Gc |
| IECEx | [Ex ia Ga] IIC/IIB, [Ex ia Da] IIIC, Ex nA [ia Ga] IIC/IIB T4 Gc |
| UL, USA / Canada | Class I Div 2; IS for Class I, II, III Div 1 |
| SIL in accordance with IEC 61508 | 2 |

### 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 |
| Push-in connection | **MACX MCR-EX-SL-RPSSI-2I-SP** | **2924236** | 1 |

## Analog IN
## Repeater power supply, Ex i



**2-channel repeater power supply**

Functional Safety
Ex:
Housing width 12.5 mm

Repeater power supply for the operation of intrinsically safe (Ex i) 2-wire measuring transducers installed in the Ex area.

- 2-channel
- 4 ... 20 mA input, [Ex ia] (powered)
- 4 ... 20 mA output (active)
- Bidirectional transmission of digital HART communication signals
- Plug-in screw or push-in connection technology, with integrated sockets for HART communicators
- Safe 3-way electrical isolation
- Power supply via DIN rail connector possible
- Up to SIL 3 according to IEC 61508
- Installation in zone 2 permitted

**Notes:**

Information on the power and fault signaling module, DIN rail connectors, system cabling, and marking material can be found from page 213

Test plugs for test sockets can be found on page 180

Information on Plug and Play connection using system cabling can be found from page 216

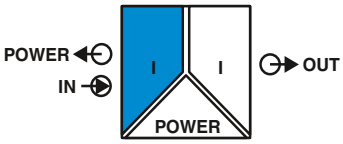
### Technical data

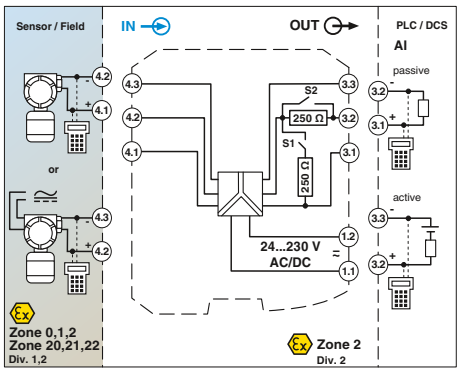
| | |
|---|---|
| Input data | per channel |
| Input signal | 4 mA ... 20 mA |
| Transmitter supply voltage | > 16 V (at 20 mA) |
| Underload/overload signal range | 0 mA ... 24 mA |
| Output data | per channel |
| Output signal | 4 mA ... 20 mA (active) |
| Load | ≤ 450 Ω (20 mA) |
| Underload/overload signal range | 0 mA ... 24 mA |
| General data | |
| Supply voltage range | 19.2 V DC ... 30 V DC (24 V DC (-20% ... +25%)) |
| Current consumption | < 100 mA (24 V / 20 mA) |
| Power dissipation | < 1.4 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) |
| Electrical isolation | |
| Input/output, power supply | 300 $V_{rms}$ (rated insulation voltage (surge voltage category II; pollution degree 2, safe isolation as per EN 61010-1))<br>2.5 kV (50 Hz, 1 min., test voltage) |
| 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/ power supply | 1.5 kV (50 Hz, 1 min., test voltage) |
| 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 |
| Push-in connection solid / stranded / AWG | 0.2 ... 1.5 $mm^2$ / 0.2 ... 1.5 $mm^2$ / 24 - 16 |
| EMC note | Class A product, see page 625 |
| Safety data as per ATEX | |
| Max. output voltage $U_o$ | 25.2 V |
| Max. output current $I_o$ | 93 mA |
| Max. output 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 Ga] IIC/IIB<br>II (1) D [Ex ia Da] IIIC<br>II 3(1) G Ex nA [ia Ga] IIC T4 Gc |
| IECEx | [Ex ia Ga] IIC/IIB, [Ex ia Da] IIIC, Ex nA [ia Ga] IIC T4 Gc |
| UL, USA / Canada | Class I Div 2; IS for Class I, II, III Div 1 |
| SIL in accordance with IEC 61508 | 3 |

### Ordering data

| Description | Type | Order No. | Pcs. / Pkt. |
|---|---|---|---|
| **Repeater power supply**, 2-channel, smart, intrinsically safe input | | | |
| Screw connection | **MACX MCR-EX-SL-RPSS-2I-2I** | **2865382** | 1 |
| Push-in connection | **MACX MCR-EX-SL-RPSS-2I-2I-SP** | **2924676** | 1 |

## Analog IN
## Repeater power supply with wide range power supply, Ex i



**Repeater power supply and input signal conditioner, wide range power supply**

Functional Safety
Ex: EAC Ex // Applied for: GL
Housing width 17.5 mm

Repeater power supply and input signal conditioner for the operation of intrinsically safe (Ex i) 2-wire measuring transducers, 4-wire measuring transducers, and mA current sources installed in Ex areas.

- 0/4 ... 20 mA input, [Ex ia] (powered or not powered)
- 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 push-in connection technology, 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 IEC 61508
- Installation in zone 2 permitted

| Notes: |
|---|
| Information on marking material can be found on page 179 |
| Test plugs for test sockets can be found on page 180 |

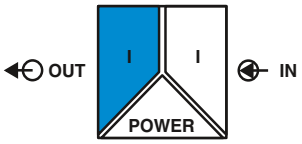
### Technical data

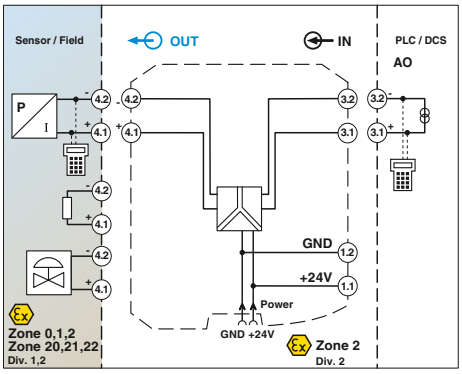
| | |
|---|---|
| **Input data** | |
| Input signal | 0 mA ... 20 mA / 4 mA ... 20 mA |
| Transmitter supply voltage | > 16 V (at 20 mA) |
| Voltage drop | < 3.5 V (in input signal conditioner operation) |
| **Output data** | |
| Output signal (configurable using the DIP switch) | 0 mA ... 20 mA (active)<br>4 mA ... 20 mA (active)<br>0 mA ... 20 mA (14 ... 26 V ext. source voltage)<br>4 mA ... 20 mA (14 ... 26 V ext. source voltage)<br>0 V ... 5 V (internal resistance, 250 Ω, 0.1%)<br>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 ... 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) |
| Underload/overload range | according to NE 43 |
| Electrical isolation | |
| Input/output/power supply | 300 $V_{rms}$ (rated insulation voltage (surge voltage category II; pollution degree 2, safe isolation as per EN 61010-1))<br>2.5 kV (50 Hz, 1 min., test voltage) |
| 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 % (non-condensing) |
| 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 in acc. with 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 |
| Push-in connection solid / stranded / AWG | 0.2 ... 1.5 $mm^2$ / 0.2 ... 1.5 $mm^2$ / 24 - 16 |
| EMC note | Class A product, see page 625 |
| **Safety data as per ATEX** | |
| Max. output voltage $U_o$ | 25.2 V |
| Max. output current $I_o$ | 93 mA |
| Max. output 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 Ga] IIC/IIB<br>II (1) D [Ex ia Da] IIIC<br>II 3(1) G Ex nA [ia Ga] IIC/IIB T4 Gc |
| IECEx | [Ex ia Ga] IIC/IIB, [Ex ia Da] IIIC, Ex nA [ia Ga] IIC/IIB T4 Gc |
| UL, USA / Canada | Class I Div 2; IS for Class I, II, III Div 1 |
| SIL in accordance with IEC 61508 | 2 |

### 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 |
| Push-in connection | **MACX MCR-EX-SL-RPSSI-I-UP-SP** | **2924029** | 1 |

## Analog OUT
## Output signal conditioner, Ex i



Functional Safety
Ex:
Housing width 12.5 mm

Output signal conditioner 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 push-in connection technology, 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 IEC 61508
- Installation in zone 2 permitted

| Notes: |
|---|
| Information about the power and fault signaling module as well as about the DIN rail connectors and marking material can be found from page 213 |
| Test plugs for test sockets can be found on page 180 |
| Information on Plug and Play connection using system cabling can be found from page 216 |

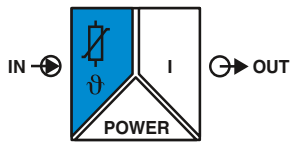
### Technical data

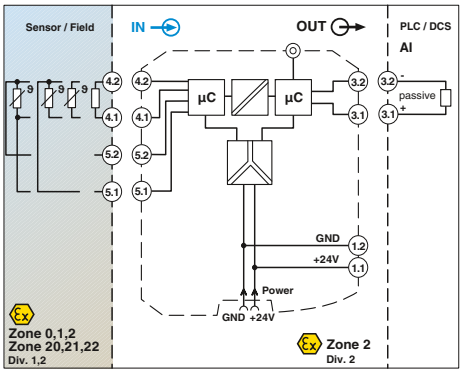
| | |
|---|---|
| Input data | |
| Input signal | 0 mA ... 20 mA / 4 mA ... 20 mA |
| Input voltage | 5.4 V (at 20 mA) |
| Input impedance in the event of a cable break at the output | > 100 kΩ (If there is a line fault) |
| Output data | |
| Output signal | 0 mA ... 20 mA (intrinsically safe) /<br>4 mA ... 20 mA (intrinsically safe) |
| Load | < 800 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 | < 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 (for 4 mA ... 20 mA step) |
| Maximum transmission error | < 0.1 % (of final value) |
| Electrical isolation | |
| Input/output/power supply | 1.5 kV (50 Hz, 1 min., test voltage)<br>300 $V_{rms}$ (rated insulation voltage (surge voltage category II, pollution degree 2)) |
| Output/input | 375 V (peak value in accordance with EN 60079-11) |
| Output/supply | 375 V (peak value in accordance with EN 60079-11) |
| Ambient temperature range | -20 °C ... 60 °C (any mounting position) |
| Humidity | 10 % ... 95 % (non-condensing) |
| 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 in acc. with 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 |
| Push-in connection solid / stranded / AWG | 0.2 ... 1.5 $mm^2$ / 0.2 ... 1.5 $mm^2$ / 24 - 16 |
| EMC note | Class A product, see page 625 |
| Safety data as per ATEX | |
| Max. output voltage $U_o$ | 27.7 V |
| Max. output current $I_o$ | 92 mA |
| Max. output 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) G [Ex ia Ga] IIC/IIB<br>II (1) D [Ex ia Da] IIIC<br>II 3(1) G Ex nA [ia Ga] IIC/IIB T4 Gc |
| IECEx | [Ex ia Ga] IIC/IIB, [Ex ia Da] IIIC, Ex nA [ia Ga] IIC/IIB T4 Gc |
| UL, USA / Canada | Class I Div 2; IS for Class I, II, III Div 1 |
| SIL in accordance with IEC 61508 | 2 |

### Ordering data

| Description | Type | Order No. | Pcs. / Pkt. |
|---|---|---|---|
| **Output signal conditioner, smart,** intrinsically safe output | | | |
| Screw connection | **MACX MCR-EX-SL-IDSI-I** | **2865405** | 1 |
| Push-in connection | **MACX MCR-EX-SL-IDSI-I-SP** | **2924032** | 1 |

## Temperature
## 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]
- 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 IEC 61508
- Installation in zone 2 permitted

| Notes: |
|---|
| To order a product with an order configuration, please enter the desired configuration by referring to the order key, see page 197 |
| The configuration software can be downloaded from the Internet (phoenixcontact.net/products). |
| Information about the power and fault signaling module as well as about the DIN rail connectors and marking material can be found from page 213 |
| For information on the programming adapter, refer to page 89 |
| Information on Plug and Play connection using system cabling can be found from page 216 |

### Technical data

| | |
|---|---|
| Input data | |
| Resistance thermometers | Sensors (2, 3, 4-wire) |
| Resistor | 0 Ω ... 2000 Ω |
| Cable resistance | ≤ 50 Ω per cable |
| 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 $\mu A_{PP}$ |
| General data | |
| Supply voltage range | 19.2 V DC ... 30 V DC (24 V DC (-20% ... +25%)) |
| Current draw | ≤ 40 mA (at 24 V DC) |
| Power dissipation | < 1 W |
| Temperature coefficient | 0.01 %/K |
| Step response (0–99%) | typ. 800 ms (with SIL)<br>max. 1200 ms (with SIL)<br>typ. 700 ms (without SIL)<br>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 | 300 $V_{rms}$ (rated insulation voltage (surge voltage category II; pollution degree 2, safe isolation as per EN 61010-1))<br>2.5 kV (50 Hz, 1 min., test voltage) |
| 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 % (non-condensing) |
| Status indication | Green LED (supply voltage, PWR)<br>Red LED, flashing (line, sensor error, ERR)<br>Red LED (module error, ERR) |
| Inflammability class in acc. with 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 |
| Push-in connection solid / stranded / AWG | 0.2 ... 1.5 $mm^2$ / 0.2 ... 1.5 $mm^2$ / 24 - 16 |
| EMC note | Class A product, see page 625 |
| Safety data as per ATEX | |
| Max. output voltage $U_o$ | 6 V |
| Max. output current $I_o$ | 6.3 mA |
| Max. output power $P_o$ | 9.4 mW |
| Conformance / approvals | |
| Conformance | CE-compliant, additionally EN 61326 |
| ATEX | II (1) G [Ex ia Ga] IIC<br>II (1) D [Ex ia Da] IIIC<br>II 3(1) G Ex nA ic [ia Ga] IIC T4 Gc X |
| IECEx | [Ex ia Ga] IIC, [Ex ia Da] IIIC, Ex nA ic [ia Ga] IIC T4 Gc |
| UL, USA / Canada | Class I Div 2; IS for Class I, II, III Div 1 |
| SIL in accordance with IEC 61508 | 2 |

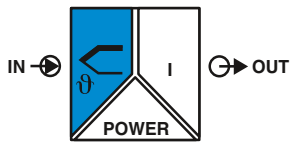
### Ordering data

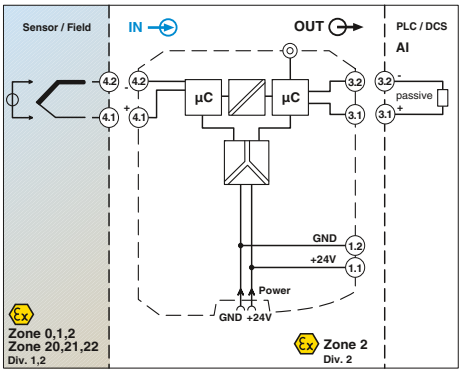
| Description | | Type | Order No. | Pcs. / Pkt. |
|---|---|---|---|---|
| **Temperature transducer for resistance thermometers,** intrinsically safe input | | | | |
| Order configuration | Screw connection | **MACX MCR-EX-SL-RTD-I** | **2865939** | 1 |
| Order configuration | Push-in connection | **MACX MCR-EX-SL-RTD-I-SP** | **2924142** | 1 |
| Standard configuration | Screw connection | **MACX MCR-EX-SL-RTD-I-NC** | **2865573** | 1 |
| Standard configuration | Push-in connection | **MACX MCR-EX-SL-RTD-I-SP-NC** | **2924168** | 1 |

### Accessories

| | | | |
|---|---|---|---|
| **Programming adapter** for configuring modules with S-PORT interface | **IFS-USB-PROG-ADAPTER** | **2811271** | 1 |

## Temperature
## 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]
- 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 IEC 61508
- Installation in zone 2 permitted

| Notes: |
|---|
| To order a product with an order configuration, please enter the desired configuration by referring to the order key, see page 197 |
| The configuration software can be downloaded from the Internet (phoenixcontact.net/products). |
| Information about the power and fault signaling module as well as about the DIN rail connectors and marking material can be found from page 213 |
| For information on the programming adapter, refer to page 89 |
| Information on Plug and Play connection using system cabling can be found from page 216 |

### 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 | ≤ 500 Ω |
| Behavior in the event of a sensor error | As per NE 43 or can be freely defined |
| Output ripple | < 50 $\mu A_{PP}$ |
| **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)<br>max. 1200 ms (with SIL)<br>typ. 700 ms (without SIL)<br>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 | 300 $V_{rms}$ (rated insulation voltage (surge voltage category II; pollution degree 2, safe isolation as per EN 61010-1))<br>2.5 kV (50 Hz, 1 min., test voltage) |
| 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 % (non-condensing) |
| Status indication | Green LED (supply voltage, PWR)<br>Red LED, flashing (line, sensor error, ERR)<br>Red LED (module error, ERR) |
| Housing material | PA 66-FR |
| Inflammability class in acc. with 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 |
| EMC note | Class A product, see page 625 |
| **Safety data as per ATEX** | |
| Max. output voltage $U_o$ | 6 V |
| Max. output current $I_o$ | 4.7 mA |
| Max. output power $P_o$ | 7 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 Ga] IIC<br>Ex II (1) D [Ex ia Da] IIIC<br>Ex II 3(1) G Ex nA ic [ia Ga] IIC T4 Gc X |
| IECEx | [Ex ia Ga] IIC, [Ex ia Da] IIIC, Ex nA ic [ia Ga] IIC T4 Gc |
| UL, USA / Canada | Class I Div 2; IS for Class I, II, III Div 1 |
| SIL in accordance with IEC 61508 | 2 |

### Ordering data

| Description | | Type | Order No. | Pcs. / Pkt. |
|---|---|---|---|---|
| **Temperature transducer 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** for configuring modules with S-PORT interface | **IFS-USB-PROG-ADAPTER** | **2811271** | 1 |

## Order key and temperature ranges for the MACX MCR-EX-SL-RTD-I(-SP) temperature transducer

**Order key for MACX MCR-EX-SL-RTD-I(-SP)** temperature transducer (standard configuration entered as an example)

| Order No. | Sensor type | Safety integrity level (SIL) | Connection technology | 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<br>2924142 ≙ MACX MCR-EX-SL-RTD-I-SP | See below | ON ≙ active<br>NONE ≙ not active<br>ON only with output range = OUT02 | 2 ≙ 2-wire<br>3 ≙ 3-wire<br>4 ≙ 4-wire | see below | see below | C ≙ °C<br>F ≙ °F<br>O ≙ Ω | OUT01 ≙ 0 ... 20 mA<br>OUT02 ≙ 4 ... 20 mA | 1 ≙ 1 value<br>3 ≙ 3 values<br>5 ≙ 5 values<br>7 ≙ 7 values<br>10 ≙ 10 values<br>20 ≙ 20 values | 1 ≙ 1 value<br>2 ≙ 2 values<br>3 ≙ 3 values<br>4 ≙ 4 values |

| | | | | | Smallest measuring range span |
|---|---|---|---|---|---|
| RES01 | ≙ Resistor | 0 | 2000 | Ω | 25 Ω |
| PT50 | ≙ Pt 50 acc. to IEC 751 | -200 | 850 | °C | 50 K |
| PT100 | ≙ Pt 100 acc. to IEC 751 | -200 | 850 | °C | 50 K |
| PT200 | ≙ Pt 200 acc. to IEC 751 | -200 | 850 | °C | 50 K |
| PT500 | ≙ Pt 500 acc. to IEC 751 | -200 | 850 | °C | 50 K |
| PT100S | ≙ Pt 100 acc. to Sama RC21-4-1966 | -200 | 600 | °C | 50 K |
| PT500S | ≙ Pt 500 acc. to Sama RC21-4-1966 | -200 | 600 | °C | 50 K |
| NI100DIN | ≙ Ni 100 acc. to DIN 43760 | -60 | 250 | °C | 50 K |
| NI500DIN | ≙ Ni 500 acc. to DIN 43760 | -60 | 250 | °C | 50 K |
| CU50 | ≙ CU50 acc. to GOST 6651 (α = 1.428) | -50 | 200 | °C | 50 K |
| CU53 | ≙ CU53 acc. to GOST 6651 (α = 1.426) | -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<br>I035 ≙ 3.5 mA<br>I215 ≙ 21.5 mA<br>I035 only with output range = OUT02<br>Alarm signals can also be configured individually using software. | I000 ≙ 0 mA<br>I035 ≙ 3.5 mA<br>I215 ≙ 21.5 mA | NONE ≙ without FCC<br>Yes ≙ with FCC (a fee is charged)<br>YESPLUS ≙ FCC with 5 measuring points (a fee is charged) |

**Temperature conversion guide for °C to °F:**

$$T\,[°F] = \frac{9}{5}\,T\,[°C] + 32$$

## Order key and temperature ranges for the MACX MCR-EX-SL-TC-I temperature transducer

**Order key for MACX MCR-EX-SL-TC-I** temperature transducer (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<br>NONE ≙ Not active<br>ON only with output range = OUT02 | 1 ≙ Enabled<br>0 ≙ switched off (e.g., for mV voltage measurement) | see below | see below | C ≙ °C<br>F ≙ °F<br>V ≙ mV | OUT01 ≙ 0 ... 20 mA<br>OUT02 ≙ 4 ... 20 mA | 1 ≙ 1 value<br>3 ≙ 3 values<br>5 ≙ 5 values<br>7 ≙ 7 values<br>10 ≙ 10 values<br>20 ≙ 20 values | 1 ≙ 1 value<br>2 ≙ 2 values<br>3 ≙ 3 values<br>4 ≙ 4 values |

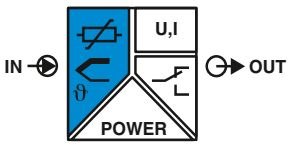
| | | | | | Smallest measuring range span |
|---|---|---|---|---|---|
| V03 | ≙ Voltage (mV) | -20 | +70 | mV | 3 mV |
| E | ≙ acc. to IEC 584-1 (NiCr-CuNi) | -250 | 1000 | °C | 50 K |
| J | ≙ acc. to IEC 584-1 (Fe-CuNi) | -210 | 1200 | °C | 50 K |
| K | ≙ acc. to IEC 584-1 (NiCr-Ni) | -250 | 1372 | °C | 50 K |
| N | ≙ acc. to IEC 584-1 (NiCrSi-NiSi) | -250 | 1300 | °C | 50 K |
| L | ≙ acc. to DIN 43760 (Fe-CuNi) | -200 | 900 | °C | 50 K |

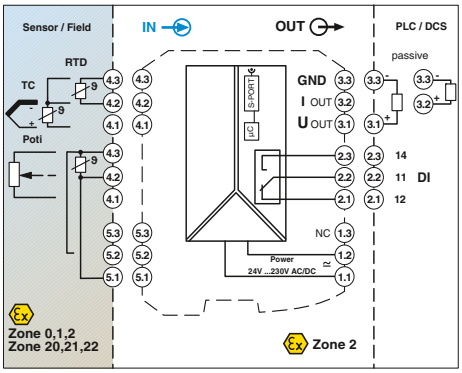
| ... | Alarm signal Overrange | Alarm signal Sensor break/ underrange | Factory calibration certificate = FCC |
|---|---|---|---|
| | I035 | I215 | NONE |
| | I000 ≙ 0 mA<br>I035 ≙ 3.5 mA<br>I215 ≙ 21.5 mA<br>I035 only with output range = OUT02<br>Alarm signals can also be configured individually using software. | I000 ≙ 0 mA<br>I035 ≙ 3.5 mA<br>I215 ≙ 21.5 mA | NONE ≙ without FCC<br>Yes ≙ with FCC (a fee is charged)<br>YESPLUS ≙ FCC with 5 measuring points (a fee is charged) |

**Temperature conversion guide for °C to °F:**

$$T\,[°F] = \frac{9}{5}\,T\,[°C] + 32$$

## Temperature
## Temperature transducer, Ex i



**Universal, with switching output, wide range power supply**

Functional Safety
Ex:
Housing width 17.5 mm

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]
- 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 push-in connection technology
- 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 IEC 61508
- Installation in zone 2 permitted

| Notes: |
|---|
| To order a product with an order configuration, enter the required configuration by referring to the adjacent order key. |
| The configuration software can be downloaded from the Internet (phoenixcontact.net/products). |
| Information on the IFS-OP-UNIT operating and display unit and the associated IFS-OP-CRADLE DIN rail cradle can be found on page 170 |
| For information on the programming adapter, refer to page 89 |

### 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 (in the case of SIL; further free configuration without SIL) | |
| Maximum output signal | ± 11 V | 22 mA |
| Load $R_B$ | ≥ 10 kΩ | ≤ 600 Ω (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 % (e.g., for Pt 100, 300 K span, 4 ... 20 mA) | |
| Electrical isolation | | |
| Input/output/power supply | 2.5 kV (50 Hz, 1 min., test voltage) | |
| 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 | 300 $V_{rms}$ (rated insulation voltage (surge voltage category II; pollution degree 2, safe isolation as per EN 61010-1)) | |
| Ambient temperature range | -20 °C ... 65 °C | |
| Humidity | typ. 5 % ... 95 % (non-condensing) | |
| Housing material | PA 66-FR | |
| Inflammability class in acc. with 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 | |
| Push-in connection solid / stranded / AWG | 0.2 ... 1.5 $mm^2$ / 0.2 ... 1.5 $mm^2$ / 24 - 16 | |
| EMC note | Class A product, see page 625 | |
| Safety data as per ATEX | | |
| Max. output voltage $U_o$ | 6 V | |
| Max. output current $I_o$ | 7.4 mA | |
| Max. output power $P_o$ | 11 mW | |
| Conformance / approvals | | |
| Conformance | CE-compliant | |
| ATEX | II (1) G [Ex ia Ga] IIC<br>II (1) D [Ex ia Da] IIIC<br>II 3 G Ex nA nC ic IIC T4 Gc X | |
| IECEx | [Ex ia Ga] IIC, [Ex ia Da] IIIC, Ex nA nC ic IIC T4 Gc X | |
| SIL in accordance with IEC 61508 | 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 | Push-in connection | **MACX MCR-EX-T-UI-UP-SP** | **2924689** | 1 |
| Order configuration | Screw connection | **MACX MCR-EX-T-UI-UP-C** | **2811763** | 1 |
| Order configuration | Push-in connection | **MACX MCR-EX-T-UI-UP-SP-C** | **2924692** | 1 |

### Accessories

| | | | |
|---|---|---|---|
| **Programming adapter** for configuring modules with S-PORT interface | **IFS-USB-PROG-ADAPTER** | **2811271** | 1 |

**Order key for MACX MCR-EX-T-UI-UP(-SP)-C temperature transducer** (standard configuration entered as an example)

| Order No. | Safety integrity level (SIL) | Sensor type | Connection technology | 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<br>2924692 ≙ MACX MCR-EX-T-UI-UP-SP-C | ON ≙ Active<br>NONE ≙ not active<br>ON only with output range = OUT02 | See below | 2 ≙ 2-wire<br>3 ≙ 3-wire<br>4 ≙ 4-wire | 0 ≙ off, e.g., with RTD, R, potentiometer, mV<br>1 ≙ on, e.g., with TC | see below | see below | C ≙ °C<br>F ≙ °F<br>O ≙ Ω<br>P ≙ %<br>V ≙ mV | OUT15 ≙ 0 ... 5 mA<br>OUT16 ≙ 0 ... 10 mA<br>OUT01 ≙ 0 ... 20 mA<br>OUT15 ≙ 0 ... 5 mA<br>OUT25 ≙ 1 ... 5 mA<br>OUT26 ≙ 2 ... 10 mA<br>OUT02 ≙ 4 ... 20 mA<br>OUT05 ≙ 0 - 5 V DC<br>OUT03 ≙ 0...10 V<br>OUT06 ≙ 1...5 V<br>OUT04 ≙ 2...10 V<br>OUT13 ≙ -5...+5 V<br>OUT14 ≙ -10...+10 V<br>Others can be freely configured in the software | NONE ≙ without FCC<br>YES ≙ with FCC (a fee is charged)<br>YESPLUS ≙ FCC with 5 measuring points (a fee is charged) |

| | | | | | | Smallest measuring range span |
|---|---|---|---|---|---|---|
| **Resistance thermometers (RTD)**<br>Others can be selected or freely configured in the software. | PT100 ≙ Pt 100 acc. to IEC 751 | -200 | 850 | °C | 20 K |
| | PT200 ≙ Pt 200 acc. to IEC 751 | -200 | 850 | °C | 20 K |
| | PT500 ≙ Pt 500 acc. to IEC 751 | -200 | 850 | °C | 20 K |
| | PT1000 ≙ Pt 1000 acc. to IEC 751 | -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 6651-2009 (α = 0.00385) | -200 | 850 | °C | 20 K |
| | PT1000G ≙ Pt 1000 acc. to GOST 6651-2009 (α = 0.00385) | -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 acc. to GOST 6651-2009 (α = 0.00428) | -50 | 200 | °C | 100 K |
| | CU100 ≙ Cu 100 acc. to GOST 6651-20091 (α = 0.00428) | -50 | 200 | °C | 100 K |
| | CU53 ≙ Cu 53 acc. to GOST 6651-2009 (α = 0.00426) | -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)**<br>Others can be selected in the software. | B ≙ acc. to IEC 584-1 (Pt30Rh-Pt6Rh) | 500 | 1820 | °C | 50 K |
| | E ≙ acc. to IEC 584-1 (NiCr-CuNi) | -230 | 1000 | °C | 50 K |
| | J ≙ acc. to IEC 584-1 (Fe-CuNi) | -210 | 1200 | °C | 50 K |
| | K ≙ acc. to IEC 584-1 (NiCr-Ni) | -250 | 1372 | °C | 50 K |
| | N ≙ acc. to IEC 584-1 (NiCrSi-NiSi) | -250 | 1300 | °C | 50 K |
| | R ≙ acc. to IEC 584-1 (Pt13Rh-Pt) | -50 | 1768 | °C | 50 K |
| | S ≙ acc. to IEC 584-1 (Pt10Rh-Pt) | -50 | 1768 | °C | 50 K |
| | T ≙ acc. to IEC 584-1 (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)**<br>Others can be selected in the software. | RES03 ≙ 0...150 Ω resistor | 0 | 150 | Ω | 10% of the selected measuring range |
| | RES05 ≙ 0...600 Ω resistor | 0 | 600 | Ω | |
| | RES06 ≙ 0...1200 Ω resistor | 0 | 1200 | Ω | |
| | RES09 ≙ 0...6250 Ω resistor | 0 | 6250 | Ω | |
| | RES10 ≙ 0...12500 Ω resistor | 0 | 12500 | Ω | |
| | RES12 ≙ 0...50000 Ω resistor | 0 | 50000 | Ω | |
| **Potentiometers (3-wire)**<br>Others can be selected in the software. | POT03 ≙ 0...150 Ω potentiometer | 0 | 100 | % | 10% of the selected measuring range |
| | POT05 ≙ 0...600 Ω potentiometer | 0 | 100 | % | |
| | POT06 ≙ 0...1200 Ω potentiometer | 0 | 100 | % | |
| | POT09 ≙ 0...6250 Ω potentiometer | 0 | 100 | % | |
| | POT10 ≙ 0...12500 Ω potentiometer | 0 | 100 | % | |
| | POT12 ≙ 0...50000 Ω potentiometer | 0 | 100 | % | |
| **Voltage signals (mV)**<br>Others can be selected in the software. | V04 ≙ Voltage (mV) | -1000 | +1000 | mV | 10% of nominal span |

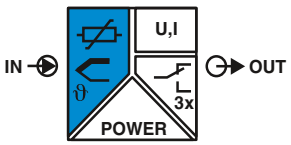
**Other setting options can be configured with the IFS-CONF software:**

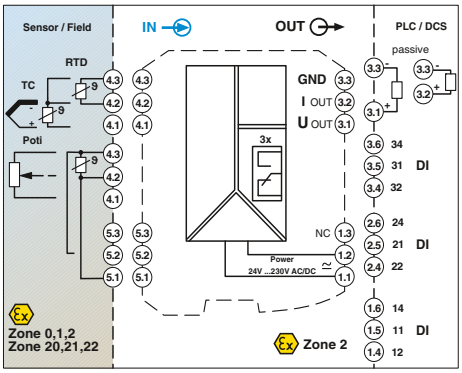
- Freely configurable user characteristic curve with 30 interpolation points
- Output behavior in the event of a short circuit, sensor break or overrange/underrange can be freely configured or set acc. to NE43 (standard configuration: NE43 upscale)
- Filter setting (standard configuration: 1)
- Restart 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
## Temperature transducer, Ex i



**Universal, with three limit value relays, wide range power supply**

Functional Safety
Ex:
Housing width 35 mm

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]
- 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 push-in connection technology
- 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 IEC 61508
- Installation in zone 2 permitted

| Notes: |
|---|
| To order a product with an order configuration, enter the required configuration by referring to the adjacent order key. |
| The configuration software can be downloaded from the Internet (phoenixcontact.net/products). |
| Information on the IFS-OP-UNIT operating and display unit and the associated IFS-OP-CRADLE DIN rail cradle can be found on page 170 |
| For information on the programming adapter, refer to page 89 |

### 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 | 0 mA ... 20 mA ±10 V (in the case of SIL; further free configuration without SIL) | |
| Maximum output signal | ± 11 V | 22 mA |
| Load $R_B$ | ≥ 10 kΩ | ≤ 600 Ω (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 | |
| Maximum transmission error | 0.1 % (e.g. for Pt 100, 300 K span, 4 ... 20 mA) | |
| Electrical isolation | | |
| Input/output/power supply | 2.5 kV (50 Hz, 1 min., test voltage) | |
| 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 | 300 $V_{rms}$ (rated insulation voltage (surge voltage category II; pollution degree 2, safe isolation as per EN 61010-1)) | |
| Ambient temperature range | -20 °C ... 65 °C | |
| Humidity | typ. 5 % ... 95 % (non-condensing) | |
| Housing material | PA 66-FR | |
| Inflammability class in acc. with 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 | |
| Push-in connection solid / stranded / AWG | 0.2 ... 1.5 $mm^2$ / 0.2 ... 1.5 $mm^2$ / 24 - 16 | |
| EMC note | Class A product, see page 625 | |
| Safety data as per ATEX | | |
| Max. output voltage $U_o$ | 6 V | |
| Max. output current $I_o$ | 7.4 mA | |
| Max. output power $P_o$ | 11 mW | |
| Conformance / approvals | | |
| Conformance | CE-compliant | |
| ATEX | II (1) G [Ex ia Ga] IIC<br>II (1) D [Ex ia Da] IIIC<br>II 3 G Ex nA nC ic IIC T4 Gc X | |
| IECEx | [Ex ia Ga] IIC, [Ex ia Da] IIIC, Ex nA nC ic IIC T4 Gc X | |
| SIL in accordance with IEC 61508 | 2 | |

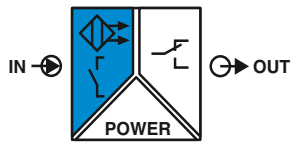
### Ordering data

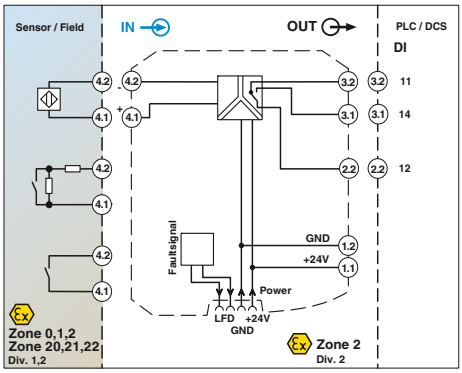
| Description | | Type | Order No. | Pcs. / Pkt. |
|---|---|---|---|---|
| **Temperature transducer,** intrinsically safe input | | | | |
| Standard configuration | Screw connection | **MACX MCR-EX-T-UIREL-UP** | **2865751** | 1 |
| Standard configuration | Push-in connection | **MACX MCR-EX-T-UIREL-UP-SP** | **2924799** | 1 |

### Accessories

| | | | |
|---|---|---|---|
| **Programming adapter** for configuring modules with S-PORT interface | **IFS-USB-PROG-ADAPTER** | **2811271** | 1 |

## Digital IN
## NAMUR signal conditioner, Ex i



**Signal output: PDT relay**

Functional Safety
Ex:
Housing width 12.5 mm

NAMUR signal conditioner 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]
- 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 IEC 61508
- Installation in zone 2 permitted

**Notes:**

Information about the power and fault signaling module as well as about the DIN rail connectors and marking material can be found from page 213

Information about resistance circuits is given on page 180

Information on Plug and Play connection using system cabling can be found from page 216

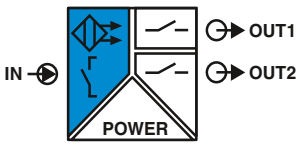
### Technical data

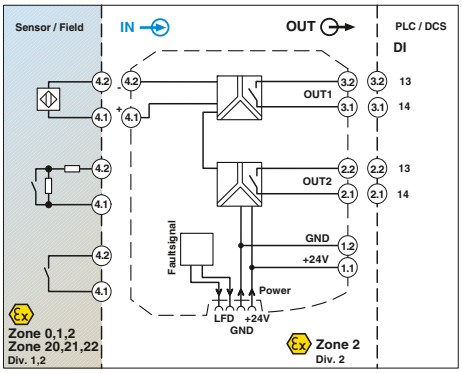
| | |
|---|---|
| **Input data** | |
| Input signal | NAMUR proximity sensors (EN 60947-5-6)<br>Floating switch contacts<br>Switch contacts with resistance circuit |
| No-load voltage | ~ 8 V DC |
| Switching points | > 2.1 mA (conductive) / < 1.2 mA (blocking) |
| Switching hysteresis | < 0.2 mA |
| Line fault detection | Break 0.05 mA < IIN < 0.35 mA<br>Short circuit 100 Ω < RSensor < 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 (24 V DC (-20% ... +25%)) |
| 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/output/supply, DIN rail connector | 300 $V_{rms}$ (rated insulation voltage (surge voltage category II; pollution degree 2, safe isolation as per EN 61010-1))<br>2.5 kV (50 Hz, 1 min., test voltage) |
| Input/supply, DIN rail connector | 375 V (peak value in accordance with EN 60079-11) |
| Ambient temperature range | -20 °C ... 60 °C (any mounting position) |
| Humidity | 10 % ... 95 % (non-condensing) |
| Status indication | Green LED (supply voltage)<br>Yellow LED (switching state)<br>Red LED (line fault) |
| Housing material | PA 66-FR |
| Inflammability class in acc. with 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 |
| Push-in connection solid / stranded / AWG | 0.2 ... 1.5 $mm^2$ / 0.2 ... 1.5 $mm^2$ / 24 - 16 |
| EMC note | Class A product, see page 625 |
| **Safety data as per ATEX** | |
| Max. output voltage $U_o$ | 9.6 V |
| Max. output current $I_o$ | 10 mA |
| Max. output power $P_o$ | 25 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 Ga] IIC<br>Ex II (1) D [Ex ia Da] IIIC |
| IECEx | [Ex ia Ga] IIC, [Ex ia Da] IIIC, Ex nA nC IIC T4 Gc |
| UL, USA / Canada | Class I Div 2; IS for Class I, II, III Div 1 |
| SIL in accordance with IEC 61508 | 2 |

### Ordering data

| Description | Type | Order No. | Pcs. / Pkt. |
|---|---|---|---|
| **NAMUR signal conditioner,** 1-channel, intrinsically safe input, output: PDT contact | | | |
| Screw connection | **MACX MCR-EX-SL-NAM-R** | **2865434** | 1 |
| Push-in connection | **MACX MCR-EX-SL-NAM-R-SP** | **2924045** | 1 |

## Digital IN
## NAMUR signal conditioner, Ex i



**2 signal outputs: N/O contact relay**

Functional Safety
Ex:
Housing width 12.5 mm

NAMUR signal conditioner 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]
- 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 IEC 61508
- Installation in zone 2 permitted

| Notes: |
|---|
| Information about the power and fault signaling module as well as about the DIN rail connectors and marking material can be found from page 213 |
| Information about resistance circuits is given on page 180 |
| Information on Plug and Play connection using system cabling can be found from page 216 |

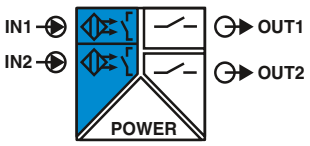
### Technical data

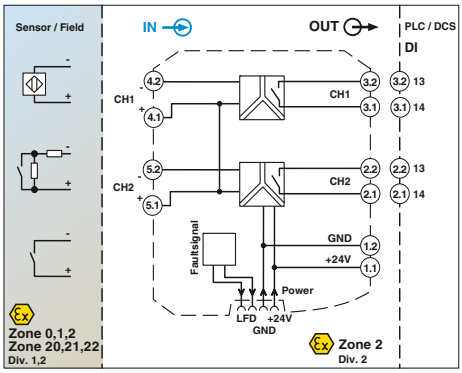
| | |
|---|---|
| **Input data** | |
| Input signal | NAMUR proximity sensors (EN 60947-5-6)<br>Floating switch contacts<br>Switch contacts with resistance circuit |
| No-load voltage | ~ 8 V DC |
| Switching points | > 2.1 mA (conductive) / < 1.2 mA (blocking) |
| Switching hysteresis | < 0.2 mA |
| Line fault detection | Break 0.05 mA < IIN < 0.35 mA<br>Short circuit 100 Ω < RSensor < 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 (24 V DC (-20% ... +25%)) |
| 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/supply, DIN rail connector | 375 V (peak value in accordance with EN 60079-11)<br>300 $V_{rms}$ (rated insulation voltage (surge voltage category II; pollution degree 2, safe isolation as per EN 61010-1)) |
| Output 1/output 2/input, power supply, DIN rail connector | 300 $V_{rms}$ (rated insulation voltage (surge voltage category III; pollution degree 2, safe isolation as per EN 61010-1)) |
| Output 1/output 2/input/power supply, DIN rail connector | 2.5 kV (50 Hz, 1 min., test voltage) |
| Ambient temperature range | -20 °C ... 60 °C (any mounting position) |
| Humidity | 10 % ... 95 % (non-condensing) |
| Status indication | Green LED (supply voltage)<br>Yellow LED (switching state)<br>Red LED (line fault) |
| Housing material | PA 66-FR |
| Inflammability class in acc. with 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 |
| Push-in connection solid / stranded / AWG | 0.2 ... 1.5 $mm^2$ / 0.2 ... 1.5 $mm^2$ / 24 - 16 |
| EMC note | Class A product, see page 625 |
| **Safety data as per ATEX** | |
| Max. output voltage $U_o$ | 9.6 V |
| Max. output current $I_o$ | 10 mA |
| Max. output 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) G [Ex ia Ga] IIC<br>II (1) D [Ex ia Da] IIIC |
| IECEx | [Ex ia Ga] IIC, [Ex ia Da] IIIC, Ex nA nC IIC T4 Gc |
| UL, USA / Canada | Class I Div 2; IS for Class I, II, III Div 1 |
| SIL in accordance with IEC 61508 | 2 |

### Ordering data

| Description | Type | Order No. | Pcs. / Pkt. |
|---|---|---|---|
| **NAMUR signal conditioner,** 1-channel, intrinsically safe input, output: 2 N/O contacts | | | |
| Screw connection | **MACX MCR-EX-SL-NAM-2RO** | **2865450** | 1 |
| Push-in connection | **MACX MCR-EX-SL-NAM-2RO-SP** | **2924061** | 1 |

## Digital IN
## NAMUR signal conditioner, Ex i



**2-channel, signal output: N/O contact relay**

Functional Safety
Ex:
Housing width 12.5 mm

NAMUR signal conditioner 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]
- 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 IEC 61508
- Installation in zone 2 permitted

| Notes: |
|---|
| Information about the power and fault signaling module as well as about the DIN rail connectors and marking material can be found from page 213 |
| Information about resistance circuits is given on page 180 |
| Information on Plug and Play connection using system cabling can be found from page 216 |

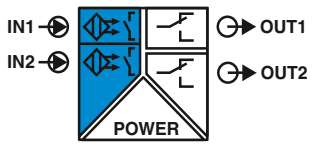
### Technical data

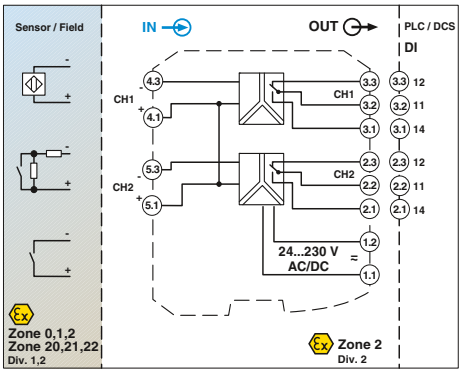
| | |
|---|---|
| **Input data** | |
| Input signal | NAMUR proximity sensors (EN 60947-5-6)<br>Floating switch contacts<br>Switch contacts with resistance circuit |
| No-load voltage | ~ 8 V DC |
| Switching points | > 2.1 mA (conductive) / < 1.2 mA (blocking) |
| Switching hysteresis | < 0.2 mA |
| Line fault detection | Break 0.05 mA < IIN < 0.35 mA<br>Short circuit 100 Ω < RSensor < 360 Ω |
| **Switching output** | **Relay output** |
| Contact type | 1 N/O contact per channel |
| 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 (24 V DC (-20% ... +25%)) |
| 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/supply, DIN rail connector | 375 V (peak value in accordance with EN 60079-11)<br>300 $V_{rms}$ (rated insulation voltage (surge voltage category II; pollution degree 2, safe isolation as per EN 61010-1)) |
| Output 1/output 2/input, power supply, DIN rail connector | 300 $V_{rms}$ (rated insulation voltage (surge voltage category III; pollution degree 2, safe isolation as per EN 61010-1)) |
| Output 1/output 2/input/power supply, DIN rail connector | 2.5 kV (50 Hz, 1 min., test voltage) |
| Ambient temperature range | -20 °C ... 60 °C (any mounting position) |
| Humidity | 5 % ... 95 % (non-condensing) |
| Status indication | Green LED (supply voltage)<br>Yellow LED (switching state)<br>Red LED (line fault) |
| Housing material | PA 66-FR |
| Inflammability class in acc. with 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 |
| Push-in connection solid / stranded / AWG | 0.2 ... 1.5 $mm^2$ / 0.2 ... 1.5 $mm^2$ / 24 - 16 |
| EMC note | Class A product, see page 625 |
| **Safety data as per ATEX** | |
| Max. output voltage $U_o$ | 9.6 V |
| Max. output current $I_o$ | 10.3 mA |
| Max. output power $P_o$ | 25 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 Ga] IIC<br>Ex II (1) D [Ex ia Da] IIIC |
| IECEx | [Ex ia Ga] IIC, [Ex ia Da] IIIC, Ex nA nC IIC T4 Gc |
| UL, USA / Canada | Class I Div 2; IS for Class I, II, III Div 1 |
| SIL in accordance with IEC 61508 | 2 |

### Ordering data

| Description | Type | Order No. | Pcs. / Pkt. |
|---|---|---|---|
| **NAMUR signal conditioner,** 2-channel, intrinsically safe input, output: N/O contact | | | |
| Screw connection | **MACX MCR-EX-SL-2NAM-RO** | **2865476** | 1 |
| Push-in connection | **MACX MCR-EX-SL-2NAM-RO-SP** | **2924087** | 1 |

## Digital IN
## NAMUR signal conditioner, Ex i



**2-channel, signal output: PDT relay, wide range power supply**

Functional Safety
Ex: EAC Ex
Housing width 17.5 mm

NAMUR signal conditioner 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]
- 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 IEC 61508
- Installation in zone 2 permitted

**Notes:**

Information on resistance circuits and marking material can be found on page 180

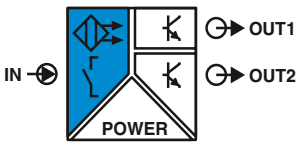
### Technical data

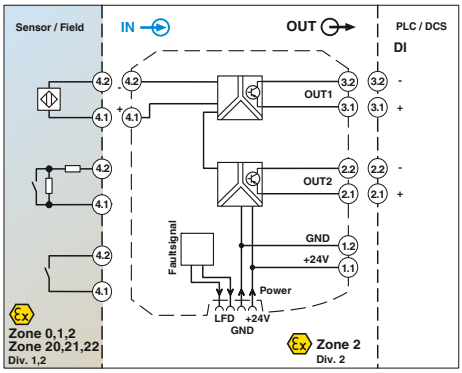
| | |
|---|---|
| **Input data** | |
| Input signal | NAMUR proximity sensors (EN 60947-5-6)<br>open circuit switch contacts<br>Switch contacts with resistance circuit |
| No-load voltage | ~ 8 V DC |
| Switching points | > 2.1 mA (conductive) / < 1.2 mA (blocking) |
| Switching hysteresis | approx. 0.2 mA |
| Line fault detection | Break 0.05 mA < IIN < 0.35 mA<br>Short circuit 100 Ω < RSensor < 360 Ω |
| **Switching output** | Relay output |
| Contact type | 1 PDT per channel |
| 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 ... 230 V AC/DC (-20 % ... +10 %, 50 Hz ... 60 Hz) |
| Current consumption | < 80 mA ; < 42 mA (24 V DC) |
| Power dissipation | ≤ 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)<br>300 $V_{rms}$ (rated insulation voltage (surge voltage category II; pollution degree 2, safe isolation as per EN 61010-1))<br>2.5 kV AC (50 Hz, 1 min., test voltage) |
| Output 1/output 2/input, power supply | 300 $V_{rms}$ (rated insulation voltage (surge voltage category III; pollution degree 2, safe isolation as per EN 61010-1))<br>2.5 kV (50 Hz, 1 min., test voltage) |
| Ambient temperature range | -20 °C ... 60 °C |
| Humidity | 10 % ... 95 % (non-condensing) |
| Housing material | PA 66-FR |
| Inflammability class in acc. with 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 |
| Push-in connection solid / stranded / AWG | 0.2 ... 1.5 $mm^2$ / 0.2 ... 1.5 $mm^2$ / 24 - 16 |
| EMC note | Class A product, see page 625 |
| **Safety data as per ATEX** | |
| Max. output voltage $U_o$ | 9.6 V |
| Max. output current $I_o$ | 10.3 mA |
| Max. output power $P_o$ | 25 mW |
| Maximum voltage $U_m$ | 253 V AC/DC (supply terminals)<br>250 V AC (output terminals)<br>120 V DC (output terminals) |
| **Conformance / approvals** | |
| Conformance | CE-compliant, additionally EN 61326 |
| ATEX | II (1) G [Ex ia Ga] IIC<br>II (1) D [Ex ia Da] IIIC<br>II 3(1) G Ex nA nC [ia Ga] IIC T4 Gc X |
| IECEx | [Ex ia Ga] IIC, [Ex ia Da] IIIC, Ex nA nC [ia Ga] IIC T4 Gc |
| UL, USA / Canada | Class I Div 2; IS for Class I, II, III Div 1 |
| SIL in accordance with IEC 61508 | 2 |

### Ordering data

| Description | Type | Order No. | Pcs. / Pkt. |
|---|---|---|---|
| **NAMUR signal conditioner,** 2-channel, intrinsically safe input, output: PDT | | | |
| Screw connection | **MACX MCR-EX-SL-2NAM-R-UP** | **2865984** | 1 |
| Push-in connection | **MACX MCR-EX-SL-2NAM-R-UP-SP** | **2924249** | 1 |

## Digital IN
## NAMUR signal conditioner, Ex i



**2 signal outputs: transistor (passive)**

Functional Safety
Ex:
Housing width 12.5 mm

NAMUR signal conditioner 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]
- 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 IEC 61508
- Installation in zone 2 permitted

| Notes: |
|---|
| Information about the power and fault signaling module as well as about the DIN rail connectors and marking material can be found from page 213 |
| Information about resistance circuits is given on page 180 |
| Information on Plug and Play connection using system cabling can be found from page 216 |

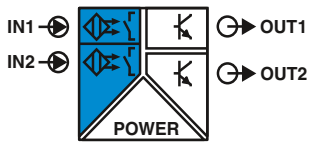
### Technical data

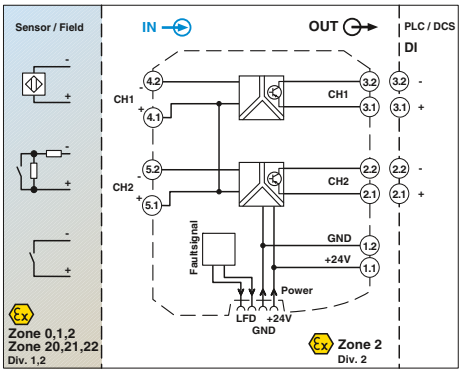
| | |
|---|---|
| **Input data** | |
| Input signal | NAMUR proximity sensors (EN 60947-5-6)<br>Floating switch contacts<br>Switch contacts with resistance circuit |
| No-load voltage | ~ 8 V DC |
| Switching points | > 2.1 mA (conductive) / < 1.2 mA (blocking) |
| Line fault detection | Break 0.05 mA < IIN < 0.35 mA<br>Short circuit 100 Ω < RSensor < 360 Ω |
| **Switching output** | 2 transistor outputs, passive |
| Max. switching voltage | 30 V DC |
| Max. switching current | 50 mA (short-circuit resistant) |
| 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 (24 V DC (-20% ... +25%)) |
| 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/output/supply, DIN rail connector | 300 $V_{rms}$ (rated nsulation voltage (surge voltage category II; pollution degree 2, safe isolation as per EN 61010-1))<br>2.5 kV (50 Hz, 1 min., test voltage) |
| Input/supply, DIN rail connector | 375 V (peak value in accordance with EN 60079-11) |
| Output 1/output 2 | 50 $V_{rms}$ (rated insulation voltage (surge voltage category II; pollution degree 2, basic insulation as per EN 61010-1))<br>1 kV (50 Hz, 1 min., test voltage) |
| Ambient temperature range | -20 °C ... 60 °C (any mounting position) |
| Humidity | 10 % ... 95 % (non-condensing) |
| Status indication | Green LED (supply voltage)<br>Yellow LED (switching state)<br>Red LED (line fault) |
| Housing material | PA 66-FR |
| Inflammability class in acc. with 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 |
| Push-in connection solid / stranded / AWG | 0.2 ... 1.5 $mm^2$ / 0.2 ... 1.5 $mm^2$ / 24 - 16 |
| EMC note | Class A product, see page 625 |
| **Safety data as per ATEX** | |
| Max. output voltage $U_o$ | 9.6 V |
| Max. output current $I_o$ | 10.3 mA |
| Max. output power $P_o$ | 25 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 Ga] IIC<br>Ex II (1) D [Ex ia Da] IIIC<br>Ex II 3 G Ex nA IIC T4 Gc X |
| IECEx | [Ex ia Ga] IIC, [Ex ia Da] IIIC, Ex nA IIC T4 Gc |
| UL, USA / Canada | Class I Div 2; IS for Class I, II, III Div 1 |
| SIL in accordance with IEC 61508 | 2 |

### Ordering data

| Description | Type | Order No. | Pcs. / Pkt. |
|---|---|---|---|
| **NAMUR signal conditioner,** intrinsically safe input, output: transistor, passive | | | |
| Screw connection | **MACX MCR-EX-SL-NAM-2T** | **2865463** | 1 |
| Push-in connection | **MACX MCR-EX-SL-NAM-2T-SP** | **2924074** | 1 |

## Digital IN
## NAMUR signal conditioner, Ex i



**2-channel, signal output transistor (passive)**

Functional Safety
Ex:
Housing width 12.5 mm

NAMUR signal conditioner 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]
- 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 IEC 61508
- Installation in zone 2 permitted

| Notes: |
|---|
| Information about the power and fault signaling module as well as about the DIN rail connectors and marking material can be found from page 213 |
| Information about resistance circuits is given on page 180 |
| Information on Plug and Play connection using system cabling can be found from page 216 |

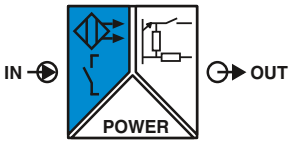
### Technical data

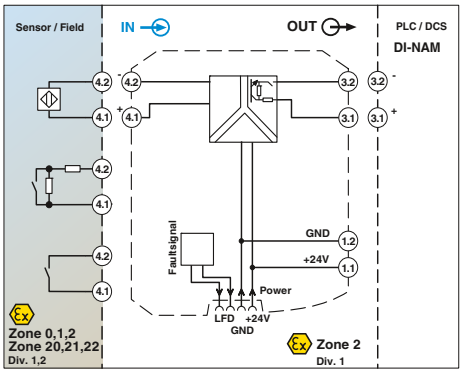
| | |
|---|---|
| **Input data** | |
| Input signal | NAMUR proximity sensors (EN 60947-5-6)<br>Floating switch contacts<br>Switch contacts with resistance circuit |
| No-load voltage | ~ 8 V DC |
| Switching points | > 2.1 mA (conductive) / < 1.2 mA (blocking) |
| Line fault detection | Break 0.05 mA < IIN < 0.35 mA<br>Short circuit 100 Ω < RSensor < 360 Ω |
| **Switching output** | 1 transistor output, passive (per channel) |
| Max. switching voltage | 30 V DC |
| Max. switching current | 50 mA (short-circuit resistant) |
| 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 (24 V DC (-20% ... +25%)) |
| 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/output/supply, DIN rail connector | 300 $V_{rms}$ (rated insulation voltage (surge voltage category II; pollution degree 2, safe isolation as per EN 61010-1))<br>2.5 kV (50 Hz, 1 min., test voltage) |
| Input/supply, DIN rail connector | 375 V (peak value in accordance with EN 60079-11) |
| Output 1/output 2 | 50 $V_{rms}$ (rated insulation voltage (surge voltage category II; pollution degree 2, basic insulation as per EN 61010-1))<br>1 kV (50 Hz, 1 min., test voltage) |
| Ambient temperature range | -20 °C ... 60 °C (any mounting position) |
| Humidity | 10 % ... 95 % (non-condensing) |
| Status indication | Green LED (supply voltage)<br>Yellow LED (switching state)<br>Red LED (line fault) |
| Housing material | PA 66-FR |
| Inflammability class in acc. with 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 |
| Push-in connection solid / stranded / AWG | 0.2 ... 1.5 $mm^2$ / 0.2 ... 1.5 $mm^2$ / 24 - 16 |
| EMC note | Class A product, see page 625 |
| **Safety data as per ATEX** | |
| Max. output voltage $U_o$ | 9.6 V |
| Max. output current $I_o$ | 10.3 mA |
| Max. output 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) G [Ex ia Ga] IIC<br>II (1) D [Ex ia Da] IIIC<br>II 3 G Ex nA IIC T4 Gc X |
| IECEx | [Ex ia Ga] IIC, [Ex ia Da] IIIC, Ex nA IIC T4 Gc |
| UL, USA / Canada | Class I Div 2; IS for Class I, II, III Div 1 |
| SIL in accordance with IEC 61508 | 2 |

### Ordering data

| Description | Type | Order No. | Pcs. / Pkt. |
|---|---|---|---|
| **NAMUR signal conditioner,** 2-channel, intrinsically safe input, output: transistor, passive | | | |
| Screw connection | **MACX MCR-EX-SL-2NAM-T** | **2865489** | 1 |
| Push-in connection | **MACX MCR-EX-SL-2NAM-T-SP** | **2924090** | 1 |

## Digital IN
## NAMUR signal conditioner, Ex i



**With line fault transparency**

Ex:
Housing width 12.5 mm

NAMUR signal conditioner for the intrinsically safe operation of proximity sensors or mechanical contacts installed in the Ex area.

- Input for NAMUR proximity sensors (EN 60947-5-6), floating contacts or contacts with resistance circuit, [Ex ia]
- Signal output with resistive behavior (transistor)
- Signal output with line fault transparency: line fault indicated directly via output to PLC or PCS. The output responds in accordance with EN 60947-5-6.
- Up to 5 kHz
- Direction of operation can be selected
- Line fault detection can be activated/deactivated
- Power supply and error indication possible via the DIN rail connector
- LED indicators for supply voltage, status, and fault according to NAMUR NE 44
- Plug-in screw or push-in connection technology
- Safe 3-way electrical isolation
- Up to SIL 2 according to IEC 61508
- Installation in zone 2 permitted

**Notes:**

Information on the power and fault signaling module, DIN rail connectors, system cabling, and marking material can be found from page 213

Information about resistance circuits is given on page 180

### Technical data

| | |
|---|---|
| **Input data** | |
| Input signal | NAMUR proximity sensors (EN 60947-5-6)<br>Floating switch contacts<br>Switch contacts with resistance circuit |
| No-load voltage | ~ 8 V DC |
| Switching points | > 2.1 mA (conductive) / < 1.2 mA (blocking) |
| Line fault detection | Break 0.05 mA < IIN < 0.35 mA<br>Short circuit 100 Ω < RSensor < 360 Ω |
| **Switching output** | Resistive (transistor, passive) |
| Switching voltage | typ. 8.2 V DC ±10 % (according to EN 60947-5-6) |
| Switching frequency | ≤ 5 kHz (ohmic load) |
| Impedance 0-signal | 11 kΩ ±5 % |
| Impedance 1-signal | 1.4 kΩ ±5 % |
| Impedance fault | > 100 kΩ |
| Switching behavior | can be inverted using DIP switch |
| **General data** | |
| Supply voltage range | 12 V DC ... 24 V DC -20 % ... +25 % |
| Current draw | 25 mA (24 V DC) |
| Power dissipation | < 0.6 W |
| Electrical isolation | |
| Input/output | 375 V (peak value in accordance with EN 60079-11) |
| Input/output/supply, DIN rail connector | 300 $V_{rms}$ (rated insulation voltage (surge voltage category II; pollution degree 2, safe isolation as per EN 61010-1))<br>2.5 kV (50 Hz, 1 min., test voltage) |
| Input/supply, DIN rail connector | 375 V (peak value in accordance with EN 60079-11) |
| Ambient temperature range | -20 °C ... 60 °C (any mounting position) |
| Humidity | 10 % ... 95 % (non-condensing) |
| Status indication | Green LED (supply voltage)<br>Yellow LED (switching state)<br>Red LED (line fault) |
| Housing material | PA 66-FR |
| Inflammability class in acc. with 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 |
| Push-in connection solid / stranded / AWG | 0.2 ... 1.5 $mm^2$ / 0.2 ... 1.5 $mm^2$ / 24 - 16 |
| EMC note | Class A product, see page 625 |
| **Safety data as per ATEX** | |
| Max. output voltage $U_o$ | 9.6 V |
| Max. output current $I_o$ | 10 mA |
| Max. output power $P_o$ | 25 mW |
| Maximum voltage $U_m$ | 253 V |
| **Conformance / approvals** | |
| Conformance | CE-compliant, additionally EN 61326 |
| ATEX | Ex II (1) G [Ex ia Ga] IIC<br>Ex II (1) D [Ex ia Da] IIIC<br>Ex II 3G Ex nA IIC T4 Gc X |
| IECEx | [Ex ia Ga] IIC, [Ex ia Da] IIIC, Ex nA IIC T4 Gc |
| SIL in accordance with IEC 61508 | 2 |

### Ordering data

| Description | Type | Order No. | Pcs. / Pkt. |
|---|---|---|---|
| **NAMUR signal conditioner**, intrinsically safe input, output with line fault transparency | | | |
| Screw connection | **MACX MCR-EX-SL-NAM-NAM** | **2866006** | 1 |
| Push-in connection | **MACX MCR-EX-SL-NAM-NAM-SP** | **2924883** | 1 |

## 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:

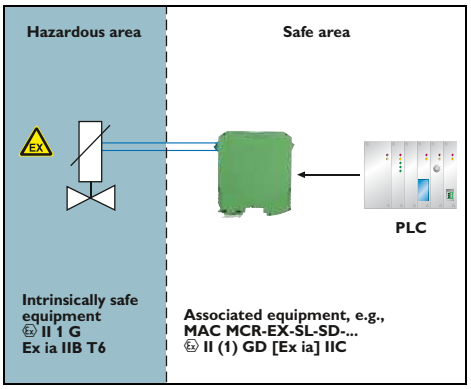
– Valve
– Cable with corresponding resistance
– Solenoid driver

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.net/products

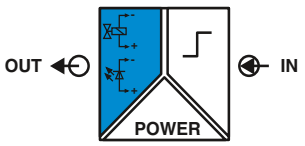
## Example circuit

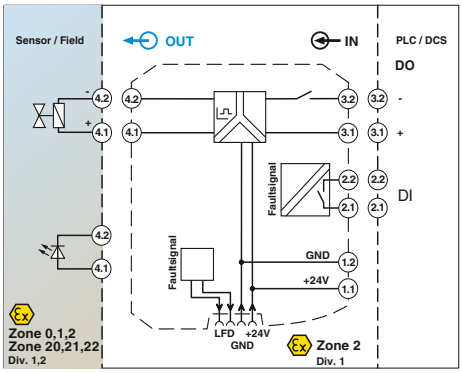



## Overview of valves

| 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 | | | | ✓ | |
| | Coil | 2003 | PTB 04 ATEX 2010 | | | | ✓ | |
| **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 | ✓ | ✓ | | |
| **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 | | ✓ | ✓ | ✓ | |
| | Coil | 3965-11 (6 V) | PTB 05 ATEX 2044X | | ✓ | | | |
| | Coil | 3965-12 (12 V) | PTB 05 ATEX 2044X | | ✓ | ✓ | ✓ | |
| | Coil | 3965-13 (24 V) | PTB 05 ATEX 2044X | | ✓ | ✓ | ✓ | |
| | Coil | 3967-11 (6 V) | PTB 06 ATEX 2027 | | ✓ | | | |
| | Coil | 3967-12 (12 V) | PTB 06 ATEX 2027 | | ✓ | ✓ | ✓ | |
| | Coil | 3967-13 (24 V) | PTB 06 ATEX 2027 | | ✓ | ✓ | ✓ | |
| **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 | | | | ✓ | |

## Digital OUT
## Solenoid driver, Ex i



**Current limitation 48 mA, with line fault detection**

Functional Safety
Ex:
Housing width 12.5 mm

Solenoid driver for the intrinsically safe control of Ex i solenoid valves, alarm transmitters or indicators installed in the Ex area.

- Input: logic (low/high signal)
- Output: 48 mA current limitation at 9.5 V, [Ex ia]
- Line fault detection (can be activated/deactivated)
  - Directly via signal channel
  - Or via switching output
- Transparent for test pulses
- Power supply and error indication possible via the DIN rail connector
- LED indicators for supply voltage, status, and fault according to NAMUR NE 44
- Plug-in screw or push-in connection technology
- Safe 3-way electrical isolation
- Up to SIL 2 according to IEC 61508
- Installation in zone 2 permitted

**Notes:**

Information on the power and fault signaling module, DIN rail connectors, system cabling, and marking material can be found from page 213

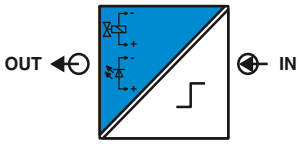
### Technical data

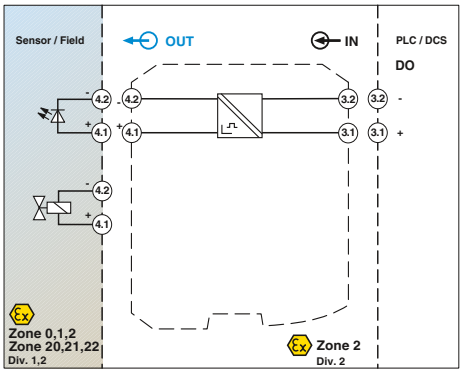
| | |
|---|---|
| **Input data** | |
| Switching level 0 signal ("L") | 0 V DC ... 5 V DC (Open) |
| Switching level 1 signal ("H") | 15 V DC ... 30 V DC |
| Input current | < 12 mA |
| Input impedance in the event of a line fault at the output | 3 MΩ (high resistance (Mega Ω)) |
| Transparent for test pulses | Yes |
| **Output data** | |
| Output voltage | ≥ 9.5 V DC (at 48 mA) |
| Current limitation | > 48 mA (with line fault detection) |
| No-load voltage | > 23.3 V DC |
| Internal resistance | ≥ 269 Ω (internal resistance $R_i$) |
| Immunity to short-circuiting | Yes |
| Response time $t_A$ | < 30 ms |
| Line fault detection | < 50 Ω (short circuit on the line)<br>> 10 kΩ (line break) |
| **Error message output** | |
| Switch contact | N/C contact |
| Max. switching voltage | 30 V DC |
| Max. switching current | 50 mA |
| Short-circuit-proof | Yes |
| **General data** | |
| Supply voltage range | 19.2 V DC ... 30 V DC (24 V DC (-20% ... +25%)) |
| Current draw | < 90 mA |
| Power dissipation | < 1.5 W |
| Electrical isolation | |
| Input/output, supply, error message output | 375 V (peak value in accordance with EN 60079-11)<br>300 $V_{rms}$ (rated insulation voltage (surge voltage category II; pollution degree 2, safe isolation as per EN 61010-1))<br>2.5 kV (50 Hz, 1 min., test voltage) |
| Ambient temperature range | -20 °C ... 60 °C (any mounting position) |
| Humidity | 10 % ... 95 % (non-condensing) |
| Status indication | Green LED (supply voltage)<br>Yellow LED (switching state)<br>Red LED (line fault) |
| Degree of protection | IP20 |
| Housing material | PA 66-FR |
| Inflammability class in acc. with 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 |
| Push-in connection solid / stranded / AWG | 0.2 ... 1.5 $mm^2$ / 0.2 ... 1.5 $mm^2$ / 24 - 16 |
| EMC note | Class A product, see page 625 |
| **Safety data as per ATEX** | |
| Max. output voltage $U_o$ | 25.3 V |
| Max. output current $I_o$ | 94 mA |
| Max. output power $P_o$ | 595 mW |
| Maximum voltage $U_m$ | 253 V |
| **Conformance / approvals** | |
| Conformance | CE-compliant, additionally EN 61326 |
| ATEX | Ex II (1) G [Ex ia Ga] IIC<br>Ex II (1) D [Ex ia Da] IIIC<br>Ex II 3(1) G Ex nA [ia Ga] IIC T4 Gc X |
| IECEx | [Ex ia Ga] IIC, [Ex ia Da] IIIC, Ex nA IIC T4 Gc |
| SIL in accordance with IEC 61508 | 2 |

### Ordering data

| Description | Type | Order No. | Pcs. / Pkt. |
|---|---|---|---|
| **Solenoid driver**, logic input, intrinsically safe output, line fault detection | | | |
| Screw connection | **MACX MCR-EX-SL-SD-23-48-LFD** | **2924867** | 1 |
| Push-in connection | **MACX MCR-EX-SL-SD-23-48-LFD-SP** | **2924870** | 1 |

## Digital OUT
## Solenoid driver, Ex i



**Current limitation 25 mA**

Functional Safety
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]
- Various output characteristic curves compatible with standard solenoid valves
- Loop-powered: the required power is supplied via the control signal on the input side.
- Mechanically compatible with DIN rail connector
- 2-way electrical isolation
- Up to SIL 3 as per EN 61508
- Installation in zone 2 permitted

**Notes:**

A list of suitable valves and notes for calculating a valve circuit are available from the download center at phoenixcontact.net/products.

Information on marking material can be found on page 179

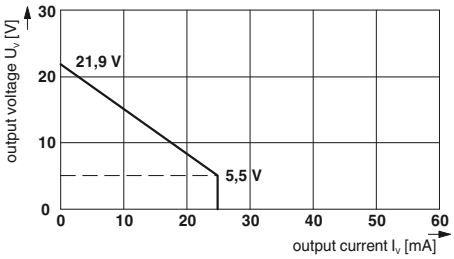
Information on Plug and Play connection using system cabling can be found from page 216

### 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 | |
| Output/input | 375 V (peak value in accordance with EN 60079-11)<br>300 $V_{rms}$ (rated insulation voltage (surge voltage category II; pollution degree 2, safe isolation as per EN 61010-1))<br>2.5 kV (50 Hz, 1 min., test voltage) |
| Ambient temperature range | -20 °C ... 60 °C (any mounting position) |
| Status indication | Yellow LED (switching state / status, lights up when output circuit is active) |
| Degree of protection | IP20 |
| Inflammability class in acc. with 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 |
| Push-in connection solid / stranded / AWG | 0.2 ... 1.5 mm² / 0.2 ... 1.5 mm² / 24 - 16 |
| EMC note | Class A product, see page 625 |
| **Safety data as per ATEX** | |
| Max. output voltage $U_o$ | 25.1 V |
| Max. output current $I_o$ | 39 mA |
| Max. output 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 3 G Ex nA IIC T4 Gc X<br>II (1) G [Ex ia Ga] IIC/IIB/IIA<br>II (1) D [Ex ia Da] IIIC |
| IECEx | [Ex ia Ga] IIC/IIB/IIA, [Ex ia Da] IIIC, Ex nA IIC T4 Gc X |
| UL, USA / Canada | Class I Div 2; IS for Class I, II, III Div 1 |
| SIL in accordance with IEC 61508 | 3 |

### Ordering data

| Description | Type | Order No. | Pcs. / Pkt. |
|---|---|---|---|
| **Solenoid driver,** loop-powered, intrinsically safe output | | | |
| Screw connection | **MACX MCR-EX-SL-SD-21-25-LP** | **2865492** | 1 |
| Push-in connection | **MACX MCR-EX-SL-SD-21-25-LP-SP** | **2924113** | 1 |



## Current limitation 40 mA

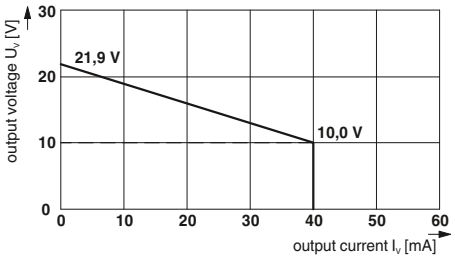
Functional Safety
Ex:
Housing width 12.5 mm

### 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 |
| 375 V (peak value in accordance with EN 60079-11)<br>300 $V_{rms}$ (rated insulation voltage (surge voltage category II; pollution degree 2, safe isolation as per EN 61010-1))<br>2.5 kV (50 Hz, 1 min., test voltage) |
| -20 °C ... 60 °C (any mounting position)<br>Yellow LED (switching state / status, lights up when output circuit is active)<br>IP20<br>V0<br>12.5 / 99 / 114.5 mm<br>0.2 ... 2.5 $mm^2$ / 0.2 ... 2.5 $mm^2$ / 24 - 14<br>0.2 ... 1.5 $mm^2$ / 0.2 ... 1.5 $mm^2$ / 24 - 16<br>Class A product, see page 625 |
| 25.1 V<br>87 mA<br>550 mW<br>253 V AC (125 V DC) |
| CE-compliant, additionally EN 61326<br>Ex II 3 G Ex nA IIC T4 Gc X<br>Ex II (1) G [Ex ia Ga] IIC/IIB/IIA<br>Ex II (1) D [Ex ia Da] IIIC<br>[Ex ia Ga] IIC/IIB/IIA<br>Class I Div 2; IS for Class I, II, III Div 1<br>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

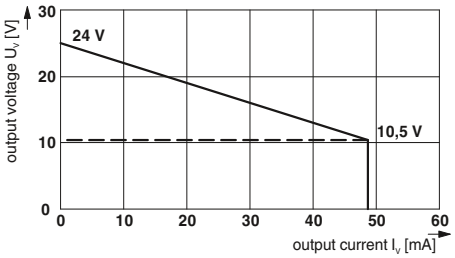
Functional Safety
Ex:
Housing width 12.5 mm

### 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 |
| 375 V (peak value in accordance with EN 60079-11)<br>300 $V_{rms}$ (rated insulation voltage (surge voltage category II; pollution degree 2, safe isolation as per EN 61010-1))<br>2.5 kV (50 Hz, 1 min., test voltage) |
| -20 °C ... 60 °C (any mounting position)<br>Yellow LED (switching state / status, lights up when output circuit is active)<br>IP20<br>V0<br>12.5 / 99 / 114.5 mm<br>0.2 ... 2.5 $mm^2$ / 0.2 ... 2.5 $mm^2$ / 24 - 14<br>0.2 ... 1.5 $mm^2$ / 0.2 ... 1.5 $mm^2$ / 24 - 16<br>Class A product, see page 625 |
| 27.7 V<br>101 mA<br>697 mW<br>253 V AC (125 V DC) |
| CE-compliant, additionally EN 61326<br>Ex II 3 G Ex nA IIC T4 Gc X<br>Ex II (1) G [Ex ia Ga] IIC/IIB/IIA<br>Ex II (1) D [Ex ia Da] IIIC<br>[Ex ia Ga] IIC/IIB/IIA<br>Class I Div 2; IS for Class I, II, III Div 1<br>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

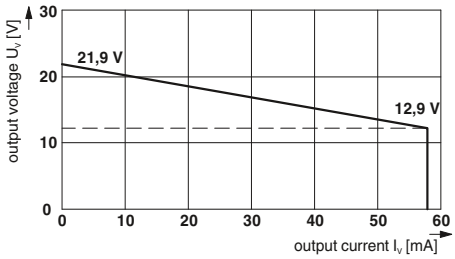
Functional Safety
Ex:
Housing width 12.5 mm

### 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 |
| 375 V (peak value in accordance with EN 60079-11)<br>300 $V_{rms}$ (rated insulation voltage (surge voltage category II; pollution degree 2, safe isolation as per EN 61010-1))<br>2.5 kV (50 Hz, 1 min., test voltage) |
| -20 °C ... 60 °C (any mounting position)<br>Yellow LED (switching state / status, lights up when output circuit is active)<br>IP20<br>V0<br>12.5 / 99 / 114.5 mm<br>0.2 ... 2.5 $mm^2$ / 0.2 ... 2.5 $mm^2$ / 24 - 14<br>0.2 ... 1.5 $mm^2$ / 0.2 ... 1.5 $mm^2$ / 24 - 16<br>Class A product, see page 625 |
| 25.1 V<br>188 mA<br>1.18 W<br>253 V AC (125 V DC) |
| CE-compliant, additionally EN 61326<br>Ex II 3 G Ex nA IIC T4 Gc X<br>Ex II (1) G [Ex ia Ga] IIB/IIA<br>Ex II (1) D [Ex ia Da] IIIC<br>[Ex ia Ga] IIB/IIA<br>Class I Div 2; IS for Class I, II, III Div 1<br>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 |



## Accessories
## Programming adapter

The IFS-USB-PROG-ADAPTER programming adapter is used for configuring Phoenix Contact INTERFACE modules with S-Port interface.

The adapter is used with FDT/DTM software or ANALOG-CONF software. For programming MACX Analog, MINI Analog Pro, and MINI Analog.

Ex:

| | Technical data |
|---|---|
| General data | |
| EMC note | Class A product, see page 625 |

| | Ordering data | | |
|---|---|---|---|
| Description | Type | Order No. | Pcs. / Pkt. |
| **Programming adapter** for configuring modules with S-PORT interface | **IFS-USB-PROG-ADAPTER** | **2811271** | 1 |

## Accessories

### Power and fault signaling module

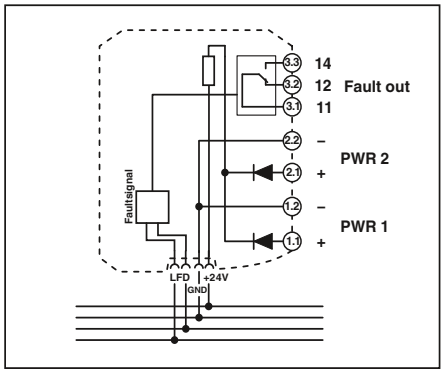
Power and fault signaling module for feeding the 24 V supply voltage to the DIN rail connectors and signaling line faults and power supply failures.

- 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 permitted

### ME 6,2 TBUS... DIN rail connector

DIN rail connector (5-pos.) 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 fault signaling module

Ex:

Housing width 17.5 mm

### Technical data

| | |
|---|---|
| Input data | |
| Input signal | 19.2 V DC ... 30 V DC (24 V DC (-20% ... +25%)) |
| 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 (50 V DC (0.3 A) / 50 V DC (2 A) / 33 V AC (2 A)) |
| General data | |
| Ambient temperature range | -20 °C ... 60 °C (any mounting position) |
| Humidity | 5 % ... 95 % (non-condensing) |
| Fuse | 5 A (replaceable), slow-blow 250 V AC |
| Status indication | 1 x red LED (error)<br>2 x green LEDs (PWR1 and PWR2) |
| Housing material | Polyamide (PA 6.6) |
| Inflammability class in acc. with 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 |
| Push-in connection solid / stranded / AWG | 0.2 ... 1.5 $mm^2$ / 0.2 ... 1.5 $mm^2$ / 24 - 16 |
| Conformance / approvals | |
| Conformance | CE-compliant |
| ATEX | II 3 G Ex nA nC IIC T4 Gc X |
| IECEx | Ex nA nC IIC T4 Gc X |
| UL, USA / Canada | UL 61010 Listed<br>Class I, Div. 2, Groups A, B, C, D T5<br>Class I, Zone 2, Group IIC |

### Ordering data

| Description | Type | Order No. | Pcs. / Pkt. |
|---|---|---|---|
| **Power and fault signaling 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 |
| Push-in connection | **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

### 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 | | | | |
| 10-part, lettering field size: 11 x 9 mm | white | **UC-EMLP (11X9)** | **0819291** | 10 |
| **UniCard,** with self-adhesive plastic labels, **marked according to customer specifications** For ordering details, see Catalog 5 or phoenixcontact.net/product. | | | | |
| 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 |

## Termination Carriers for MACX Analog Ex signal conditioners

Select standard DIN rail device

Select module carrier

Select controller-specific front adapter and system cable

Solutions are also available for MINI Analog, MACX Analog Ex, and Safety

**TC... Termination Carriers** are compact solutions for quickly and smoothly connecting DIN rail devices from the MACX Analog Ex series to input/output cards of automation systems using system cables.

The Termination Carriers combine the advantages of modular DIN rail devices with those offered by Plug and Play rapid cabling solutions to provide a consistent solution for system technology.

### Compact
– Saves up to 30% of space due to compact design

### Robust and reliable
– Stable, vibration-resistant aluminum carrier device profile
– PCB is completely decoupled from modules
– PCB without active components
– Redundant supply and monitoring in separate DIN rail module

### Easy maintenance
– Use of standard DIN rail devices
– Easy access to connection points
– Quick and safe module connection with plug-in and coded cable sets

### Flexible
– Horizontal or vertical DIN rail mounting
– Profile section without pitch markings for I/O cards with specific number of channels
– Can be specifically adapted for I/O cards of various automation systems with different system plug types

## Termination Carriers for MACX Analog Ex signal conditioners

The **TC-D37SUB-ADIO16-EX-P-UNI** universal Termination Carrier is a compact solution which connects signal conditioners from the MACX Analog Ex series to analog or binary input/output cards of automation systems.

The **TC-D37SUB-AIO16-EX-PS-UNI** Termination Carrier design, when combined with the MACX MCR-S-MUX HART multiplexer, also enables communication between HART-capable field devices and a management system.

- Connection of up to 16 single-channel (Ex i) signal conditioners
- Universal 1:1 signal routing to a 37-pos. D-SUB connector
- For system cables with D-SUB socket and open ends for universal connection
- Redundant supply and monitoring in separate DIN rail module

**Notes:**

Contact us: specific Termination Carrier designs for I/O modules of various automation systems are available, planned or can be implemented according to your specifications.

EAC
Ex: Ⓔx
Housing width 242 mm

### Technical data

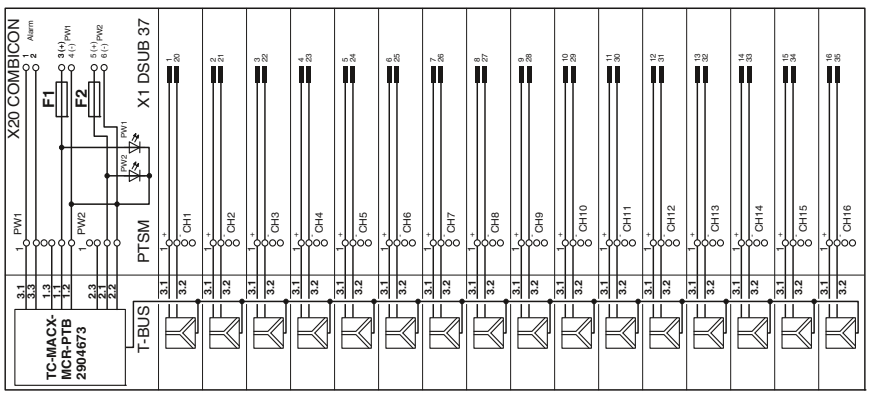
| | |
|---|---|
| General data | |
| Connection to the control system level | D-SUB pin strip |
| Number of positions | 37 |
| Max. operating voltage | < 50 V DC (per signal/channel) |
| Max. permissible current | 23 mA (signal/channel) |
| Rated insulation voltage | 50 V |
| Pollution degree | 2 |
| Surge voltage category | II |
| Rated surge voltage | 0.5 kV (basic insulation) |
| Clearance and creepage distances | DIN EN 50178 |
| Ambient temperature range | -20 °C ... 60 °C (please observe module specifications) |
| Shock | 15g, according to IEC 60068-2-27 |
| Vibration (operation) | 2g, according to IEC 60068-2-6 |
| Dimensions W / H / D | 242 / 170 / 160 mm |
| EMC note | Class A product, see page 625 |
| Power supply via power module | |
| Input voltage range | 19.2 V DC ... 30 V DC |
| Redundant supply | yes, decoupled from diodes |
| Polarization and surge protection | Yes |
| Fuse | 2x 2.5 A on PCB, slow-blow (replaceable) |
| Status indication | 1 x red LED (error)<br>2x green LEDs (PWR1 and PWR2) |
| Switching output | 1 N/C contact (alarm = open) |
| Maximum switching voltage | 50 V DC (0.3 A) / 30 V DC (2 A) / 33 V AC (2 A) |

### Ordering data

| Description | Type | Order No. | Pcs. / Pkt. |
|---|---|---|---|
| **Universal Termination Carrier** for 16 MACX MCR-EX isolators | | | |
| | **TC-D37SUB-ADIO16-EX-P-UNI** | **2924854** | 1 |
| - With connection for MACX MCR-S-MUX HART multiplexer | **TC-D37SUB-AIO16-EX-PS-UNI** | **2902932** | 1 |

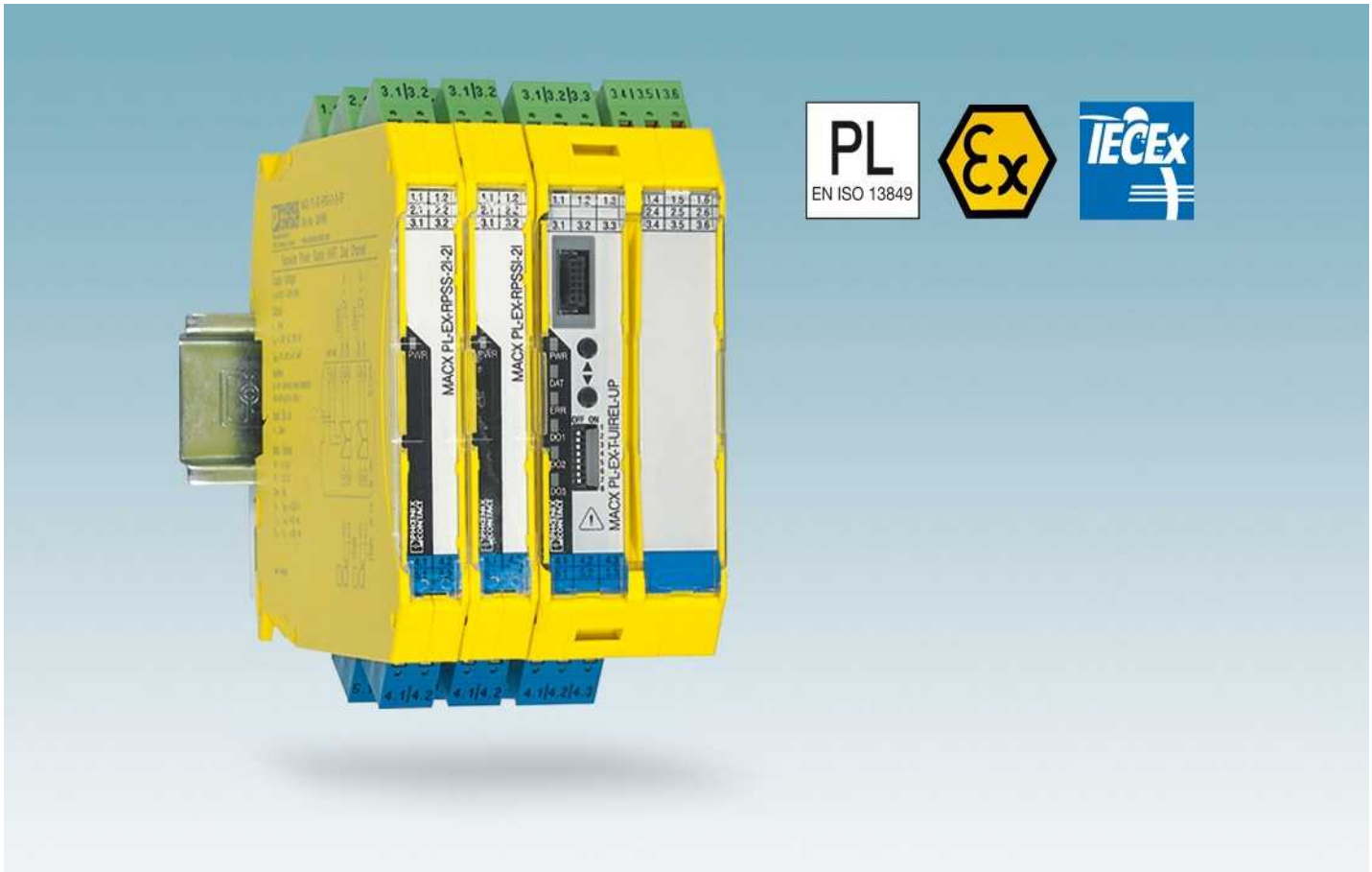
### Accessories

| | | | |
|---|---|---|---|
| **Power and fault signaling module** | **TC-MACX-MCR-PTB** | **2904673** | 1 |
| **HART multiplexer,** 32-chanel, including two 14-wire flat-ribbon cables | **MACX MCR-S-MUX** | **2865599** | 1 |




**TC-D37SUB-ADIO16-EX-P-UNI and TC-D37SUB-AIO16-EX-PS-UNI connection scheme**

## Ex i signal conditioners with PL and SIL functional safety - MACX Safety Ex




### Integrate analog signals safely

Integrate analog signals easily into your safety application according to the Machinery Directive. The MACX Safety Ex analog signal conditioners are certified according to EN ISO 13849-1 with performance level PL d.

Universal use for intrinsically safe circuits in all Ex zones and for all gas and dust groups, thanks to international approval package.

### Choose the right MACX Safety Ex signal conditioner for your application:

**Analog IN**

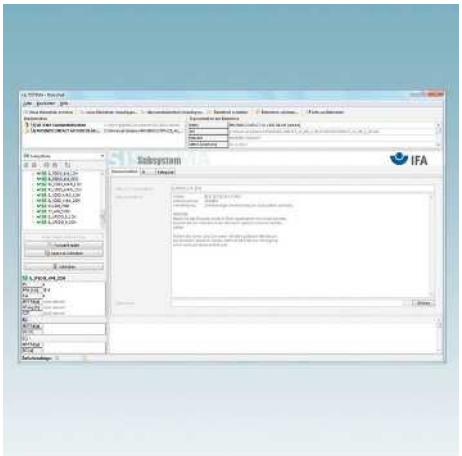
– 4...20 mA repeater power supplies and input signal conditioners with 2 electrically isolated outputs

**Temperature**

– Universal temperature transducers

**Direct switching of limit values possible without an additional safety controller**

– Cost savings: direct, safe switching of limit values possible without an additional safety controller
– Easy to combine active or passive analog signals with other safety modules

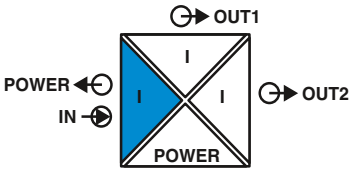


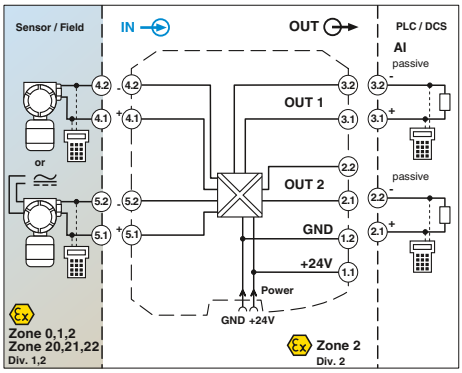
**Easy planning of the safety application with SISTEMA**

– Easy planning of the safety application with SISTEMA: the required data is already stored there

**DIN rail connector-compatible**
The DIN rail connector enables the modular bridging of the 24 V supply voltage.

## Analog IN
## Repeater power supply, Ex i



**Repeater power supply and input signal conditioner, with two electrically isolated outputs**

Ex:

Housing width 12.5 mm

- 4...20 mA input, [Ex ia], powered and not powered
- Two electrically isolated 4...20 mA (active) outputs
- PL d according to EN ISO 13849-1
- Up to SIL 2 according to IEC 61508
- Installation in zone 2 possible
- Plug-in screw and push-in connection technology
- 4-way electrical isolation
- Bidirectional HART communication possible
- Power supply via DIN rail connector possible

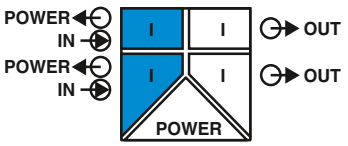
### Technical data

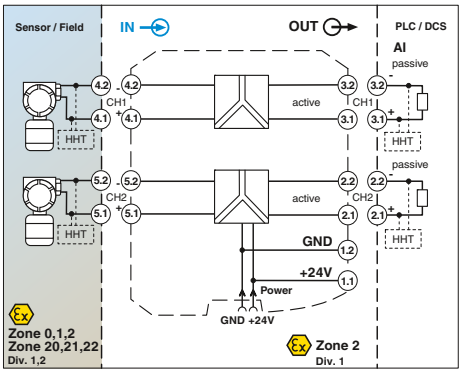
| | |
|---|---|
| **Input data** | |
| Input signal | 4 mA ... 20 mA / 4 mA ... 20 mA |
| Transmitter supply voltage | > 16 V (at 20 mA) |
| Voltage drop | approx. 3.9 V |
| **Output data** | |
| Output signal (per output) | 4 mA ... 20 mA (active) |
| Load | < 450 Ω (at 20 mA) |
| Output ripple | < 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) |
| Underload/overload range | according to NE 43 |
| Electrical isolation | |
| Input/output/power supply | 300 $V_{rms}$ (rated insulation voltage (surge voltage category II; pollution degree 2, safe isolation as per EN 61010-1)) 2.5 kV (50 Hz, 1 min., test voltage) |
| 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 |
| Push-in connection solid / stranded / AWG | 0.2 ... 1.5 $mm^2$ / 0.2 ... 1.5 $mm^2$ / 24 - 16 |
| EMC note | Class A product, see page 625 |
| **Safety data as per ATEX** | |
| Max. output voltage $U_o$ | 25.2 V |
| Max. output current $I_o$ | 93 mA |
| Max. output 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 Ga] IIC/IIB<br>II (1) D [Ex ia Da] IIIC<br>II 3 (1)G Ex nA [ia Ga] IIC/IIB T4 Gc |
| IECEx | [Ex ia Ga] IIC/IIB, [Ex ia Da], Ex nA [ia Ga] IIC/IIB T4 Gc |
| SIL in accordance with IEC 61508 | 2 |
| Performance level according to ISO 13849 | PLd |

### Ordering data

| Description | Type | Order No. | Pcs. / Pkt. |
|---|---|---|---|
| **Repeater power supply and input signal conditioner, signal duplicator**, with performance level, intrinsically safe input | | | |
| Screw connection | **MACX PL-EX-RPSSI-2I** | **2904959** | 1 |
| Push-in connection | **MACX PL-EX-RPSSI-2I-SP** | **2904960** | 1 |

## Analog IN
## Repeater power supply, Ex i



**2-channel repeater power supply**

Functional Safety
Ex:
Housing width 12.5 mm

- 2-channel
- 4...20 mA input, [Ex ia], powered
- 4 ... 20 mA output (active)
- PL d according to EN ISO 13849-1
- Up to SIL 3 according to IEC 61508
- Installation in zone 2 possible
- Plug-in screw and push-in connection technology
- 3-way electrical isolation, per channel
- Bidirectional HART communication possible
- Power supply via DIN rail connector possible

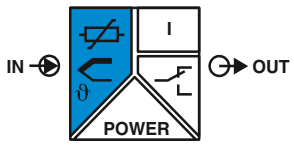
### Technical data

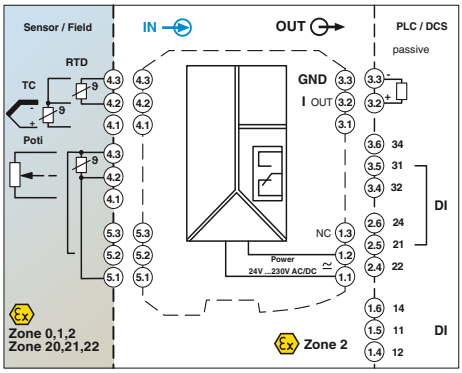
| | |
|---|---|
| Input data | per channel |
| Input signal | 4 mA ... 20 mA |
| Transmitter supply voltage | > 16 V (at 20 mA) |
| Underload/overload signal range | 0 mA ... 24 mA |
| Output data | per channel |
| Output signal | 4 mA ... 20 mA (active) |
| Load | ≤ 450 Ω (20 mA) |
| Underload/overload signal range | 0 mA ... 24 mA |
| General data | |
| Supply voltage range | 19.2 V DC ... 30 V DC (24 V DC (-20% ... +25%)) |
| Current consumption | < 100 mA (24 V / 20 mA) |
| Power dissipation | < 1.4 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) |
| Electrical isolation | |
| Input/output, power supply | 300 $V_{rms}$ (rated insulation voltage (surge voltage category II; pollution degree 2, safe isolation as per EN 61010-1))<br>2.5 kV (50 Hz, 1 min., test voltage) |
| 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/ power supply | 1.5 kV (50 Hz, 1 min., test voltage) |
| 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 |
| Push-in connection solid / stranded / AWG | 0.2 ... 1.5 $mm^2$ / 0.2 ... 1.5 $mm^2$ / 24 - 16 |
| EMC note | Class A product, see page 625 |
| Safety data as per ATEX | |
| Max. output voltage $U_o$ | 25.2 V |
| Max. output current $I_o$ | 93 mA |
| Max. output 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 Ga] IIC/IIB<br>II (1) D [Ex ia Da] IIIC<br>II 3(1) G Ex nA [ia Ga] IIC T4 Gc |
| IECEx | [Ex ia Ga] IIC/IIB, [Ex ia Da] IIIC, Ex nA [ia Ga] IIC T4 Gc |
| SIL in accordance with IEC 61508 | 3 |
| Performance level according to ISO 13849 | PLd |

### Ordering data

| Description | Type | Order No. | Pcs. / Pkt. |
|---|---|---|---|
| **Repeater power supply,** two-channel, with performance level, intrinsically safe input | | | |
| Screw connection | **MACX PL-EX-RPSS-2I-2I** | **2904963** | 1 |
| Push-in connection | **MACX PL-EX-RPSS-2I-2I-SP** | **2904964** | 1 |

## Temperature
## Temperature transducer, Ex i



**Universal, with limit value relay, wide range power supply**

Functional Safety
Ex:
Housing width 35 mm

- Input for resistance thermometers, thermocouples, resistance-type sensors, potentiometers, mV sources, [Ex ia]
- Differential measurement possible with Pt 100
- A safety-related limit value relay, by bridging two relays
- An additional limit value relay for non-safety-related function
- PL d according to EN ISO 13849-1
- Up to SIL 2 according to IEC 61508
- Configuration via software (ANALOG-CONF or FDT/DTM)
- Cold junction compensation with separate connector
- Wide range power supply 19.2...253 V AC/DC
- Status indicators for supply voltage, cable, sensor, and module errors
- Installation in zone 2 possible
- Plug-in screw and push-in connection technology

**Notes:**

You can find the ANALOG-CONF and FDT/DTM configuration software on page 187

### 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** | |
| Output signal | 4 mA ... 20 mA |
| Maximum output signal | 22 mA |
| Load $R_B$ | ≤ 600 Ω (20 mA) |
| Behavior in the event of a sensor error | according to NE 43 or freely configurable |
| **Switching output** | Relay output |
| Contact type | 2 PDT |
| 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 |
| Maximum transmission error | 0.1 % (e.g. for Pt 100, 300 K span, 4 ... 20 mA) |
| Electrical isolation | |
| Input/output/power supply | 2.5 kV (50 Hz, 1 min., test voltage) |
| 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 | 300 $V_{rms}$ (rated insulation voltage (surge voltage category II; pollution degree 2, safe isolation as per EN 61010-1)) |
| Ambient temperature range | -20 °C ... 65 °C |
| Humidity | typ. 5 % ... 95 % (non-condensing) |
| Housing material | PA 66-FR |
| Inflammability class in acc. with 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 |
| Push-in connection solid / stranded / AWG | 0.2 ... 1.5 $mm^2$ / 0.2 ... 1.5 $mm^2$ / 24 - 16 |
| EMC note | Class A product, see page 625 |
| **Safety data as per ATEX** | |
| Max. output voltage $U_o$ | 6 V |
| Max. output current $I_o$ | 7.4 mA |
| Max. output power $P_o$ | 11 mW |
| **Conformance / approvals** | |
| Conformance | CE-compliant |
| ATEX | Ex II (1) G [Ex ia Ga] IIC<br>Ex II (1) D [Ex ia Da] IIIC<br>Ex II 3 G Ex nA nC ic IIC T4 Gc X |
| IECEx | [Ex ia Ga] IIC, [Ex ia Da] IIIC, Ex nA nC ic IIC T4 Gc X |
| SIL in accordance with IEC 61508 | 2 |
| Performance level according to ISO 13849 | PLd |

### Ordering data

| Description | Type | Order No. | Pcs. / Pkt. |
|---|---|---|---|
| **Temperature transducer with threshold value switch,** with performance level, intrinsically safe input | | | |
| Screw connection | **MACX PL-EX-T-UIREL-UP** | **2904910** | 1 |
| Push-in connection | **MACX PL-EX-T-UIREL-UP-SP** | **2904912** | 1 |

### Accessories

| | | | |
|---|---|---|---|
| **Programming adapter** for configuring modules with S-PORT interface | **IFS-USB-PROG-ADAPTER** | **2811271** | 1 |

## 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-pos. (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 socket |
| Signal | RS-485 |
| Data flow control/protocols | Compatible with OPC HART server, PDM, PRM, and FDT/DTM |
| 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) |
| Electrical isolation between HART signal/RS-485 | 350 V AC |
| Electrical isolation between HART signals | 100 V DC (capacitive) |
| Electrical isolation between HART signal/supply | 350 V AC |
| Electrical isolation between RS-485/supply | 350 V AC |
| Error monitoring | Processor error: “PWR” LED flashes; HART communication error: “ERR” LED flashes |
| Ambient temperature range | -20 °C ... 60 °C |
| Humidity | ≤ 95 % (non-condensing) |
| 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 cables | **MACX MCR-S-MUX** | **2865599** | 1 |

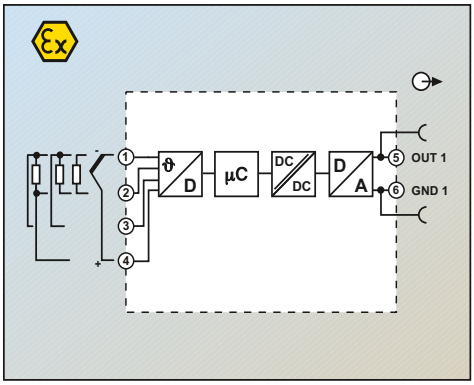
### Accessories

| | | | |
|---|---|---|---|
| **Universal Termination Carrier** for 16 MACX MCR-EX isolators<br>- With connection for MACX MCR-S-MUX HART multiplexer | **TC-D37SUB-AIO16-EX-PS-UNI** | **2902932** | 1 |
| **Module carrier** for 16 MINI Analog channels, power and feed-through module<br>- With connection for MACX MCR-S-MUX HART multiplexer | **TC-D37SUB-AIO16-M-PS-UNI** | **2902934** | 1 |
| **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, DIN-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 |

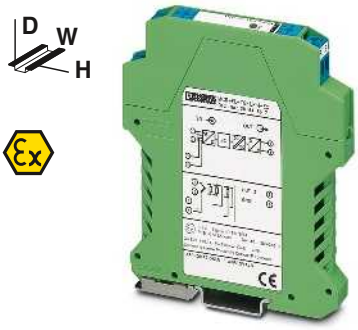
## Programmable loop-powered temperature transducer, Ex i

- 1-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
- 2-way electrical 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. |
| To configure the MCR-FL-TS-LPI-EX HART-capable device (2864587), you need a HART modem. |
| To configure the MCR-FL-T-LP-EX device (2864574), you need the MCR-PAC-T-USB programming adapter and the MCR/PI-CONF-WIN software, see page 226 |




Block diagram MCR-FL-TS-LP-I-EX




**Loop-powered, programmable**

Ex: Housing width 12.5 mm

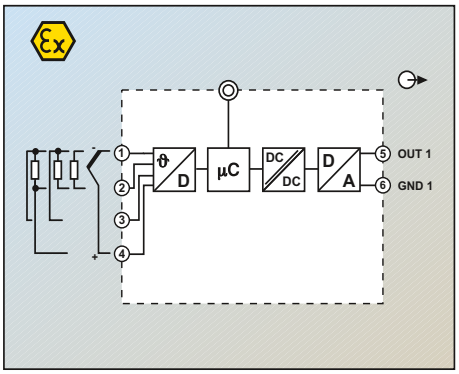
### Technical data

| | | |
|---|---|---|
| **Measuring input** | | |
| Resistance thermometers | | Pt, Ni (100, 500, 1000); min. measuring range 10 K |
| Thermocouple sensors | | B, C, D, E, J, K, L, N, R, S, T, U; min. measuring range 50 K/500 K |
| Resistor | | 10 Ω ... 400 Ω (min. measuring range 10 Ω)<br>10 Ω ... 2000 Ω (min. measuring range 100 Ω) |
| Voltage | | -10 mV ... 100 mV (min. measuring 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 in acc. with UL 94 | | V0 |
| Dimensions W / H / D | | 12.5 / 99 / 114.5 mm |
| Connection method | | 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 | | IIA | IIB | IIC | IIA | IIB | IIC |
| - 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 | | |
| **Conformance / approvals** | | | | | | | |
| Conformance | | CE-compliant | | | CE-compliant | | |
| ATEX | | Ex II 2(1) G Ex ia IIC T6 | | | Ex II 2(1) G Ex ia IIC T4...T6 | | |
| UL, USA / Canada | | cULus | | | cULus | | |
| Functional Safety (SIL) | | SIL 2 | | | - | | |

### Ordering data

| Description | Type | Order No. | Pcs. / Pkt. |
|---|---|---|---|
| **MCR temperature transducer,** for resistance thermometers, thermocouples, resistance-type sensors, and voltage sensors | | | |
| HART-compatible | **MCR-FL-TS-LP-I-EX** | **2864587** | 1 |
| | **MCR-FL-T-LP-I-EX** | **2864574** | 1 |




Block diagram MCR-FL-T-LP-I-EX

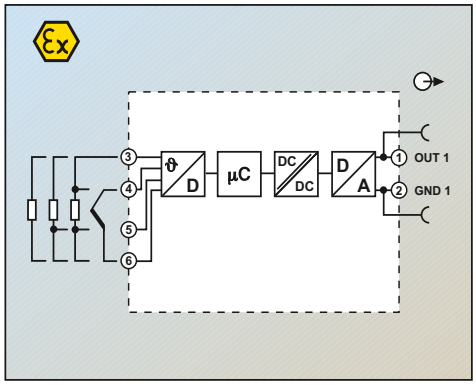
## Programmable loop-powered temperature transducer with connection heads, Ex i

- 1-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
- 2-way electrical isolation
- HART-compatible

**Notes:**

The devices are supplied with the standard configuration: Pt 100 sensor, measuring range 0 ... 100°C, 3-wire connection.

To configure the MCR-FL-TS-LPI-EX HART-capable device, you need a HART modem.




Block diagram MCR-FL-HT-TS-I-EX

**Loop-powered, programmable**

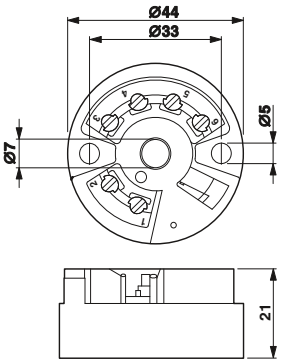
Ex:

### Technical data

| | | |
|---|---|---|
| **Measuring input** | | |
| Resistance thermometers | | Pt, Ni (100, 500, 1000); min. measuring range 10 K |
| Thermocouple sensors | | B, C, D, E, J, K, L, N, R, S, T, U; min. measuring range 50 K/500 K |
| Resistor | | 10 Ω ... 400 Ω (min. measuring range 10 Ω)<br>10 Ω ... 2000 Ω (min. measuring range 100 Ω) |
| Voltage | | -10 mV ... 75 mV (min. measuring 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 in acc. with UL 94 | | V0 |
| Screw connection solid / stranded / AWG | | 0.2 ... 1.75 $mm^2$ / 0.2 ... 1.75 $mm^2$ / 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 | | IIA IIB IIC |
| - 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<br>Category 2: T4 = 85°C, T5 = 70°C, T6 = 55°C |
| **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 |

### Ordering data

| Description | Type | Order No. | Pcs. / Pkt. |
|---|---|---|---|
| **MCR temperature transducer, smart,** for resistance thermometers, thermocouples, resistance-type sensors and voltage sensors | **MCR-FL-HT-TS-I-EX** | **2864545** | 1 |



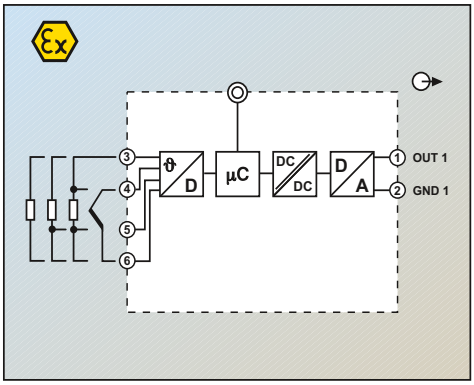
## Programmable loop-powered temperature transducer with connection heads, Ex i

- 1-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
- 2-way electrical 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 226




Block diagram MCR-FL-HT-T-I-EX

**Loop-powered, programmable**

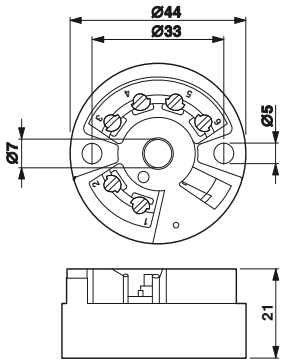
EAC
Ex:

### Technical data

| | | |
|---|---|---|
| **Measuring input** | | |
| Resistance thermometers | | Pt, Ni (100, 500, 1000); min. measuring range 10 K |
| Thermocouple sensors | | B, C, D, E, J, K, L, N, R, S, T, U; min. measuring range 50 K/500 K |
| Resistor | | 10 Ω ... 400 Ω (min. measuring range 10 Ω)<br>10 Ω ... 2000 Ω (min. measuring range 100 Ω) |
| Voltage | | -10 mV ... 100 mV (min. measuring 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 in acc. with 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 | | IIB IIC |
| - 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<br>Category 2: T4 = 85°C, T5 = 70°C, T6 = 55°C |
| **Conformance / approvals** | | |
| Conformance | | CE-compliant |
| ATEX | | Ex II 1 G Ex ia IIC T6/T5/T4 |
| UL, USA / Canada | | cULus |

### Ordering data

| Description | Type | Order No. | Pcs. / Pkt. |
|---|---|---|---|
| **MCR temperature transducer,** for resistance thermometers, thermocouples, resistance-type sensors and voltage sensors | **MCR-FL-HT-T-I-EX** | **2864532** | 1 |



## Accessories

### 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-FL-T(S)-LP-I-EX and MCR-FL-HT-T(S)-I-EX
– Electrically isolated
– 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 MCR-T-...-, MCR-...-LP-...-, MCR-...-HT-...-, MCR-S-...-, MCR-F-..., and MCR-PSP-... modules, CD-ROM | **MCR/PI-CONF-WIN** | **2814799** | 1 |

## Accessories

### 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 supported under 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 adapter D-9-SUB to D-25-SUB | **CM-KBL-RS232/USB** | **2881078** | 1 |
| **Software adapter cable,** 2.4 m in length, with USB connection, for programming MCR-...-LP-... and MCR-...-HT-... modules | **MCR-PAC-T-USB** | **2309000** | 1 |
| | **Accessories** | | |
| **Adapter cable,** flexible, 9-pos. D-SUB socket to 25-pos. D-SUB pin | **PSM-KAD 9 SUB 25/BS** | **2761295** | 1 |

## Accessories

### Shield fast connection

– For connecting cable shielding to cable terminal points
– Can be connected to PLUGTRAB PT
– Easy assembly

| Description | Ordering data: Type | Order No. | Pcs. / Pkt. |
|---|---|---|---|
| **Shield fast connection,** for connection to PLUGTRAB PT | | | |
| For Ø 3-6 mm | **SSA 3-6** | **2839295** | 10 |
| For Ø 5-10 mm | **SSA 5-10** | **2839512** | 10 |

## Accessories

### Test plug

| Description | Color | Ordering data: Type | Order No. | Pcs. / Pkt. |
|---|---|---|---|---|
| **Test plug,** consisting of: | | | | |
| **Metal part** for 2.3 mm Ø socket hole and | silver | **MPS-MT** | **0201744** | 10 |
| **Insulating sleeve,** for MPS metal part | red | **MPS-IH RD** | **0201676** | 10 |
| | white | **MPS-IH WH** | **0201663** | 10 |
| | blue | **MPS-IH BU** | **0201689** | 10 |
| | yellow | **MPS-IH YE** | **0201692** | 10 |
| | green | **MPS-IH GN** | **0201702** | 10 |
| | gray | **MPS-IH GY** | **0201728** | 10 |
| | black | **MPS-IH BK** | **0201731** | 10 |

PHOENIX CONTACT
EMpro
1-2 690.3 V
U 2-3 689.6
3-1 688.9
F 50.00 Hz
C 0002 17683 kWh
I °C U F P PF MAX AVG H E
◀/TEST ▶ ▼ ▲ OK PROG

Serial No. 9N1XNB0005

# Monitoring

**Measuring power and energy**

EMpro energy meters measure, analyze, and communicate electrical system parameters.

Monitoring software ensures efficient energy and power measurement.

Stand-alone data loggers are the complete package for decentralized data acquisition.

PSK sensors acquire the operating pressure of gaseous media.

PSK meters record compressed air consumption.

**Current measurement**

PACT current transformers convert currents up to 4000 A into secondary currents of 1 and 5 A.

MCR current transducers convert currents into standard analog signals.

**Monitoring and diagnostics**

The SOLARCHECK modular monitoring system is used for string monitoring in photovoltaic systems.

RCM devices provide residual current monitoring in grounded power supply systems. They detect residual currents at an early stage before they result in forced shutdown.

EV Charge Control is the charging controller used to charge electric vehicles on the AC mains according to IEC 61851-1.

EMD monitoring relays detect and indicate deviations in important system parameters at an early stage.

ETD timer relays are used for straightforward time control functions.

Diode modules, lamp testing modules, and EMG display modules allow industrial use of simple components such as diodes - with professional housing and connection technology.

**Product range overview**


| | |
|---|---|
| **Product overview** | **230** |
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| EMpro function and communication modules | **240** |
| Accessories | **243** |
| Software for usage data acquisition | **244** |
| Complete packages for data logging | **245** |
| Pressure sensors and compressed air meters | **246** |
| **Current measurement** | |
| Current transformers | **250** |
| Current transformer selection guide | **252** |
| PACT current transformers | **253** |
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| Diode modules, lamp testing modules, EMG display modules | **312** |

## Product overview

### Measuring power and energy

EMpro energy meters for front-panel installation Page 238

EMpro energy meters for DIN rail mounting Page 239

Function and communication modules for EMpro Page 240

DIN rail adapter for EMpro Page 243

### Current transformers

PACT bus-bar current transformers Page 252
Can be calibrated Page 264

PACT window-type current transformers Page 254
Can be calibrated Page 264

PACT winding current transformer Page 262

PACT RCP... current transformers for retrofitting Page 268

### Solar system monitoring

Accessories
Configuration software and USB adapter cable Page 226

SOLARCHECK PV string monitoring
Communication module Page 282

SOLARCHECK PV string monitoring
Current measuring module Page 285

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Voltage measuring module Page 285

### Timer relays

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Multifunctional monitoring relays Page 300

ETD-BL
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ETD
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### Function modules

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Software for usage data acquisition
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Complete packages for data logging
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Compressed air meters
Page 246

## Current measurement

Mounting accessories, shock protection
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MCR current transducers for AC/DC and distorted currents
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MCR current transducers for sinusoidal and distorted AC currents
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Passive, up to 5 A
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MCR current protector for AC currents, sinusoidal up to 16 A
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## Residual current monitoring

RCM residual current monitoring for DC residual currents and pulsating DC and AC residual currents
Page 288

## Components for E-Mobility

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Charging controller
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EV Charge Lock Release
Mains failure plug release
Page 292

## Monitoring relays

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Compact monitoring relays
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## Lightning monitoring system

Lightning monitoring system
See Catalog 6

## HMIs

HMIs
See Catalog 8

## Signal towers

Signal towers
See Catalog 8

## Energy costs at a glance

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 advantage in the areas of production, process, and industrial engineering.

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.

## Advantages of energy data acquisition

Continuously recorded energy flow provides the basis for a target-oriented energy management system.

Access comprehensive information regarding the characteristic electrical data of your machinery and benefit from the advantages of this:

– Reduce your energy costs by identifying potential energy savings.
– Optimize your system capacity: through intelligent switching of system parts, uniform network load, and reduced harmonics.
– Reduce peak loads using forward-looking trend calculation and load management.
– Safeguard your production processes and minimize downtimes by continuously monitoring important system parameters.

## Measurement – monitoring – communication

Efficient energy management – network-capable EMpro energy meters can be used to acquire and monitor the characteristic electrical data of your machines and systems.

They can be freely extended with communication modules and function modules, enabling your energy meters to keep pace with your growing requirements. Future-proof planning and investment is therefore ensured.

**The communication expert**

The EMpro MA600 is capable of performing all measurement tasks associated with power supply applications up to 700 V AC.

– From simple current and power measurement to the detection of harmonics including spectral analysis
– Flexible integration into Ethernet, PROFIBUS or RS-485 networks
– Remote access via web server
– Optional DIN rail adapter for DIN rail mounting
– Can be extended with communication modules and function modules

**The universal solution on the front panel**

The EMpro MA400 performs standard measuring tasks up to 519 V AC.

– Optional DIN rail adapter for DIN rail mounting
– Communication module for integration into RS-485 networks (Modbus/RTU)
– Function module for pulse or alarm output

**The measuring device with RS-485 communication**

The EMpro MA250 performs standard measuring tasks up to 519 V AC.

– DIN rail device
– With pulse or alarm output
– Integrated RS-485 communication (Modbus/RTU)

**The measuring device with pulse output**

The EMpro MA200 is ideal for simple measuring tasks up to 519 V AC.

– DIN rail device
– With pulse or alarm output

**Software for usage data acquisition**

In conjunction with a 100-series modular controller, the EMwise software from Phoenix Contact is the efficient solution for recording energy data related to heat, cold, air, or electricity. You can therefore keep an eye on your resources at all times and efficiently manage their use in your machines and systems.

**Sensors and meters**

Use of resources at a glance - determine all relevant states using sensors and meters.

– Detailed procurement measurement, thanks to precise sensor and meter technology
– Intelligent sensor communication, thanks to IO-Link technology

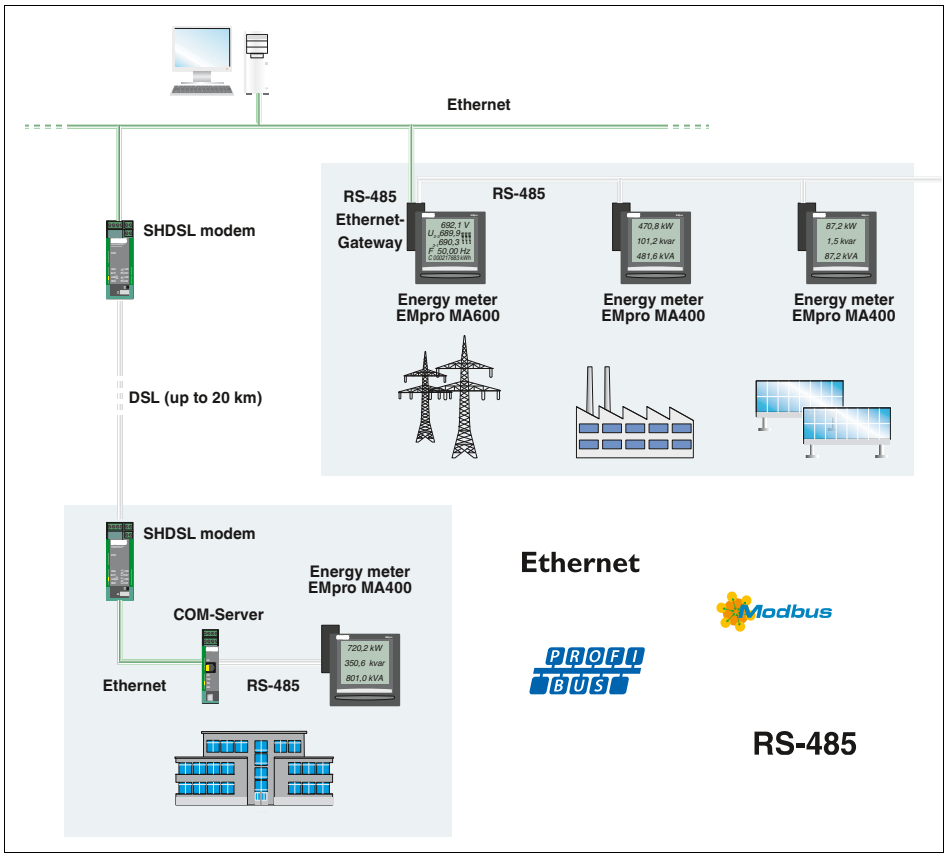
**Inline power measurement terminal**

The Inline power measurement terminal enables analysis of AC networks.

– For measuring current, voltage, and power, as well as identifying distortion and harmonics

The power measurement terminal can be found in Catalog 8, Control technology, I/O systems, and network structure.

## Energy meters




### Measurement – monitoring – communication

In order to achieve efficient energy management, all energy data that has been determined is acquired and analyzed centrally in the control center.

For data transmission, integrate the EMpro measuring devices flexibly into your network structures.

The network components from Phoenix Contact offer interference-free and high-performance communication of energy data, even in harsh industrial environments:

– Copper-based and fiber optic data transmission
– Ethernet and modem communication
– Industrial wireless transmission

### Direct access to measured values

Analyze your system parameters quickly on site. At the touch of a button, you can access precisely those measured values that are of relevance.

You can also use the user-friendly web server function to request measured values directly from the control center.

### Planning reliability and investment security

EMpro extension modules, function modules, and communication modules enable you to remain flexible and extend your EMpro measuring devices at any time:

– Digital inputs and outputs
– Pulse outputs
– Analog outputs
– Communication interfaces
– Measured mass storage
– Temperature measurement

### Remote access to multiple meters - with just one IP address

The web server that has been integrated into the Ethernet communication modules allows you to conveniently configure key parameters online. It also allows remote access to key electrical characteristics such as current, voltage, power, energy, and harmonics.

## Selection guide

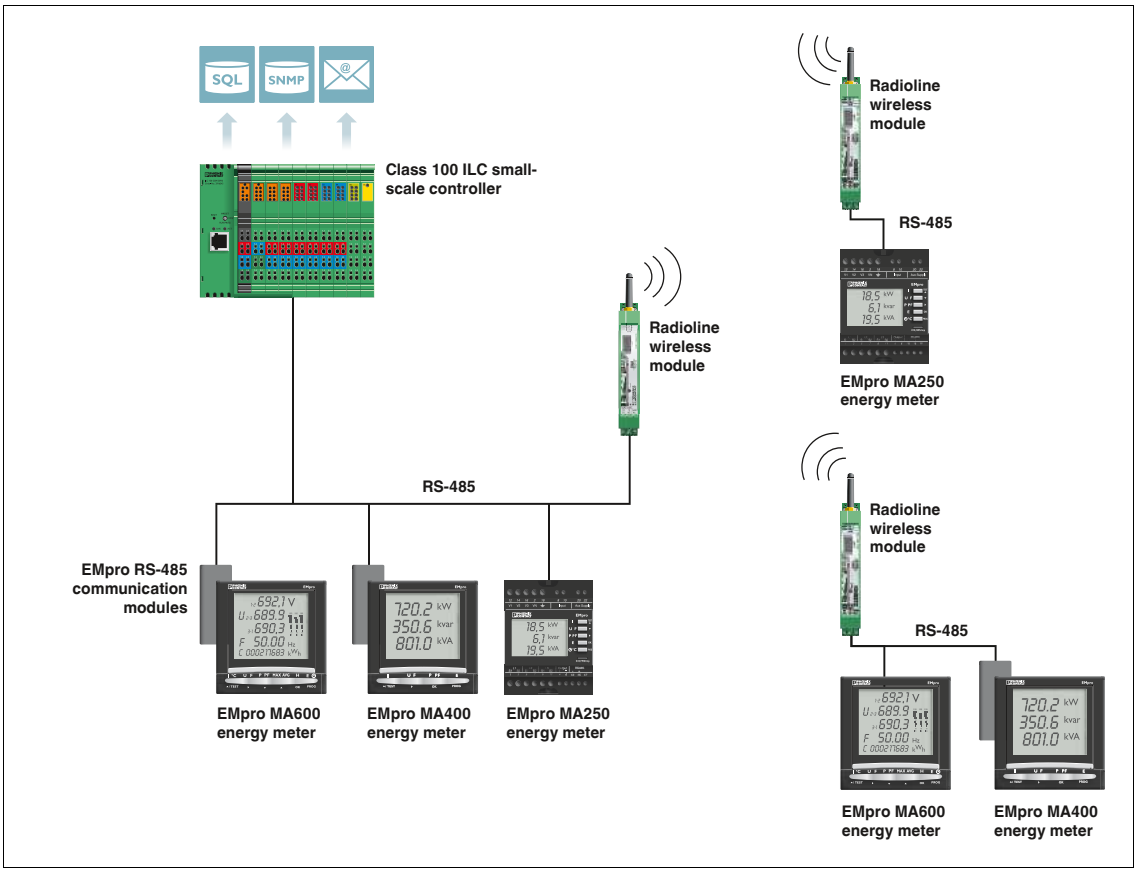
You can easily select the right device for your application by referring to the table below:

| Product type | EMpro MA600 | EMpro MA400 | EMpro MA200/250 |
|---|---|---|---|
| | 2901366 EEM-MA600 | 2901364 EEM-MA400 | 2901362 EEM-MA200 |
| | 2902352 EEM-MA600-24DC | | 2901363 EEM-MA250 |
| **Voltages** | | | |
| Voltage measurement direct | up to 700 V | up to 519 V | up to 519 V |
| Voltage converter | up to 500 kV | | |
| Voltages U12, U23, U31, V1, V2, V3 | • | • | • |
| Maximum mean value | • | | |
| Mean value | • | | |
| **Currents** | | | |
| Current measurement | direct up to 6 A or current transformer | Current transformer | Current transformer |
| Currents I1, I2, I3 | • | • | • |
| Neutral conductor current IN (calculation) | • | • | • |
| Maximum mean value | • | • | • |
| Mean value | • | | |
| **Frequency** | | | |
| F | • | • | • |
| Maximum mean value | • | | • |
| Mean value | • | | |
| **Power** | | | |
| Real power, reactive power, apparent power: ΣP (+/-), ΣQ (+/-), ΣS (+/-) | • | • | • |
| P, Q, S per phase | • | • | • |
| Maximum mean value | • | • | • |
| Mean value | • | | |
| Trend performances | • | | |
| **Power factor** | | | |
| ΣPF | • | • | • |
| PF per phase | • | • | • |
| **Metering** | | | |
| Real energy (kWh) | kWh+/kWh- | kWh+ | kWh+ |
| Reactive power (kvarh) | kvarh+/kvarh- | kvarh+ | kvarh+ |
| Apparent energy (kVAh) | kVAh | | |
| Multi-tariff meter | | | 2 |
| Operating hours | • | • | • |
| **Accuracy class (EN62053-22)** | 0.5 S | 0.5 S | 0.5 S |
| **Harmonics analysis** | | | |
| Distortion factor THD I/U/V | up to 63rd | up to 51st | up to 51st |
| Spectral analysis | up to 63rd | | |
| **Functions** | | | |
| Temperature recording | | | • |
| Digital input | | | • |
| **Function modules (optional)** | | | |
| 1 pulse or alarm output | | 2904314 EEM-IMP-MA400 | Integrated |
| 2 pulse outputs | 2904313 EEM-IMP-MA600 | | |
| 2 digital inputs, 2 digital outputs | 2901371 EEM-2DIO-MA600 | | |
| 2 analog outputs | 2901475 EEM-2AO-MA600 | | |
| 3 Pt100 inputs and 1 internal temperature measurement | 2901949 EEM-TEMP-MA600 | | |
| Memory | 2901370 EEM-MEMO-MA600 | | |
| **Communication modules (optional)** | | | |
| RS-485 (Modbus/RTU) | 2901367 EEM-RS485-MA600 | 2901365 EEM-RS485-MA400 | integrated (MA250 only) |
| D-SUB (PROFIBUS) | 2901418 EEM-PB12-MA600 | | |
| Ethernet gateway (Modbus/TCP/RTU) with integrated web server | 2901374 EEM-ETH-RS485-MA600 | | |
| Ethernet (Modbus/TCP) with integrated web server | 2901373 EEM-ETH-MA600 | | |

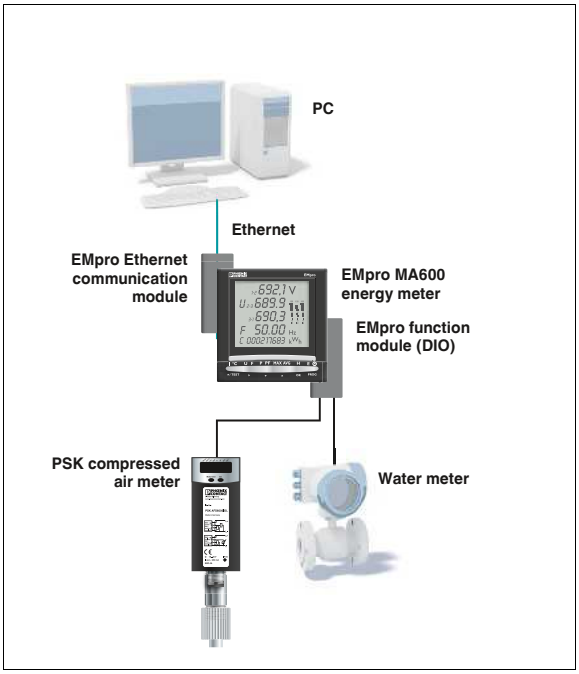
**Key**

| | | | | | |
|---|---|---|---|---|---|
| I1, I2, I3 | Conductor currents | P | Real power | THD | Total harmonic distortion |
| IN | Neutral conductor current | Q | Reactive power | Σ | Total values |
| U12, U23, U31 | Phase conductor voltages | S | Apparent power | | |
| V1, V2, V3 | Phase/N conductor voltages | PF | Power factor | | |

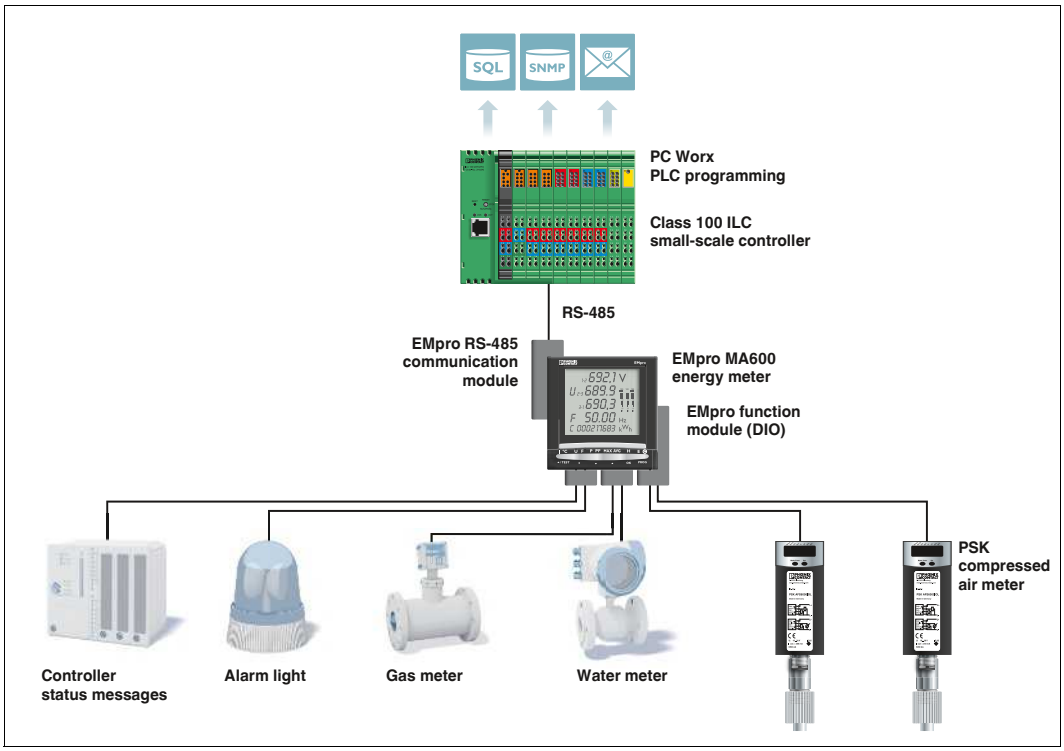
## Transmit electrical characteristics wirelessly and easily



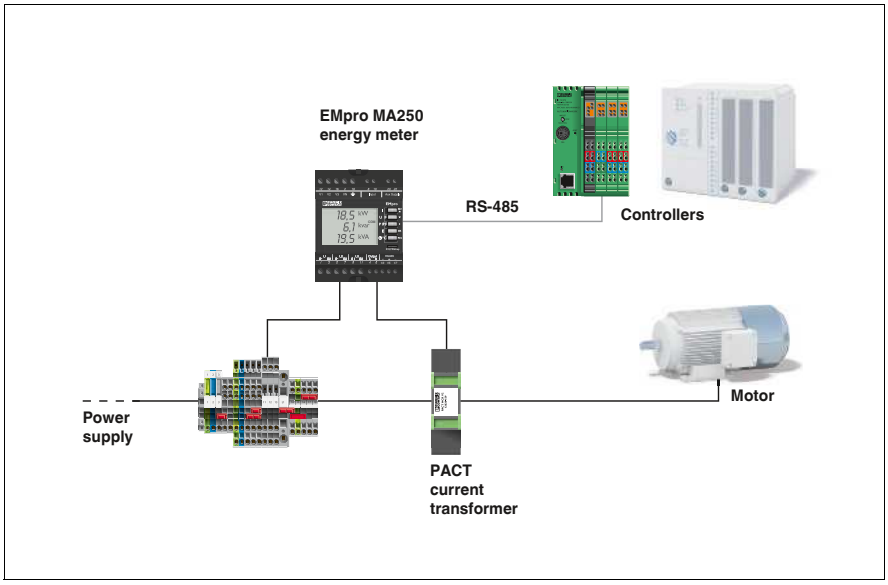

## Direct connection from the PC to the EMpro MA600



## Connect up to six external meters to one EMpro MA600




## Easy machine monitoring - communicate electrical characteristics via Modbus/RTU



## Energy meters

EMpro energy meters are capable of acquiring, monitoring, and displaying all electrical system and machine parameters locally.

### EEM-MA600
- Can be extended with function and communication modules
- Remote access via web server, integrated into Ethernet communication module
- Acquisition of individual harmonic components up to 63rd order
- Trend calculation for real and reactive power

### EEM-MA400
- Can be extended with output module
- Can be extended with RS-485 communication module (JBUS/MODBUS)
- Acquisition of total harmonic content up to 51st order

### EEM-MA250
- Two-tariff measurement via digital input
- Pulse or alarm output
- RS-485 interface (JBUS/MODBUS)

### EEM-MA200
- Two-tariff measurement via digital input
- Pulse or alarm output

### EEM-MKT-DRA
- DIN rail adapter for the EEM-MA600 and EEM-MA400 front panel devices see page 243.

**Notes:**

The EEM-MA600-24DC energy meter (Order No. 2902352) is not CE-compliant.

**Measuring voltage up to 700 V AC, can be extended with function and communication modules**

### Technical data

| | |
|---|---|
| Input data | |
| Measuring principle | True r.m.s. value measurement |
| Acquisition of harmonics | up to 63rd harmonic |
| Measured value | AC sine (50/60 Hz) |
| Voltage measuring input V1, V2, V3 | |
| Input voltage range | 18 V AC ... 700 V AC (phase/phase)<br>11 V AC ... 404 V AC (phase/neutral conductor)<br>500 kV AC (Primary, via external voltage transducers)<br>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)<br>1 A and 5 A, secondary |
| Overload capacity | 6 A (permanent) |
| 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 % |
| Real power (IEC 62053-22) | Class 0.5 S |
| Reactive power (IEC 62053-23) | Class 2 |
| Digital input | |
| Voltage input signal | Via function module |
| Switching output | |
| Output description | Via function module |
| Maximum switching voltage | - |
| Current carrying capacity | - |
| Serial port | |
| Output description | Via communication module |
| Serial transmission speed | - |
| Display | |
| Type | LCD display, backlighting |
| Measuring rate | 1 s |
| General data | |
| Supply voltage | |
| Nominal power consumption | 10 VA<br>20 VA (with maximum number of extension modules) |
| Degree of protection | IP52 (front), IP30 (back) |
| Ambient temperature range | -10 °C ... 55 °C (14 °F to 131 °F) |
| Dimensions W / H / D | 96 / 96 / 82 mm |
| Installation depth with extension module | 80 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 |
| EMC note | Class A product, see page 625 |
| Conformance / approvals | |
| Conformance | CE-compliant |

### Ordering data

| Description | Type | Order No. | Pcs. / Pkt. |
|---|---|---|---|
| **Energy meter,** for front-panel installation | **EEM-MA600** | **2901366** | 1 |
| **Energy meter**, for front-panel installation, 24 V DC | **EEM-MA600-24DC** | **2902352** | 1 |
| **Energy meter,** for mounting on a DIN rail | | | |

**Measuring voltage up to 519 V AC, can be extended with RS-485 interface and output module**

**Measuring voltage up to 519 V AC, DIN rail installation, also with RS-485 interface**

## Technical data

| | |
|---|---|
| True r.m.s. value measurement<br>up to 51st harmonic<br>AC sine (50/60 Hz) | True r.m.s. value measurement<br>up to 51st harmonic<br>AC sine (50/60 Hz) |
| 50 V AC ... 500 V AC (phase/phase)<br>28 V AC ... 289 V AC (phase/neutral conductor)<br>- | 50 V AC ... 519 V AC (phase/phase)<br>28 V AC ... 300 V AC (phase/neutral conductor)<br>- |
| 0.2 % | 0.2 % |
| 9999 A (primary)<br>5 A (secondary)<br>6 A (permanent)<br>5 mA<br>0.2 % | 9999 A (primary)<br>5 A (secondary)<br>6 A (permanent)<br>5 mA<br>0.2 % |
| 0 MW ... 11 MW / 0 Mvar ... 11 Mvar / 0 MVA ... 11 MVA | 0 kW ... 9999 kW / 0 kvar ... 9999 kvar / 0 kVA ... 9999 kVA |
| 0.5 %<br>Class 0.5 S<br>Class 2 | 0.5 %<br>Class 0.5 S<br>Class 2 |
| - | 230 V AC ±10 % (tariff switchover: e.g., day/nighttime tariff) |
| Via function module<br>-<br>- | Transistor output, active<br>30 V DC<br>27 mA |
| | EEM-MA250 / EEM-MA200 |
| Via communication module<br>- | Modbus RTU/JBUS RS-485 / None<br>2.4 ... 38.4 kbps |
| LCD display, backlighting<br>1 s | LCD display, backlighting<br>1 s |
| 5 VA<br>10 VA (with maximum number of extension modules)<br>IP52 (front), IP30 (back)<br>-10 °C ... 55 °C (14 °F to 131 °F)<br>96 / 96 / 82 mm<br>80 mm | 5 VA<br>IP51 (front), IP20 (back)<br>-10 °C ... 55 °C (14 °F to 131 °F)<br>72 / 90 / 64 mm |
| 0.5 ... 2.5 mm² / 0.5 ... 2.5 mm² / 20 - 14<br>0.5 ... 6 mm² / 0.5 ... 6 mm² / 20 - 8<br>Class A product, see page 625 | 0.5 ... 2.5 mm² / 0.5 ... 2.5 mm² / 20 - 14<br>0.5 ... 4 mm² / 0.5 ... 4 mm² / 20 - 10<br>Class A product, see page 625 |
| CE-compliant | CE-compliant |

## Ordering data

| Type | Order No. | Pcs. / Pkt. |
|---|---|---|
| **EEM-MA400** | **2901364** | 1 |

## Ordering data

| Type | Order No. | Pcs. / Pkt. |
|---|---|---|
| **EEM-MA250** | **2901363** | 1 |
| **EEM-MA200** | **2901362** | 1 |

## Function modules

Plug-in function modules 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, two digital 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) |
| EMC note | Class A product, see page 625 | Class A product, see page 625 |
| Conformance / approvals | | |
| Conformance | CE-compliant | CE-compliant |
| UL, USA / Canada | UL 61010-1 | UL 61010-1 |

| | Ordering data | | | Ordering data | | |
|---|---|---|---|---|---|---|
| Description | Type | Order No. | Pcs. / Pkt. | Type | Order No. | Pcs. / Pkt. |
| **Function module** (for EEM-MA600) | | | | | | |
| | **EEM-2DIO-MA600** | **2901371** | 1 | **EEM-2AO-MA600** | **2901475** | 1 |

## Function module

Plug-in function module for the EEM-MA600 energy meter.

### EEM-MEMO-MA600
- Stores P (+/-) and Q (+/-) with an internal or external synchronization pulse of 5, 8, 10, 20, 30 or 60 minutes, e.g., synchronization pulse of 15 minutes over 45 days
- Stores the last ten alarms with time stamp (2DIO function module necessary)
- Stores the last smallest and largest instantaneous values for voltages, currents, frequency, actual power, reactive power, entire harmonic distortion
- Stores the mean values of the cable voltage, line to line voltage and frequency (maximum 60 days)
- Stores undervoltage, surge voltage, and phase failure
- Cannot be combined with PROFIBUS communication module

**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 kByte |
| Degree of protection | IP20 |
| Ambient temperature range | -10 °C ... 55 °C (14 °F to 131 °F) |
| EMC note | Class A product, see page 625 |
| Conformance / approvals | |
| Conformance | CE-compliant |
| UL, USA / Canada | UL 61010-1 |

| | Ordering data | | |
|---|---|---|---|
| Description | Type | Order No. | Pcs. / Pkt. |
| **Function module** (for EEM-MA600)<br>Memory module | **EEM-MEMO-MA600** | **2901370** | 1 |

## Communication modules

### EEM-PB 12-MA600
– PROFIBUS DP, with transmission speeds of 12 Mbps

### EEM-RS485-MA...
– JBUS/Modbus/RTU

Modbus/RTU (RS-485)

PROFIBUS

| | Technical data | Technical data |
|---|---|---|
| Serial port | | |
| Output description | Modbus RTU/JBUS RS-485 | PROFIBUS DP |
| Serial transmission speed | 2.4 ... 38.4 kbps | 12 Mbps |
| General data | | |
| Supply voltage | 9 V (Via EEM-MA600/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) |
| EMC note | Class A product, see page 625 | Class A product, see page 625 |
| Conformance / approvals | | |
| Conformance | CE-compliant | CE-compliant |
| UL, USA / Canada | UL 61010-1 | UL 61010-1 |

| | Ordering data | | | Ordering data | | |
|---|---|---|---|---|---|---|
| Description | Type | Order No. | Pcs. / Pkt. | Type | Order No. | Pcs. / Pkt. |
| **Communication module** (for EEM-MA400) RS-485 (JBUS/Modbus/RTU) | **EEM-RS485-MA400** | **2901365** | 1 | | | |
| **Communication module** (for EEM-MA600) RS-485 (JBUS/Modbus/RTU) D-SUB (PROFIBUS DP) | **EEM-RS485-MA600** | **2901367** | 1 | **EEM-PB 12-MA600** | **2901418** | 1 |

## Communication modules

### EEM-ETH-MA600
– Ethernet
– Modbus/TCP
– Integrated web server

### EEM-ETH-RS485-MA600
– Ethernet gateway to RS-485
– Modbus/TCP / Modbus/RTU
– Integrated web server

Ethernet with integrated web server

Ethernet gateway with integrated web server

| | 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) |
| EMC note | Class A product, see page 625 | Class A product, see page 625 |
| Conformance / approvals | | |
| Conformance | CE-compliant | CE-compliant |
| UL, USA / Canada | UL 61010-1 | UL 61010-1 |

| | Ordering data | | | Ordering data | | |
|---|---|---|---|---|---|---|
| Description | Type | Order No. | Pcs. / Pkt. | Type | Order No. | Pcs. / Pkt. |
| **Communication module** (for EEM-MA600) Ethernet Ethernet gateway | **EEM-ETH-MA600** | **2901373** | 1 | **EEM-ETH-RS485-MA600** | **2901374** | 1 |

## Function modules

Plug-in function module for the EEM-MA400 energy meter.

**EEM-IMP-MA400**
– One configurable pulse output or one configurable threshold value

**Pulse module**

| | Technical data |
|---|---|
| Output | |
| Output description | Relay output |
| Maximum switching voltage | 100 V DC |
| General data | |
| Supply voltage | 9 V (via EEM-MA400) |
| Degree of protection | IP20 |
| Ambient temperature range | -10 °C ... 55 °C (14 °F to 131 °F) |
| Conformance / approvals | |
| Conformance | CE-compliant |
| UL, USA / Canada | UL 61010-1 |

| Description | Type | Order No. | Pcs. / Pkt. |
|---|---|---|---|
| **Function module** (for EEM-MA400) with one pulse or alarm output | **EEM-IMP-MA400** | **2904314** | 1 |

## Function module

Plug-in function module for the EEM-MA600 energy meter.

**EEM-IMP-MA600**
– Two configurable pulse outputs

**Pulse module**

| | Technical data |
|---|---|
| Output | |
| Output description | Relay output |
| Maximum switching voltage | 100 V DC |
| General data | |
| Supply voltage | 9 V (via EEM-MA600) |
| Degree of protection | IP20 |
| Ambient temperature range | -10 °C ... 55 °C (14 °F to 131 °F) |
| Conformance / approvals | |
| Conformance | CE-compliant |
| UL, USA / Canada | UL 61010-1 |

| Description | Type | Order No. | Pcs. / Pkt. |
|---|---|---|---|
| **Function module** (for EEM-MA600) with two configurable pulse outputs | **EEM-IMP-MA600** | **2904313** | 1 |

## Function module

Plug-in function module for the EEM-MA600 energy meter.

### EEM-TEMP-MA600

- Temperature recording for up to three Pt 100 temperature sensors
- Temperature measuring range –20°C...+150°C
- Internal temperature recording of the ambient temperature –10°C...+55°C
- CE-compliant

Temperature module

**Technical data**

| | |
|---|---|
| Input data | |
| Description of the input | Pt 100 input: 2, 3, 4-wire |
| Temperature range | -20 °C ... 150 °C (connected sensors)<br>-10 °C ... 55 °C (in the immediate vicinity) |
| Transmission error | 0.5 K/m (2-wire)<br>0.25 K/m (3-wire)<br>0 K/m (4-wire) |
| Basic accuracy | ± 1 K |
| General data | |
| Supply voltage | 9 V (via EEM-MA600) |
| Degree of protection | IP20 |
| Ambient temperature range | -10 °C ... 55 °C (14 °F to 131 °F) |
| EMC note | Class A product, see page 625 |

**Ordering data**

| Description | Type | Order No. | Pcs. / Pkt. |
|---|---|---|---|
| **Function module** (for EEM-MA600) for temperature recording | **EEM-TEMP-MA600** | **2901949** | 1 |

## Accessories

### DIN rail adapter

- For mounting the EEM-MA600 or EEM-MA400 energy meters on a 35-mm DIN rail according to EN 60715

For mounting on DIN rails

**Technical data**

| | |
|---|---|
| General data | |
| Vibration resistance | 57 Hz ... 150 Hz (2 g) |
| Weight | 265 g |
| DIN rail clip material | Aluminum, natural anodized |
| Fixing sheet material | Stainless steel VA |
| Dimensions W / H / D | 116 / 112 / 115 mm |

**Ordering data**

| Description | Type | Order No. | Pcs. / Pkt. |
|---|---|---|---|
| **DIN rail adapter** for EEM-MA600 and EEM-MA400 | **EEM-MKT-DRA** | **2902078** | 1 |

## Software for usage data acquisition

The EMwise software from Phoenix Contact is the efficient solution for acquiring energy data regarding heat, cold, air or electricity in conjunction with a compact controller.

Integrate up to 24 digital inputs, 8 analog channels, 50 EMpro energy meters, 30 M-bus counters, and 4 IO-Link measuring sensors.

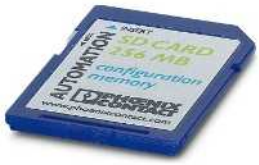
A web-based interface is available for system parameterization. Each device/channel can be configured individually, without any programming knowledge. The configuration is saved to a file and can be reused for identical systems.

**Your advantages:**

– Startup without programming knowledge
– Direct parameterization of predefined sensors

**Three software versions, suitable for every application:**

– EMWISE IMPULS: for up to 16 digital signals
– EMWISE IMP ANALOG: for up to 16 digital and 6 analog signals
– EMWISE EXTENDED: for up to 24 digital and 8 analog signals, EMpro energy meters, M-bus counters, M-bus level converters, IO-Link sensors




**Monitoring software**

### Technical data

See phoenixcontact.net/products

### Ordering data

| Description | Type | Order No. | Pcs. / Pkt. |
|---|---|---|---|
| **Program and configuration memory,** plug-in, 2 GB with license key and application program for reading from measuring devices via pulses | SD FLASH 2GB EMWISE IMPULS | 2701745 | 1 |
| **Program and configuration memory,** plug-in, 2 GB with license key and application program for reading from measuring devices via pulses and analog values | SD FLASH 2GB EMWISE IMP ANALOG | 2701746 | 1 |
| **Program and configuration memory,** plug-in, 2 GB with license key and application program for reading from measuring devices via pulses, analog values, M-bus, Modbus RTU, and IO-Link | SD FLASH 2GB EMWISE EXTENDED | 2701747 | 1 |

## Complete packages for data logging

new

The PSK RTU 50 is a multifunctional RTU (Remote Telemetry Unit), which combines the functions of a data logger, gateway, and alarm manager. The PSK RTU 50 offers various communication options, was developed with low power technology and allows independent operation, e.g., with batteries or solar cells.

**Your advantages:**
– GSM/GPRS modem
– Ethernet interface
– IEC 60870-5-101
– IEC 60870-5-104
– Modbus/RTU

**Multifunctional data logger**

| | Technical data |
|---|---|
| Interfaces | |
| Interfaces | RS-232<br>RS-232/-485<br>Serial<br>Ethernet |
| Digital inputs/outputs | |
| Number of inputs | 4 |
| Number of outputs | 2 (relay output) |
| Analog inputs | |
| Number of inputs | 2 |
| IEC-61131 runtime system | |
| Program memory | 832 kByte |
| Retentive mass storage | 1 Mbyte |
| Realtime clock | Yes (battery-backed) |
| Power supply | |
| Supply voltage | 24 V DC |
| Typical current consumption | 5 mA |
| General data | |
| Weight | 475 g |
| Width | 210 mm |
| Height | 110 mm |
| Depth | 45 mm |
| Degree of protection | IP20 |
| Ambient temperature (operation) | -20 °C ... 65 °C |

**Ordering data**

| Description | Type | Order No. | Pcs. / Pkt. |
|---|---|---|---|
| **Multifunctional data logger** | | | |
| | **PSK RTU 50** | **2400018** | 1 |

## Compressed air meters

Use meters from Phoenix Contact to monitor the use of compressed air, an expensive production resource. By using compressed air efficiently, you can decrease compressor usage and therefore reduce energy costs. The calorimetric measuring procedure records even the smallest consumption rates. You can therefore detect wear or leaks based on the amount of air consumed.

### Use compressed air meters to acquire the following values:

- The current volumetric flow according to ISO 2533 and DIN 1343
- The total volume used
- The temperature of the compressed air in the monitored operating processes

### The compressed air meters impress thanks to their:

- Detailed reference measurement with flow rate, total volume, and temperature display
- Intelligent sensor communication, thanks to IO-Link technology
- A measuring range from 0.06 Nm³/h to 700.0 Nm³/h
- Flexible use, thanks to IP65 protection: resistant to dust and splash water

IO-Link

**Compressed air meter up to 75 Nm³/h**

### Technical data

| | PSK AFS6050IOL | PSK AFS6000IOL |
|---|---|---|
| Flow monitoring | | |
| Measuring range | 0.20 Nm³/h ... 75 Nm³/h | |
| Display range | 0.00 Nm³/h ... 90 Nm³/h | |
| Repeatability | ±1.5% of the measured value | |
| Response time | < 0.1 s ((dAP = 0)) | |
| Measured value error | ±15 % of the measured value +1.5 % of the measuring range final value | Depending on the air quality: ±3% of the measured value + 0.3% of the measuring range final value; ±6% of the measured value + 0.6% of the measuring range final value |
| Temperature monitoring | | |
| Measuring range | 0 °C ... 60 °C | |
| Display range | -12 °C ... 72 °C | |
| Response time | 30 s (Q > 0.1 Nm³/h) | |
| Resolution | 0.5 °C | |
| Accuracy | ± 2.5 °C (Q > 0.1 Nm³/h) | |
| Supply for module electronics | | |
| Connection method | M12 connector | |
| No. of pos. | 4 | |
| Supply voltage range | 19 V DC ... 30 V DC | |
| Current draw | < 100 mA | |
| Digital outputs | | |
| Pulse value | 0.0010 m³ ... 1000000 m³ | |
| Pulse length | min. 0.04 s | |
| Delay time | 0.5 s (operational readiness) | |
| Analog outputs | | |
| Type of protection | Short-circuit protection, polarity reversal protection | |
| Current output signal | 4 mA ... 20 mA | |
| Load/output load current output | ≤ 500 Ω | |
| General data | | |
| Weight | 581 g | 961 g |
| Width | 45 mm | |
| Height | 111 mm | 300 mm |
| Depth | 79.5 mm | 76.8 mm |
| Degree of protection | IP65 | |
| Protection class | III | |
| Ambient temperature (operation) | 0 °C ... 60 °C | |
| Ambient temperature (storage/transport) | -20 °C ... 85 °C | |
| Vibration resistance in acc. with EN 60068-2-6/IEC 60068-2-6 | 5g (55 ... 2000 Hz) | |

### Ordering data

| Description | Type | Order No. | Pcs. / Pkt. |
|---|---|---|---|
| **Compressed air meter**: G1/2 process connection, measuring range up to 75 Nm³/h | **PSK AFS6050IOL** | **2700704** | 1 |
| **Compressed air meter**: G1/2 process connection, measuring range up to 75 Nm³/h | **PSK AFS6000IOL** | **2700707** | 1 |
| **Compressed air meter**: R1/4 process connection, measuring range up to 15 Nm³/h | | | |
| **Compressed air meter**: R1 process connection, measuring range up to 225 Nm³/h | | | |
| **Compressed air meter**: R2 process connection, measuring range up to 700 Nm³/h | | | |

IO-Link

**Compressed air meter up to 15 Nm³/h**

## Technical data

0.04 Nm³/h ... 15 Nm³/h
0.00 Nm³/h ... 18 Nm³/h
±1.5% of the measured value
< 0.1 s ((dAP = 0))
Depending on the air quality: ±3% of the measured value + 0.3% of the measuring range final value; ±6% of the measured value + 0.6% of the measuring range final value

0 °C ... 60 °C
-12 °C ... 72 °C
30 s (Q > 0.1 Nm³/h)
0.5 °C
± 2.5 °C (Q > 0.1 Nm³/h)

M12 connector
4
19 V DC ... 30 V DC
< 100 mA

0.0010 m³ ... 1000000 m³
min. 0.2 s
0.5 s (operational readiness)

Short-circuit protection, polarity reversal protection
4 mA ... 20 mA
≤ 500 Ω

887 g
45 mm
193.3 mm
74.5 mm
IP65
III
0 °C ... 60 °C
-20 °C ... 85 °C
5g (55 ... 2000 Hz)

## Ordering data

| Type | Order No. | Pcs. / Pkt. |
|---|---|---|
| PSK AFS5000IOL | 2700705 | 1 |

IO-Link

**Compressed air meter up to 225 Nm³/h**

## Technical data

0.70 Nm³/h ... 225 Nm³/h
0.00 Nm³/h ... 270 Nm³/h
±1.5% of the measured value
< 0.1 s ((dAP = 0))
Depending on the air quality: ±3% of the measured value + 0.3% of the measuring range final value; ±6% of the measured value + 0.6% of the measuring range final value

0 °C ... 60 °C
-12 °C ... 72 °C
30 s (Q > 0.1 Nm³/h)
0.5 °C
± 2.5 °C (Q > 0.1 Nm³/h)

M12 connector
4
19 V DC ... 30 V DC
< 100 mA

0.0030 m³ ... 3000000 m³
min. 0.02 s
1 s (operational readiness)

Short-circuit protection, polarity reversal protection
4 mA ... 20 mA
≤ 500 Ω

2.053 kg
45 mm
475 mm
88.5 mm
IP65
III
0 °C ... 60 °C
-20 °C ... 85 °C
5g (55 ... 2000 Hz)

## Ordering data

| Type | Order No. | Pcs. / Pkt. |
|---|---|---|
| PSK AFS8000IOL | 2700708 | 1 |

IO-Link

**Compressed air meter up to 700 Nm³/h**

## Technical data

2.30 Nm³/h ... 700 Nm³/h
0.00 Nm³/h ... 840 Nm³/h
±1.5% of the measured value
< 0.1 s ((dAP = 0))
Depending on the air quality: ±3% of the measured value + 0.3% of the measuring range final value; ±6% of the measured value + 0.6% of the measuring range final value

0 °C ... 60 °C
-12 °C ... 72 °C
30 s (Q > 0.1 Nm³/h)
0.5 °C
± 2.5 °C (Q > 0.1 Nm³/h)

M12 connector
4
19 V DC ... 30 V DC
< 100 mA

0.0100 m³ ... 4000000 m³
min. 0.043 s
0.5 s (operational readiness)

Short-circuit protection, polarity reversal protection
4 mA ... 20 mA
≤ 500 Ω

4.332 kg
133 mm
475 mm
-
IP65
III
0 °C ... 60 °C
-20 °C ... 85 °C
5g (55 ... 2000 Hz)

## Ordering data

| Type | Order No. | Pcs. / Pkt. |
|---|---|---|
| PSK AFS2000IOL | 2700709 | 1 |

## Pressure sensor

### Pressure sensor with IO-Link

Pressure sensors from Phoenix Contact detect the operating pressure of gas media in a range from -1 to 10 bar. The overload-proof ceramic measuring cell is designed for in excess of 100 million cycles and enables a high switching point accuracy. The pressure switch offers the option of using the set switching points via two switching outputs or reading all process data via the IO-Link interface.

### Your advantages:

– IO-Link communication
– Parameterization, diagnostics, and process value monitoring via IO-Link
– Programmable function
– 4-character alphanumeric display

IO-Link

**Pressure sensor up to 10 bar**

### Technical data

| | |
|---|---|
| Pressure monitoring | |
| Measuring range | -1 bar ... 10 bar (minimum burst pressure 150 bar) |
| Pressure resistance | 75 bar |
| Process connection | G1/4 I |
| Supply for module electronics | |
| Connection method | M12 connector |
| No. of pos. | 4 |
| Supply voltage range | 18 V DC ... 36 V DC |
| Current draw | < 35 mA |
| Digital outputs | |
| Number of outputs | 2 (OUT1 = switching output, OUT2 = switching output or diagnostic output) |
| Connection method | M12 connectors, assigned four times |
| Delay time | 0.3 s (operational readiness) |
| IO-Link | |
| Specification | V1.1 |
| Transmission speed | 38.4 kbaud |
| General data | |
| Weight | 263 g |
| Width | 34 mm |
| Height | 91.5 mm |
| Depth | 48 mm |
| Degree of protection | IP65 |
| Protection class | III |
| Ambient temperature (operation) | -25 °C ... 80 °C |
| Ambient temperature (storage/transport) | -40 °C ... 100 °C |
| Vibration resistance in acc. with EN 60068-2-6/IEC 60068-2-6 | 20g (10 Hz ... 2000 Hz) |

### Ordering data

| Description | Type | Order No. | Pcs. / Pkt. |
|---|---|---|---|
| **Pressure sensor with indicator**, G1/4 I process connection, IO-Link communication | **PSK APS7004IOL** | **2700710** | 1 |

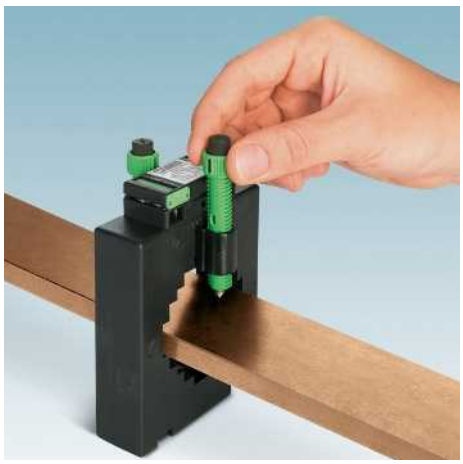
**Extremely versatile**

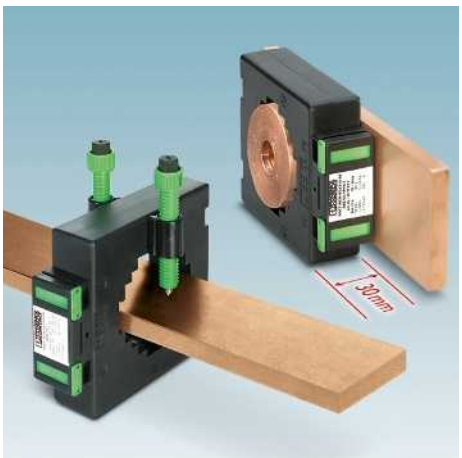
PACT current transformers offer a complete product range for converting alternating currents up to 4000 A into secondary currents of 1 A and 5 A. Depending on requirements, bus-bar, plug-in, and winding current transformers are available. PACT current transformers are available in different transformation ratios, accuracy classes, and rated powers - in 3000 versions, for your current measurement requirements.

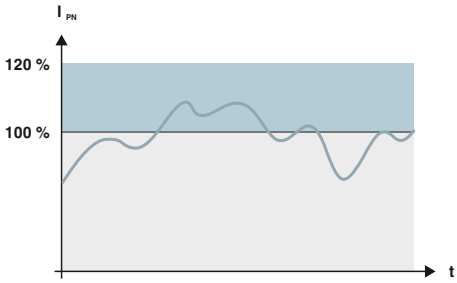
**Also available for higher accuracy classes**

For standard applications, such as in machine building or systems manufacturing, Phoenix Contact offers current transformers with accuracy classes 0.5 and 1 in a version that cannot be calibrated.

For higher accuracy or for billing purposes in energy supply, type-tested transformers that can be calibrated as well as calibrated transformers are available - with classes 0.2/0.2S/0.5 and 0.5S.






**Fast and secure installation**

The current transformer quick-action mechanism offers the following advantages:

- Tool-free mounting
- Considerable reduction in installation time
- Easy handling and secure fastening by pressing with finger
- Current transformers align themselves – no need for subsequent alignment

**Variable and space-saving mounting**

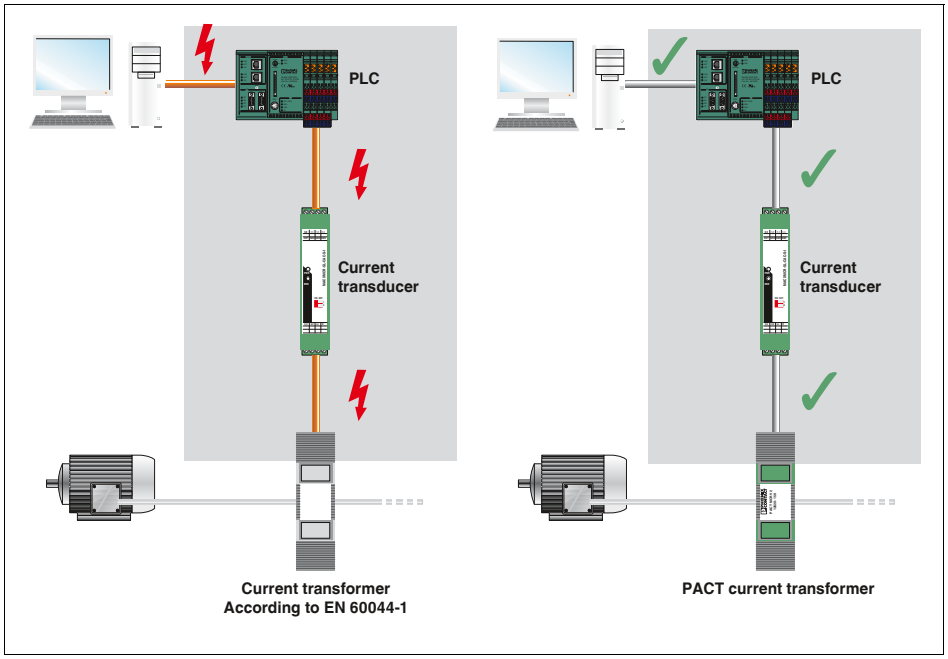
In addition to the vertical and horizontal mounting position, the optional accessories offer further installation options such as mounting on the DIN rail or on the control cabinet panel.

All PACT current transformers are just 30 mm wide. This saves space – for example flat mounting when measuring branch outlets.

**Safe detection of current peaks**

PACT current transformers can be used to safely detect current peaks greater than the rated nominal current strength – without resulting in any damage: the transformers are designed for a continuous thermal nominal current that is 120% of the primary rated current strength.

Example: a PACT transformer with a specified rated power of 10 VA does indeed deliver 14.4 VA on a continual basis.




**Safe isolation**

PACT current transformers are manufactured in accordance with EN 50178. This is relevant for electronic equipment for use in power installations.

EN 50178 differs considerably from EN 60044, the usual standard for transformers, with regard to safety.

Your advantages:

- PACT current transformers offer safe isolation, thanks to greater clearance and creepage distances.
- PACT current transformers ensure that there is no sparkover on the secondary side of the transformer and human life is protected inside and outside the control cabinet.
- Up to 1000 V (L-N) operating voltage possible
- Routine testing with 12 kV (1.2/50 µs)
- Surge voltage category 3 is met

## Current transformer selection guide

- Complete range consisting of winding, bus-bar, and window-type 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 transformer in accordance with the dimensions of the copper rail
- Specify the four electrical characteristics of the transformer:
  **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 for adherence to 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 capacity 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 (forward 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 forward and return line) | |
|---|---|---|
| | Secondary current $I_{sn}$ 5 A | Secondary current $I_{sn}$ 1 A |
| 1.5 | 0.2917 | 0.0117 |
| 2.5 | 0.1750 | 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 ordered directly are 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.

**Selection table (extract)**

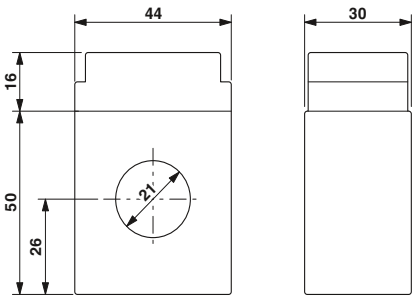
| $I_{sn}$ | Cl. | Primary rated current strength $I_{pn}$ [A] 60 | 75 | 80 | 100 | 125 | 150 | 200 | 250 | Rated power $S_n$ [VA] |
|---|---|---|---|---|---|---|---|---|---|---|
| 1A | 0.5 | | | | 1.25 | 2.5 | 2.5 | 2.5 | 2.5 | |
| | | | | | | | | 3.75 | 5 | |
| | 1 | 1.25 | 2.5 | 2.5 | 2.5 | 2.5 | 2.5 | 2.5 | 2.5 | |
| | | | | | | 3.75 | 5 | 5 | 5 | |
| | | | | | | | | | 7.5 | |
| 5A | 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 | | |
| | | | | | | | | | 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 phoenixcontact.net/products, 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 264 |
| The relevant installation accessories can be found on page 263 |



**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,** observe the order key below to determine the desired current transformer type | | **PACT MCR-V1-21-44** | **2277268** | 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)

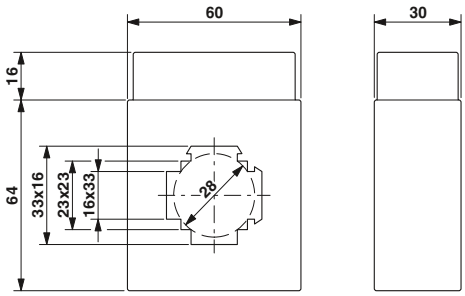
| $I_{sn}$ | Cl. | Primary rated current amperage $I_{pn}$ [A] 50 | 60 | 75 | 80 | 100 | 125 | 150 | 200 | 250 | 300 | 400 | 500 | Rated power $S_n$ [VA] |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| IS01 ≙ 1 A | C05 ≙ 0.5 | | | | | 1.25 | 2.5 | 2.5 | 2.5 | 2.5 | 2.5 | 2.5 | 2.5 | |
| | | | | | | | | 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

| Notes: |
|---|
| Our configurator, which is available at phoenixcontact.net/products, 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 264 |
| The relevant installation accessories can be found on page 263 |



**Window-type 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 $I_{pn}$: | | | | |
| - 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,** observe the order key below to determine the desired current transformer type | | **PACT MCR-V2- 3015- 60** | **2277271** | 1 |

### Accessories

| | | | |
|---|---|---|---|
| **Quick-action mechanism**; width of the holding latch 16 mm<br>Fixing pin length 40 mm | **PACT-FAST-MNT-W16-L40** | **2276638** | 1 |
| **Quick-action mechanism**; width of the holding latch 16 mm<br>Fixing pin length 65 mm | **PACT-FAST-MNT-W16-L65** | **2276641** | 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)

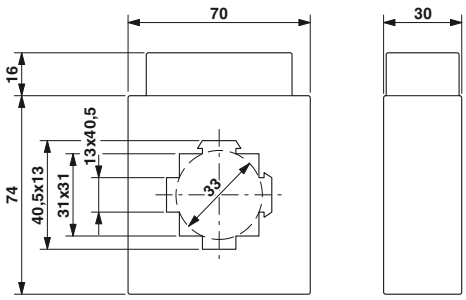
| $I_{sn}$ | Cl. | Primary rated current amperage $I_{pn}$ [A] 50 | 60 | 75 | 80 | 100 | 125 | 150 | 200 | 250 | 300 | 400 | 500 | 600 | 750 | Rated power $S_n$ [VA] |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| IS01 ≙ 1 A | C05 ≙ 0.5 | | | | | 1.25 | 2.5 | 2.5 | 2.5 | 2.5 | 2.5 | 2.5 | 2.5 | 2.5 | 2.5 | |
| | | | | | | | | | 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 phoenixcontact.net/products, 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 264 |
| The relevant installation accessories can be found on page 263 |



**Window-type 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,** observe the order key below to determine the desired current transformer type | | **PACT MCR-V2- 4012- 70** | **2277284** | 1 |

### Accessories

| | | | |
|---|---|---|---|
| **Quick-action mechanism**; width of the holding latch 13 mm<br>Fixing pin length 40 mm | **PACT-FAST-MNT-W13-L40** | **2276612** | 1 |
| **Quick-action mechanism**; width of the holding latch 13 mm<br>Fixing pin length 65 mm | **PACT-FAST-MNT-W13-L65** | **2276625** | 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 | 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 | 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 | 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

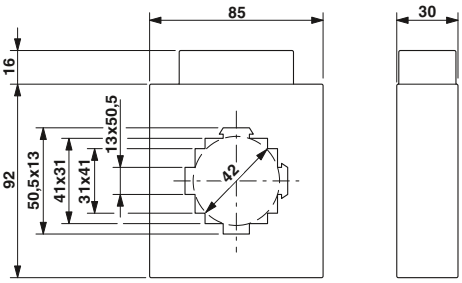
- Primary rated current $I_{pn}$: 0...(100...1500) A
- Circular conductor dimensions: Ø 42 mm
- Rail dimensions: 50x12 mm; 2x 40x10 mm

**Notes:**

Our configurator, which is available at phoenixcontact.net/products, 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 264

The relevant installation accessories can be found on page 263



**Window-type 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,** observe the order key below to determine the desired current transformer type | | **PACT MCR-V2- 5012- 85** | **2277297** | 1 |

### Accessories

| | | | |
|---|---|---|---|
| **Quick-action mechanism**; width of the holding latch 13 mm<br>Fixing pin length 40 mm | **PACT-FAST-MNT-W13-L40** | **2276612** | 1 |
| **Quick-action mechanism**; width of the holding latch 13 mm<br>Fixing pin length 65 mm | **PACT-FAST-MNT-W13-L65** | **2276625** | 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)

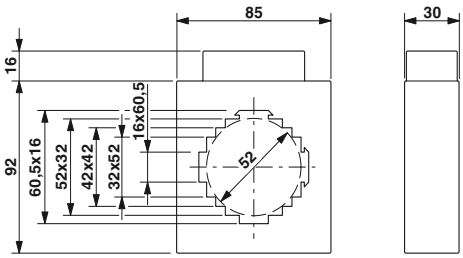
| $I_{sn}$ | Cl. | Primary rated current amperage $I_{pn}$ [A] 100 | 125 | 150 | 200 | 250 | 300 | 400 | 500 | 600 | 750 | 800 | 1000 | 1250 | 1500 | Rated power $S_n$ [VA] |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| IS01 ≙ 1 A | C05 ≙ 0.5 | | | 1.25 | 2.5 | 2.5 | 2.5 | 2.5 | 2.5 | 2.5 | 2.5 | 2.5 | 2.5 | 2.5 | 2.5 | |
| | | | | | 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 phoenixcontact.net/products, 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 264 |
| The relevant installation accessories can be found on page 263 |



**Window-type 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,** observe the order key below to determine the desired current transformer type | | **PACT MCR-V2- 6015- 85** | **2277336** | 1 |

### Accessories

| | | | |
|---|---|---|---|
| **Quick-action mechanism**; width of the holding latch 16 mm<br>Fixing pin length 40 mm | **PACT-FAST-MNT-W16-L40** | **2276638** | 1 |
| **Quick-action mechanism**; width of the holding latch 16 mm<br>Fixing pin length 65 mm | **PACT-FAST-MNT-W16-L65** | **2276641** | 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 | Rated power $S_n$ [VA] |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| IS01 ≙ 1 A | C05 ≙ 0.5 | | 1.25 | 1.25 | 1.25 | 2.5 | 2.5 | 2.5 | 2.5 | 2.5 | 2.5 | | | |
| | | | | | | | | 5 | | | 5 | | | |
| | C10 ≙ 1 | 2.5 | 2.5 | 2.5 | 2.5 | 2.5 | 2.5 | 2.5 | 2.5 | 2.5 | 2.5 | | | |
| | | | | | | 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

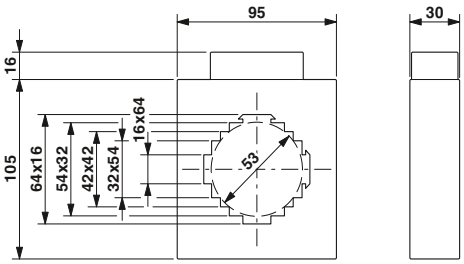
### PACT MCR-V2-6040-96

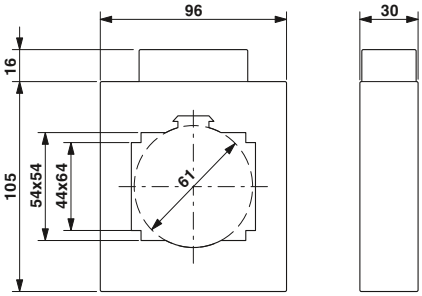
- Primary rated current $I_{pn}$:
  0...(200...2000) A
- Circular conductor dimensions: Ø 61 mm
- Rail dimensions:
  60x40 mm; 50x50 mm

**Window-type curr. transformer, official calibration as an option**

**Window-type curr. transformer, official calibration as an option**

| Notes: |
|---|
| Our configurator, which is available at phoenixcontact.net/products, 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 265 |
| The relevant installation accessories can be found on page 263 |




| 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,** observe the order key below to determine the desired current transformer type | | PACT MCR-V2- 6315- 95 | 2277307 | 1 | PACT MCR-V2- 6040- 96 | 2277349 | 1 |
| **Accessories** | | | | | | | |
| **Quick-action mechanism**; width of the holding latch 16 mm<br>Fixing pin length 40 mm | | PACT-FAST-MNT-W16-L40 | 2276638 | 1 | PACT-FAST-MNT-W16-L40 | 2276638 | 1 |
| **Quick-action mechanism**; width of the holding latch 16 mm<br>Fixing pin length 65 mm | | PACT-FAST-MNT-W16-L65 | 2276641 | 1 | PACT-FAST-MNT-W16-L65 | 2276641 | 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

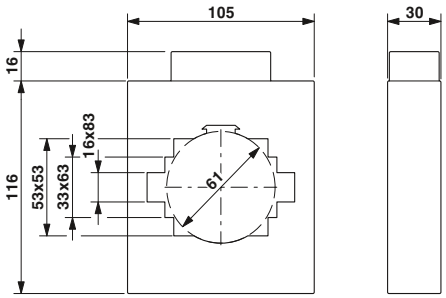
### PACT MCR-V2-8020-105

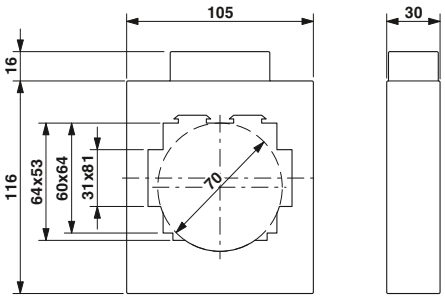
- Primary rated current $I_{pn}$: 0...(500...2000) A
- Circular conductor dimensions: Ø 70 mm
- Rail dimensions: 2x 80x10 mm; 60x60 mm

**Window-type curr. transformer, official calibration as an option**

**Window-type curr. transformer, official calibration as an option**

| Notes: |
|---|
| Our configurator, which is available at phoenixcontact.net/products, 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 265 |
| The relevant installation accessories can be found on page 263 |




| 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,** observe the order key below to determine the desired current transformer type | | **PACT MCR-V2- 8015-105** | **2277352** | 1 | **PACT MCR-V2- 8020-105** | **2277365** | 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

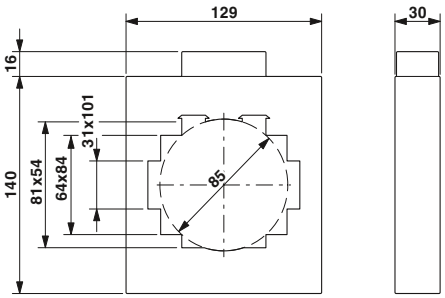
### PACT MCR-V2-10036-129

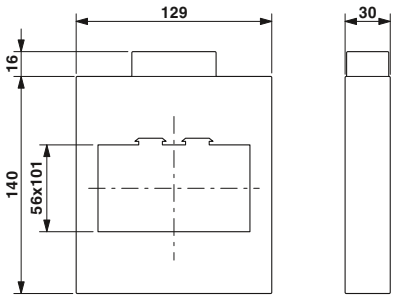
- Primary rated current $I_{pn}$: 0...(400...4000) A
- Rail dimensions: 3x 100x12 mm

**Window-type curr. transformer, official calibration as an option**

**Window-type curr. transformer, official calibration as an option**

| Notes: |
|---|
| Our configurator, which is available at phoenixcontact.net/products, 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 265 |
| The relevant installation accessories can be found on page 263 |




| 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,** observe the order key below to determine the desired current transformer type | | **PACT MCR-V2-10020-129** | **2277378** | 1 | **PACT MCR-V2-10036-129** | **2277381** | 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

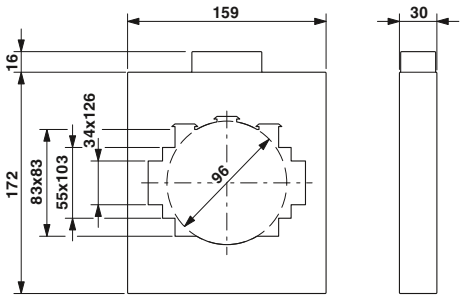
Window-type current transformer

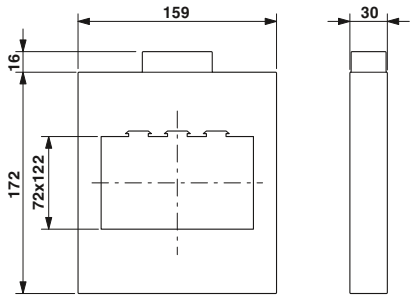
Window-type current transformer

**Notes:**

Our configurator, which is available at phoenixcontact.net/products, makes ordering easy.

The relevant installation accessories can be found on page 263




| 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,** observe the order key below to determine the desired current transformer type | | 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] 400 | 500 | 600 | 750 | 800 | 1000 | 1250 | 1500 | 1600 | 2000 | 2500 | 3000 | 4000 | Rated power $S_n$ [VA] |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 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 | 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 | |
| | | 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] 400 | 500 | 600 | 750 | 800 | 1000 | 1250 | 1500 | 1600 | 2000 | 2500 | 3000 | 4000 | Rated power $S_n$ [VA] |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 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

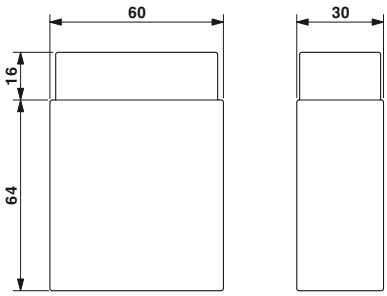
– Primary rated current $I_{pn}$: 0...(1...40) A

– Current-carrying copper lines connected directly to the screw terminal blocks on the primary side

**Notes:**

Our configurator, which is available at phoenixcontact.net/products, makes ordering easy.

The relevant installation accessories can be found on page 263



Winding current transformer

**Ordering data**

| Description | Type | Order No. | Pcs. / Pkt. |
|---|---|---|---|
| **Current transformer,** observe the order key below to determine the desired current transformer type | | | |
| | **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

### Quick-action mechanism for PACT current transformers

- No tools necessary for mounting
- Extremely easy handling, thanks to secure fastening by pressing with finger
- Set consisting of two fixing pins and a holding latch

**Notes:**

The 16 mm wide quick-action mechanism can also be used for larger current transformers if the length of the fixing pins is sufficient.

for: ...-V2-4012-70..., ...-V2-5012-85...

for: ...-V2-3015-60..., ...-V2-6015-85..., ...-V2-6315-95...

| | Technical data | Technical data |
|---|---|---|
| General data | | |
| Material | PA 6 | PA 6 |
| Ambient temperature (operation) | -25 °C ... 120 °C | -25 °C ... 120 °C |

| | Ordering data | | | Ordering data | | |
|---|---|---|---|---|---|---|
| Description | Type | Order No. | Pcs. / Pkt. | Type | Order No. | Pcs. / Pkt. |
| **Quick-action mechanism**; width of the holding latch 13 mm | | | | | | |
| Fixing pin length 65 mm | **PACT-FAST-MNT-W13-L65** | **2276625** | 1 | | | |
| Fixing pin length 40 mm | **PACT-FAST-MNT-W13-L40** | **2276612** | 1 | | | |
| **Quick-action mechanism**; width of the holding latch 16 mm | | | | | | |
| Fixing pin length 65 mm | | | | **PACT-FAST-MNT-W16-L65** | **2276641** | 1 |
| Fixing pin length 40 mm | | | | **PACT-FAST-MNT-W16-L40** | **2276638** | 1 |

## Accessories

- Copper sleeves
- DIN rail adapter
- Secondary terminal cover
- Insulating caps

Copper sleeves
DIN rail adapter

Secondary terminal cover
Insulating caps

| | Ordering data | | | Ordering data | | |
|---|---|---|---|---|---|---|
| Description | Type | Order No. | Pcs. / Pkt. | Type | Order No. | Pcs. / Pkt. |
| **Copper sleeves,** for establishing a conductive connection during the horizontal assembly of PACT analog 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 | | | |
| **DIN rail adapter** | **PACT MCR-RA** | **2277598** | 12 | | | |
| **Secondary terminal cover,** for increasing the clearance and creepage distances | | | | | | |
| Length: 60 mm | | | | **PACT MCR-ETC-60** | **2277572** | 9 |
| Length: 75 mm | | | | **PACT MCR-ETC-75** | **2277585** | 9 |
| **Insulating caps,** for protection against unintended contact with mounting screws of the primary rail | | | | **PACT MCR-ICAP** | **2277608** | 18 |

## Current transformers that can be calibrated - order key

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<br>IP02000 ≙ 200 A<br>IP02500 ≙ 250 A<br>IP03000 ≙ 300 A<br>IP04000 ≙ 400 A<br>IP05000 ≙ 500 A<br>IP06000 ≙ 600 A<br>IP07500 ≙ 750 A<br>IP08000 ≙ 800 A<br>IP10000 ≙ 1000 A<br>IP12000 ≙ 1200 A<br>IP12500 ≙ 1250 A<br>IP15000 ≙ 1500 A<br>IP16000 ≙ 1600 A<br>IP20000 ≙ 2000 A<br>IP25000 ≙ 2500 A | IS05 ≙ 5 A | C02S ≙ 0.2S<br>C02 ≙ 0.2<br>C05S ≙ 0.5S<br>C05 ≙ 0.5 | P250 ≙ 2.5 VA<br>P500 ≙ 5.0 VA<br>P1000 ≙ 10 VA<br>P1500 ≙ 15 VA<br>P2000 ≙ 20 VA<br>P3000 ≙ 30 VA | NONE ≙ not calibrated<br>YES ≙ calibrated | NONE ≙ no calibration certificate<br>YES ≙ calibration certificate (a fee is charged)<br>YESPLUS ≙ Calibration certificate with catalog of errors (5 measuring points) (a fee is charged) |

### PACT MCR-V1C-21-44 (Order No.: 2277420)

You will find information about the product on page 253.

Add **order key** from the selection table

2277420 / IP03000 / IS05 / C02 / P250 / NONE / NONE

**Selection table**

| $I_{sn}$ | Cl. | Primary rated current amperage $I_{pn}$ [A] 150 | 200 | 250 | 300 | 400 | 500 | Rated power $S_n$ [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)

You will find information about the product on page 254.

Add **order key** from the selection table

2277433 / IP02000 / IS05 / C05 / P250 / NONE / NONE

**Selection table**

| $I_{sn}$ | Cl. | Primary rated current amperage $I_{pn}$ [A] 200 | 250 | 300 | 400 | 500 | 600 | 750 | Rated power $S_n$ [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)

You will find information about the product on page 255.

Add **order key** from the selection table

2277446 / IP06000 / IS05 / C02 / P1000 / NONE / NONE

**Selection table**

| $I_{sn}$ | Cl. | Primary rated current amperage $I_{pn}$ [A] 200 | 250 | 300 | 400 | 500 | 600 | 750 | 800 | 1000 | Rated power $S_n$ [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)

You will find information about the product on page 256.

Add **order key** from the selection table

2277459 / IP10000 / IS05 / C05 / P1500 / NONE / NONE

**Selection table**

| $I_{sn}$ | Cl. | Primary rated current amperage $I_{pn}$ [A] 200 | 250 | 300 | 400 | 500 | 600 | 750 | 800 | 1000 | 1200 | Rated power $S_n$ [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)

You will find information about the product on page 257.

Add **order key** from the selection table

2277462 / IP02500 / IS05 / C05 / P250 / NONE / NONE

**Selection table**

| $I_{sn}$ | Cl. | Primary rated current amperage $I_{pn}$ [A] 250 | 300 | 400 | 500 | 600 | 750 | 800 | 1000 | 1200 | Rated power $S_n$ [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

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<br>IP02000 ≙ 200 A<br>IP02500 ≙ 250 A<br>IP03000 ≙ 300 A<br>IP04000 ≙ 400 A<br>IP05000 ≙ 500 A<br>IP06000 ≙ 600 A<br>IP07500 ≙ 750 A<br>IP08000 ≙ 800 A<br>IP10000 ≙ 1000 A<br>IP12000 ≙ 1200 A<br>IP12500 ≙ 1250 A<br>IP15000 ≙ 1500 A<br>IP16000 ≙ 1600 A<br>IP20000 ≙ 2000 A<br>IP25000 ≙ 2500 A | IS05 ≙ 5 A | C02S ≙ 0.2S<br>C02 ≙ 0.2<br>C05S ≙ 0.5S<br>C05 ≙ 0.5 | P250 ≙ 2.5 VA<br>P500 ≙ 5.0 VA<br>P1000 ≙ 10 VA<br>P1500 ≙ 15 VA<br>P2000 ≙ 20 VA<br>P3000 ≙ 30 VA | NONE ≙ not calibrated<br>YES ≙ calibrated | NONE ≙ no calibration certificate<br>YES ≙ calibration certificate (a fee is charged)<br>YESPLUS ≙ Calibration certificate with catalog of errors (5 measuring points) (a fee is charged) |

### PACT MCR-V2C-6315-95 (Order No.: 2277475)

You will find information about the product on page 258.

Add **order key** from the selection table

| 2277475 | IP15000 | IS05 | C05 | P3000 | NONE | NONE |
|---|---|---|---|---|---|---|

**Selection table**

| $I_{sn}$ | Cl. | Primary rated current amperage $I_{pn}$ [A] 200 | 250 | 300 | 400 | 500 | 600 | 750 | 800 | 1000 | 1200 | 1250 | 1500 | Rated power $S_n$ [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)

You will find information about the product on page 258.

Add **order key** from the selection table

| 2277488 | IP12000 | IS05 | C02 | P1000 | NONE | NONE |
|---|---|---|---|---|---|---|

**Selection table**

| $I_{sn}$ | Cl. | Primary rated current amperage $I_{pn}$ [A] 500 | 600 | 750 | 800 | 1000 | 1200 | 1250 | 1500 | Rated power $S_n$ [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)

You will find information about the product on page 259.

Add **order key** from the selection table

| 2277491 | IP05000 | IS05 | C05 | P500 | NONE | NONE |
|---|---|---|---|---|---|---|

**Selection table**

| $I_{sn}$ | Cl. | Primary rated current amperage $I_{pn}$ [A] 400 | 500 | 600 | 750 | 800 | 1000 | 1200 | 1250 | 1500 | Rated power $S_n$ [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)

You will find information about the product on page 259.

Add **order key** from the selection table

| 2277501 | IP15000 | IS05 | C05S | P1000 | NONE | NONE |
|---|---|---|---|---|---|---|

**Selection table**

| $I_{sn}$ | Cl. | Primary rated current amperage $I_{pn}$ [A] 400 | 500 | 600 | 750 | 800 | 1000 | 1200 | 1250 | 1500 | Rated power $S_n$ [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)

You will find information about the product on page 260.

Add **order key** from the selection table

| 2277514 | IP08000 | IS05 | C05 | P1500 | NONE | NONE |
|---|---|---|---|---|---|---|

**Selection table**

| $I_{sn}$ | Cl. | Primary rated current amperage $I_{pn}$ [A] 500 | 600 | 750 | 800 | 1000 | 1200 | 1250 | 1500 | 1600 | 2000 | 2500 | Rated power $S_n$ [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)

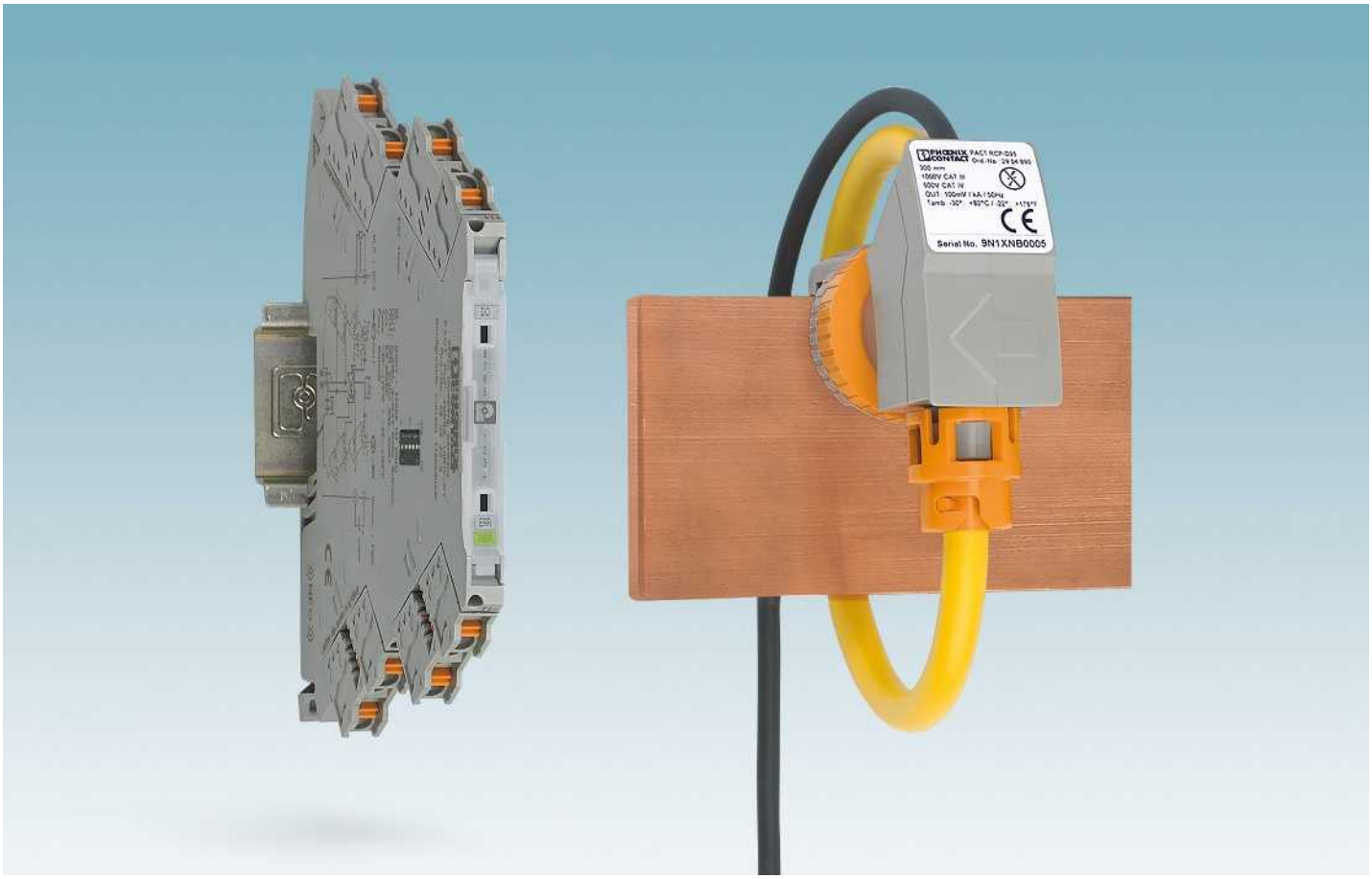
You will find information about the product on page 260.

Add **order key** from the selection table

| 2277527 | IP16000 | IS05 | C05 | P500 | NONE | NONE |
|---|---|---|---|---|---|---|

**Selection table**

| $I_{sn}$ | Cl. | Primary rated current amperage $I_{pn}$ [A] 500 | 600 | 750 | 800 | 1000 | 1200 | 1250 | 1500 | 1600 | 2000 | 2500 | Rated power $S_n$ [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 | |




**Fast installation in a confined space**

PACT RCP current transformers for retrofitting can be conveniently mounted where there is not enough space for split core current transformers. System downtimes are reduced as system parts do not have to be removed for installation.

Your advantages:

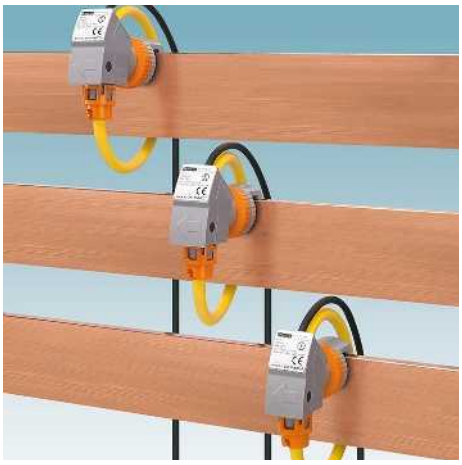
– High system availability due to reduced downtimes: fast installation without removing system parts
– Safe installation and operation: no dangerous open circuit voltages
– No magnetic saturation
– High linearity, even at high currents
– Responds to fast current changes
– The coil is protected against electromagnetic interference
– The current can rise up to the short-circuit current without necessarily destroying the coil
– High nominal insulation voltage

**Professional holding device for busbars**

The PACT RCP-CLAMP holding device offers the following advantages:

– Suitable for industrial applications
– Steel bracket ensures permanent fixed seating at high busbar temperatures
– Designed for rails with a thickness of 10 ... 15 mm
– Rogowski coil is snapped onto the fixing element
– Rogowski coil has a safe and defined place on the busbar
– Rogowski coil can be rotated in 15° increments for optimum alignment.
– PACT RCP avoids direct contact of the measuring coil with its own or adjacent busbar
– This allows installations on warm busbars to remain under control

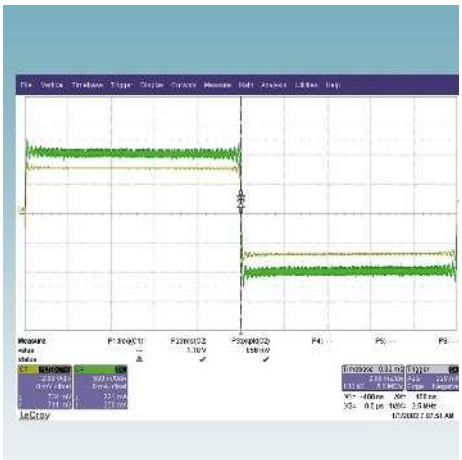
**Easy and safe installation**
Simply place the handy Rogowski coil quickly around power rails and circular conductors. The measuring transducer connected downstream supplies the same typical secondary currents as a standard current transformer.



**Fast installation in a confined space**
PACT RCP current transformers save space and are handy as the size and weight of the Rogowski coil are not dependent on the amperage and unlike split core current transformers, remain the same.

**One measuring system for all amperages**
Acquire alternating currents up to 4000 A using a single coil type. Rogowski coils are available in three different lengths for optimum adjustment to the busbar and circular conductor dimensions.

**Eight current measuring ranges**
The measuring transducer connected downstream supplies the same typical secondary currents as a standard current transformer. Choose between eight different current measuring ranges via DIP switches. For optimum measuring accuracy, compensate for the different coil lengths by simply using a potentiometer.



**Detect harmonics and transients**
PACT RCP current transformers for retrofitting cover a large frequency range from 10 to 5000 Hz. You can therefore measure harmonics and transients with phase accuracy.

**Safe seating**
The optional holding device ensures safe seating and optimal alignment of the coil even on very hot busbars. If the gap between the busbars is very small, simply turn the coil diagonally to avoid touching other rails.

## Current transformers for retrofitting

### PACT RCP

- Practical handling due to the flexible measuring coil for opening
- Universal application possibilities through 8 different current measuring ranges in one device: (0 ... 100/ ... / ... /4000 A)
- The large bandwidth (10...5000 Hz) enables harmonics and transients to be detected
- It is not possible for dangerous open circuit voltages to occur
- The bracket ensures optimum alignment of the measuring coil to the power rail
- Low space requirement in the control cabinet

**Current transformer for subsequent installation in the field**

### Technical data

| | |
|---|---|
| Measuring coil input data | |
| Frequency range | 10 Hz ... 5000 Hz |
| Input signal | Sine |
| Position error | < 1 % |
| Measuring coil signal output | |
| Output signal (at 50 Hz) | 100 mV (no load, at 1000 A) |
| General data, measuring coil | |
| Length of signal cable | 3000 mm |
| Rated insulation voltage | 1000 V AC (rms CAT III)<br>600 V AC (rms CAT IV) |
| Test voltage | 10.45 kV (DC / 1 min.) |
| Ambient temperature (operation) | -30 °C ... 80 °C (measuring coil) |
| Ambient temperature (storage/transport) | -40 °C ... 90 °C (measuring coil) |
| Measuring transducer input data | |
| Measuring ranges (current) via DIP switch | 100 A, 250 A, 400 A, 630 A, 1000 A, 1500 A, 2000 A, 4000 A |
| Phase angle | < 1 ° |
| Measuring transducer signal input | |
| Input signal (at 50 Hz) | 100 mV (1000 A) |
| Measuring transducer signal output | |
| Current output signal | 0 A AC ... 1 A AC (effective at sine) |
| Miscellaneous data for measuring transducer | |
| Nominal supply voltage | 24 V DC -20 % ... +25 % |
| Nominal supply voltage range | 19.2 V DC ... 30 V DC |
| Transmission error, maximum | ≤ 0.5 % (of range final value) |
| Linearity error | < 0.5 % (of range final value) |
| Frequency range | 45 Hz ... 65 Hz |
| Degree of protection | IP20 |
| Test voltage | 1.5 kV AC (supply/input and output: 50 Hz, 1 min) |
| Dimensions W / H / D | 22.5 / 70.4 / 85 mm |
| Ambient temperature (operation) | -20 °C ... 70 °C (measuring transducer) |
| Ambient temperature (storage/transport) | -25 °C ... 85 °C (measuring transducer) |
| General data for the set | |
| Altitude | < 2000 m |
| Permissible humidity (operation) | 5 % ... 95 % (non-condensing) |
| Approvals / conformities | |
| Standards/specifications | IEC 61010-1<br>IEC 61010-031<br>IEC 61010-2-031<br>IEC 61010-2-032 |

### Ordering data

| Description | Type | Order No. | Pcs. / Pkt. |
|---|---|---|---|
| **Current transformer for retrofitting,** set consisting of Rogowski coil and measuring transducer, output signal: 1 A AC (effective for sine) | | | |
| Length of measuring coil 300 mm | **PACT RCP-4000A-1A-D95** | **2904921** | 1 |
| Length of measuring coil 450 mm | **PACT RCP-4000A-1A-D140** | **2904922** | 1 |
| Length of measuring coil 600 mm | **PACT RCP-4000A-1A-D190** | **2904923** | 1 |

### Accessories

| | | | |
|---|---|---|---|
| **Holding device for power rail** | **PACT RCP-CLAMP** | **2904895** | 1 |

**Recommendations for the use of coil lengths and power rail dimensions**

| Busbar [mm x mm] | Diameter/ coil length [mm] | 1 busbar per phase | 2 busbars per phase | 3 busbars per phase |
|---|---|---|---|---|
| 30 x 10 | 95/300 | X | X | |
| 40 x 10 | 95/300 | X | X | |
| 40 x 10 | 140/450 | | | X |
| 50 x 10 | 95/300 | X | | |
| 50 x 10 | 140/450 | | X | X |
| 60 x 10 | 95/300 | X | | |
| 60 x 10 | 140/450 | | X | X |
| 60 x 10 | 140/450 | X | X | X |
| 100 x 10 | 140/450 | X | X | |
| 100 x 10 | 190/600 | | | X |
| 120 x 10 | 140/450 | X | | |
| 120 x 10 | 190/600 | | X | X |
| 160 x 10 | 190/600 | X | X | X |

## Current transformers for retrofitting

new

Current transformer for subsequent installation in the field

### PACT RCP

- Universal application possibilities through 8 different current measuring ranges in one device: (0 ... 100/ ... / ... /4000 A)
- Detection of harmonics and transients in the frequency range from (16 ... 1000) Hz
- Large number of different standard signals on output side
- Freely configurable 4-way signal conditioner with switching output
- FASTCON Pro plug-in connection system
- Overall width of just 6.2 mm
- Easy configuration, e.g., via DIP switches, programmable software, via smartphone app or FDT/DTM

### Technical data

| | |
|---|---|
| Measuring coil input data | |
| Frequency range | 10 Hz ... 5000 Hz |
| Input signal | Sine |
| Position error | < 1 % |
| Measuring coil signal output | |
| Output signal (at 50 Hz) | 100 mV (no load, at 1000 A) |
| General data, measuring coil | |
| Length of signal cable | 3000 mm |
| Rated insulation voltage | 1000 V AC (rms CAT III)<br>600 V AC (rms CAT IV) |
| Test voltage | 10.45 kV (DC / 1 min.) |
| Ambient temperature (operation) | -30 °C ... 80 °C (measuring coil) |
| Measuring transducer input data | |
| Measuring ranges (current) via DIP switch | 100 A, 250 A, 400 A, 630 A, 1000 A, 1500 A, 2000 A, 4000 A |
| Measuring transducer signal input | |
| Input signal (at 50 Hz) | 100 mV (1000 A) |
| Measuring transducer signal output | |
| Current output signal | 0 mA ... 20 mA (via DIP switch)<br>4 mA ... 20 mA (via DIP switch)<br>0 mA ... 10 mA (via DIP switch)<br>2 mA ... 10 mA (via DIP switch)<br>0 mA ... 21 mA (can be set via software) |
| Output signal<br>Voltage | 0 V ... 10 V (via DIP switch)<br>2 V ... 10 V (via DIP switch)<br>0 V ... 5 V (via DIP switch)<br>1 V ... 5 V (via DIP switch)<br>0 V ... 10.5 V (can be set via software) |
| Miscellaneous data for measuring transducer | |
| Nominal supply voltage | 24 V DC |
| Nominal supply voltage range | 9.6 V DC ... 30 V DC |
| Transmission error, maximum | ≤ 0.5 % (of range final value) |
| Frequency range | 16 Hz ... 1000 Hz |
| Degree of protection | IP20 |
| Test voltage | 3 kV (50 Hz, 1 min.) |
| Dimensions W / H / D | 6.2 / 110.5 / 120.5 mm |
| Ambient temperature (operation) | -40 °C ... 70 °C (measuring transducer) |
| General data for the set | |
| Altitude | > 4000 m |
| Permissible humidity (operation) | 5 % ... 95 % (non-condensing) |
| Approvals / conformities | |
| Standards/specifications | IEC 61010-1<br>IEC 61010-031<br>IEC 61010-2-031<br>IEC 61010-2-032 |

### Ordering data

| Description | Type | Order No. | Pcs. / Pkt. |
|---|---|---|---|
| **Current transformer with screw connection for retrofitting,** set consisting of Rogowski coil and 4-way signal conditioner with switching output | | | |
| Length of measuring coil 300 mm | **PACT RCP-4000A-UIRO-D95** | **2906231** | 1 |
| Length of measuring coil 450 mm | **PACT RCP-4000A-UIRO-D140** | **2906232** | 1 |
| Length of measuring coil 600 mm | **PACT RCP-4000A-UIRO-D190** | **2906233** | 1 |
| **Current transformer with push-in connection for retrofitting,** set consisting of Rogowski coil and 4-way signal conditioner with switching output | | | |
| Length of measuring coil 300 mm | **PACT RCP-4000A-UIRO-PT-D95** | **2906234** | 1 |
| Length of measuring coil 450 mm | **PACT RCP-4000A-UIRO-PT-D140** | **2906235** | 1 |
| Length of measuring coil 600 mm | **PACT RCP-4000A-UIRO-PT-D190** | **2906236** | 1 |

### Accessories

| | | | |
|---|---|---|---|
| **Holding device for power rail** | **PACT RCP-CLAMP** | **2904895** | 1 |

**With flexible power supply – current transducers up to 12 A AC**

Active current transducers convert sinusoidal alternating currents up to 12 A. The integrated wide range power supply unit enables use in various different countries.

**With hinged Rogowski sensor – current transducers up to 200 A AC**

The AC current transducers measure sinusoidal and non-sinusoidal alternating currents up to 200 A. The hinged Rogowski sensor ensures very easy installation, as cables that are to be measured do not have to be isolated. This enables mounting to be carried out without interruptions.

**Limit value monitoring with the current protector**

At the current protector, a desired amperage is specified at which a PDT contact switches a load on or off.

**Flexible signal conditioning – current transducers up to 55 A AC/DC**

Current transducers up to 55 A offer an infinitely adjustable measuring range. This range is mapped over the entire output signal range. This ensures extremely accurate resolution of measured values. Basic configuration can be performed quickly via the DIP switches. Additional useful device functions can be set via the software.

**For high currents – current transducers up to 600 A AC/DC**

The universal current transducers are the ideal solution for measuring high currents with any waveform up to 600 A AC/DC. The product range offers various different devices in graded measuring ranges with current or voltage output.

**For sinusoidal alternating currents up to 12 A**
- 3-way electrical isolation
- Wide range version from 19.2 ... 253 V AC/DC
- Voltage bridging with DIN rail connector
- Input/output can be configured via DIP switches
- Suitable for potentially explosive areas, thanks to ATEX approval for Ex zone 2

**For sinusoidal and non-sinusoidal alternating currents up to 200 A**
- Distorted alternating currents up to 6000 Hz can be also acquired, thanks to true r.m.s. value measurement (RMS)
- Uninterrupted installation and lossless current measurement thanks to hinged Rogowski sensor
- Measuring range selection with slide switch

**Limit value monitoring**

The current protector converts sinusoidal alternating currents to 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
- Operating current/quiescent current behavior can be set

**With flexible measuring ranges for all waveforms up to 55 A**
- Lossless true r.m.s. value measurement without shunt via Hall sensor (TRMS)
- Optimum mapping of the measuring range up to 55 A, thanks to software-programmable upper and lower limits
- Limit value alarm in the event of threshold value overrange or underrange up to 55 A – via relay or transistor output

**For high currents – current transducers up to 600 A AC/DC**
- Lossless true r.m.s. value measurement without shunt via Hall sensor (TRMS)
- Compact dimensions also enable distributed use
- Variable mounting on DIN rail and mounting plate
- COMBICON plug-in connection terminal blocks
- 3-way isolation
- For a conductor diameter of up to 32 mm

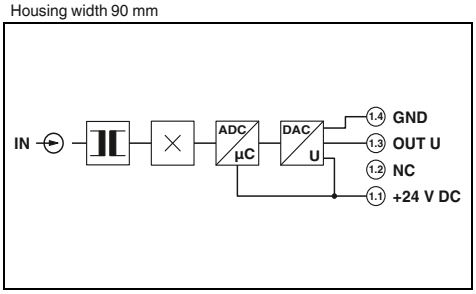
## Current transducers for AC/DC and distorted currents

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

**For DC, AC, and distorted currents of 0 ... 300 A, voltage output**

Housing width 90 mm




### Technical data

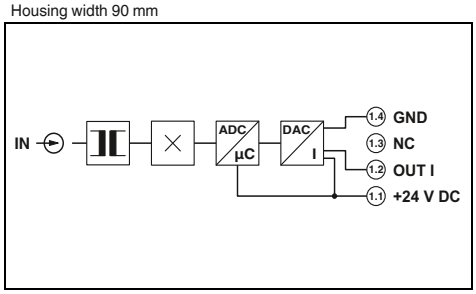
| | |
|---|---|
| Input data | |
| Frequency range | 20 Hz ... 6000 Hz (0 Hz) |
| Curve type | AC, DC or distorted currents |
| Connection method | Cable design: 32 mm diameter |
| Output data | |
| Output signal | 0 ... 10 V |
| Maximum output signal | |
| Load $R_B$ | ≥ 10 kΩ |
| General data | |
| Supply voltage $U_B$ | 20 V DC ... 30 V DC |
| Maximum transmission error | <± 1 % (of final value) |
| Temperature coefficient | typ. 0.02 %/K (0 ... 60°C) 0.04 %/K (-40 ... 65°C) |
| Step response (10-90%) | 150 ms |
| Safe isolation | acc. to EN 61010 |
| Rated insulation voltage | 300 V AC |
| Surge voltage category / pollution degree | III / 2 |
| Degree of protection | IP20 |
| Ambient temperature range | -40 °C ... 65 °C |
| Dimensions W / H / D | 90 / 33.8 / 85 mm |
| Spring-cage connection solid / stranded / AWG | 0.25 ... 2.5 mm² / 0.2 ... 2.5 mm² / 24 - 12 |
| Conformance / approvals | |
| Conformance | CE-compliant |
| UL, USA / Canada | UL/C-UL listed UL 508 |

### Ordering data

| Description | Overload capacity | 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 $I_{IN}$ | | | |
| **Universal current transducer without UL approval** | | | | |
| Input current range: 0 ... 500 A | 3.6 x $I_{IN}$ | | | |
| Input current range: 0 ... 600 A | 3 x $I_{IN}$ | | | |

**For DC, AC, and distorted currents of 0 ... 600 A, current output**

Housing width 90 mm




## Technical data

20 Hz ... 6000 Hz (0 Hz)
AC, DC or distorted currents
Cable design: 32 mm diameter

4 ... 20 mA
< 25 mA
< 300 Ω

20 V DC ... 30 V DC
<± 1 % (of final value)
typ. 0.02 %/K (0 ... 60°C) 0.04 %/K (-40 ... 65°C)

150 ms
acc. to EN 61010
300 V AC
III / 2
IP20
-40 °C ... 65 °C
90 / 33.8 / 85 mm
0.25 ... 2.5 mm² / 0.2 ... 2.5 mm² / 24 - 12

CE-compliant
UL/C-UL listed UL 508

## 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 |

## Current transducers for AC/DC and distorted currents

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:**

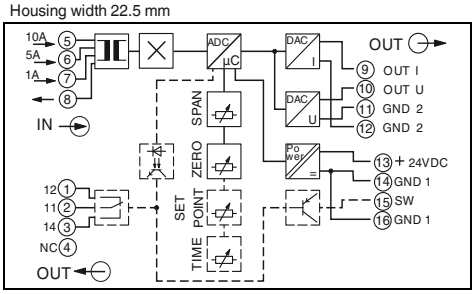
To order a configurable product, enter the required configuration by referring to the adjacent order key.

Further information about the configuration software can be found on page 280

**For DC, AC, and distorted currents**
**0 ... 11 A**

Ex:

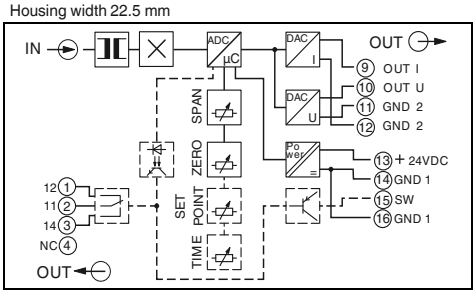
Housing width 22.5 mm



**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 capacity | | 2 x $I_N$ (continuous) | | Depending on through connected conductor | |
| Surge strength | | 20 x $I_N$ (1 s) | | Depending 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<br>2 ... 10 V / -5 ... 5 V / -10 ... 10 V | 0 ... 20 mA / 4 ... 20 mA | 0 ... 5 V / 1 ... 5 V / 0 ... 10 V<br>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 (for gold layer, 30 V AC/ 36 V DC)<br>2 A (in case of a destroyed gold layer, 250 V AC) | | 50 mA (for gold layer, 30 V AC/ 36 V DC)<br>2 A (in case of a destroyed 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 | | acc. to EN 50178, EN 61010 | | acc. 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 | |
| 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 | |
| EMC note | | Class A product, see page 625 | | Class A product, see page 625 | |
| 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 | |

| | Ordering data | | | Ordering data | | |
|---|---|---|---|---|---|---|
| Description | Type | Order No. | Pcs. / Pkt. | Type | Order No. | Pcs. / Pkt. |
| **MCR current 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 |

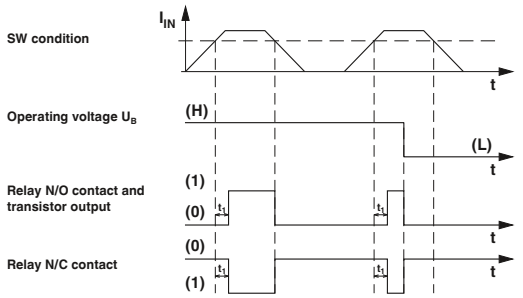
**Order key for the current transducers** (standard configuration entered as example)

| Order No. | Measuring range: Start | Measuring range: End | Output | Threshold value | Suppression time | Switching 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<br>2814650 ≙ MCR-S-1-5-UI-SW-DCI | Measuring range start value between 0.00 ... 7.50 A<br>0.00 ≙ 0.00 A | Measuring range end value between 0.2 ... 11 A<br>5.00 ≙ 5.00 A | OUT01 ≙ 0 ... 20 mA<br>OUT02 ≙ 4 ... 20 mA<br>OUT03 ≙ 0 ... 10 V<br>OUT04 ≙ 2 ... 10 V<br>OUT05 ≙ 0 ... 5 V<br>OUT06 ≙ 1 ... 5 V<br>OUT07 ≙ 20 ... 0 mA<br>OUT08 ≙ 20 ... 4 mA<br>OUT09 ≙ 10 ... 0 V<br>OUT10 ≙ 10 ... 2 V<br>OUT11 ≙ 5 ... 0 V<br>OUT12 ≙ 5 ... 1 V<br>OUT13 ≙ -5 ... +5 V<br>OUT14 ≙ -10 ... +10 V<br>OUT17 ≙ +10 ... -10 V<br>OUT18 ≙ +5 ... -5 V | Switching threshold between 1 ... 110%<br>50 ≙ 50% of set measuring range final value (here: 2.5 A) | between 0.1 ... 20 s<br>3.0 ≙ 3 s | A ≙ Operating current controlled<br>R ≙ Closed-circuit current controlled | O ≙ Overrun<br>U ≙ Underrun |

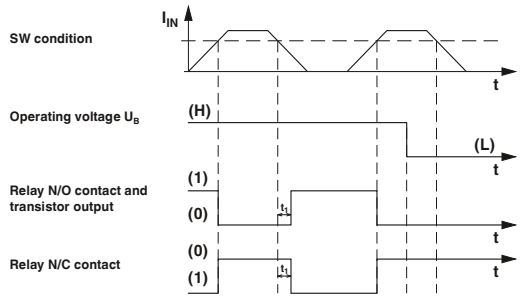
| Order No. | Measuring range: Start | Measuring range: End | Output | Threshold value | Suppression time | Switching behavior of relay and transistor | |
|---|---|---|---|---|---|---|---|
| 2814647 / | 0.0 / | 50.0 / | OUT01 | | | | |
| 2814663 / | 0.0 / | 50.0 / | OUT01 / | 50 / | 3.0 / | A / | O |
| 2814647 ≙ MCR-S-10-50-UI-DCI<br>2814663 ≙ MCR-S-10-50-UI-SW-DCI | Measuring range start value between 0.0 ... 37.5 A<br>0.0 ≙ 0.0 A | Measuring range end value between 9.5 ... 55 A<br>50.0 ≙ 50.0 A | OUT01 ≙ 0 ... 20 mA<br>OUT02 ≙ 4 ... 20 mA<br>OUT03 ≙ 0 ... 10 V<br>OUT04 ≙ 2 ... 10 V<br>OUT05 ≙ 0 ... 5 V<br>OUT06 ≙ 1 ... 5 V<br>OUT07 ≙ 20 ... 0 mA<br>OUT08 ≙ 20 ... 4 mA<br>OUT09 ≙ 10 ... 0 V<br>OUT10 ≙ 10 ... 2 V<br>OUT11 ≙ 5 ... 0 V<br>OUT12 ≙ 5 ... 1 V<br>OUT13 ≙ -5 ... +5 V<br>OUT14 ≙ -10 ... +10 V<br>OUT17 ≙ +10 ... -10 V<br>OUT18 ≙ +5 ... -5 V | Switching threshold between 1 ... 110%<br>50 ≙ 50% of set measuring range final value (here: 25 A) | between 0.1 ... 20 s<br>3.0 ≙ 3 s | A ≙ Operating current controlled<br>R ≙ Closed-circuit current controlled | O ≙ Overrun<br>U ≙ Underrun |

**Functional diagram: switching behavior of relay and transistor output:**

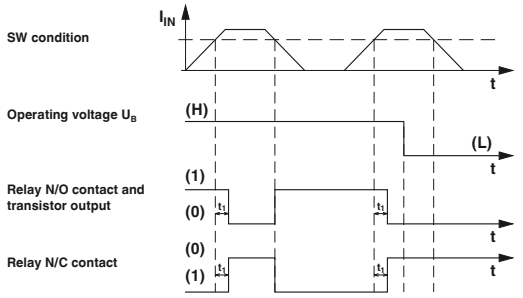
**1) Operating current controlled when threshold value is exceeded**



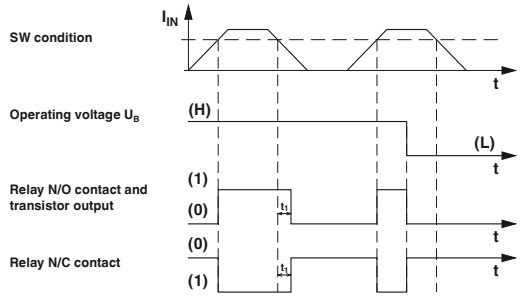

**2) Operating current controlled when threshold value is underrun**




**3) Closed-circuit current controlled when above threshold value**




**4) Closed-circuit current controlled when below the threshold value**

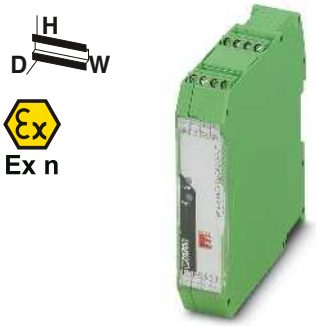



(0) ≙ N/O contact and transistor open / N/C contact closed
(1) ≙ N/O contact and transistor closed / N/C contact open

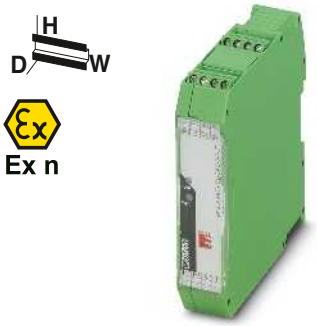
## AC current transducers, sinusoidal

The **MCR-SL-CAC-...** current transducers measure sinusoidal alternating currents within the range 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

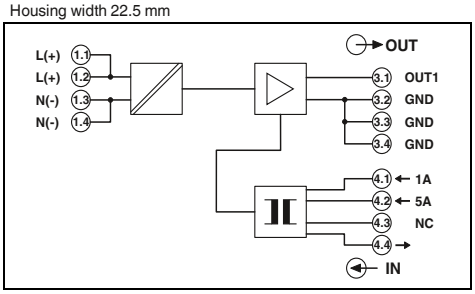


**For sinusoidal alternating currents 0 ... 1 A/0 ... 5 A**

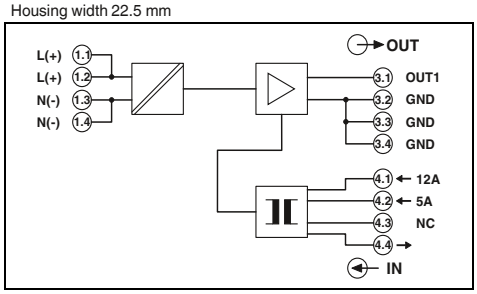


**For sinusoidal alternating currents 0 ... 5 A/0 ... 12 A**

Ex: Housing width 22.5 mm




Ex: 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 | | 50 Hz | |
| Frequency range | 45 Hz ... 65 Hz | | 45 Hz ... 65 Hz | |
| Curve type | Sine | | Sine | |
| Overload capacity | 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 | MACX MCR-SL-CAC-12-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 | acc. to EN 61010 | acc. to EN 61010 | acc. 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 (-4°F ... 149°F) | - |
| 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 IIC T4 Gc X | | Ex II 3 G Ex nA IIC T4 Gc X | |
| UL, USA / Canada | UL 508 Recognized | | - | |

| | Ordering data | | | Ordering data | | |
|---|---|---|---|---|---|---|
| Description | Type | Order No. | Pcs. / Pkt. | Type | Order No. | Pcs. / Pkt. |
| **MCR current 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 | **MACX MCR-SL-CAC-12-I-UP** | **2810638** | 1 |

| | Accessories | | | Accessories | | |
|---|---|---|---|---|---|---|
| **DIN rail connector,** for bridging the supply voltage (19.2...30 V DC), can be snapped onto 35 mm DIN rails as per EN 60715 | **ME 22,5 TBUS 1,5/ 5-ST-3,81 GN** | **2707437** | 50 | | | |

## AC current transducers, sinusoidal and distorted

The **MCR-SL-S-...00-...** current transducers measure sinusoidal and non-sinusoidal alternating currents within the range 0 ... 200 A.

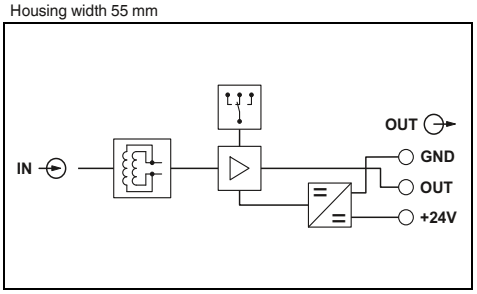
- True r.m.s. value measurement from 30...6000 Hz
- Measuring range selection with slide switch
- Loop-powered
- Can be retrofitted with the hinged Rogowski coil

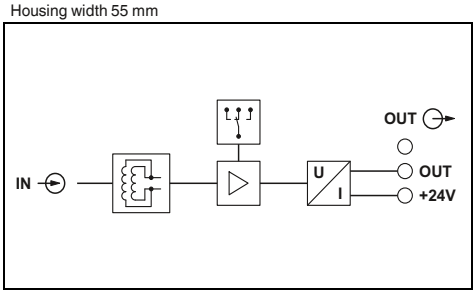
**For sinusoidal and non-sinusoidal alternating currents, 0 ... 200 A, voltage output**

Ex:
Housing width 55 mm

**For sinusoidal and non-sinusoidal alternating currents, 0 ... 200 A, current output (loop-powered)**

Ex:
Housing width 55 mm



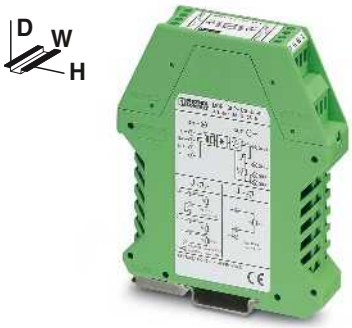




| | Technical data | | Technical data | |
|---|---|---|---|---|
| Input data | ...-S-100-U | ...-S-200-U | ...-S-100-I-LP | ...-S-200-I-LP |
| Input current (configurable) | 0 A ... 100 A (0...50/75/100 A) | 0 A ... 200 A (0..100/150/200 A) | 0 A ... 100 A (0...50/75/100 A) | 0 A ... 200 A (0...100/150/200 A) |
| Operate threshold | 1 % (of final value) | | 1 % (of final value) | |
| Frequency range | 30 Hz ... 6000 Hz | | 30 Hz ... 6000 Hz | |
| Curve type | Sinusoidal and non-sinusoidal | | Sinusoidal and non-sinusoidal | |
| Overload capacity | Depending on laid conductor | | Depending on laid conductor | |
| Surge strength | Depending on through connected conductor | | Depending on through connected conductor | |
| Connection method | Clamp-on cable design, diameter 18.5 mm | | Clamp-on cable design, diameter 18.5 mm | |
| Output data | | | | |
| Output signal | 0 ... 5 V / 0 ... 10 V | | 4 ... 20 mA | |
| Maximum output signal | (0 V ... 10 V) 14 V, (0 V ... 5 V) 7 V | | < 25 mA | |
| Load $R_B$ | ≥ 10 kΩ | | ($U_B$ - 12 V) x 350 / 12 A | |
| General data | | | | |
| Supply voltage $U_B$ | 20 V DC ... 30 V DC | | 20 V DC ... 30 V DC | |
| Current consumption | < 30 mA | | | |
| Maximum transmission error | < 1 % (of final value) | | < 1 % (of final value) | |
| Cable position error | < 0.63 % | | < 0.63 % | |
| Temperature coefficient | < 0.035 %/K | | < 0.025 %/K | |
| Step response (10-90%) | < 340 ms | | < 340 ms | |
| Safe isolation | As per IEC 61010-1 and IEC 61326 | | As per IEC 61010-1 and IEC 61326 | |
| 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 | 5 kV (50 Hz, 1 min.) | | 5 kV (50 Hz, 1 min.) | |
| Degree of protection | IP20 | | IP20 | |
| Ambient temperature range | -20 °C ... 60 °C | | -20 °C ... 60 °C | |
| Dimensions W / H / D | 55 / 85 / 70.5 mm | | 55 / 85 / 70.5 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 | cULus | | cULus | |

| | Ordering data | | | Ordering data | | |
|---|---|---|---|---|---|---|
| Description | Type | Order No. | Pcs. / Pkt. | Type | Order No. | Pcs. / Pkt. |
| **MCR current transducer** for sinusoidal and non-sinusoidal alternating currents | | | | | | |
| Input current range: 0...50/75/100 A | **MCR-SL-S-100-U** | **2813457** | 1 | **MCR-SL-S-100-I-LP** | **2813486** | 1 |
| Input current range: 0..0.100/150/200 A | **MCR-SL-S-200-U** | **2813460** | 1 | **MCR-SL-S-200-I-LP** | **2813499** | 1 |

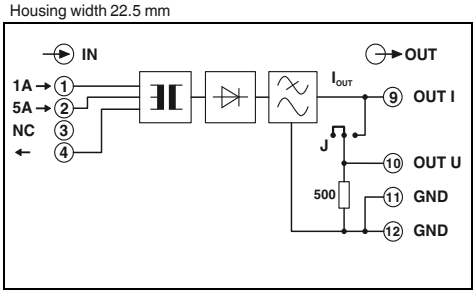
## Passive AC current transducer, sinusoidal

The **MCR-SLP-1-5-UI-0** passive current transducer measures sinusoidal alternating currents within the range 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 capacity | 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<br>< 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 | acc. 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 | |
| EMC note | Class A product, see page 625 | |
| Conformance / approvals | | |
| Conformance | CE-compliant | |

### Ordering data

| Description | Type | Order No. | Pcs. / Pkt. |
|---|---|---|---|
| **MCR passive current transducer** for sinusoidal alternating currents | **MCR-SLP-1-5-UI-0** | **2814359** | 1 |

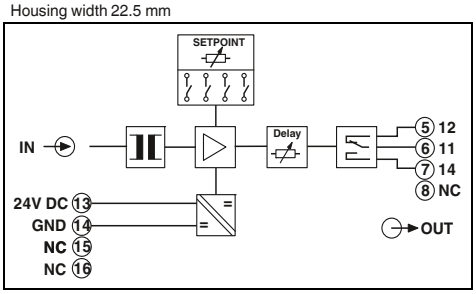
## AC current protector, sinusoidal

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
- Operating current/quiescent current behavior can be set

**For sinusoidal alternating currents, 0 ... 16 A AC**

Housing width 22.5 mm

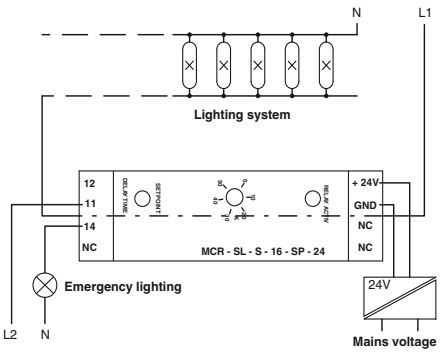



### Technical data

| | |
|---|---|
| Input data | |
| Input current | 0 A AC ... 16 A AC |
| Frequency range | 45 Hz ... 65 Hz |
| Curve type | Sine |
| Overload capacity | 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 (for gold layer, 30 V AC/ 36 V DC)<br>2 A (in case of a destroyed gold layer, 250 V AC) |
| Switching hysteresis | Adjustable using a DIP switch (0.5 %, 5 %, 10 %, 15 %) |
| Response delay | typ. 0.1 s ... 10 s (adjustable using a potentiometer) |
| Operating and closed-circuit current behavior | Adjustable using a 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 | acc. 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 |
| EMC note | Class A product, see page 625 |
| 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**

## 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™.

**For MCR-S-... current transducer**

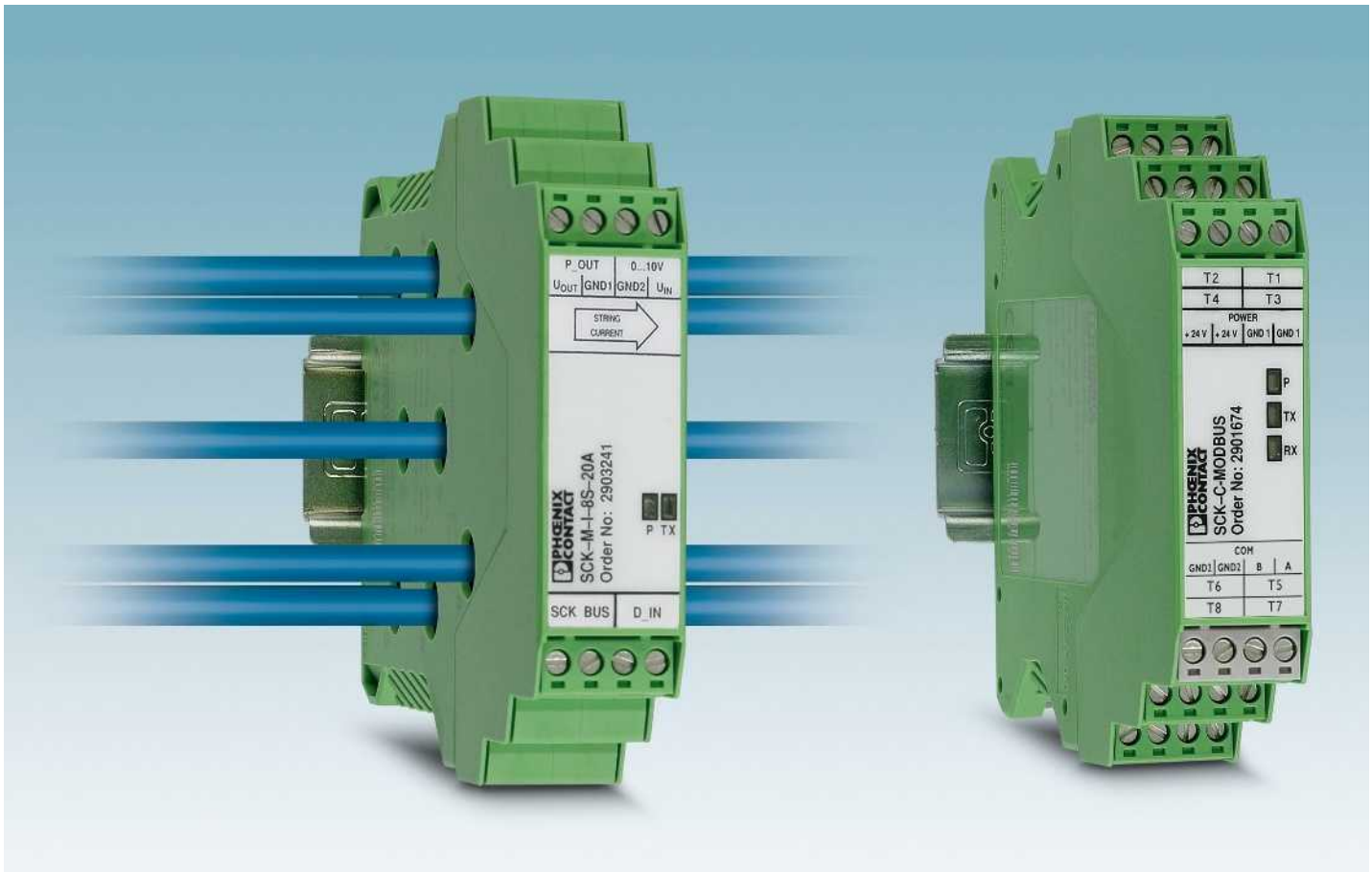
| Description | Type | Order No. | Pcs. / Pkt. |
|---|---|---|---|
| | **Ordering data** | | |
| **MCR configuration software,** for programming MCR-T-...-, MCR-...-LP-...-, MCR-...-HT-...-, MCR-S-...-, MCR-F-..., and MCR-PSP-... modules, CD-ROM | **MCR/PI-CONF-WIN** | **2814799** | 1 |
| | **Accessories** | | |
| **Labels,** for marking 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 the MCR-S... current transducers:
– USB adapter cable
– Software adapter cable

**For MCR-S-... current transducer**

| Description | Type | Order No. | Pcs. / Pkt. |
|---|---|---|---|
| | **Ordering data** | | |
| **USB adapter cable,** D-9-SUB to USB, with adapter D-9-SUB to D-25-SUB | **CM-KBL-RS232/USB** | **2881078** | 1 |
| **Software adapter cable** (stereo jack plug/25-pos. D-SUB), 1.2 m long, for programming MCR-T-..., MCR-S-..., and MCR-F-... modules | **MCR-TTL-RS232-E** | **2814388** | 1 |
| | **Accessories** | | |
| **Adapter cable,** flexible, 9-pos. D-SUB socket to 25-pos. D-SUB pin | **PSM-KAD 9 SUB 25/BS** | **2761295** | 1 |




## Utilize solar electricity efficiently

Detect errors – increase efficiency: photovoltaic systems should achieve maximum energy yield within the shortest possible time.

SOLARCHECK provides reliable information regarding the performance of your photovoltaic system. It can be used to detect faults, which may be caused by damaged panels, defective contacts or damage in the cabling. This allows you to implement countermeasures quickly, thereby increasing the efficiency of your system.

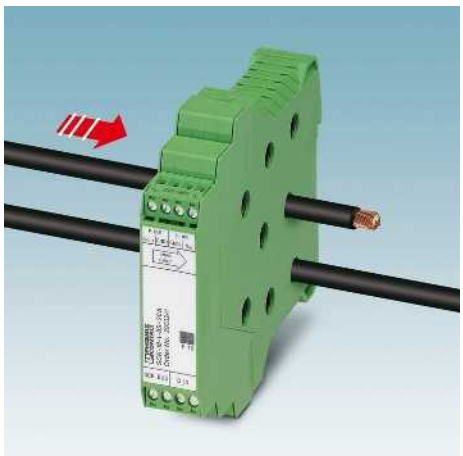
## Current topic: reliable monitoring

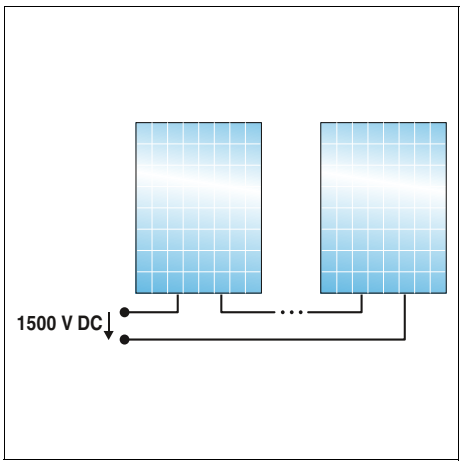
Whether a small roof-top system on a family home or a megawatt outdoor system: for reliable operation, the photovoltaic market requires monitoring systems where status information is continuously available and visualization is easy. Phoenix Contact offers a comprehensive portfolio of hardware and software products specifically designed for this purpose.

## Energy of the future

From installation to monitoring - in the "Components and systems for photovoltaics" brochure you will find further innovative solutions for your photovoltaic system, such as:

– Connection technology
– Surge protection
– Hardware and software solutions
– Generator connection boxes
– Tools and marking






**Contact-free current measurement**

Contact-free measurement using Hall sensors offers many advantages:

- Safe isolation is already ensured by the cable insulation.
- No contact resistance due to additional contact points.
- The current is forwarded safely as the line circuit is not directly accessed.

**Space-saving installation without an additional power supply**

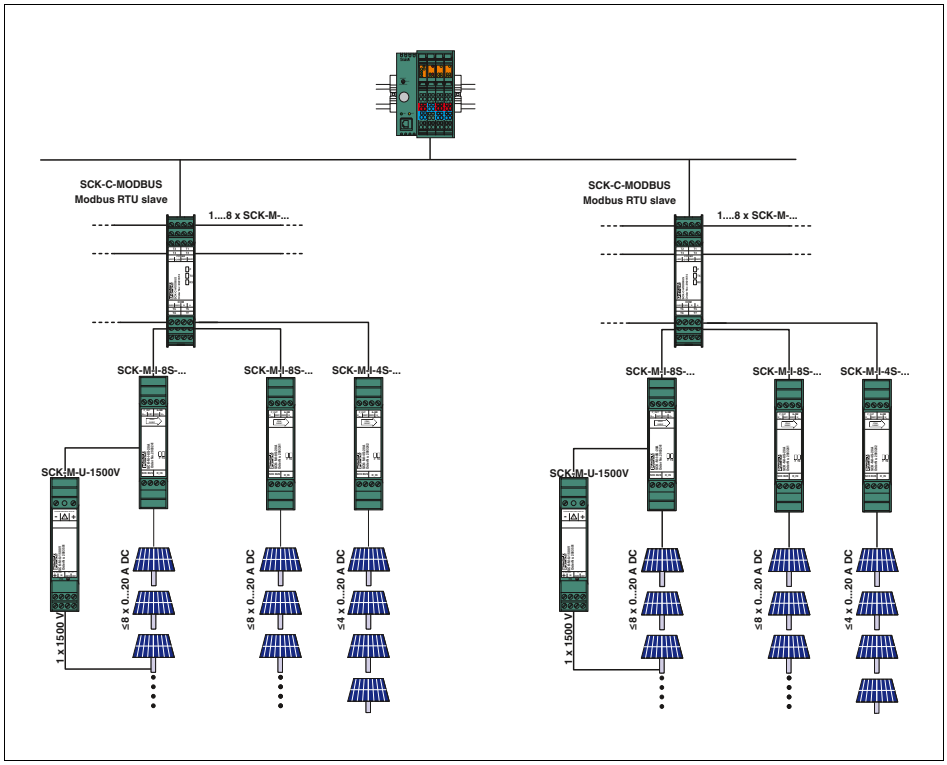
With a width of just 22.5 mm, the narrow measuring module bundles the cables in a confined space.

- The 2-wire communication cable is also used to supply the measuring modules.
- This means that one communication module supplies up to eight measuring modules – without an additional power supply.

**Flexible expansion**

Optional extension of voltage measurement up to 1500 V DC.

- Also suitable for grounded systems.
- Suitable for PV systems with extra high system voltages
- Flexible use, even outside the SOLARCHECK system




**Easy integration in monitoring systems**

The modular SOLARCHECK monitoring system consists of various measuring modules for current and voltage measurement and an associated communication module.

The communication module collects the measured values from the current measuring modules and forwards them to a higher-level controller. You can acquire up to eight or four string currents with one current measuring module each. A maximum of eight current measuring modules of any type can be connected to one communication module. The 2-wire communication cable is also used to supply the measuring modules with power. This means that no additional power supply is required in the field.

The voltage measuring module is usually connected to and also supplied via the analog input provided on the 8-channel current measuring modules.

## Solar system monitoring

### PV string monitoring
### SOLARCHECK

The modular SOLARCHECK monitoring system consists of various devices for current and voltage measurement and an associated communication module.

### Communication module:

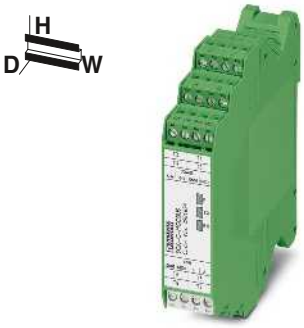
– For connecting and collecting measured values from up to eight measuring modules
– Provision of data for transfer to higher-level controllers

### Current measuring modules:

– 8-channel current measurement up to 20 A DC
– Detection of reverse currents up to -1 A
– 4-channel extension modules for 20 A DC
– Internal temperature monitoring
– Digital input for monitoring, e.g., the remote indication contacts of surge protection modules
– Supply via the communication module

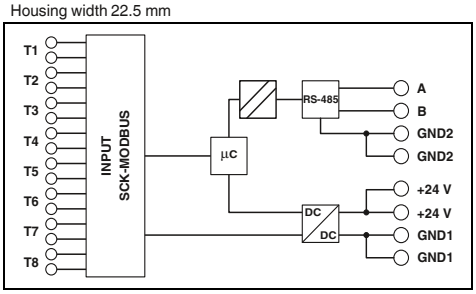
### Voltage measuring module

– Voltage measurement up to 1500 V DC in any grounded PV system
– Connection and supply is usually via the analog input provided (0 ... 10 V) on the 8-channel SOLARCHECK current measuring module
– Output of the voltage measured value as a 2 ... 10 V analog signal
– As an option, can also be removed from the SOLARCHECK group and used separately




**Communication module RS-485 (Modbus RTU)**

Housing width 22.5 mm

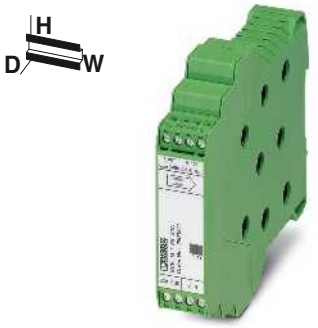



### Technical data

| | |
|---|---|
| Supply | |
| Supply voltage | 24 V DC -10 % ... +25 % |
| Own current consumption | 22 mA (typical) |
| Measuring input | |
| Current measuring range | - |
| Transmission error, maximum | - |
| Temperature coefficient | - |
| Reverse current detection | - |
| Number of measuring channels | - |
| Voltage measuring range | - |
| Connection method | - |
| Digital input | |
| Controlled by external floating contact | - |
| Analog input | |
| Input voltage range | - |
| Analog output | |
| Output voltage range | - |
| SCK-C-MODBUS data interface | |
| Cable length (for 0.15 mm$^2$) | - |
| Communication protocol | Proprietary |
| Serial port | RS-485 |
| Serial transmission speed | 9.6/14.4/19.2/38.4 kbps |
| Cable length | ≤ 1200 m |
| Communication protocol | Modbus/RTU |
| General data | |
| Degree of protection | IP20 |
| Ambient temperature range | -20 °C ... 70 °C |
| Dimensions W / H / D | 22.5 / 102 / 106 mm |
| Screw connection solid / stranded / AWG | 0.2 ... 2.5 mm$^2$ / 0.2 ... 2.5 mm$^2$ / 24 - 12 |
| EMC note | Class A product, see page 625 |
| Conformance / approvals | |
| Conformance | CE-compliant |
| UL, USA | 1741 Recognized |
| UL, USA / Canada | 508 Listed |

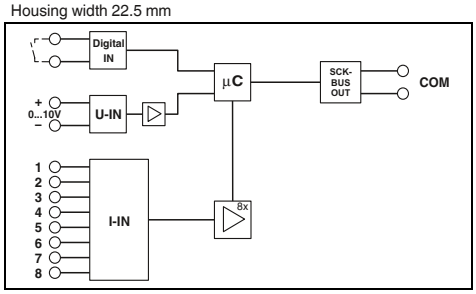
### Ordering data

| Description | Type | Order No. | Pcs. / Pkt. |
|---|---|---|---|
| **Communication module** | | | |
| | **SCK-C-MODBUS** | **2901674** | 1 |
| **Current measuring module,** 8-channel | | | |
| **Current measuring module,** 4-channel for extension | | | |
| **Voltage measuring module** | | | |



**Current measuring module, 20 A DC, 8-channel**

Housing width 22.5 mm




## Technical data

| |
|---|
| Via SCK-C-MODBUS |
| 43 mA (typical) |
| 0 A DC ... 20 A DC (UL: 0 A DC...25 A DC)<br>± 1 % (of measuring range final value) |
| 0.02 %/K ($T_{K20}$)<br>-1 A DC ... 0 A DC<br>8<br>-<br>Through connection, 9.5 mm diameter |
| Floating switch contacts |
| 0 V ... 10 V |
| - |
| ≤ 300 m (0.14 mm²)<br>Proprietary |
| -<br>-<br>- |
| IP20<br>-20 °C ... 70 °C<br>22.5 / 102 / 128.5 mm<br>0.2 ... 2.5 mm² / 0.2 ... 2.5 mm² / 24 - 12<br>Class A product, see page 625 |
| CE-compliant<br>1741 Recognized<br>508 Listed |

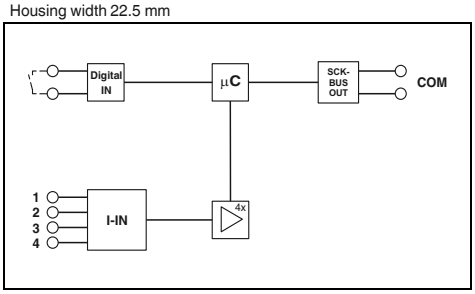
## Ordering data

| Type | Order No. | Pcs. / Pkt. |
|---|---|---|
| **SCK-M-I-8S-20A** | **2903241** | 1 |



**Extension module, 4-channel Current measurement 20 A DC**

Housing width 22.5 mm




## Technical data

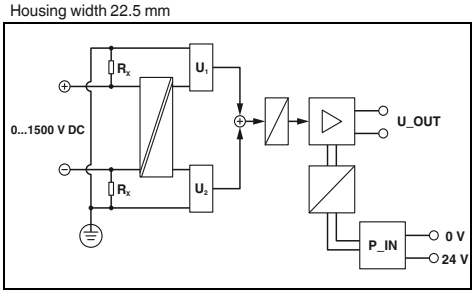
| |
|---|
| Via SCK-C-MODBUS |
| 43 mA (typical) |
| 0 A DC ... 20 A DC (UL: 0 A DC...25 A DC)<br>± 1 % (of measuring range final value) |
| 0.02 %/K ($T_{K20}$)<br>-1 A DC ... 0 A DC<br>4<br>-<br>Through connection, 9.5 mm diameter |
| Floating switch contacts |
| - |
| - |
| ≤ 300 m (0.14 mm²)<br>Proprietary |
| -<br>-<br>- |
| IP20<br>-20 °C ... 70 °C<br>22.5 / 102 / 128.5 mm<br>0.2 ... 2.5 mm² / 0.2 ... 2.5 mm² / 24 - 12<br>Class A product, see page 625 |
| CE-compliant<br>1741 Recognized<br>508 Listed |

## Ordering data

| Type | Order No. | Pcs. / Pkt. |
|---|---|---|
| **SCK-M-I-4S-20A** | **2903242** | 1 |

**Voltage measuring module, 0...1500 V DC**

Housing width 22.5 mm




## Technical data

| |
|---|
| 24 V DC -10 % ... +25 % (or via SSCK-M-I-8S-20A) |
| 8 mA (typical) |
| -<br>± 1 % (after additional tuning (valid for 100 - 1500 V DC)) |
| < 0.01 %/K<br>-<br>1<br>0 V DC ... 1500 V DC<br>Screw connection |
| - |
| - |
| 2 V DC ... 10 V DC |
| -<br>- |
| -<br>-<br>- |
| IP20<br>-20 °C ... 70 °C<br>22.5 / 102 / 128.5 mm<br>0.2 ... 2.5 mm² / 0.2 ... 2.5 mm² / 24 - 12<br>Class A product, see page 625 |
| CE-compliant<br>1741 Recognized<br>508 Listed |

## Ordering data

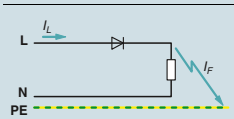
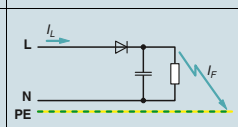
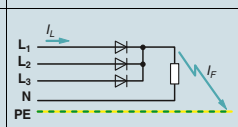
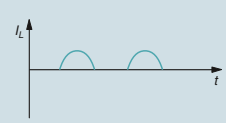
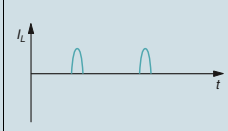
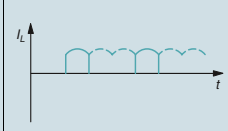
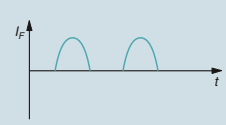
| Type | Order No. | Pcs. / Pkt. |
|---|---|---|
| **SCK-M-U-1500V** | **2903591** | 1 |

## Monitoring and diagnostics

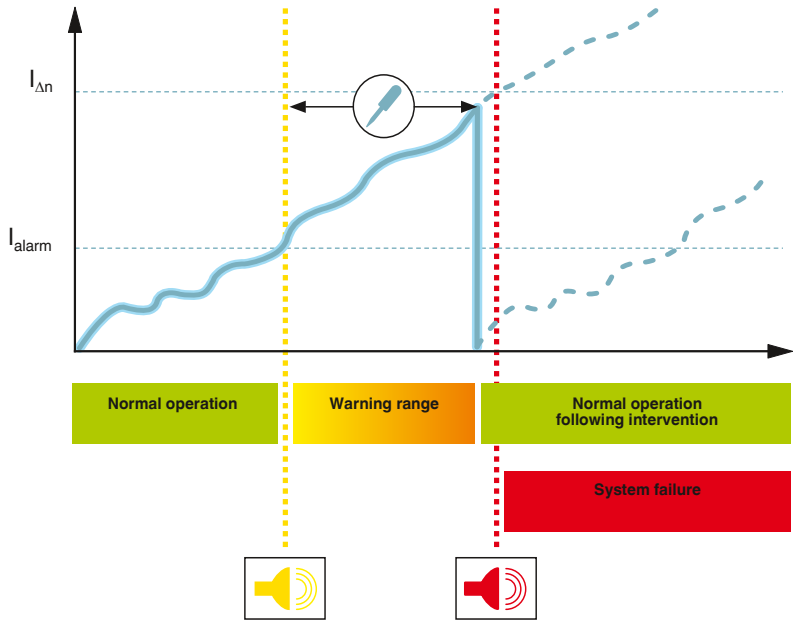
### Detect errors before they actually occur

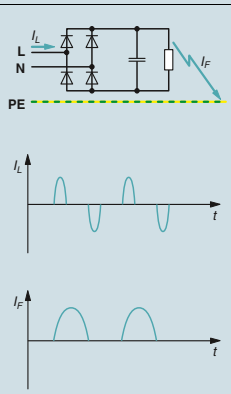
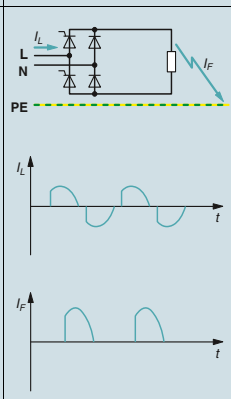
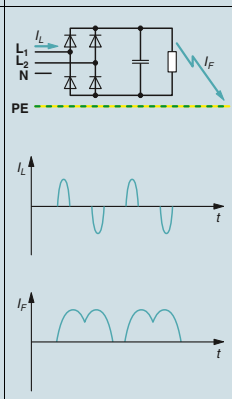
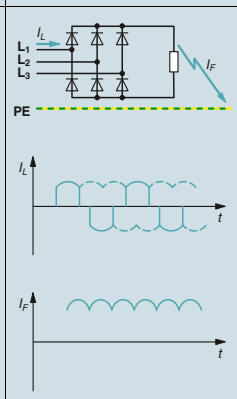
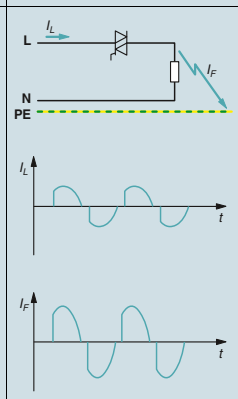
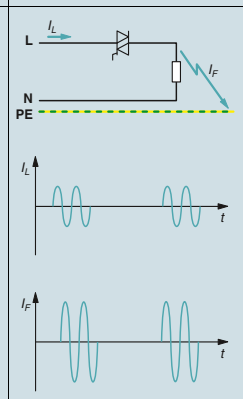
RCM devices provide residual current monitoring in grounded power supply systems. They detect residual currents at an early stage such as those that occur as a result of insulation errors. They can therefore be used to prevent forced system shutdown. Plans can be made to remove errors outside of operating hours. RCM devices also act as a form of fire prevention.

Increasing use is being made of equipment such as frequency inverters. In the event of an error, residual currents with a frequency of up to 50 kHz can be generated. Type B+ RCM devices from Phoenix Contact are already able to detect residual currents with frequencies up to 100 kHz. This far exceeds present-day requirements of 20 kHz for type B+ devices.

| | Single-phase | Single-phase with smoothing | Three-phase star circuit |
|---|---|---|---|
| **Circuit** |  |  |  |
| **Correct load current** |  |  |  |
| **Residual current to ground potential** |  | | |
| **Solution** | **Type A** | **–** | **–** |
| | **Type B** | **Type B** | **Type B** |

Residual currents can increase continually due to gradual processes. This can be attributed, for example, to humidity or conductive dirt on live parts. Residual current devices trip at different rated residual currents $I_{\Delta n}$, depending on their type. Additionally installed residual current monitoring devices prevent sudden system downtimes thanks to early warnings. The continuous supply of information about gradually increasing residual currents allows timely intervention. Unplanned system failures can be avoided.




| Full bridge circuit | Semi-controlled full bridge circuit | Full bridge circuit between outer conductors | Three-phase full bridge circuit | Phase-controlled modulator | Burst control |
|---|---|---|---|---|---|
|  |  |  |  |  |  |
| **Type A** | **Type A** | **–** | **–** | **Type A** | **Type A** |
| **Type B** | **Type B** | **Type B** | **Type B** | **Type B** | **Type B** |

## Residual current monitoring - RCM

- Adjustable residual response current of 30 mA to 3 A
- Adjustable pre-alarm threshold and delay time
- Actual differential current can be read via LED display
- Remote signaling for main and pre-alarm

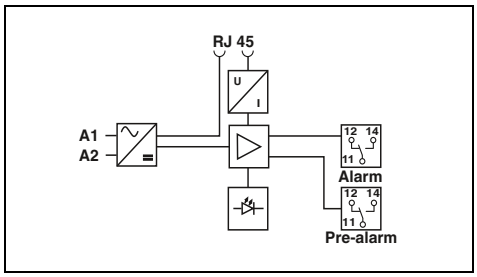
**Notes:**

Cables for type B+ converter connection (RJ45, 4-pair, 1:1 line) can be found in the accessories section by entering the order number (RCM/converter) at: phoenixcontact.net/products

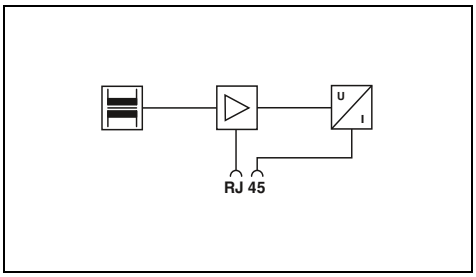
**RCM type B+ for smooth and pulsating DC and AC residual currents up to 100 kHz**

**Converter for RCM type B+**

Total width 71.6 mm




Total width 65.5 mm




| | Technical data | Technical data | | |
|---|---|---|---|---|
| Electrical data | | ...SCT-35 | ...SCT-70 | ...SCT-105 |
| Nominal voltage range | 85 V AC ... 264 V AC | - | - | - |
| Nominal frequency $f_N$ | 50 Hz (60 Hz) | - | - | - |
| Rated current $I_n$ | - | 125 A | 200 A | 300 A |
| Max. required back-up fuse | 16 A (B) | - | - | - |
| **RCM data** | | | | |
| Rated response differential current $I_{dyn}$ | 3 A | 3 A | 3 A | 3 A |
| Differential current acquisition characteristic | Type B+ (DC up to 100 kHz) | Type B+ (DC up to 100 kHz) | Type B+ (DC up to 100 kHz) | Type B+ (DC up to 100 kHz) |
| Response differential current $I_{\Delta n}$ | 30, 100, 300, 1000, 3000 mA (adjustable) | 0.03 A ... 3 A | 0.03 A ... 3 A | 0.1 A ... 3 A |
| Discrimination threshold main alarm | 80 % ... 100 % (of the set response differential current $I_{\Delta n}$) | - | - | - |
| Discrimination threshold pre-alarm | 10 % ... 90 % (of the main alarm threshold, adjustable) | - | - | - |
| Response time for 2 x $I_{\Delta n}$ | 0.1 s ... 1 s (adjustable) | - | - | - |
| Thermal permanent differential current $I_{cth}$ | - | 150 A (50 Hz / 20 kHz) | 150 A (50 Hz / 20 kHz) | 150 A (50 Hz / 20 kHz) |
| Thermal rated short-time differential current $I_{th}$ | - | 3 kA for 1 s (50 Hz/20 kHz) | 3 kA for 1 s (50 Hz/20 kHz) | 3 kA for 1 s (50 Hz/20 kHz) |
| Rated surge voltage resistance $U_{imp}$ | 4 kV | 8 kV | 8 kV | 8 kV |
| General data | | | | |
| Connection data solid / stranded / AWG | 0.2 ... 4 mm² / 0.2 ... 2.5 mm² / 24 - 12 | - | | |
| Maximum permissible outside diameter of cables | - | 23.00 mm | 46.00 mm | 70.00 mm |
| Housing material | Polycarbonate | Polycarbonate | | |
| Ambient temperature (operation) | -25 °C ... 65 °C | -20 °C ... 65 °C | | |
| Degree of protection | IP20 | IP20 | | |
| Test standards | DIN EN 62020 / DIN EN 60664 / DIN VDE 0664-400 | DIN EN 62020 / VDE 0663 / DIN EN 60044-1 / VDE 0414 / DIN VDE 0664-400 | | |
| Test standards | - | | | |
| Pollution degree | 2 | 2 | 2 | 2 |
| Surge voltage category | III | IV | IV | IV |
| Mounting | | | | |
| Mounting type | DIN rail: 35 mm | Screw mounting | Screw mounting | Screw mounting |
| Remote indication contact | PDT contact | - | | |
| Connection data solid / stranded / AWG | 0.2 ... 4 mm² / 0.2 ... 2.5 mm² / - | - | | |
| Max. operating voltage | 230 V AC | - | | |
| Max. operating current | 5 A (cos phi > 0.9) | - | | |

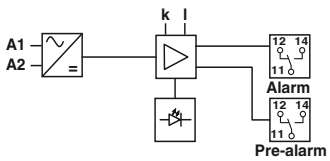
| | Ordering data | | | Ordering data | | |
|---|---|---|---|---|---|---|
| Description | **Type** | **Order No.** | Pcs. / Pkt. | **Type** | **Order No.** | Pcs. / Pkt. |
| **Evaluation unit** | | | | | | |
| | **RCM-B/50/85-264V** | **2806210** | 1 | | | |
| **Current transformer** | | | | | | |
| 20 mm Ø | | | | | | |
| 30 mm Ø | | | | | | |
| 35 mm Ø | | | | **RCM-B-SCT- 35** | **2806223** | 1 |
| 70 mm Ø | | | | **RCM-B-SCT- 70** | **2806236** | 1 |
| 105 mm Ø | | | | **RCM-B-SCT-105** | **2806249** | 1 |
| 140 mm Ø | | | | | | |
| 210 mm Ø | | | | | | |

**RCM type A for pulsating DC and AC residual currents with 50/60 Hz**

**Converter for RCM type A**

**Converter for RCM type A**

Total width 71.6 mm




Total width 32 mm

Total width 33 mm

## Technical data

| | |
|---|---|
| 85 V AC ... 264 V AC | |
| 50 Hz (60 Hz) | |
| - | |
| 16 A (B) | |
| 3 A | |
| Type A (50 / 60 Hz) | |
| 30, 100, 300, 1000, 3000 mA (adjustable) | |
| 80 % ... 100 % (of the set response differential current $I_{\Delta n}$) | |
| 10 % ... 90 % (of the main alarm threshold, adjustable) | |
| 0.1 s ... 1 s (adjustable) | |
| - | |
| - | |
| 4 kV | |
| 0.2 ... 4 mm² / 0.2 ... 2.5 mm² / 24 - 12 | |
| - | |
| Polycarbonate | |
| -25 °C ... 65 °C | |
| IP20 | |
| DIN EN 62020 / DIN EN 60664 | |
| - | |
| 2 | |
| III | |
| DIN rail: 35 mm | |
| PDT contact | |
| 0.2 ... 4 mm² / 0.2 ... 2.5 mm² / - | |
| 230 V AC | |
| 5 A (cos phi > 0.9) | |

## Ordering data

| Type | Order No. | Pcs. / Pkt. |
|---|---|---|
| **RCM-A/50/85-264V** | **2806016** | 1 |

## Technical data

| | ...SCT-20 | ...SCT-30 | ...SCT-35 | ...SCT-70 |
|---|---|---|---|---|
| 85 V AC ... 264 V AC | - | - | - | - |
| 50 Hz (60 Hz) | - | - | - | - |
| - | 50 A | 100 A | 125 A | 200 A |
| 16 A (B) | - | - | - | - |
| 3 A | 3 A | 3 A | 3 A | 3 A |
| Type A (50 / 60 Hz) | Type A (50 / 60 Hz) | Type A (50 / 60 Hz) | Type A (50 / 60 Hz) | Type A (50 / 60 Hz) |
| 30, 100, 300, 1000, 3000 mA (adjustable) | 0.03 A ... 3 A | 0.03 A ... 3 A | 0.03 A ... 3 A | 0.03 A ... 3 A |
| 80 % ... 100 % (of the set response differential current $I_{\Delta n}$) | - | - | - | - |
| 10 % ... 90 % (of the main alarm threshold, adjustable) | - | - | - | - |
| 0.1 s ... 1 s (adjustable) | - | - | - | - |
| - | 1.5 x $I_n$ | 1.5 x $I_n$ | 1.5 x $I_n$ | 1.5 x $I_n$ |
| - | 10 x $I_n$ (for 1 s) | 10 x $I_n$ (for 1 s) | 10 x $I_n$ (for 1 s) | 10 x $I_n$ (for 1 s) |
| 4 kV | 8 kV | 8 kV | 8 kV | 8 kV |
| 0.2 ... 4 mm² / 0.2 ... 2.5 mm² / 24 - 12 | 0.2 ... 4 mm² / 0.2 ... 2.5 mm² / 24 - 12 | | | |
| - | 13.00 mm | 20.00 mm | 23.00 mm | 46.00 mm |
| Polycarbonate | Polycarbonate | | | |
| -25 °C ... 65 °C | -20 °C ... 65 °C | | | |
| IP20 | IP20 (terminal blocks) | | | |
| DIN EN 62020 / DIN EN 60664 | DIN EN 62020 / VDE 0663 / DIN EN 60044-1 / VDE 0414 | | | |
| - | | | | |
| 2 | 2 | 2 | 2 | 2 |
| III | IV | IV | IV | IV |
| DIN rail: 35 mm | DIN rail: 35 mm | DIN rail: 35 mm | Screw mounting | Screw mounting |
| PDT contact | - | | | |
| 0.2 ... 4 mm² / 0.2 ... 2.5 mm² / - | - | | | |
| 230 V AC | - | | | |
| 5 A (cos phi > 0.9) | - | | | |

## Ordering data

| Type | Order No. | Pcs. / Pkt. |
|---|---|---|
| **RCM-A-SCT- 20** | **2806045** | 1 |
| **RCM-A-SCT- 30** | **2806058** | 1 |
| **RCM-A-SCT- 35** | **2806061** | 1 |
| **RCM-A-SCT- 70** | **2806074** | 1 |

## Technical data

| | ...SCT-105 | ...SCT-140 | ...SCT-210 |
|---|---|---|---|
| 85 V AC ... 264 V AC | - | - | - |
| 50 Hz (60 Hz) | - | - | - |
| - | 250 A | 350 A | 400 A |
| 16 A (B) | - | - | - |
| 3 A | 3 A | 3 A | 3 A |
| Type A (50 / 60 Hz) | Type A (50 / 60 Hz) | Type A (50 / 60 Hz) | Type A (50 / 60 Hz) |
| 30, 100, 300, 1000, 3000 mA (adjustable) | 0.03 A ... 3 A | 0.03 A ... 3 A | 0.03 A ... 3 A |
| 80 % ... 100 % (of the set response differential current $I_{\Delta n}$) | - | - | - |
| 10 % ... 90 % (of the main alarm threshold, adjustable) | - | - | - |
| 0.1 s ... 1 s (adjustable) | - | - | - |
| - | 1.5 x $I_n$ | 1.5 x $I_n$ | 1.5 x $I_n$ |
| - | 10 x $I_n$ (for 1 s) | 10 x $I_n$ (for 1 s) | 10 x $I_n$ (for 1 s) |
| 4 kV | 8 kV | 8 kV | 8 kV |
| 0.2 ... 4 mm² / 0.2 ... 2.5 mm² / 24 - 12 | 0.2 ... 4 mm² / 0.2 ... 2.5 mm² / 24 - 12 | | |
| - | 70.00 mm | 93.00 mm | 140.00 mm |
| Polycarbonate | Polycarbonate | | |
| -25 °C ... 65 °C | -20 °C ... 65 °C | | |
| IP20 | IP20 (terminal blocks) | | |
| DIN EN 62020 / DIN EN 60664 | DIN EN 62020 / VDE 0663 / DIN EN 60044-1 / VDE 0414 | | |
| - | | | |
| 2 | 2 | 2 | 2 |
| III | IV | IV | IV |
| DIN rail: 35 mm | Screw mounting | Screw mounting | Screw mounting |
| PDT contact | - | | |
| 0.2 ... 4 mm² / 0.2 ... 2.5 mm² / - | - | | |
| 230 V AC | - | | |
| 5 A (cos phi > 0.9) | - | | |

## Ordering data

| Type | Order No. | Pcs. / Pkt. |
|---|---|---|
| **RCM-A-SCT-105** | **2806087** | 1 |
| **RCM-A-SCT-140** | **2806090** | 1 |
| **RCM-A-SCT-210** | **2806100** | 1 |

### Control and monitor the charging process of electric vehicles

Sustainable E-Mobility requires safe and reliable charging infrastructure functions that can be intelligently integrated into energy systems if required. The controller and monitoring components from Phoenix Contact allow the setup of charging stations according to current standards and therefore ensure a high degree of safety and interoperability with electric vehicles.

### Charging controllers for AC charging

Charge electric vehicles according to the IEC 61851-1 standard with the E-Mobility **EV-CC-...** and **EM-CP-PP-ETH** charging controllers. The portfolio addresses the entire spectrum of charging stations, from simple autonomous charging points up to networked stations. Comprehensive configuration options in the devices are provided for the specific requirements of our customers.

### From the charging point to the networked charging infrastructure

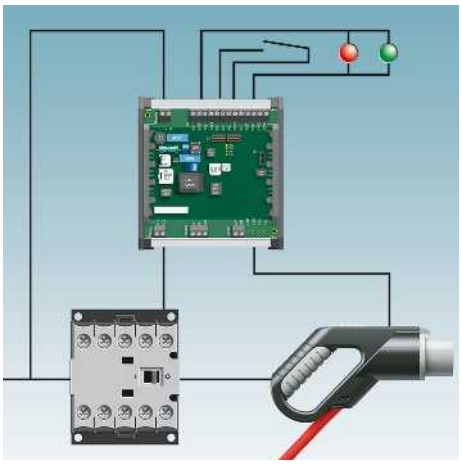
Phoenix Contact charging controllers can be operated both autonomously and in networks. Status data can be acquired via the integrated communication interfaces and controlled intervention into the charging process. Here we rely on standardized communication interfaces and protocols and therefore offer easy connection options to various automation systems.

### Smart charging

Operating a charging infrastructure requires more than just the charging technology in the charging station. Intelligent charging infrastructures are integrated in management systems and communicate with billing and operator systems. Based on Phoenix Contact products, software function blocks for implementing charging and energy management, authorization routines, and interfaces to back-end systems are available, for example, via the Open Charge Point Protocol (OCPP).

### Residual current detection in the charging station

The E-Mobility residual current modules from the **EV-RCM** series detect AC and DC residual currents. In conjunction with existing residual current protection devices, the modules increase the voltage protection level during charging of electric vehicles according to DIN VDE 0100-722. Based on IEC 62752, residual current devices (e.g., RCD type A) are protected against DC components and can continue to be operated.

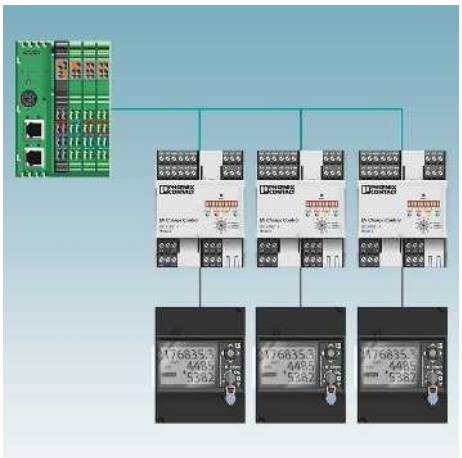


**All the necessary functions in one controller**

The **EV-CC-...** charging controllers are specially designed for simple charging points. All functions required for this application are integrated. From the interface to the vehicle, the control of the connector locking and its release in case of mains failure or control of the charging contactor, all in one device.

**The optimum marking solution for every version**

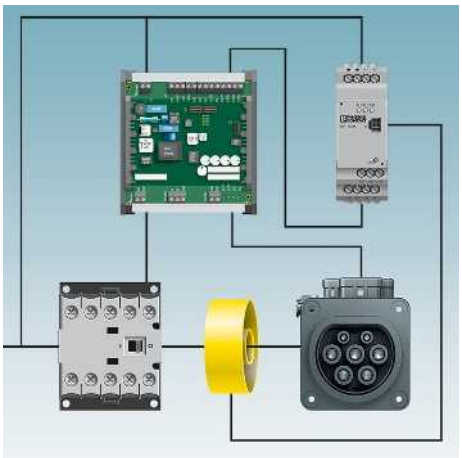
The versions of the **EV-CC-...** are conceived respectively for the possible charging station types. Corresponding versions are available, whether for charging stations with permanently connected Vehicle Connector or with an Infrastructure Socket Outlet, classical design with DIN rail or PCB for integration into the housing.



**Interface to power meters**

Detection of the actual charging current and the charging power for each individual vehicle is necessary for efficient charging and energy management.

The **EM-CP-PP-ETH** charging controller is equipped with a configurable RS-485/Modbus/RTU interface, to which various meters can be connected.



**Compatible with Phoenix Contact charging controllers**

The universal **RCM modules** from Phoenix Contact detect DC and AC residual current and therefore offer additional protection during vehicle charging. Optional status monitoring and resetting of the RCM module is possible in conjunction with the charging controllers from Phoenix Contact.

**Vehicle Connectors and Infrastructure Socket Outlets**

Phoenix Contact has a unique and wide range of Vehicle Connectors, charging cables, Infrastructure Socket Outlets, and vehicle inlets. Different standards for the European, American, and Chinese markets are covered. Solutions for both conventional AC and fast DC charging are available for all standards - in particular components of so-called “Combined Charging Systems” (CCS).

**Note:**

Information on charging systems can be found in Catalog 4, Sensor/actuator cabling and industrial connectors.

## EV Charge Control charging controller

### EM-CP-PP-ETH

- AC charging according to IEC 61851-1, Mode 3
- Comprehensive configuration options
- Ethernet/Modbus/TCP interface
- Charging and energy management
- Connection of power meters

### EM-EV-CLR-12V

- Plug release in case of mains failure
- For 12 V actuators

Charging controller

Mains power failure plug release

**Notes:**

For information on plug-in charging systems, see Catalog 2, Connection technology for field devices.

| | Housing width 71.6 mm | Housing width 35.6 mm |
|---|---|---|
| | **Technical data** | **Technical data** |
| Input | | |
| Description of the input | Digital input | Signal input |
| Nominal input voltage $U_N$ | 24 V | 12 V |
| Input current | 8 mA (24 V) | approx. 5 mA (at 12 V) |
| Input voltage level digital I/O | -3 V ... 5 V (Off)<br>15 V ... 30 V (On) | -3 V ... 3 V (Off)<br>-30 V ... -10 V (lock ON)<br>10 V ... 30 V (release ON) |
| Switching output | | |
| Socket locking | Relay output $R_{1,3}$ and $R_{2,4}$ | Relay output |
| Maximum switching voltage | 30 V AC/DC | approx. 11.5 V (operating/capacitor voltage minus the diode voltage of ~ 0.5 V) |
| Max. switching current | 6 A | 4 A |
| Switching output | | |
| Charging contactor output | Relay output $C_{1,2}$ and $V_{1,2}$ | - |
| Maximum switching voltage | 250 V AC | - |
| Max. switching current | 6 A | - |
| Maximum switching capacity | 1500 VA | - |
| Switching output | | |
| Ventilation control | Digital output | - |
| Maximum output voltage | 30 V | - |
| Maximum output current | 0.6 A | - |
| Digital outputs | | |
| Number of outputs | 4 | - |
| Output voltage | 12 V ... 30 V | - |
| Output current | 0.1 A (total current for all outputs; internally supplied)<br>0.6 A (per output; externally supplied) | - |
| Ethernet interface | | |
| Designation | Ethernet interface, 100Base-TX according to IEEE 802.3u / 10Base-T according to IEEE 802.3 | - |
| Connection method | RJ45 socket | - |
| Transmission speed | 10/100 Mbps | - |
| Transmission length | 100 m (with shielded, twisted-pair data cable) | - |
| RS-485 interface | | |
| Designation | RS-485 interface, 2-wire + GND | - |
| Connection method | Screw connection | - |
| Transmission mode | 8, N, 1 | - |
| Transmission speed | 9.6 kbps (standard)<br>2.4 kbps ... 19.2 kbps (adjustable) | -<br>- |
| Protocols | Modbus/RTU (master) | - |
| General data | | |
| Supply voltage | | 12 V DC ±5 % |
| Supply voltage range | 110 V AC ... 240 V AC (nominal voltage range)<br>95 V AC ... 264 V AC | - |
| Max. current consumption | 40 mA | - |
| Frequency range | 45 Hz ... 65 Hz | - |
| Degree of protection | IP20 | IP20 |
| Ambient temperature range | -25 °C ... 60 °C | -25 °C ... 60 °C |
| Dimensions W / H / D | 71.6 / 61 / 90 mm | 35.6 / 61 / 90 mm |
| Conformance / approvals | | |
| Conformance | CE-compliant | CE-compliant |

| | Ordering data | | | Ordering data | | |
|---|---|---|---|---|---|---|
| Description | **Type** | **Order No.** | Pcs. / Pkt. | **Type** | **Order No.** | Pcs. / Pkt. |
| **EV Charge Control charging controller** | **EM-CP-PP-ETH** | **2902802** | 1 | | | |
| **Mains failure plug release** EV Charge Lock Release | | | | **EM-EV-CLR-12V** | **2903246** | 1 |

## EV CC Electrical Vehicle Charge Control

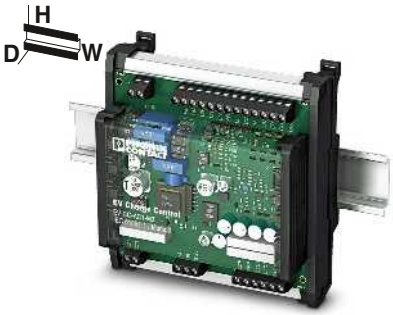
### EV-CC-AC1-M3-CBC-SER-...

- AC charging according to IEC 61851-1, Mode 3
- Comprehensive configuration options
- Adjustable amperage
- Integrated locking controller (12 V) and mains failure plug release
- RS-485 interface (Modbus/RTU slave)
- PCB version and DIN rail device

new

Charging controller on PCB

new




DIN rail housing charging controller

| | Housing width 120 mm | Housing width 124 mm |
|---|---|---|
| | **Technical data** | **Technical data** |
| Input | | |
| Description of the input | Digital input | Digital input |
| Nominal input voltage $U_N$ | 12 V | 12 V |
| Input current | ≤ 1 mA (12 V) | ≤ 1 mA (12 V) |
| Input voltage level digital I/O | 0 V ... 3 V (Off)<br>9 V ... 15 V (On) | 0 V ... 3 V (Off)<br>9 V ... 15 V (On) |
| Switching output | | |
| Socket locking | Relay output | Relay output |
| Maximum switching voltage | 12 V (internal supply) | 12 V (internal supply) |
| Max. switching current | 2 A (internal supply) | 2 A (internal supply) |
| Switching output | | |
| Charging contactor output | Relay output | Relay output |
| Maximum switching voltage | 250 V AC (external supply) | 250 V AC (external supply) |
| Max. switching current | 6 A (external supply) | 6 A (external supply) |
| Maximum switching capacity | 1500 VA | 1500 VA |
| Digital outputs | | |
| Number of outputs | 4 | 4 |
| Output voltage | 5 V ... 30 V | 5 V ... 30 V |
| Output current | 0.5 A (total current for all outputs; internally supplied)<br>0.6 A (per output; externally supplied) | 0.5 A (total current for all outputs; internally supplied)<br>0.6 A (per output; externally supplied) |
| RS-485 interface | | |
| Designation | RS-485 interface, 2-wire + GND | RS-485 interface, 2-wire + GND |
| Connection method | Screw connection | Screw connection |
| Transmission mode | 8, N, 1 | 8, N, 1 |
| Transmission speed | 9.6 kbps (standard)<br>9.6 kbps ... 19.2 kbps (adjustable) | 9.6 kbps (standard)<br>9.6 kbps ... 19.2 kbps (adjustable) |
| Protocols | Modbus/RTU (slave) | Modbus/RTU (slave) |
| General data | | |
| Supply voltage range | 100 V AC ... 240 V AC (nominal voltage range) | 100 V AC ... 240 V AC (nominal voltage range) |
| Power consumption | < 1 W (no-load) | < 1 W (no-load) |
| Frequency range | 50 Hz ... 60 Hz | 50 Hz ... 60 Hz |
| Degree of protection | IP00 | IP20 |
| Ambient temperature range | -35 °C ... 70 °C (operation) | -35 °C ... 70 °C (operation) |
| Dimensions W / H / D | 120 / 108 / 20 mm | 124 / 128 / 64 mm |
| Conformance / approvals | | |
| Conformance | CE-compliant | CE-compliant |

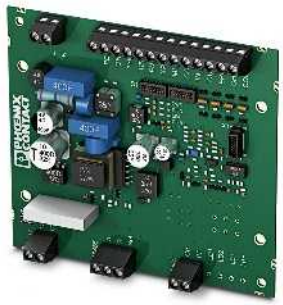
| | Ordering data | | | Ordering data | | |
|---|---|---|---|---|---|---|
| Description | **Type** | **Order No.** | Pcs. / Pkt. | **Type** | **Order No.** | Pcs. / Pkt. |
| **Charging controller** for case B and C | | | | | | |
| | **EV-CC-AC1-M3-CBC-SER-PCB** | **1622453** | 1 | **EV-CC-AC1-M3-CBC-SER-HS** | **1622452** | 1 |

## EV CC Electrical Vehicle Charge Control

### EV-CC-AC1-M3-CC-SER-...

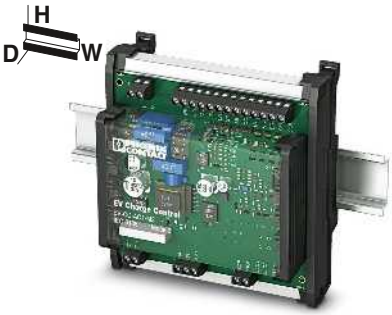
- AC charging according to IEC 61851-1, Mode 3
- Comprehensive configuration options
- Adjustable amperage
- Optimized for charging stations with vehicle connector (case C)
- RS-485 interface (Modbus/RTU slave)
- PCB version and DIN rail device

new



Charging controller on PCB

new




DIN rail housing charging controller

| | Housing width 120 mm | Housing width 124 mm |
|---|---|---|
| | **Technical data** | **Technical data** |
| Input | | |
| Description of the input | Digital input | Digital input |
| Nominal input voltage $U_N$ | 12 V | 12 V |
| Input current | ≤ 1 mA (12 V) | ≤ 1 mA (12 V) |
| Input voltage level digital I/O | 0 V ... 3 V (Off)<br>9 V ... 15 V (On) | 0 V ... 3 V (Off)<br>9 V ... 15 V (On) |
| Switching output | | |
| Charging contactor output | Relay output | Relay output |
| Maximum switching voltage | 250 V AC (external supply) | 250 V AC (external supply) |
| Max. switching current | 6 A (external supply) | 6 A (external supply) |
| Maximum switching capacity | 1500 VA | 1500 VA |
| Digital outputs | | |
| Number of outputs | 4 | 4 |
| Output voltage | 5 V ... 30 V | 5 V ... 30 V |
| Output current | 0.5 A (total current for all outputs; internally supplied)<br>0.6 A (per output; externally supplied) | 0.5 A (total current for all outputs; internally supplied)<br>0.6 A (per output; externally supplied) |
| RS-485 interface | | |
| Designation | RS-485 interface, 2-wire + GND | RS-485 interface, 2-wire + GND |
| Connection method | Screw connection | Screw connection |
| Transmission mode | 8, N, 1 | 8, N, 1 |
| Transmission speed | 9.6 kbps (standard)<br>9.6 kbps ... 19.2 kbps (adjustable) | 9.6 kbps (standard)<br>9.6 kbps ... 19.2 kbps (adjustable) |
| Protocols | Modbus/RTU (slave) | Modbus/RTU (slave) |
| General data | | |
| Supply voltage range | 100 V AC ... 240 V AC (nominal voltage range) | 100 V AC ... 240 V AC (nominal voltage range) |
| Power consumption | < 1 W (no-load) | < 1 W (no-load) |
| Frequency range | 50 Hz ... 60 Hz | 50 Hz ... 60 Hz |
| Degree of protection | IP00 | IP20 |
| Ambient temperature range | -35 °C ... 70 °C (operation) | -35 °C ... 70 °C (operation) |
| Dimensions W / H / D | 120 / 108 / 20 mm | 124 / 128 / 64 mm |
| Conformance / approvals | | |
| Conformance | CE-compliant | CE-compliant |

| | Ordering data | | | Ordering data | | |
|---|---|---|---|---|---|---|
| Description | **Type** | **Order No.** | Pcs. / Pkt. | **Type** | **Order No.** | Pcs. / Pkt. |
| **Charging controller** for case C | **EV-CC-AC1-M3-CC-SER-PCB** | **1622460** | 1 | **EV-CC-AC1-M3-CC-SER-HS** | **1622459** | 1 |

## EV RCM residual current monitoring

### EV RCM...

- Universal residual current monitoring for AC and DC residual current detection
- Operate values DC 6 mA and AC 30 mA
- Protection of higher-level safety equipment, such as type A residual current circuit breakers, against DC residual currents
- Single or two-channel version

new

**RCM module for one charging point**

new

**RCM module for two separate charging points**

| | Housing width 36 mm<br>Technical data | Housing width 36 mm<br>Technical data |
|---|---|---|
| Input | | |
| Measuring transducer input | plug-in; front | plug-in; front |
| Switching output | | |
| Alarm relay K1 | $I_{\Delta n}$ DC1 | $I_{\Delta n}$ AC1 and $I_{\Delta n}$ DC1 |
| Maximum switching voltage | 250 V | 250 V |
| Max. switching current | 5 A | 5 A |
| Method of operation | Quiescent current | Quiescent current |
| Contact type | 1 N/O contact | 1 N/O contact |
| Switching output | | |
| Alarm relay K2 | $I_{\Delta n}$ AC2 | $I_{\Delta n}$ AC2 and $I_{\Delta n}$ DC2 |
| Maximum switching voltage | 250 V | 250 V |
| Max. switching current | 5 A | 5 A |
| Method of operation | Quiescent current | Quiescent current |
| Contact type | 1 N/O contact | 1 N/O contact |
| Residual current measuring range | | |
| Rated frequency | ≤ 2000 Hz | ≤ 2000 Hz |
| Number of channels | 1 | 2 |
| Measuring range | ± 300 mA (peak) | ± 300 mA (peak) |
| Current measuring range | 50 A (45 Hz ... 50 Hz) | 50 A (45 Hz ... 50 Hz) |
| Residual current IΔn1 | 30 mA | 30 mA |
| Residual current IΔn2 | 6 mA | 6 mA |
| Load current | 32 A | 32 A |
| Response time at 1 x IΔn | < 180 ms | < 180 ms |
| Response time at 2 x $I_{\Delta n}$ | < 70 ms | < 70 ms |
| Response time at 5 x IΔn | < 20 ms | < 20 ms |
| Response time at $I_N$ | < 500 ms | < 500 ms |
| Measuring current transducer | | |
| Cable feed-through diameter | 15 mm | 15 mm |
| Supply | via RCM module | via RCM module |
| Connection method | Connector | Connector |
| General data | | |
| Supply voltage range | 100 V AC ... 240 V AC (nominal voltage range) | 100 V AC ... 240 V AC (nominal voltage range) |
| Max. current consumption | 22 mA | 22 mA |
| Frequency range | 45 Hz ... 60 Hz | 45 Hz ... 60 Hz |
| Degree of protection | IP20 | IP20 |
| Ambient temperature range | -25 °C ... 80 °C (operation) | -25 °C ... 80 °C (operation) |
| Reload function | 3 switch-on attempts at intervals of 15 min. | 3 switch-on attempts at intervals of 15 min. |
| Operating elements | Test/reset button; 2 status LEDs | Test/reset button; 2 status LEDs |
| Dimensions W / H / D | 36 / 90 / 70.5 mm | 36 / 90 / 70.5 mm |
| Conformance / approvals | | |
| Conformance | CE-compliant | CE-compliant |
| Climatic class | According to IEC 60271/-1/-2/-3 | According to IEC 60271/-1/-2/-3 |

| | Ordering data | | | Ordering data | | |
|---|---|---|---|---|---|---|
| Description | **Type** | **Order No.** | Pcs. / Pkt. | **Type** | **Order No.** | Pcs. / Pkt. |
| **EV RCM 1-channel** | **EV-RCM-C1-AC30-DC6** | **1622450** | 1 | | | |
| **EV RCM 2-channel** | | | | **EV-RCM-C2-AC30-DC6** | **1622451** | 1 |

## For high system availability

EMD monitoring relays can be used to detect deviations in important system parameters at an early stage. These can be indicated or system parts can be shut down selectively. EMD monitoring relays ensure error-free and cost-effective operation of your system. They are an inexpensive solution for numerous monitoring functions.

– Surge voltage and undervoltage
– Overcurrent and undercurrent
– Phase failure, phase sequence, and phase asymmetry
– Power factor and real power
– Motor winding temperature
– Levels

For system monitoring, choose from two product ranges: compact or multifunctional monitoring relays.

## Perfect timing

ETD timer relays ensure optimum time sequences.

The modules are the cost-effective alternative to a PLC: with easy configuration and fast wiring.

Choose from two product ranges for your ideal time control application:

– Ultra-narrow timer relays each with one time range and one function
– Multifunctional timer relays with selectable time ranges and functions

## Professionally packaged components

Function modules with professional housing and connection technology can be used to integrate electronic components in your system. They can be used to perform a variety of tasks:

– Diode modules provide protection against polarity reversal. In addition, they decouple messages in fault reporting systems.
– Lamp testing modules decouple signals in isolation in the field of fault reporting technology.
– Display modules simplify troubleshooting and provide help for monitoring processes.

**Compact monitoring relays**

Ideal for simple monitoring tasks – from series production to building installation.

– Compact installation housing
– Quick and tool-free wiring with push-in technology
– Parameters can be adjusted easily using rotary switches
– Clear diagnostics, thanks to color status LED

**Multifunctional monitoring relays**

– Parameters can be adjusted easily using rotary switches
– Fast error detection, thanks to fine tuning and short response times
– Worldwide use, thanks to wide range power supply unit or plug-in transformer
– Space saving – with two PDT outputs in 22.5 mm wide housing
– Electrically isolated measuring and supply circuits
– Clear diagnostics, thanks to color status LEDs

**Ultra-narrow timer relays**

The space-saving and inexpensive solution for simple time control applications.

– Each with one time range and one function
– Overall width of just 6.2 mm - saves up to 70% space compared to conventional timer relays
– Precise time setting using the illuminated thumbwheel
– Fast wiring through the use of jumpers

**Multifunctional timer relays**

For universal use thanks to wide range of functions.

– Just three versions for all conventional time control applications.
– Two floating PDT outputs on an overall width of just 22.5 mm
– Supply voltage via wide range power supply unit
– Optimum setting of times ranging from milliseconds to several days

**Function modules**

Function modules transform components such as diodes into a shock-proof and dust-proof electronics module.

– Easy installation, thanks to electronics housing with IP20 protection that can be installed in a control cabinet
– Fast mounting on DIN rails, thanks to the foot catch
– User-friendly wiring, thanks to practical connection technology

## Monitoring relays

### Single-phase current monitoring

The **EMD-BL-C-10** monitors AC currents from 0 ... 10 A.

– Adjustable response delay
– 0 ... 5 A or 0 ... 10 A measuring range
– Adjustable via rotary switch on the front

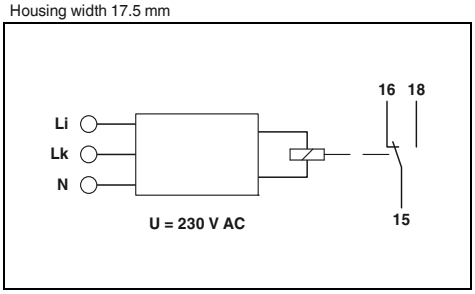
### Single-phase voltage monitoring

The **EMD-BL-V-230** monitors DC and AC voltages.

– 24 V AC/DC or 230 V AC
– Separately adjustable response delay
– Adjustable monitoring range
– Adjustable via potentiometer on the front

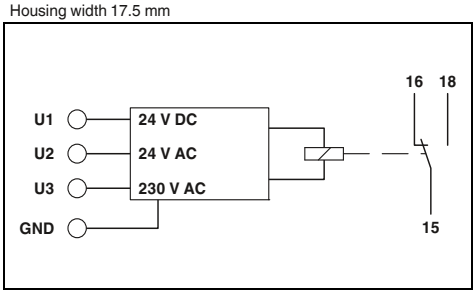
**Current monitoring, 1-phase**
**Overcurrent, undercurrent, window**

Housing width 17.5 mm



**Voltage monitoring, 1-phase**
**Undervoltage, window**

Housing width 17.5 mm




| | Technical data | Technical data |
|---|---|---|
| Functions | | |
| | Overcurrent, undercurrent, window | Undervoltage, window |
| Input | | |
| Input ranges | | 0 V DC ... 24 V DC (connection terminal blocks: U1 and GND)<br>0 V AC ... 24 V AC (connection terminal blocks: U2 and GND)<br>0 V AC ... 230 V AC (connection terminal blocks: U3 and GND) |
| Input ranges | 0 A ... 5 A AC<br>0 A ... 10 A AC<br>Configurable via rotary switch | - |
| Input resistance | 3 mΩ | - |
| Min. setting range | 5 % ... 95 % (of $I_N$) | 75 % ... 115 % (of $U_N$) |
| Max. setting range | 10 % ... 100 % (of $I_N$) | 80 % ... 120 % (of $U_N$) |
| Setting range for response delay | 0.1 s ... 10 s | 0.1 s ... 10 s |
| Basic accuracy | ≤ 5 % (of the nominal value) | ≤ 5 % (of scale end value) |
| Setting accuracy | ± 5 % (of the nominal value) | ± 5 % (of scale end value) |
| Repeat accuracy | ≤ 2 % | ≤ 2 % |
| Relay output | | |
| Contact type | 1 floating PDT | 1 floating PDT |
| Switching capacity | 1250 VA (5 A/250 V AC) | 1250 VA (5 A/250 V AC) |
| Electrical service life | 1 x $10^5$ cycles | 1 x $10^5$ cycles |
| Mechanical service life | 15 x $10^6$ cycles | 15 x $10^6$ cycles |
| Output fuse | 5 A (fast-blow) | 5 A (fast-blow) |
| General data | | |
| Supply voltage | 230 V AC ±15 % | -25 % ... +20 % (= measuring voltage) |
| Nominal power consumption | 5 VA (0.8 W) | 10 VA (at 230 V AC (0.6 W))<br>1.3 VA (at 24 V AC (0.8 W))<br>0.6 W (at 24 V DC) |
| 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 | 17.5 / 88 / 65.5 mm | 17.5 / 88 / 65.5 mm |
| 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 |
| 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. |
| **Compact monitoring relay** with push-in connection | **EMD-BL-C-10-PT** | **2903522** | 1 | **EMD-BL-V-230-PT** | **2903524** | 1 |
| **Compact monitoring relay** with screw connection | **EMD-BL-C-10** | **2903521** | 1 | **EMD-BL-V-230** | **2903523** | 1 |

## Monitoring relays

### Three-phase voltage monitoring

The **EMD-BL-3V-400** monitors three-phase AC voltages.

- 3~ 400 V AC/230 V AC ±30%
- Separately adjustable response delay
- Adjustable monitoring range
- Adjustable via potentiometer on the front
- Supply from the measuring circuit

### Phase monitoring

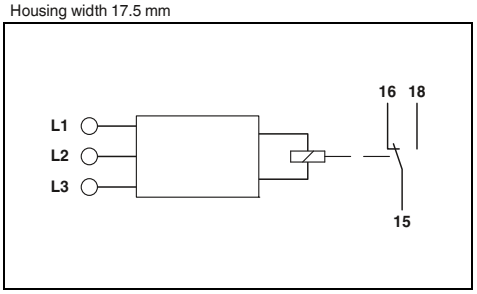
The **EMD-BL-PH-400** monitors three-phase AC voltages.

- 3~ 208 ... 480 V AC/120 ... 277 V AC
- Adjustable response delay
- Adjustable asymmetry: 5 ... 25%/OFF
- Adjustable via potentiometer on the front
- Supply from the measuring circuit

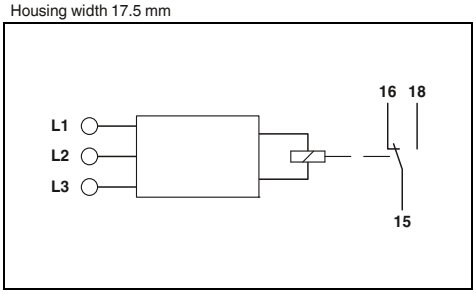
**Voltage monitoring, 3-phase**
**Window, phase sequence**

**Phase monitoring**
**Phase sequence, phase failure, asymmetry**

Housing width 17.5 mm




Housing width 17.5 mm




| | Technical data | Technical data |
|---|---|---|
| Functions | | |
| | Window, phase sequence | Phase sequence, phase failure, asymmetry |
| Input | | |
| Monitoring range | 280 V AC ... 519 V AC | 187 V AC ... 519 V AC |
| Input ranges | 3~ 400/230 V | 3~ 208 ... 480 V/120 ... 277 V |
| Input resistance | - | - |
| Min. setting range | 70 % ... 120 % (of $U_N$) | - |
| Max. setting range | 80 % ... 130 % (of $U_N$) | - |
| Setting range for response delay | 0.1 s ... 10 s | 0.1 s ... 10 s |
| Asymmetry | - | 5 % ... 25% / OFF |
| Basic accuracy | ≤ 5 % (of the nominal 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 | 1 floating PDT | 1 floating PDT |
| Switching capacity | 1250 VA (5 A/250 V AC) | 1250 VA (5 A/250 V AC) |
| Electrical service life | 1 x $10^5$ cycles | 1 x $10^5$ cycles |
| Mechanical service life | 15 x $10^6$ cycles | 15 x $10^6$ cycles |
| Output fuse | 5 A (fast-blow) | 5 A (fast-blow) |
| General data | | |
| Supply voltage | ±30 % (= measuring voltage) | ±10 % (= measuring voltage) |
| Nominal power consumption | 10 VA (1 W) | 10 VA ((1 W) at 400 V/50 Hz)<br>16 VA ((1.5 W) at 480 V/60 Hz) |
| 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 | 17.5 / 88 / 65.5 mm | 17.5 / 88 / 65.5 mm |
| 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 |
| 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. |
| **Compact monitoring relay** with push-in connection | | | | | | |
| | **EMD-BL-3V-400-PT** | **2903526** | 1 | **EMD-BL-PH-480-PT** | **2903528** | 1 |
| **Compact monitoring relay** with screw connection | | | | | | |
| | **EMD-BL-3V-400** | **2903525** | 1 | **EMD-BL-PH-480** | **2903527** | 1 |

## Monitoring relays

### Single-phase current monitoring

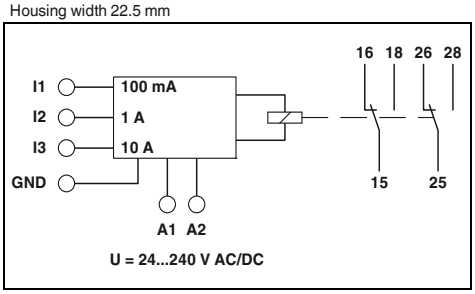
**EMD-...C...** monitoring relays monitor DC and AC currents within the range 0 ... 10 A.

- Separately adjustable startup and release delays
- Variable supply voltage range
- Adjustable via potentiometer on front

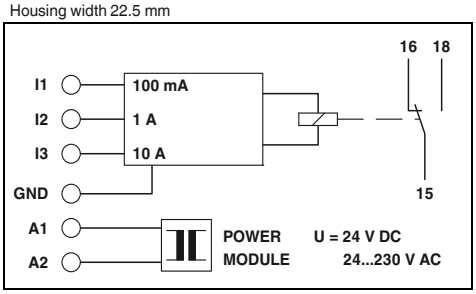
**Overcurrent and undercurrent monitoring**

**Overcurrent 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)<br>0 A ... 1 A AC/DC (connection terminal blocks: I2 and GND)<br>0 A ... 10 A AC/DC (connection terminal blocks: I3 and GND) | 0 mA ... 100 mA AC/DC (connection terminal blocks: I1 and GND)<br>0 A ... 1 A AC/DC (connection terminal blocks: I2 and GND)<br>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 starting 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)<br>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)<br>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 | | | |
| 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 | |
| EMC note | Class A product, see page 625 | | |
| Conformance / approvals | | | |
| Conformance | CE-compliant | CE-compliant | |
| UL, USA / Canada | UL/C-UL listed UL 508 | UL/C-UL listed UL 508 | |

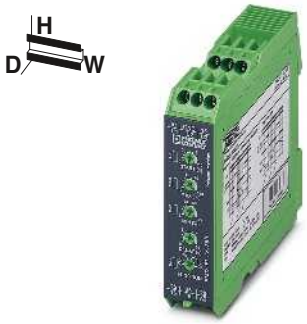
| | Ordering data | | | Ordering data | | |
|---|---|---|---|---|---|---|
| Description | **Type** | **Order No.** | Pcs. / Pkt. | **Type** | **Order No.** | Pcs. / Pkt. |
| **Electronic monitoring relay** | | | | | | |
| | **EMD-FL-C-10** | **2866022** | 1 | **EMD-SL-C-OC-10** | **2866019** | 1 |
| | | | | **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 |

## Monitoring relays

### Single-phase voltage monitoring

**EMD-...V...** monitoring relays monitor DC and AC voltages within the range 0 ... 300 V.

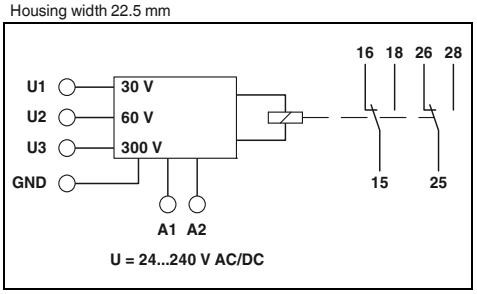
- Separately adjustable startup and release delays
- Variable supply voltage range
- Adjustable via potentiometer on front



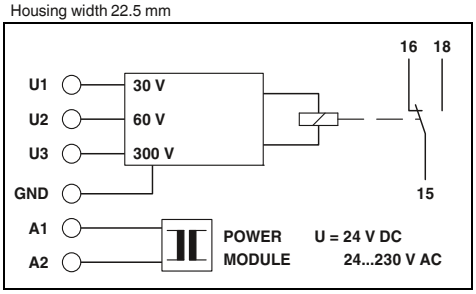
**Undervoltage and overvoltage monitoring**

**Undervoltage monitoring**

Housing width 22.5 mm




Housing width 22.5 mm




| | Technical data | Technical data |
|---|---|---|
| Functions | | |
| | Undervoltage, overvoltage, window, error memory | Undervoltage |
| Input | | |
| Input ranges | 0 V ... 30 V AC/DC (connection terminal blocks: U1 and GND)<br>0 V ... 60 V AC/DC (connection terminal blocks: U2 and GND)<br>0 V ... 300 V AC/DC (connection terminal blocks: U3 and GND) | 0 V ... 30 V AC/DC (connection terminal blocks: U1 and GND)<br>0 V ... 60 V AC/DC (connection terminal blocks: U2 and GND)<br>0 V ... 300 V AC/DC (connection terminal blocks: U3 and GND) |
| Input resistance | 47 kΩ (connection terminal blocks: U1 and GND)<br>100 kΩ (connection terminal blocks: U2 and GND)<br>470 kΩ (connection terminal blocks: U3 and GND) | 47 kΩ (connection terminal blocks: U1 and GND)<br>100 kΩ (connection terminal blocks: U2 and GND)<br>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 starting 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)<br>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)<br>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 | | |
| 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 |
| EMC note | Class A product, see page 625 | |
| Conformance / approvals | | |
| Conformance | CE-compliant | CE-compliant |
| UL, USA / Canada | UL/C-UL listed UL 508 | UL/C-UL listed UL 508 |

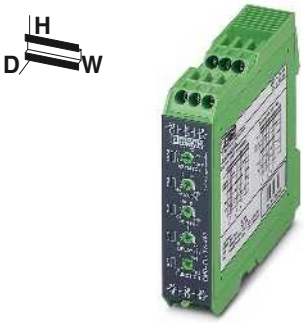
| | Ordering data | | | Ordering data | | |
|---|---|---|---|---|---|---|
| Description | Type | Order No. | Pcs. / Pkt. | Type | Order No. | Pcs. / Pkt. |
| **Electronic monitoring relay** | | | | | | |
| | **EMD-FL-V-300** | **2866048** | 1 | **EMD-SL-V-UV-300** | **2866035** | 1 |
| **Power module,** 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 |

## Monitoring relays

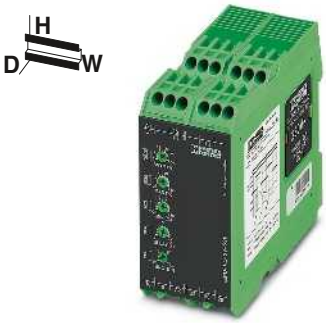
### Three-phase voltage monitoring

**EMD-...-3V...** monitoring relays monitor three-phase AC voltages of 160 ... 897 V AC (depending on the device concerned).

– Adjustable response delay
– Variable supply voltage range
– Adjustable via potentiometer on front
– Adjustable asymmetry

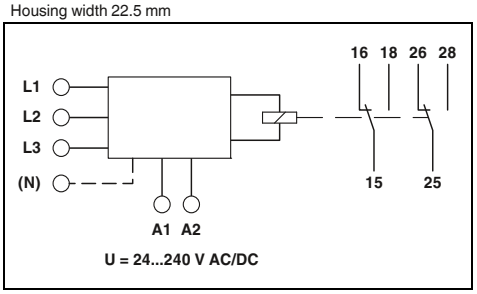


**Undervoltage and phase monitoring, 400 V or 230 V**

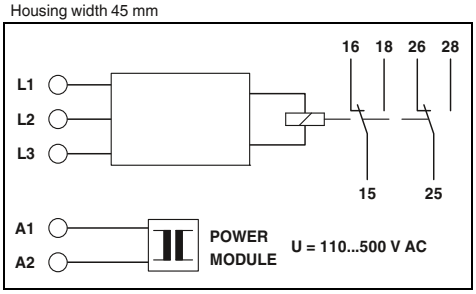


**Undervoltage and phase monitoring, 500 V or 690 V**

Housing width 22.5 mm




Housing width 45 mm



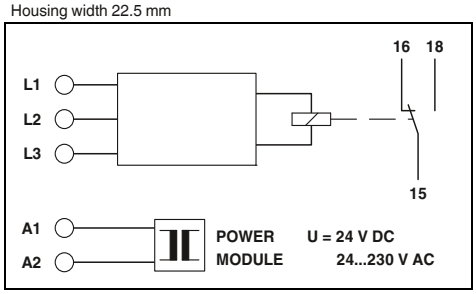

| | Technical data | | Technical data | |
|---|---|---|---|---|
| Functions | EMD-FL-3V-400 | EMD-FL-3V-230 | EMD-FL-3V-690 | EMD-FL-3V-500 |
| | Undervoltage, window, asymmetry, phase sequence, phase failure | Undervoltage, window, asymmetry, phase sequence, phase failure | Undervoltage, window, asymmetry, 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 | 483 V AC ... 897 V AC | 350 V AC ... 650 V AC |
| Input ranges | 3 N ~ 400/230 V | 3 N ~ 230/132 V | 3 ~ 690 V | 3 ~ 500 V |
| Input resistance | 1 MΩ | 470 kΩ | 1 MΩ | 1 MΩ |
| Min. setting range | -30 % ... 20 % (of $U_N$) | | -30 % ... 20 % (of $U_N$) | |
| Max. setting range | -20 % ... 30 % (of $U_N$) | | -20 % ... 30 % (of $U_N$) | |
| Setting range for response delay | 0.1 s ... 10 s | | 0.1 s ... 10 s | |
| Asymmetry | 5 % ... 25% / OFF | 5 % ... 25% / OFF | 5 % ... 25% / OFF | 5 % ... 25% / OFF |
| 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 | | 2 floating PDT contacts | |
| Switching capacity | 750 VA (3 A/250 V AC, module aligned, ≤ 5 mm spacing)<br>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)<br>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 | | | | |
| Nominal power consumption | 4.5 VA (1.5 W) | | 4.5 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 | | 45 / 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 | |
| EMC note | Class A product, see page 625 | | | |
| 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-3V-400** | **2866064** | 1 | **EMD-FL-3V-690** | **2885249** | 1 |
| | **EMD-FL-3V-230** | **2885773** | 1 | **EMD-FL-3V-500** | **2867979** | 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 | | | | **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 |

new

**Undervoltage/overvoltage monitoring, 400 V with/without neutral conductor**

Housing width 22.5 mm




## Technical data

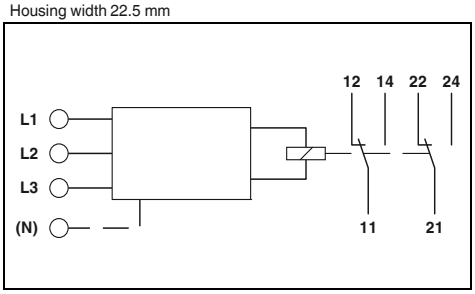
| EMD-SL-3V-400 | EMD-SL-3V-400-N |
|---|---|
| Window, without neutral conductor connection | Window, with neutral conductor connection |
| 280 V AC ... 520 V AC | 280 V AC ... 520 V AC |
| 3 ~ 400 V | 3 N ~ 400/230 V |
| 1 MΩ | 1 MΩ |
| -30 % ... 20 % (of $U_N$) | |
| -20 % ... 30 % (of $U_N$) | |
| 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) | |
| 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 |

**Phase monitoring, 400 V**

Housing width 22.5 mm




## Technical data

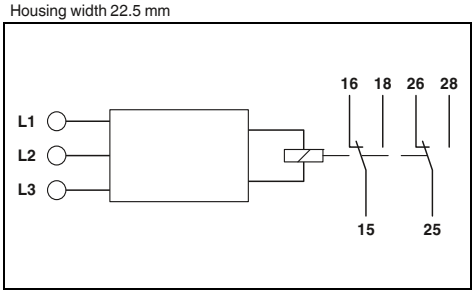
| |
|---|
| Phase sequence, phase failure, asymmetry |
| 342 V AC ... 457 V AC |
| 3 N ~ 400/230 V |
| 15 kΩ |
| - |
| - |
| ≤ 350 ms (fixed setting) |
| Fixed, approx. 30 % |
| - |
| - |
| - |
| 2 floating PDT contacts |
| 750 VA (3 A/250 V AC, module aligned, ≤ 5 mm spacing) |
| 1250 VA (5 A/250 V 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 |

**Phase monitoring, 690 V**

Housing width 22.5 mm




## Technical data

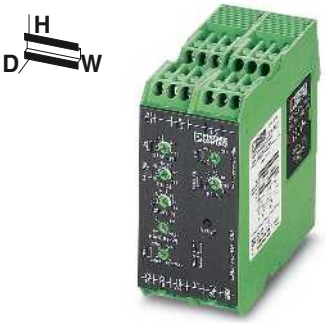
| |
|---|
| Undervoltage, phase sequence, phase failure |
| 177 V AC ... 794 V AC |
| 3~ 208 V ... 690 V |
| - |
| - |
| - |
| 0.1 s ... 10 s |
| 25 % |
| ≤ 3 % (of scale end value) |
| ≤ 5 % (of scale end value) |
| ≤ 2 % |
| 2 floating PDT contacts |
| 1250 VA (5 A/250 V AC at +55 °C) |
| 150 VA (5 A/30 V DC at +55°C) |
| 2 x $10^5$ cycles |
| 20 x $10^6$ cycles |
| 5 A (fast-blow) |
| ±15 % (= measuring voltage) |
| 2 VA (1.2 W) |
| IP40 (housing) / IP20 (connection terminal blocks) |
| -25 °C ... 70 °C (C300) |
| 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. |
|---|---|---|
| **EMD-SL-PH-690** | **2905597** | 1 |

## Monitoring and diagnostics

### Monitoring relays




Real power monitoring

Load monitoring (cos ϕ)

### Real power monitoring

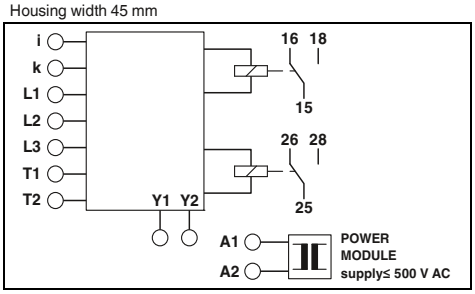
The real power in single and 3-phase networks can be monitored with the **EMD-FL-RP-480** real power monitoring relay.

- Monitoring range up to 7.2 kW
- Separately adjustable startup and release delays
- Temperature monitoring of the motor winding
- Variable supply voltage range
- Detection of switched off loads

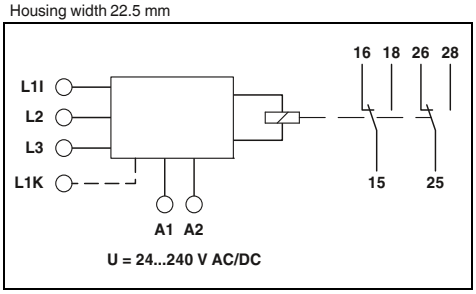
### Load monitoring (cos ϕ)

The **EMD-FL-PF-400** monitoring relay is a cos ϕ monitor for load monitoring in single or three-phase networks.

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 | | 0 V AC ... 480 V AC (1(N) ~, single-phase load)<br>0 V AC ... 480 V AC (3(N) ~, 3-phase load) | 40 V AC ... 415 V AC (1(N) ~, single-phase load)<br>40 V AC ... 415 V AC (3(N) ~, 3-phase load) |
| Input ranges | | 0.15 A ... 6 A (range: 0.75 kW and 1.5 kW)<br>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 |
| | 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)<br>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)<br>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 | | | |
| 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 |
| EMC note | | | Class A product, see page 625 |
| 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 | | | |

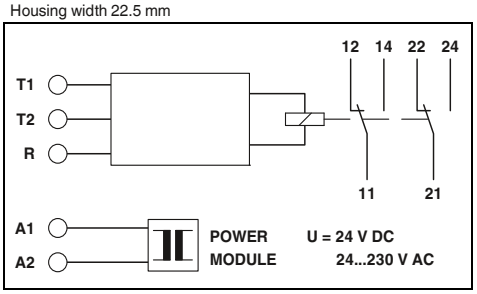
## Filling level monitoring

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
– Adjustable via potentiometer on front

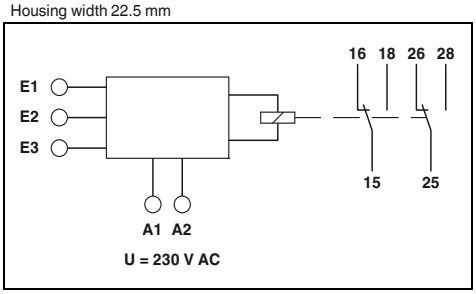
**Temperature monitoring (motor windings)**

**Filling level monitoring**

Housing width 22.5 mm




Housing width 22.5 mm




| | Technical data | Technical data |
|---|---|---|
| Functions | | |
| | Winding temperature monitoring | Pumping up (minimum monitoring), pumping 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 (line capacity 100 nF/km; set value < 50%)<br>< 100 m (line capacity 100 nF/km; set value 100%) |
| 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)<br>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)<br>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 | | 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 | | | |

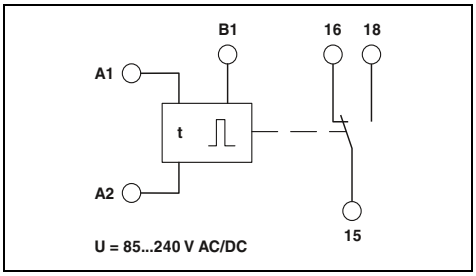
## Compact time relay

new

The multifunctional time relay offers universal use thanks to a variety of functions and various time settings. The rotary switches on the front of the housing allow easy parameterization. The compact design also allows flexible use.

Main features:

– Adjustable time
– Time range: 50 ms to 1 h
– Non-floating control input
– Delay functions
– Wiper functions
– Output: one floating PDT
– Clear diagnostics via status LED




### Technical data

| | |
|---|---|
| Functions | |
| | E: With switch-on delay<br>R: With release delay and control contact<br>Es: With switch-on delay and control contact<br>Ws: With single shot leading edge and control contact |
| Control contact | |
| Connection | Non-floating, terminals A1-B1 |
| Control pulse length | ≥ 50 ms (DC) |
| Relay output | |
| Contact type | 1 floating PDT |
| Switching capacity | 1250 VA (5 A/250 V AC) |
| Mechanical service life | 15 x $10^6$ cycles |
| General data | |
| Supply voltage | 85 V AC/DC ... 240 V AC/DC -15 % ... +10 % |
| Degree of protection | IP40 (housing) / IP20 (connection terminal blocks) |
| Ambient temperature range | -25 °C ... 55 °C |
| Housing material | - |
| Dimensions W / H / D | 17.5 / 88 / 65.5 mm |
| Screw connection solid / stranded / AWG | 0.5 ... 2.5 $mm^2$ / 0.5 ... 2.5 $mm^2$ / 20 - 14 |
| Push-in 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. |
|---|---|---|---|
| **Compact time relay,** multifunctional, with screw connection | **ETD-BL-1T-230** | **2905813** | 1 |
| **Compact time relay,** multifunctional, with push-in connection | **ETD-BL-1T-230-PT** | **2905814** | 1 |

## Timer relay

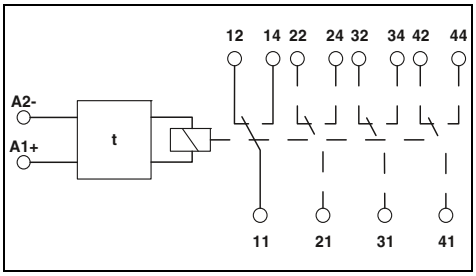
### Plug-in timer module for RIF-1, RIF-2, RIF-3, and RIF-4

The multifunctional plug-in timer module transforms the relay module into a timer relay. The RIF-1 to RIF-4 bases can be fitted with this module. Using DIP switches, you can choose from three time ranges and select four time functions. Fine adjustments to the time are made using a potentiometer. Relays can be operated with an input voltage of 24 V AC/DC.

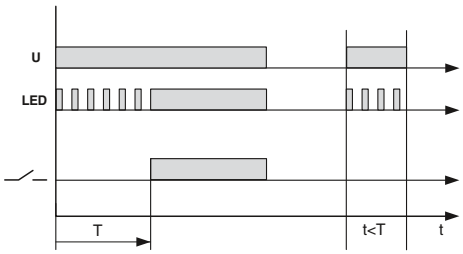
Functions:
– With switch-on delay
– With passing make contact
– Flasher/pulse generator

Time ranges:
– 0.5 s - 10 s
– 5 s - 100 s
– 0.5 min - 10 min
– 5 min - 100 min

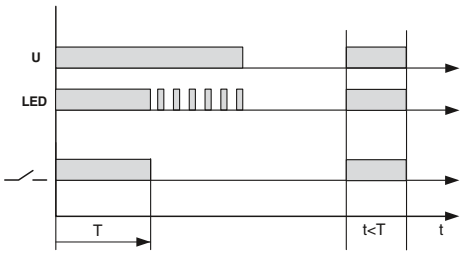
Time module



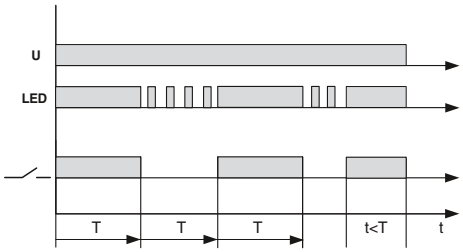

**With switch-on delay**




**With passing make contact**




**Flasher/pulse generator**




### Technical data

| | |
|---|---|
| Input data | |
| Nominal input voltage $U_N$ | 24 V DC (AC operation only permitted for RIF-1) |
| Nominal input voltage range with reference to $U_N$ | 0.4 ... 1.2 |
| Input circuit | Varistor, yellow LED |
| Output data | |
| Limiting continuous current | ≤ 250 mA (relay coil current) |
| General data | |
| Mounting position | any |
| Repeat accuracy | 1 % |
| Ambient temperature (operation) | -25 °C ... 50 °C (RIF-1, AC coil, 2 PDTs at 6 A)<br>-25 °C ... 50 °C (RIF-1, DC coil, 2 PDTs at 5 A)<br>-25 °C ... 40 °C (RIF-2, DC coil, 2 PDTs at 8 A)<br>-25 °C ... 40 °C (RIF-2, DC coil, 4 PDTs at 5 A)<br>-25 °C ... 40 °C (RIF-3, DC coil, 3 PDTs at 6.75 A)<br>-25 °C ... 40 °C (RIF-3, DC coil, 2 PDTs at 8 A)<br>-25 °C ... 35 °C (RIF-4, DC coil, 3 PDTs at 8 A)<br>-25 °C ... 25 °C (RIF-4, DC coil, 3 N/O contacts at 8 A) |
| Standards/specifications | DIN EN 50178 |
| Rated insulation voltage | 50 V DC |
| Rated surge voltage | 0.4 kV |

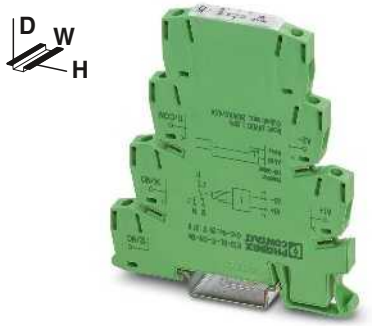
### Ordering data

| Description | Type | Order No. | Pcs. / Pkt. |
|---|---|---|---|
| **Timer module**, for mounting on RIF-1 to RIF-4, with LED status indicator for extending a relay module to create a timer relay with an input voltage of 24 V AC/DC | **RIF-T3-24UC** | **2902647** | 1 |

## Ultra-narrow timer relays

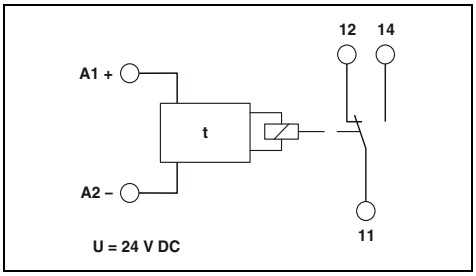
The **ETD-BL-1T-...** ultra-narrow timer relays show their strengths in applications that involve set parameters for functionality and time range.

– Purposeful device selection: one function, one time range
– High level of setting accuracy thanks to labeled and illuminated thumbwheel
– Narrow overall width of just 6.2 mm




**Timer relay with switch-on delay, voltage controlled**

Ex:

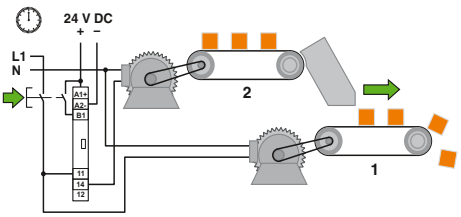



### Technical data

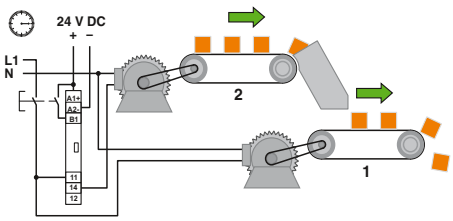
| | |
|---|---|
| Functions | |
| | ON: With switch-on delay |
| Control contact | |
| Connection | - |
| Control pulse length | min. 50 ms |
| Relay output | |
| Contact type | 1 floating PDT |
| Switching capacity | 1500 VA (6 A / 250 V AC) |
| Mechanical service life | Approx. 2 x $10^7$ cycles |
| General data | |
| Supply voltage | 24 V DC (19,2 V DC ...30 V DC) |
| Nominal current typ. | 15 mA (relay ON)<br>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 $mm^2$ / 30 - 12 |
| Push-in connection solid / stranded / AWG | 0.14 ... 2.5 $mm^2$ / 0.14 ... 2.5 $mm^2$ / 26 - 14 |
| Conformance / approvals | |
| Conformance | CE-compliant |
| ATEX | II 3 G Ex nA nC IIC T4 Gc X |
| UL, USA / Canada | UL/C-UL listed UL 508 |

### Ordering data

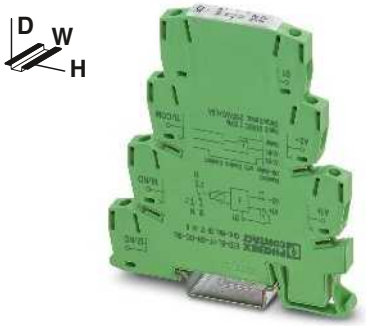
| Description | Type | Order No. | Pcs. / Pkt. |
|---|---|---|---|
| **Compact timer relay,** with screw connection | | | |
| Time range 0.1...10 s | **ETD-BL-1T-ON- 10S** | **2917379** | 1 |
| Time range 3...300 s | **ETD-BL-1T-ON-300S** | **2917382** | 1 |
| Time range 0.3...30 min | **ETD-BL-1T-ON- 30MIN** | **2917395** | 1 |
| Time range 3...300 min | **ETD-BL-1T-ON-300MIN** | **2917405** | 1 |
| **Compact timer relay**, with push-in technology | | | |
| Time range 0.1...10 s | **ETD-BL-1T-ON- 10S-PT** | **2901476** | 1 |
| Time range 3...300 s | **ETD-BL-1T-ON-300S-PT** | **2901477** | 1 |
| Time range 0.3...30 min | **ETD-BL-1T-ON- 30MIN-PT** | **2901478** | 1 |
| Time range 3...300 min | **ETD-BL-1T-ON-300MIN-PT** | **2901479** | 1 |




**Conveyor belt 1 starts immediately**

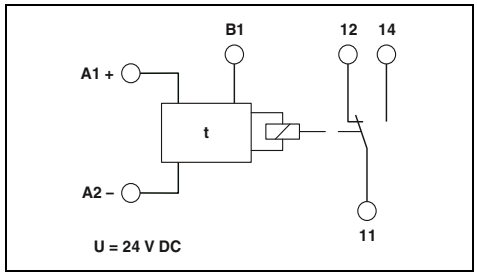



**Conveyor belt 2 stars with a time delay**



**Timer relay with switch-on delay, with control contact**

Ex:

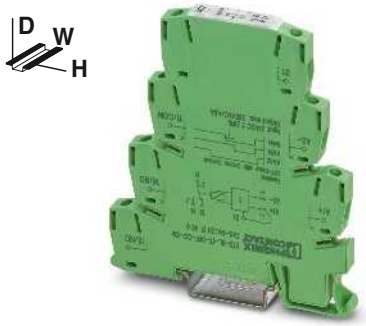



## Technical data

| |
|---|
| ON-CC: With switch-on delay with control contact |
| Non-floating, terminals A1-B1<br>min. 50 ms |
| 1 floating PDT<br>1500 VA (6 A / 250 V AC)<br>Approx. 2 x $10^7$ cycles |
| 24 V DC (19,2 V DC ...30 V DC)<br>15 mA (relay ON)<br>7 mA (relay OFF)<br>6 kV (according to EN 50178)<br>IP20<br>-20 °C ... 65 °C<br>Polyamide PA, self-extinguishing<br>6.2 / 80 / 86 mm<br>0.14 ... 2.5 $mm^2$ / 0.14 ... 2.5 $mm^2$ / 30 - 12<br>0.14 ... 2.5 $mm^2$ / 0.14 ... 2.5 $mm^2$ / 26 - 14 |
| CE-compliant<br>Ex II 3 G Ex nA nC IIC T4 Gc X<br>UL/C-UL listed UL 508 |

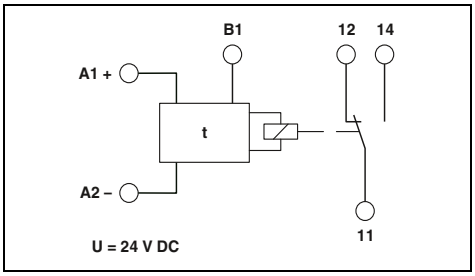
## Ordering data

| 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-PT** | **2901480** | 1 |
| **ETD-BL-1T-ON-CC-300S-PT** | **2901481** | 1 |
| **ETD-BL-1T-ON-CC- 30MIN-PT** | **2901483** | 1 |
| **ETD-BL-1T-ON-CC-300MIN-PT** | **2901484** | 1 |



**Timer relay with off delay, with control contact**

Ex:

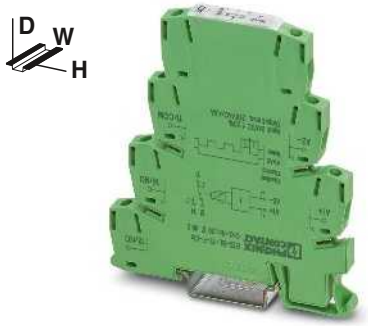



## Technical data

| |
|---|
| OFF-CC: Off delay with control contact |
| Non-floating, terminals A1-B1<br>min. 50 ms |
| 1 floating PDT<br>1500 VA (6 A / 250 V AC)<br>Approx. 2 x $10^7$ cycles |
| 24 V DC (19,2 V DC ...30 V DC)<br>15 mA (relay ON)<br>7 mA (relay OFF)<br>6 kV (according to EN 50178)<br>IP20<br>-20 °C ... 65 °C<br>Polyamide PA, self-extinguishing<br>6.2 / 80 / 86 mm<br>0.14 ... 2.5 $mm^2$ / 0.14 ... 2.5 $mm^2$ / 30 - 12<br>0.14 ... 2.5 $mm^2$ / 0.14 ... 2.5 $mm^2$ / 26 - 14 |
| CE-compliant<br>Ex II 3 G Ex nA nC IIC T4 Gc X<br>UL/C-UL listed UL 508 |

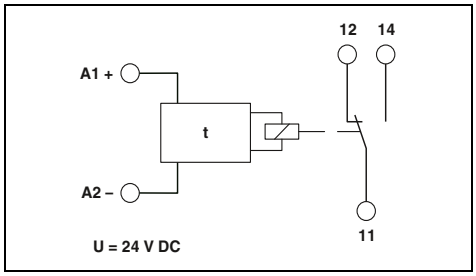
## Ordering data

| 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-PT** | **2901485** | 1 |
| **ETD-BL-1T-OFF-CC-300S-PT** | **2901486** | 1 |
| **ETD-BL-1T-OFF-CC- 30MIN-PT** | **2901487** | 1 |
| **ETD-BL-1T-OFF-CC-300MIN-PT** | **2901488** | 1 |



**Timer relay with flashing indic. function, beginning with the pulse**

Ex:




## Technical data

| |
|---|
| F: Flashing beginning with pulse |
| -<br>min. 50 ms |
| 1 floating PDT<br>1500 VA (6 A / 250 V AC)<br>Approx. 2 x $10^7$ cycles |
| 24 V DC (19,2 V DC ...30 V DC)<br>15 mA (relay ON)<br>7 mA (relay OFF)<br>6 kV (according to EN 50178)<br>IP20<br>-20 °C ... 65 °C<br>Polyamide PA, self-extinguishing<br>6.2 / 80 / 86 mm<br>0.14 ... 2.5 $mm^2$ / 0.14 ... 2.5 $mm^2$ / 30 - 12<br>0.14 ... 2.5 $mm^2$ / 0.14 ... 2.5 $mm^2$ / 26 - 14 |
| CE-compliant<br>Ex II 3 G Ex nA nC IIC T4 Gc X<br>UL/C-UL listed UL 508 |

## Ordering data

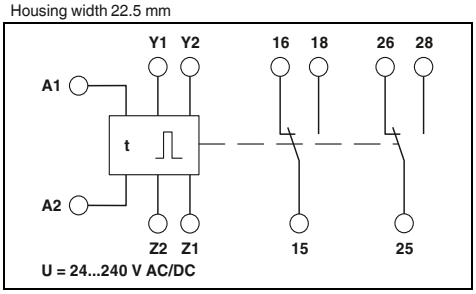
| Type | Order No. | Pcs. / Pkt. |
|---|---|---|
| **ETD-BL-1T-F- 10S** | **2917492** | 1 |
| **ETD-BL-1T-F-300S** | **2917502** | 1 |
| **ETD-BL-1T-F- 30MIN** | **2917515** | 1 |
| **ETD-BL-1T-F-300MIN** | **2917528** | 1 |
| **ETD-BL-1T-F- 10S-PT** | **2901489** | 1 |
| **ETD-BL-1T-F-300S-PT** | **2901490** | 1 |
| **ETD-BL-1T-F- 30MIN-PT** | **2901491** | 1 |
| **ETD-BL-1T-F-300MIN-PT** | **2901492** | 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

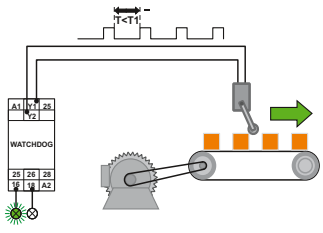
**Multifunctional timer relay, two adjustable times**

Housing width 22.5 mm

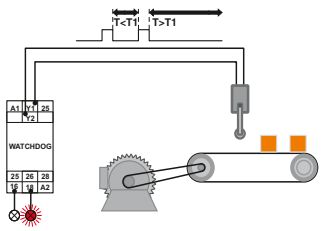



### Technical data

| | |
|---|---|
| Functions | |
| | Ip: Switched-mode beginning with the pause<br>Ii: Switched-mode beginning with the pulse<br>ER: With switch-on and release delay with control contact<br>EWu: With switch-on delay and single shot leading edge, voltage controlled<br>EWs: With switch-on delay and single shot leading edge with control contact<br>WsWa: With single shot leading edge and single shot trailing edge with control contact<br>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 capacity | Cannot carry load |
| Cable length | < 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)<br>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 %<br>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 |
| EMC note | Class A product, see page 625 |
| Conformance / approvals | |
| Conformance | CE-compliant |
| UL, USA / Canada | UL/C-UL listed UL 508 |




**Function: pulse sequence evaluation**



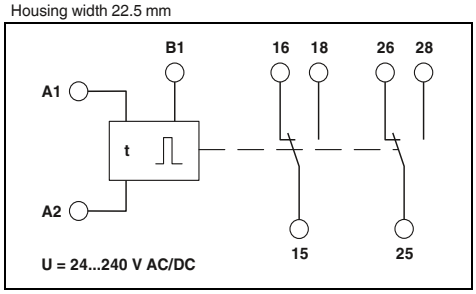

**Message for incorrect pulse**

### Ordering data

| Description | Type | Order No. | Pcs. / Pkt. |
|---|---|---|---|
| **Electronic timer relay** with adjustable functions and times | **ETD-FL-2T-DTI** | **2866187** | 1 |

**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, terminals A1-B1

Parallel switched minimum load current 1 VA (0.5 W), terminals A2-B1

< 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
Class A product, see page 625

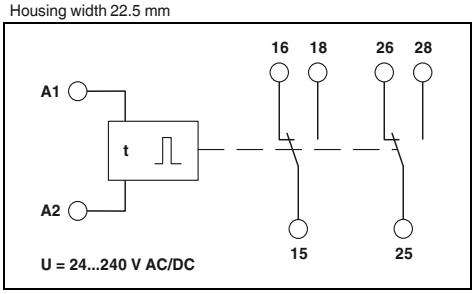
CE-compliant
UL/C-UL listed UL 508

## 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 the pause
Ii: Switched-mode beginning with the 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
Class A product, see page 625

CE-compliant
UL/C-UL listed UL 508

## Ordering data

| Type | Order No. | Pcs. / Pkt. |
|---|---|---|
| **ETD-SL-2T-I** | **2866174** | 1 |

## Diode modules

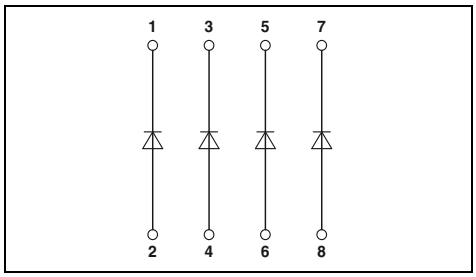
Diode circuits perform various tasks in electrical control systems, particularly in electronic ones:

- 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

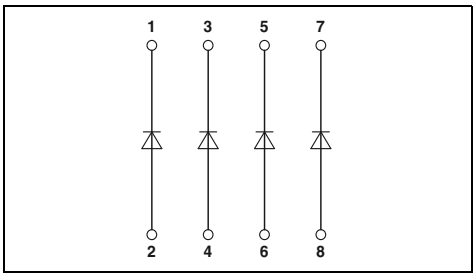
**Notes:**

Further circuit diagrams can be found in the data sheet at phoenixcontact.net/products.

**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 (as per EN 50178) | |
| Pollution degree / Surge voltage category | 2 (according to EN 50178) | |
| Mounting position | any | |
| Mounting | Can be aligned without 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 (as per EN 50178) | |
| Pollution degree / Surge voltage category | 2 (according to EN 50178) | |
| Mounting position | any | |
| Mounting | Can be aligned without 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 P-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 M 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

Lamp testing modules for checking lamps that are installed and ready for operation:

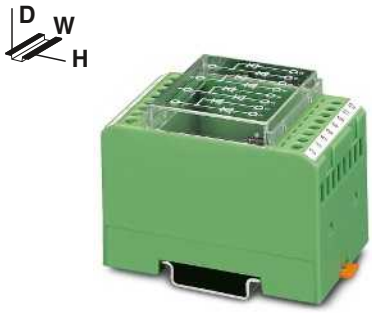
- Individual checking of separate lamps (EMG...-E/LP)
- Centrally controlled checking of lamps (EMG...-M/LP)

## Display modules

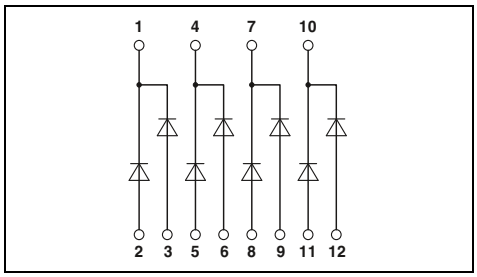
- Light indicator modules facilitate the monitoring of processes on electronic control systems during troubleshooting

**Notes:**

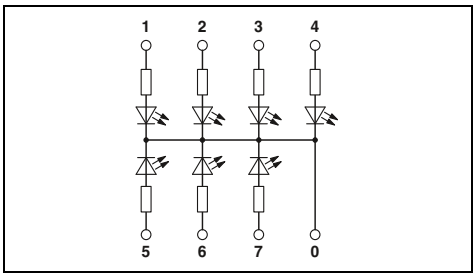
Further circuit diagrams can be found in the data sheet at phoenixcontact.net/products.



**Lamp testing module, groups of 2 diodes with common cathode**



**Light indicator module, with common return line**




### Technical data

| | | |
|---|---|---|
| Diodes | 8E/16E | 14M/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 | 0.4 A | 0.2 A |
| Input | | |
| Current required per light indicator | | |
| 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 (as per EN 50178) | |
| Pollution degree / Surge voltage category | 2 (according to EN 50178) | |
| Mounting position | any | |
| Mounting | Can be aligned without 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 | LA 7S | LED 7S/LED 14S |
| Input | | |
| Current required per light indicator | approx. 1 mA | approx. 3 mA |
| General data | | |
| Ambient temperature range | -20 °C ... 45 °C | |
| Pollution degree / Surge voltage category | III, basic insulation (as per EN 50178) | |
| Pollution degree / Surge voltage category | 2 (according to EN 50178) | |
| Mounting position | any | |
| Mounting | Can be aligned without spacing | |
| Dimensions H / D | 75 / 47.5 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. |
|---|---|---|---|---|
| **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 | | | |
| **Light indicator module,** 24 V DC input voltage | | | | |
| 7 LEDs | 22.5 mm | | | |
| 14 LEDs | 45 mm | | | |

### Ordering data

| Type | Order No. | Pcs. / Pkt. |
|---|---|---|
| **EMG 22-LA 7S/230** | **2949677** | 10 |
| **EMG 22-LED 7S/24** | **2952305** | 10 |
| **EMG 45-LED 14S/24** | **2952334** | 5 |

### Accessories

| | | | |
|---|---|---|---|
| **Equipment marker** | **EMG-GKS 12** | **2947035** | 50 |

### Accessories

| | | | |
|---|---|---|---|
| **EMG-GKS 12** | **2947035** | 50 |

K1 K2 K3 K4
K9
K10
PHOENIX CONTACT
EMD-BL-PH-480-PT
EMD-BL-C-10-PT
Delay
Failure
Max
Min
ASYM [%]
OFF
COIL

# Relay modules

The importance of the reliability of industrial automation equipment is growing with the increase in use of electronic modules.

Modern relay or solid-state relay interfaces perform a wide range of tasks. Whether in production engineering, for the electrical equipment of machines or in control engineering for energy distribution, building automation and materials processing – the main aim is to guarantee the exchange of signals between the process peripherals and the superior, central control systems. This exchange must provide reliable operation, be floating and electrically unambiguous. Safe electrical interface modules that meet the requirements of modern system concepts must include the following features:

– Coupling of different signal levels
– Safe electrical isolation between input and output
– High degree of resistance to interference

In practice, a relay interface comes into use when dealing with a flexible interface configuration with a large switching capacity range and the possibility of combining different types of contact. Further important features of relay interfaces are:

– 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 an interface between the process peripherals and electronics is subject to the following requirements:

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

**Product range overview**


| | |
|---|---|
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| **Basics of relay technology** | **318** |
| **Basics of solid-state relay technology** | **322** |
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## Product overview

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### PLC logic

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### DEK series

With miniature relay
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### Special relay and solid-state relay modules

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## PLC-INTERFACE

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For high inrush/continuous currents
Page 410
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With switch
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## Safety devices

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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 as soon as they are de-energized.

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

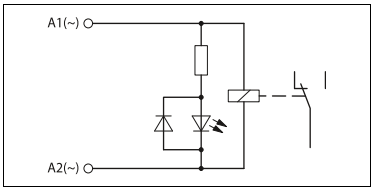
## Coil side

### 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.

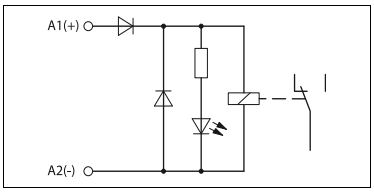
Unless otherwise specified, the frequency of the control voltage is 50/60 Hz.




Basic construction of a relay with AC input

In the case of a pure DC input, the most important addition to the circuit is a freewheeling 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.

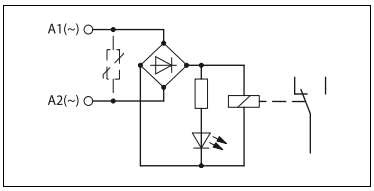
As the freewheeling diode can only perform its required function if the polarity of the voltage connection is correct, a reverse polarity protection diode is also integrated into the input circuit.




Basic construction of a 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 surge voltages, a varistor is also connected (depending on the type) upstream of the bridge rectifier.

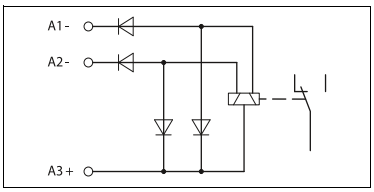



Basic construction of a relay with AC/DC input

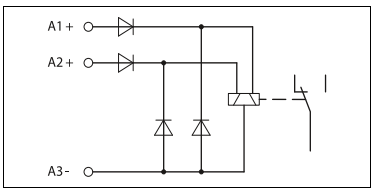
Bistable latching relays with duplex winding are operated solely with DC voltage.

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 polarity protection diodes.




Block diagram of a bistable relay, negative switching type



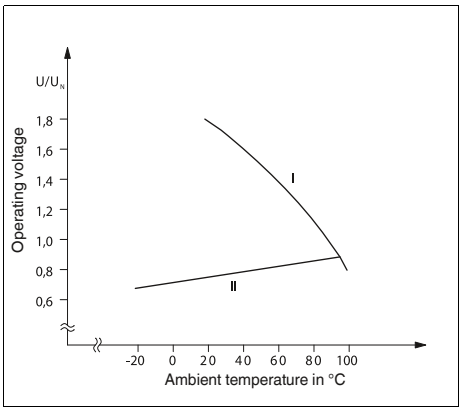

Block diagram of bistable relay, positive switching type

### 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 permitted 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.




Basic curve of a relay operating voltage

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

II: Minimum response voltage

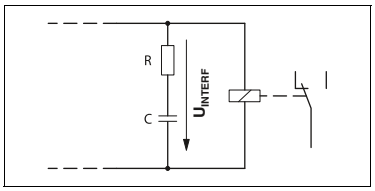
### Interference voltages and interference currents on the coil side

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

If the coupled-in voltage exceeds the release voltage required 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 $\geq 0.05 \times U_N$ and for purely 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 voltage 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 parallel to the relay coil. This measure also subjects the interference voltage to a capacitive load, causing it to collapse.




**External RC interference suppressor 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 influences

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

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

| Contact material | Typ. properties | Typ. applications | Guide values for the usage range* |
|---|---|---|---|
| **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<br>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<br>≥ 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<br>≥ 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 switch-on currents, e.g., glow lamps, fluorescent lamps. | ≥ 60 V<br>≥ 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<br>≥ 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<br>≥ 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<br>≥ 100 mA<br>(≥ 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<br>≥ 1 mA |

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

## Contact protection 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 protection 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 scenarios 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.

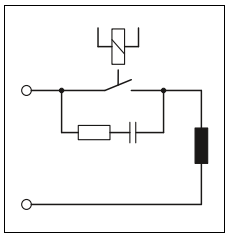
These high voltages cause an electric arc on the switching contact which can destroy the contact due to material vaporization and material migration. The electrical service life is reduced considerably as a result. In extreme cases, the relay may fail in the very first switching cycle with DC voltage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

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

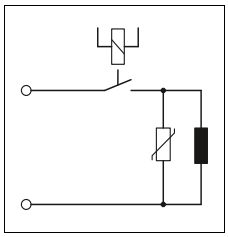
## Basics of relay technology

In principle, there are a number of possible ways of achieving an effective circuit:

1. Contact wiring
2. Load wiring
3. Combination of both wiring methods



Contact wiring



Inductive load wiring

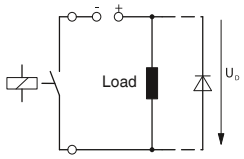
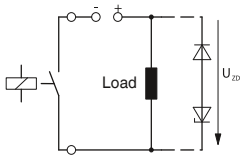
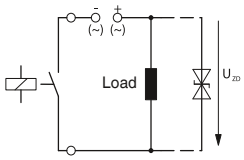
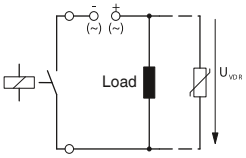
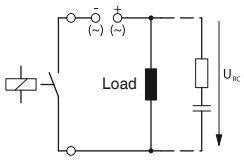
In principle, protective measures should intervene directly at the source of the interference.

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 Zener diode often do not quench the arc and only serve to comply with legislation governing EMC. Only valve connectors with an integrated 1N4007 freewheeling 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.

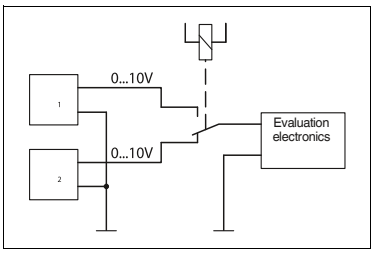
| Load wiring | Additional dropout delay | Defined induction voltage limitation | Effective bipolar attenuation | Advantages/disadvantages |
|---|---|---|---|---|
| **Diode**   | Large | Yes ($U_D$) | No | **Advantages:**<br>• Good effect in terms of extending the service life of contacts<br>• Easy implementation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

### Switching small loads

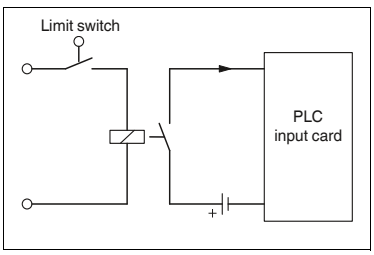
Small loads must be processed mainly in applications where signals must be forwarded to control inputs (e.g., of a PLC).

With these loads, no switching sparks (electric 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 usage ranges 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 operations 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**

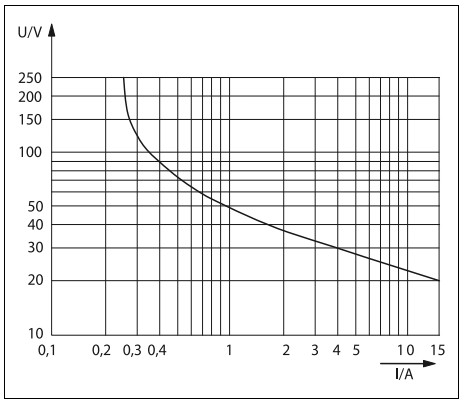
When switching large AC loads, the relay can be operated up to the corresponding maximum values for switching voltage, current, and power. The electric arc that occurs during interruption depends on the current, voltage, and phase relation. This cut-off arc usually disappears automatically the next time the load current passes through 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 permitted 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 electric arc or load limit curves.




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

A non-attenuated inductive DC load further reduces the values given for switchable currents. The energy stored in the inductance can cause an electric arc to occur, which forwards the current through the open contacts.

With an effective contact protection circuit, preferably freewheeling diodes of the type 1N4007, the service life can be increased by a factor of 5 to 10 in relation to unprotected or unfavorably protected inductive loads (see also "Contact protection circuit" section).

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 according to utilization categories AC15 and DC13 (IEC 60947)**

In practice, both the maximum interrupting rating for AC loads and the DC cut-off values taken from the load limit curves provide only a rough guide for selecting a 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 seeks to avoid these disadvantages by dividing the loads into various utilization categories (DC13, AC15, etc.). 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 circuits at all (see "Contact protection circuit" section). Moreover, the switching capacity test according to 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 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 specially 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 coordinated filters reliably suppress possible high-frequency noise emissions.

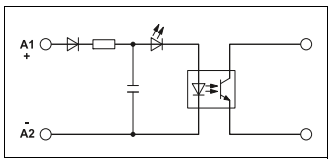



Figure 1: block diagram for DC input

## 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.

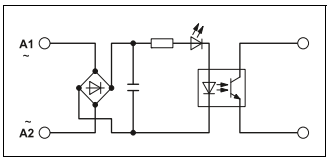



Figure 2: block diagram for AC input

## 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)
– 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 order 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. A derating curve is therefore generally specified for solid-state power relays. This shows 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.

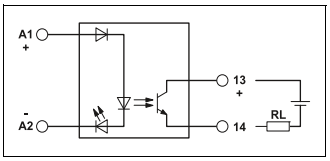



Figure 3: 2-wire output

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

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

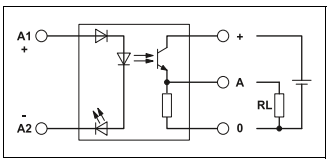



Figure 4: 3-wire output

## 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.

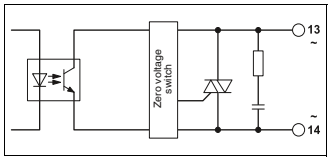



Figure 5: basic circuit diagram of AC output

## 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 on the solid-state relay output and type of load:

- A freewheeling diode/suppressor diode (DC only)
- A varistor (AC and DC)
- Or an RC element (AC only)

can provide the necessary protection.

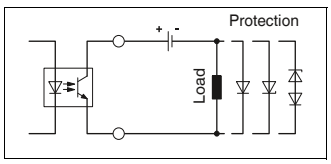



Figure 6: protective circuit with DC voltage output

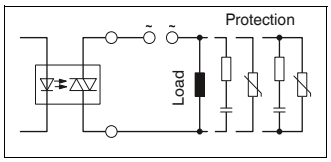



Figure 7: protective circuit with AC voltage output

## 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...

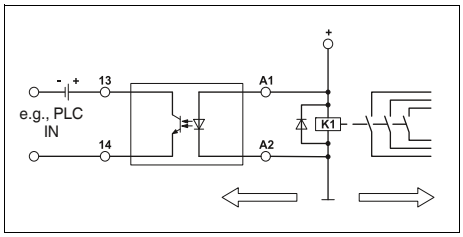
Modular version:
- DEK-OE...
- EMG 10-OE...
- SIM-EI...
- OPT...

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

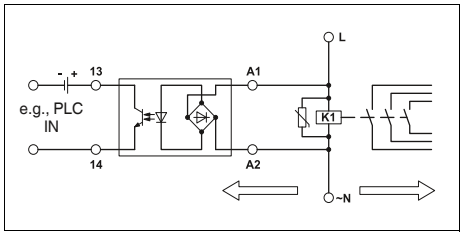
Plug-in version:
- PLC-O...

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

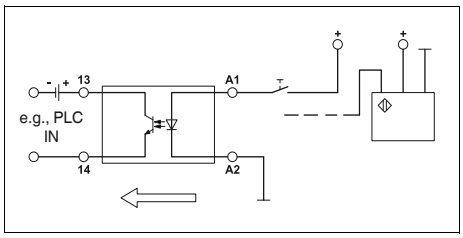
**Example: load contactor monitoring (DC contactor)**



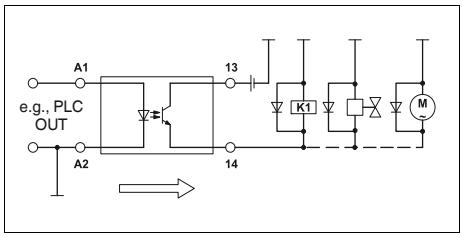

**Example: load contactor monitoring (AC contactor)**



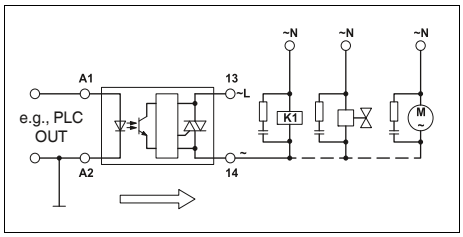

**Example: position indication with limit stop contact or initiator**




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




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




**Remarks:**

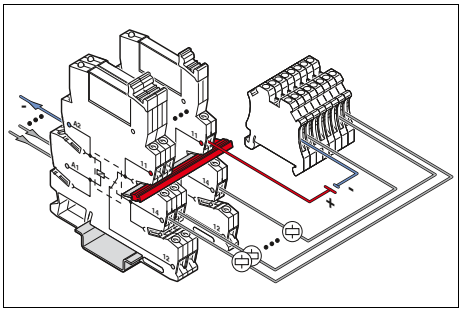
1) Ground (negative) potential from the input and output of the solid-state relay must not be connected.
2) DC loads must be provided with an effective protective circuit (e.g., diode).
3) AC loads must be protected with a varistor or an RC element.

## Sensor/actuator configuration aids and handling of interference signals

### Configuration aid for connecting sensors and actuators

Electromechanical relays or solid-state relays are used as a coupling element between the controller and the sensors or actuators in the field. This interface ensures appropriate signal conditioning with respect to current and voltage between the controller and field level.

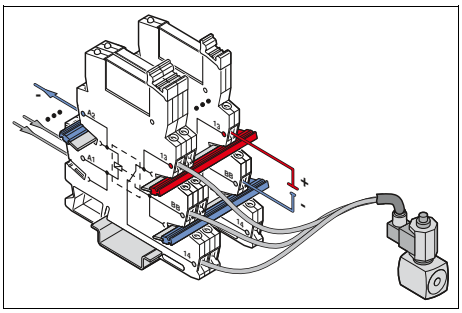
### Conventional connection of actuators



If actuators such as solenoid valves are connected to the controller via a universal relay with PDT contact, an additional terminal block strip must be used for the common load return line. The positive potential of the loads is applied to connection terminal block 11 (PDT contact) at the relay modules. This can be distributed over all relay modules using jumpers. This means only the direct connection of the potential to a relay is necessary. The loads are connected to connection terminal blocks 14 (N/O contact). The negative potential required is supplied at a terminal block. This is then distributed to further terminal blocks by means of jumpers. However, load return lines for the individual actuators are applied to every terminal block. This results in a common load return line potential for all actuators via the additional terminal block.

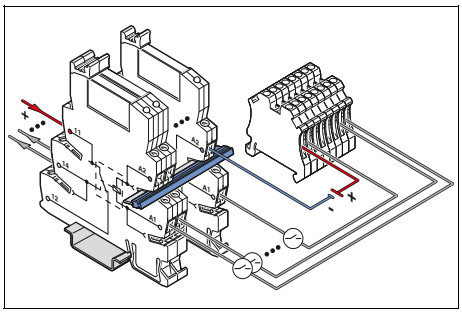
Due to increased space requirements and additional wiring to the terminal block, the use of additional terminal blocks for distributing potential is extremely time-consuming.

### Easy wiring of actuators



The PLC...ACT relay modules enable fast and easy connection of actuators. The positive potential of the loads is applied to connection terminal block 13. This can be distributed over all relay modules using jumpers. This only makes direct connection to a module necessary. The actuators are connected to contact 14 (N/O contact). In the case of PLC...ACT relay modules, an N/C contact is not required. Instead, the BB connection serves as an option for connecting the load return line. Here the common negative potential is supplied and distributed by means of jumpers. Conventional wiring of the terminal block is not necessary due to direct connection of the load return line potential to the relay module. This means that no additional space is required in the control cabinet and simpler wiring minimizes the risk of error.

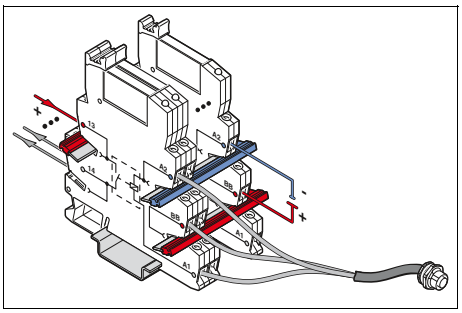
### Conventional connection of sensors



If sensors such as proximity switches are connected via a universal relay to a controller with a PDT contact, an additional terminal block strip must be used for the common sensor supply voltage. It must also be observed that either the wiring in the control cabinet must be the other way round since control of the relay is now from the field level and not via the controller. Or the relay module is installed in the control cabinet rotated at 180°. The negative potential of the sensors is applied at connection terminal block A2 on the relay module. This can be distributed over all relay modules using jumpers. This means only the direct connection to a relay is necessary. The sensors are connected to connection terminal block A1. The necessary positive potential is supplied to a terminal block and distributed to further terminal blocks by means of jumpers. However, the supply for the individual sensors is applied to every terminal block. This results in a common supply signal for all sensors via the additional terminal blocks.

Due to increased space requirements and additional wiring to the terminal block, the use of additional terminal blocks for distributing potential is extremely time-consuming.

## Easy wiring of sensors

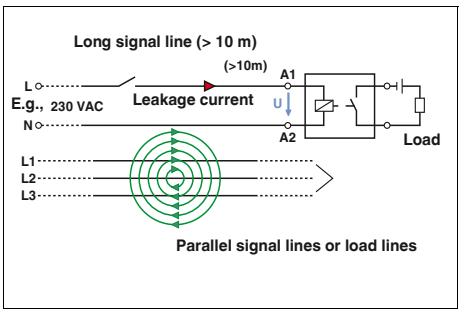


Sensors can be efficiently coupled with the controller with the PLC...SEN relay modules. The input and output side at the module are already interchanged so that the signal direction from the field to the controller can be ideally represented. Therefore, three connection terminal blocks A1, A2, and BB are located on the control side of the relay. The common negative potential of the sensors is then connected to A2 and distributed to further relay modules by means of jumpers. The sensors are connected directly to the A1 connections. Connection BB is used for the common supply potential of the sensors. The potential is distributed to all connected sensors by means of the jumpers. However, only connections 13 and 14 for the N/O contact are located on the contact side. Signal feedback to the controller takes place via these connections. The terminal block for conventional wiring can be saved by connecting the sensor supply voltage directly to the relay module. This means that no additional space is required in the control cabinet and simpler wiring minimizes the risk of error.

## Configuration aid for handling interference signals

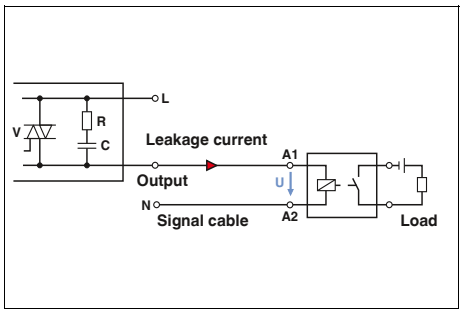
According to IEC 61810-1, the standard release voltage of a relay is 5% of the nominal voltage for DC coils and 15% for AC coils. That means that a relay with a nominal voltage of 230 V AC is switched off only when the control voltage is ≤ 0.15 x 230 V AC = 34.5 V AC. If interference signals occur on the control side of a relay that are greater than the release voltage, defined switch-off is no longer possible. In the worst case, the interference is large enough to energize the relay. The application is still in a switched-on state although no signal is applied by the controller. There can be various reasons for this.

## Coupling of interference signals from parallel lines




If the control lines to the relay are very long, interference can occur from parallel-running cables. These influence the actual control line and couple the signals to them. This interference voltage can be measured on the control side, even if no signal is applied by the controller.

## Leakage current with AC voltage output card

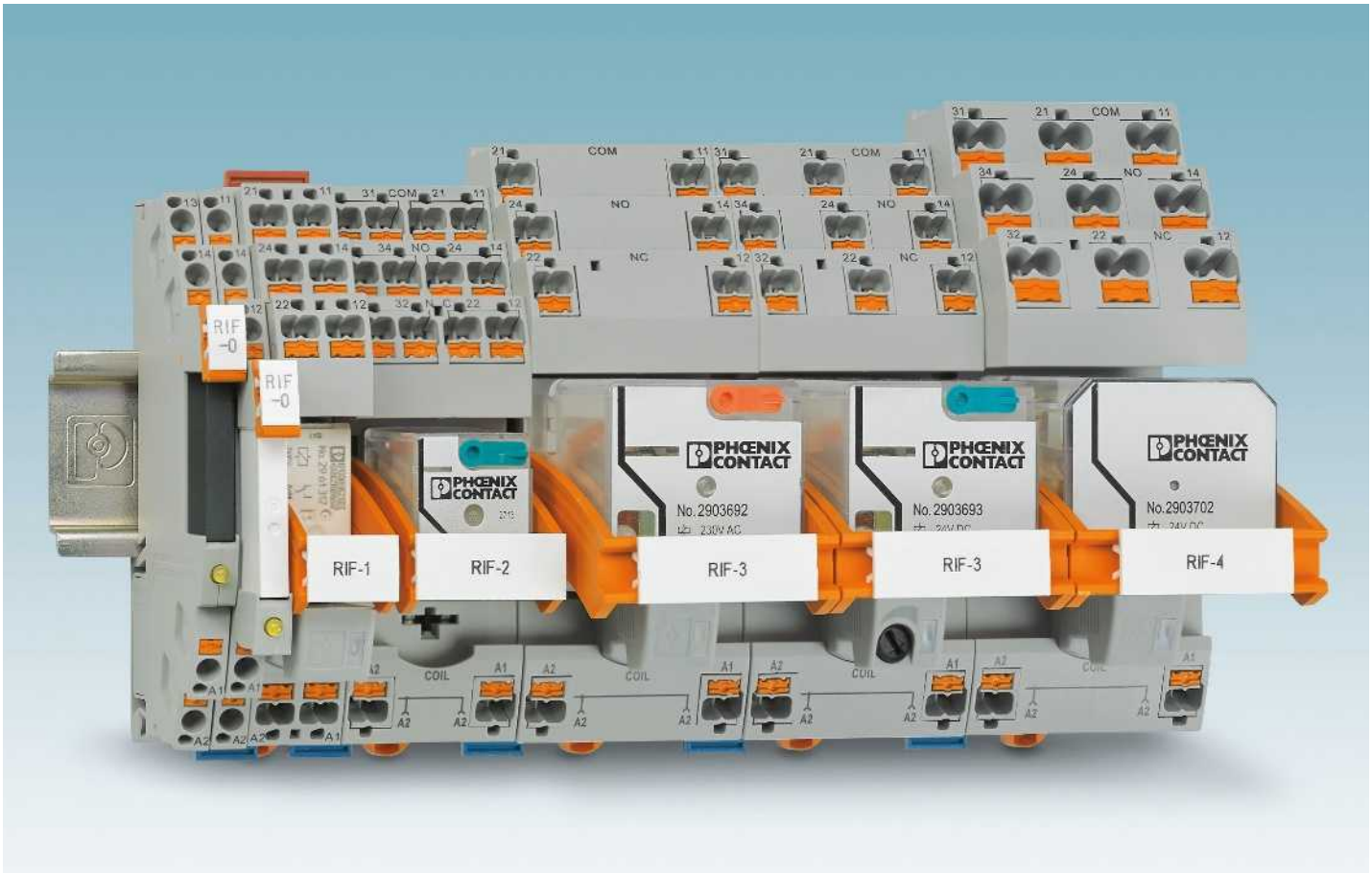



Leakage current on the signal line occurs if control of a relay takes place via an output card with AC voltage. This is caused by the RC wiring of the AC voltage output. Typically, the leakage current has a control power that is large enough not to switch off the relay reliably.

## Safe shutdown even with interference signals

The PLC...SO46 series is equipped with RCZ wiring in the base. The release voltage of the relay is increased by this circuit of resistor, capacitor, and Zener diode so that the relay is resistant to interference voltage. In the case of a 230 V AC relay, the standard release voltage is 34.5 V AC. The PLC...230UC...SO46 modules have a release voltage of 80 V AC. This enables the relay to switch off reliably at interference voltages of ≤ 80 V AC. The PLC...SO46 bases are also available with further voltages. Fitting is possible with both electromechanical relays or solid-state relays. Screw connection or push-in connection is available as connection technology.

## Industrial relay system with push-in connection - RIFLINE complete




RIFLINE complete is an inexpensive relay system with various accessories. It consists of DIN rail bases, electromechanical or solid-state relays, plug-in input/interference suppression modules, marking material, and bridging material. The range of accessories is rounded off with a timer module. This can be used to transform a basic relay into a timer relay with three different functions.

The RIFLINE complete relay range consists of seven different base versions from RIF-0 to RIF-4 – these range from one N/O contact up to four PDT contacts. The field of application of this product group ranges from coupling relay applications with switching currents of one milliamp to replacement for miniature contactors with currents up to 16 A.

The relay bases feature push-in connection technology, which enables quick and tool-free conductor contacting. The RIF-1 to RIF-4 bases offer double the contact options on both the input and output side.

On the input side of all bases, the negative potential (A2) can be bridged – regardless of the base size. On the output side, the grouped contact (11) can be bridged within the RIF-0 base version. This connection can also be bridged within the RIF-1 base size.

To offer diverse marking options, the engagement lever can be fitted with a zack marker strip. In addition, marker carriers can be mounted on the bases so that additional marking surfaces are available.

RIFLINE complete can be extended using many elements from the CLIPLINE complete accessories range. This includes marking material, bridges, and test adapters.

To make ordering and management easy, RIFLINE complete modules are provided in the most popular voltages as complete modules with relay and input/interference suppression module. For individual assembly, tailored to the requirements of the application, additional voltage levels are offered in the modular system.

**RIF-0**

The narrow 6.2 mm RIF-0 base series is designed for miniature relays with one contact. Switching currents up to 6 A are implemented here. Two base versions are available: 1 N/O contact and 1 PDT contact. RIF-0 is therefore a good choice for all coupling applications.

**RIF-1**

The narrow 16 mm RIF-1 base series is designed for miniature relays with 2 contacts. Currents up to 13 A can be switched when using the FBS 2-8 jumper. This is the ideal relay for applications that require coupling, power switching, and signal duplication.

**RIF-2**

The 31 mm wide RIF-2 base series is designed for industrial relays with up to 4 contacts. Currents up to 12 A are no problem for these bases. This relay is ideal for applications that require power and signal multiplication.

**RIF-3**

The 40 mm wide RIF-3 base series is designed for octal relays with up to 3 contacts. Switching currents up to 10 A can be implemented here. Two base versions are available: 2 PDT contacts and 3 PDT contacts. RIF-3 bases are ideal for all applications that require power and signal multiplication.

**RIF-4**

The 43 mm wide RIF-4 base series is designed for power relays with up to 3 contacts. Currents up to 16 A can be switched. RIF-4 bases are a good choice for applications that require power and signal multiplication, e.g., in miniature contactor applications.

**Accessories**

A wide range of accessories are available for the RIFLINE complete relay system that round off the range. These include bridges, professional marking material, function modules, test plugs, and end brackets.

## Modular RIF-0 relay base

Relay base that can be fitted with miniature power relays or solid-state relays with a nominal voltage of 12 to 24 V DC.

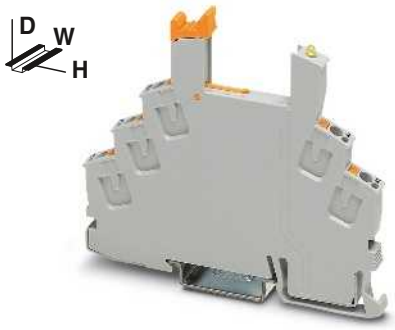
The advantages:

- Integrated freewheeling diode for input circuit and interference suppression circuit
- LED for status display
- Safe isolation according to DIN EN 50178 between coil and contact
- Professional marking material
- Holders for test plugs
- Professional bridging of adjacent modules saves wiring time (A2 and 11/13)
- FBS 2-6 jumpers for the input and output side

**Notes:**

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

For further marking systems and mounting material, see Catalog 5.




**1 PDT relay base for miniature power relay**

### Technical data

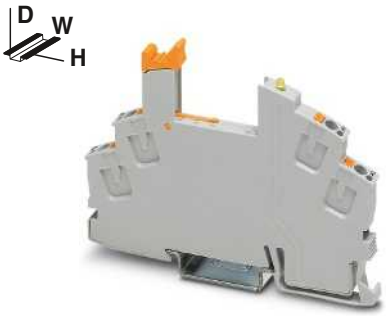
| | |
|---|---|
| Nominal voltage $U_N$ | 250 V AC/DC (contact side) |
| Nominal current at $U_N$ | max. 8 A (depending on application/assembly) |
| General data | |
| Ambient temperature (operation) | -40 °C ... 85 °C (depending on application/assembly) |
| Connection data solid / stranded / AWG | 0.14 ... 1.5 mm² / 0.14 ... 1.5 mm² / 26 - 16 |
| Dimensions | |
| Width | 6.2 mm |
| Depth | 78 mm |
| Height | 93 mm |

### Ordering data

| Description | Type | Order No. | Pcs. / Pkt. |
|---|---|---|---|
| **RIF-0 relay base**, PDT version, safe isolation I/O<br>With push-in connection | **RIF-0-BPT/21** | **2900958** | 10 |
| **RIF-0 relay base**, N/O contact version, safe isolation I/O<br>With push-in connection | | | |

### Accessories

| | | | | |
|---|---|---|---|---|
| **Jumper** | | | | |
| 2-pos. red, 24 A | | **FBSR 2-6** | **3033715** | 50 |
| 2-pos. red, 32 A | | **FBS 2-6** | **3030336** | 50 |
| 2-pos. blue, 32 A | | **FBS 2-6 BU** | **3036932** | 50 |
| 2-pos. gray, 32 A | | **FBS 2-6 GY** | **3032237** | 50 |
| 3-pos. red, 24 A | | **FBSR 3-6** | **3001594** | 50 |
| 4-pos. red, 24 A | | **FBSR 4-6** | **3001595** | 50 |
| 5-pos. red, 24 A | | **FBSR 5-6** | **3001596** | 50 |
| 5-pos. red, 32 A | | **FBS 5-6** | **3030349** | 50 |
| 10-pos. red, 32 A | | **FBS 10-6** | **3030271** | 10 |
| 20-pos. red, 32 A | | **FBS 20-6** | **3030365** | 10 |
| 50-pos. red, 32 A | | **FBS 50-6** | **3032224** | 10 |
| **End bracket,** for snapping onto NS 35, 9.5 mm wide, can be marked with ZB 6, ZB 8/27, KLM... | | **CLIPFIX 35** | **3022218** | 50 |
| **Test plug,** consisting of: | | | | |
| **Metal part** for 2.3 mm Ø socket hole and | silver | **MPS-MT** | **0201744** | 10 |
| **Insulating sleeve,** for MPS metal part | red | **MPS-IH RD** | **0201676** | 10 |
| | white | **MPS-IH WH** | **0201663** | 10 |
| | blue | **MPS-IH BU** | **0201689** | 10 |
| | yellow | **MPS-IH YE** | **0201692** | 10 |
| | green | **MPS-IH GN** | **0201702** | 10 |
| | gray | **MPS-IH GY** | **0201728** | 10 |
| | black | **MPS-IH BK** | **0201731** | 10 |
| **Zack marker strip, 10-section, unprinted:** pack contains enough to mark 100 terminal blocks | | | | |
| 10-section | | **ZB 6:UNBEDRUCKT** | **1051003** | 10 |




**1 N/O contact relay base for miniature power relay**

## Technical data

250 V AC/DC (contact side)
max. 8 A (depending on application/assembly)

-40 °C ... 85 °C (depending on application/assembly)

0.14 ... 1.5 mm² / 0.14 ... 1.5 mm² / 26 - 16

6.2 mm
66 mm
93 mm

## Ordering data

| Type | Order No. | Pcs. / Pkt. |
|---|---|---|
| RIF-0-BPT/1 | 2901873 | 10 |

## Accessories

| | | |
|---|---|---|
| FBSR 2-6 | 3033715 | 50 |
| FBS 2-6 | 3030336 | 50 |
| FBS 2-6 BU | 3036932 | 50 |
| FBS 2-6 GY | 3032237 | 50 |
| FBSR 3-6 | 3001594 | 50 |
| FBSR 4-6 | 3001595 | 50 |
| FBSR 5-6 | 3001596 | 50 |
| FBS 5-6 | 3030349 | 50 |
| FBS 10-6 | 3030271 | 10 |
| FBS 20-6 | 3030365 | 10 |
| FBS 50-6 | 3032224 | 10 |
| CLIPFIX 35 | 3022218 | 50 |
| MPS-MT | 0201744 | 10 |
| MPS-IH RD | 0201676 | 10 |
| MPS-IH WH | 0201663 | 10 |
| MPS-IH BU | 0201689 | 10 |
| MPS-IH YE | 0201692 | 10 |
| MPS-IH GN | 0201702 | 10 |
| MPS-IH GY | 0201728 | 10 |
| MPS-IH BK | 0201731 | 10 |
| ZB 6:UNBEDRUCKT | 1051003 | 10 |

## Industrial relay system with push-in connection - RIFLINE complete

### Plug-in miniature power relays

Plug-in miniature power relays suitable for RIF-0 and PLC-INTERFACE relay bases.

The advantages:

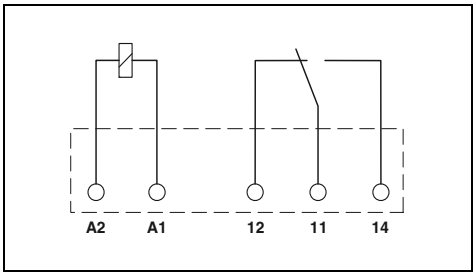
- Power contacts up to 6 A
- Multi-layer gold contact or power contact
- High degree of protection RT III (comparable with IP67)
- Safe isolation according to DIN EN 50178 between coil and contact
- Can be soldered in on PCB

**1 PDT**

**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 dimensional drawings and perforations for assembly, see page 424




### Technical data

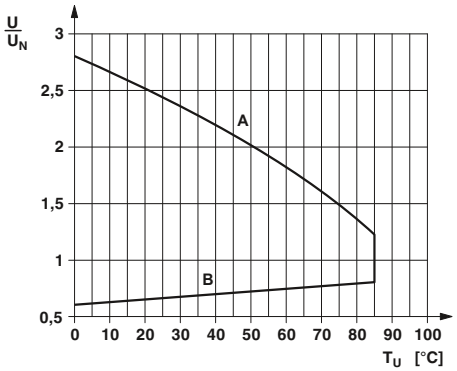
| | | | |
|---|---|---|---|
| Input data | | ① | ② |
| Permissible range (with reference to $U_N$) | | see diagram | |
| Typ. input current at $U_N$ | [mA] | 14 | 7 |
| Typ. response time at $U_N$ | [ms] | 5 | 5 |
| Typ. release time at $U_N$ | [ms] | 2.5 | 2.5 |
| Output data | | | |
| Contact type | | 1 PDT | 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 (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

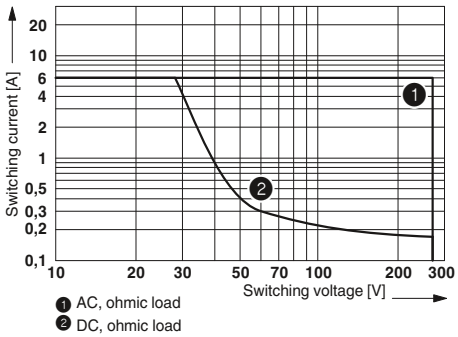
| Description | | Input voltage $U_N$ | Type | Order No. | Pcs. / Pkt. |
|---|---|---|---|---|---|
| **Plug-in miniature power relay** | | | | | |
| with power contacts | ① | 12 V DC | **REL-MR- 12DC/21** | **2961150** | 10 |
| with power contacts | ② | 24 V DC | **REL-MR- 24DC/21** | **2961105** | 10 |
| **Plug-in miniature power relay** | | | | | |
| with multi-layer gold contacts | ① | 12 V DC | **REL-MR- 12DC/21AU** | **2961163** | 10 |
| with multi-layer gold contacts | ② | 24 V DC | **REL-MR- 24DC/21AU** | **2961121** | 10 |

## REL-MR-.../21... (1 PDT)

Input voltage range




Interrupting rating



## Plug-in solid-state relays

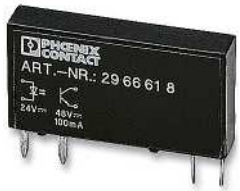
Notes:

For dimensional drawings and perforations for assembly, see page 425

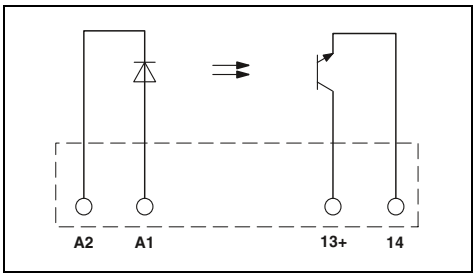
Plug-in solid-state relays suitable for RIF-0 and PLC-INTERFACE relay bases.

The advantages:

– Switching capacity of up to 24 V DC/3 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




**Max. DC voltage output of 3 A**

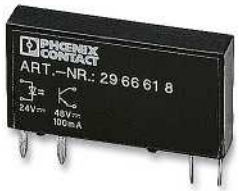



### Technical data

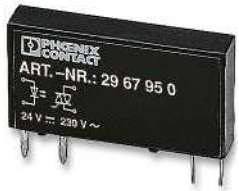
| | | |
|---|---|---|
| Input data | | ① |
| Permissible range (with reference to $U_N$) | | 0.8 - 1.2 |
| Switching level | 1 signal ("H") [V DC] ≥ | 16 |
| | 0 signal ("L") [V DC] ≤ | 10 |
| Typ. input current at $U_N$ | [mA] | 7 |
| Typ. switch-on time at $U_N$ | [µs] | 20 |
| Typ. shutdown time at $U_N$ | [µs] | 300 |
| Transmission frequency $f_{limit}$ | [Hz] | 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 |

### Ordering data

| Description | | Input voltage $U_N$ | Type | Order No. | Pcs. / Pkt. |
|---|---|---|---|---|---|
| **Plug-in solid-state relay** | | | | | |
| Solid-state power relay | ① | 24 V DC | **OPT-24DC/ 24DC/ 2** | **2966595** | 10 |
| **Plug-in solid-state relay** | | | | | |
| Solid-state input relay | ① | 24 V DC | | | |

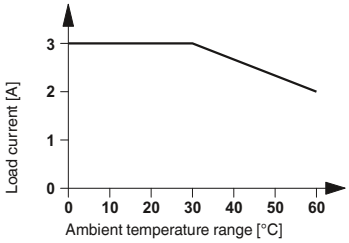



**Max. DC voltage output of 100 mA**

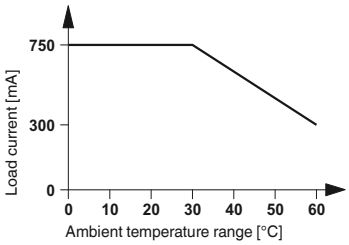


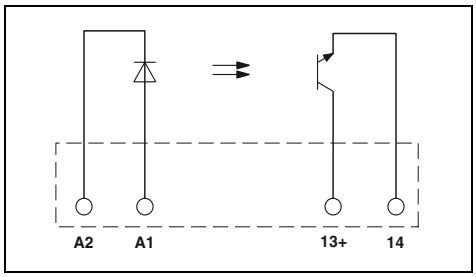

**Max. AC voltage output of 750 mA**

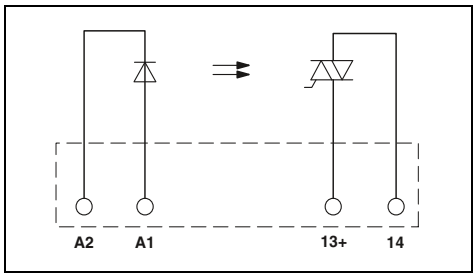
**Derating curve for OPT...DC/24DC/2 and PLC-OS.../24DC/2 solid-state relays**




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




## Technical data

| | |
|---|---|
| ① | |
| 0.8 - | |
| 1.2 | |
| 16 | |
| 10 | |
| 7 | |
| 20 | |
| 300 | |
| 300 | |
| | |
| 48 V DC | |
| 3 V DC | |
| 100 mA | |
| - | |
| - | |
| - | |
| - | |
| 2-wire, floating | |
| - | |
| Protection against polarity reversal, surge protection | |
| ≤ 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/ 48DC/100** | **2966618** | 10 |

## Technical data

| | |
|---|---|
| ① | |
| 0.8 - | |
| 1.2 | |
| 10 | |
| 5 | |
| 3 | |
| 6000 | |
| 500 | |
| 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 $A^2s$ | |
| 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 |

## Modular RIF-1 relay base

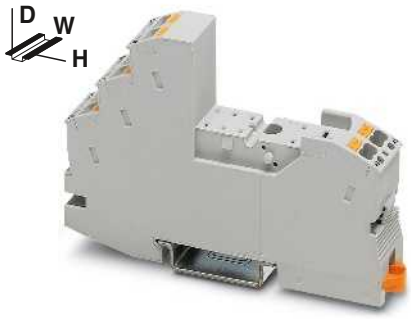
Relay base that can be fitted with 1 or 2 PDT relays or solid-state relays. Range of accessories includes:

- Plug-in input and interference suppression module
- Plug-in timer module
- Relay retaining bracket with ejector function and holder for marking material
- Comprehensive range of marking material
- Test plug
- FBS 2-6 jumpers for the input side (A2)
- FBS 2-8 jumpers for the output side (11/21)

**Notes:**

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

For further marking systems and mounting material, see Catalog 5.




**2 PDT relay base for miniature power relay**

### Technical data

| | |
|---|---|
| Nominal voltage $U_N$ | 250 V AC/DC |
| Nominal current at $U_N$ | max. 13 A (depending on application/assembly) |
| General data | |
| Ambient temperature (operation) | -40 °C ... 85 °C (depending on application/assembly) |
| Connection data solid / stranded / AWG | 0.14 ... 1.5 mm² / 0.14 ... 1.5 mm² / 26 - 16 |
| Dimensions | |
| Width | 16 mm |
| Depth with retaining bracket | 75 mm |
| Height | 96 mm |

### Ordering data

| Description | Type | Order No. | Pcs. / Pkt. |
|---|---|---|---|
| **RIF-1 relay base**, plug-in option for input/interference suppression module, safe isolation I/O with push-in connection | **RIF-1-BPT/2X21** | **2900931** | 10 |
| **Relay retaining bracket**, with ejector function and holder for marking material, suitable for RIF-1 relay base | | | |
| - for 16 mm high miniature power and solid-state relays | | | |
| - for 25 mm high miniature power relays | | | |
| **Relay retaining bracket**, wire model, suitable for RIF-1 relay base | | | |
| - for 16 mm high miniature power and solid-state relays | | | |
| - for 25 mm high miniature power relays | | | |

### Accessories

| | | | | |
|---|---|---|---|---|
| **Jumper** | | | | |
| 2-pos. red, 32 A | | **FBS 2-6** | **3030336** | 50 |
| 2-pos. red, 24 A | | **FBSR 2-6** | **3033715** | 50 |
| 2-pos. red, 32 A | | **FBSR 2-8** | **3033808** | 10 |
| 2-pos. blue, 32 A | | **FBS 2-6 BU** | **3036932** | 50 |
| 2-pos. gray, 32 A | | **FBS 2-6 GY** | **3032237** | 50 |
| 2-pos. red, 41 A | | **FBS 2-8** | **3030284** | 10 |
| 2-pos. blue, 41 A | | **FBS 2-8 BU** | **3032567** | 10 |
| 2-pos. gray, 41 A | | **FBS 2-8 GY** 7042 | **3032541** | 10 |
| **End bracket,** for snapping onto NS 35, 9.5 mm wide, can be marked with ZB 6, ZB 8/27, KLM... | | **CLIPFIX 35** | **3022218** | 50 |
| **Test plug,** consisting of: | | | | |
| **Metal part** for 2.3 mm Ø socket hole and | silver | **MPS-MT** | **0201744** | 10 |
| **Insulating sleeve,** for MPS metal part | red | **MPS-IH RD** | **0201676** | 10 |
| | white | **MPS-IH WH** | **0201663** | 10 |
| | blue | **MPS-IH BU** | **0201689** | 10 |
| | yellow | **MPS-IH YE** | **0201692** | 10 |
| | green | **MPS-IH GN** | **0201702** | 10 |
| | gray | **MPS-IH GY** | **0201728** | 10 |
| | black | **MPS-IH BK** | **0201731** | 10 |
| **Zack marker strip, unprinted** | | | | |
| 10-section | | **ZB 5 :UNBEDRUCKT** | **1050004** | 10 |
| 5-section | | **ZB 15:UNBEDRUCKT** | **0811972** | 10 |
| **Double marker carrier for ZB 5** | | **STP 5-2** | **0800967** | 100 |

Relay retaining bracket

Relay retaining bracket

EAC UL

## Technical data

-
-

-

-

-
-
-

## Technical data

-
-

-

-

-
-
-

## Ordering data

| Type | Order No. | Pcs. / Pkt. |
|---|---|---|
| RIF-RH-1 | 2900953 | 10 |
| RIF-RH-1-H | 2904468 | 10 |

## Ordering data

| Type | Order No. | Pcs. / Pkt. |
|---|---|---|
| RIF-RHM-1 | 2905986 | 10 |
| RIF-RHM-1-H | 2905985 | 10 |

## Accessories

## Accessories

## Industrial relay system with push-in connection - RIFLINE complete

### Plug-in miniature power relays

Plug-in miniature power relays with 1 or 2 PDT contacts, suitable for RIF-1, PR1, and PLC-INTERFACE relay bases.

The advantages:

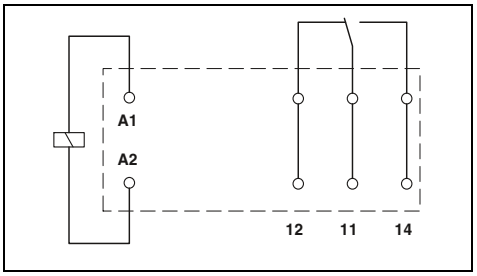
- Power contacts up to 16 A
- Multi-layer gold contact or power contact
- High degree of protection up to RT III (comparable with IP67) depending on type

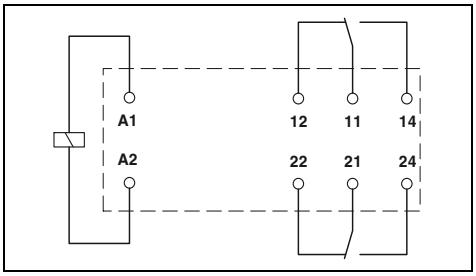
**Notes:**

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 $U_N$) | | see 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 | 1 PDT | 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 (at 10 mA) | 100 mV (at 10 mA) |
| Limiting continuous current | 16 A | 50 mA |
| Max. inrush current, AC | 25 A (20 ms) | 50 mA |
| Max. inrush current, DC | 50 A (20 ms) | 50 mA |
| Min. switching current | 10 mA (at 12 V) | 1 mA (at 24 V) |
| **General data** | | |
| Test voltage (winding/contact) | 5 kV AC (50 Hz, 1 min.) | |
| Test voltage (contact/contact) | - | |
| Ambient temperature (operation), AC | -40 °C ... 85 °C | |
| Ambient temperature (operation), DC | -40 °C ... 85 °C | |
| Mechanical service life, AC | 1 x $10^7$ cycles | |
| Mechanical service life, DC | 3 x $10^7$ cycles | |
| 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 $U_N$) | | see 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 | 2 PDT | 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 (at 10 mA) | 100 mV (at 10 mA) |
| Limiting continuous current | 8 A | 50 mA |
| Max. inrush current, AC | 12 A (20 ms) | 50 mA |
| Max. inrush current, DC | 25 A (20 ms) | 50 mA |
| Min. switching current | 10 mA (at 5 V) | 1 mA (at 24 V) |
| **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), AC | -40 °C ... 85 °C | |
| Ambient temperature (operation), DC | -40 °C ... 85 °C | |
| Mechanical service life, AC | 1 x $10^7$ cycles | |
| Mechanical service life, DC | 3 x $10^7$ cycles | |
| Standards/regulations | IEC 60664, EN 50178, IEC 62103 | |

### Ordering data

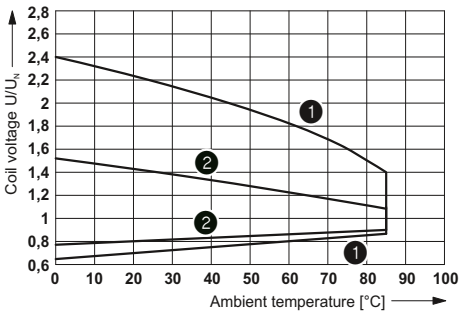
| Description | | Input voltage $U_N$ | Type | Order No. | Pcs. / Pkt. |
|---|---|---|---|---|---|
| **Plug-in miniature power relay** | | | | | |
| with power contacts | ① | 12 V DC | **REL-MR- 12DC/21HC** | **2961309** | 10 |
| with power contacts | ② | 24 V DC | **REL-MR- 24DC/21HC** | **2961312**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

### Ordering data

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

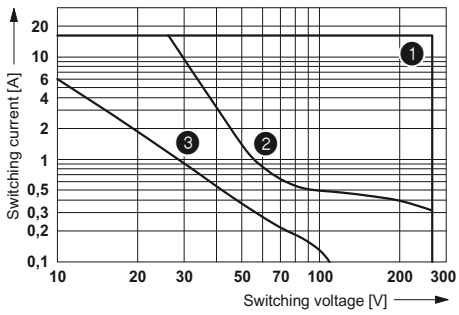
## REL-MR...21HC... (1 PDT)

Operating voltage range



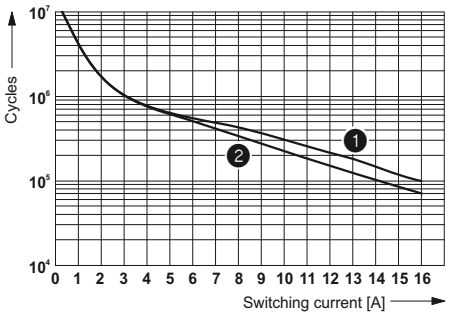

❶ DC coils
❷ AC coils

Interrupting rating



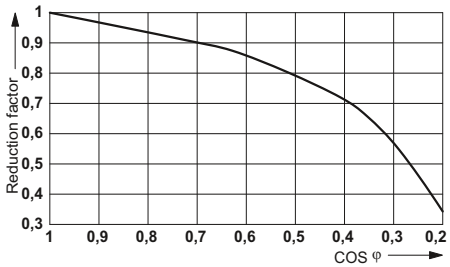

❶ AC, ohmic load
❷ DC, ohmic load
❸ DC, L/R = 40 ms

Electrical service life



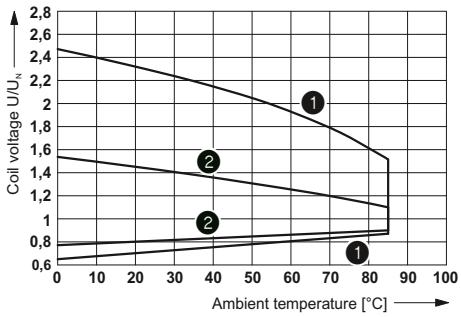

❶ 250 V AC, ohmic load (DC coils)
❷ 250 V AC, ohmic load (AC coils)

Service life reduction factor with various cos phi



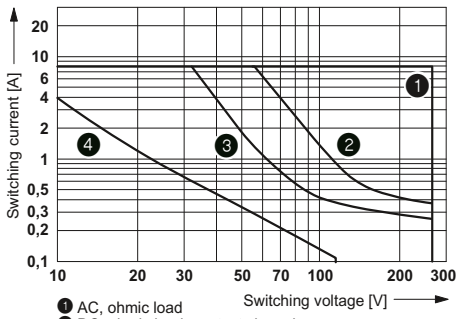

## REL-MR...21-21... (2 PDTs)

Operating voltage range



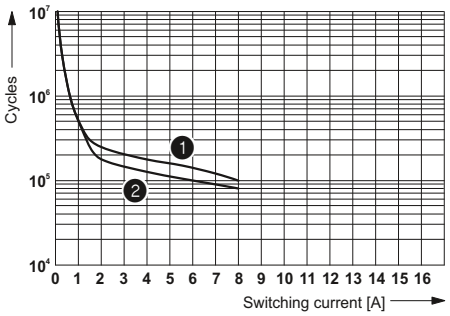

❶ DC coils
❷ AC coils

Interrupting rating



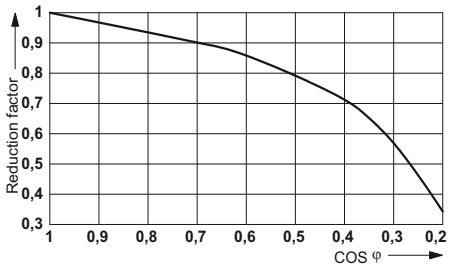

❶ AC, ohmic load
❷ DC, ohmic load, contacts in series
❸ DC, ohmic load
❹ DC, L/R = 40 ms

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



## Industrial relay system with push-in connection - RIFLINE complete

### Plug-in miniature power relays

Plug-in miniature power relays with 1 or 2 PDT contacts, suitable for RIF-1 and PR1 relay bases.

The advantages:

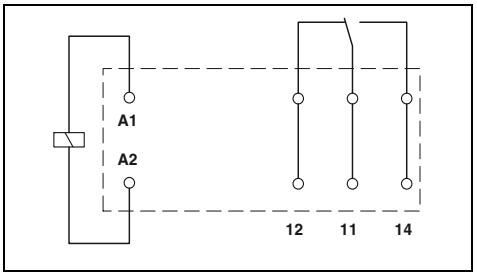
- Switching current of up to 16 A
- With lockable manual operation
- Mechanical switch position indicator
- Integrated status LED
- Multi-layer gold contact or power contact
- DC types with integrated freewheeling diode
- Can be soldered in on PCB

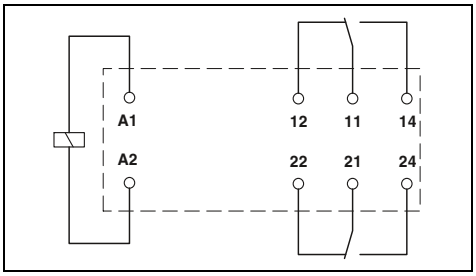
1 PDT relay

2 PDT relay

**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.




### Technical data

| Input data | | ① | ② | ③ | ④ |
|---|---|---|---|---|---|
| Permissible range (with reference to $U_N$) | | see 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 | 1 PDT | 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 (at 10 mA) | 12 V (at 1 mA) |
| Limiting continuous current | 16 A | 50 mA |
| Max. inrush current, AC | 32 A (20 ms) | 50 mA |
| Max. inrush current, DC | 32 A (20 ms) | 50 mA |
| Min. switching current | 10 mA (at 12 V) | 1 mA (at 12 V) |
| **General data** | | |
| Test voltage (winding/contact) | 5 kV AC (50 Hz, 1 min.) | |
| Test voltage (contact/contact) | - | |
| Ambient temperature (operation), AC | -40 °C ... 70 °C | |
| Ambient temperature (operation), DC | -40 °C ... 70 °C | |
| Mechanical service life, AC | 5 x $10^6$ cycles | |
| Mechanical service life, DC | 5 x $10^6$ cycles | |
| Standards/regulations | DIN EN 61810-1, VDE 0435-201, EN 50178, IEC 62103 | |

### Technical data

| Input data | | ① | ② | ③ | ④ |
|---|---|---|---|---|---|
| Permissible range (with reference to $U_N$) | | see 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 | 2 PDT | 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 | 12 V (at 10 mA) | 12 V (at 1 mA) |
| Limiting continuous current | 8 A | 50 mA |
| Max. inrush current, AC | 16 A (20 ms) | 50 mA |
| Max. inrush current, DC | 16 A (20 ms) | 50 mA |
| Min. switching current | 10 mA (at 12 V) | 1 mA (at 12 V) |
| **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), AC | -40 °C ... 70 °C | |
| Ambient temperature (operation), DC | -40 °C ... 70 °C | |
| Mechanical service life, AC | 5 x $10^6$ cycles | |
| Mechanical service life, DC | 5 x $10^6$ cycles | |
| Standards/regulations | DIN EN 61810-1, VDE 0435-201, EN 50178, IEC 62103 | |

### Ordering data

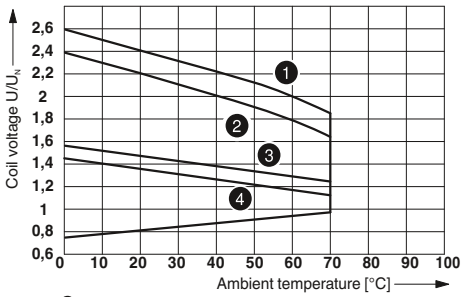
| Description | | Input voltage $U_N$ | Type | Order No. | Pcs. / Pkt. |
|---|---|---|---|---|---|
| **Plug-in miniature power relay, with power contacts** | | | | | |
| - Status LED, freewheeling diode A1+, A2- | ① | 24 V DC | **REL-MR- 24DC/21HC/MS** | **2987888** | 10 |
| - Status LED | ② | 24 V AC | **REL-MR- 24AC/21HC/MS** | **2987891** | 10 |
| - Status LED | ③ | 120 V AC | **REL-MR-120AC/21HC/MS** | **2987901** | 10 |
| - Status LED | ④ | 230 V AC | **REL-MR-230AC/21HC/MS** | **2987914** | 10 |
| **Plug-in miniature power relay**, with multi-layer gold contacts, with manual operation, mechanical switch position indicator | | | | | |
| - Status LED, freewheeling diode A1+, A2- | ① | 24 V DC | **REL-MR- 24DC/21HC AU/MS** | **2987927** | 10 |
| - Status LED | 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 |

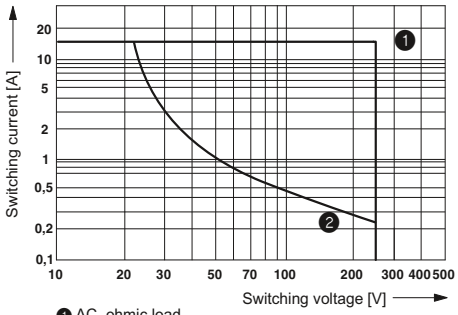
## REL-MR...21HC...MS (1 PDT)

Operating voltage range



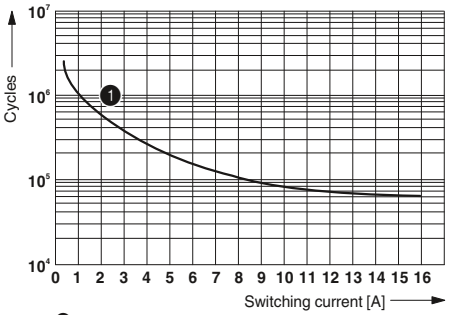

❶ DC coils, 0 A contact current
❷ DC coils, 16 A contact current
❸ AC coils, 0 A contact current
❹ AC coils, 16 A contact current

Interrupting rating



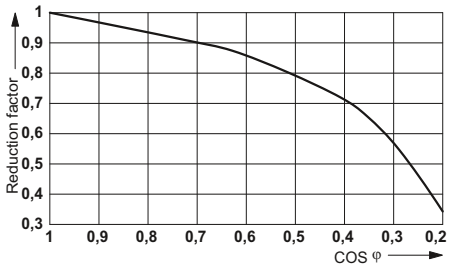

❶ AC, ohmic load
❷ DC, ohmic load

Electrical service life



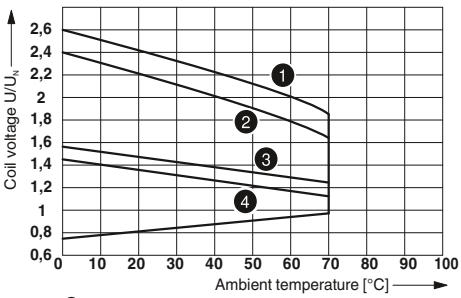

❶250 V AC, ohmic load

Service life reduction factor with various cos phi



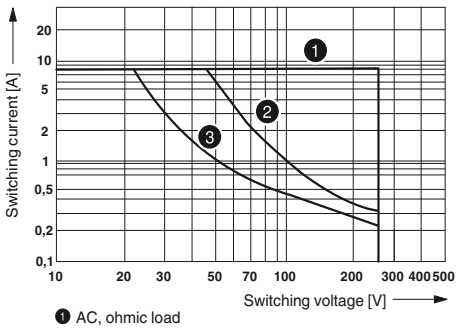

## REL-MR...21-21...MS (2 PDTs)

Operating voltage range



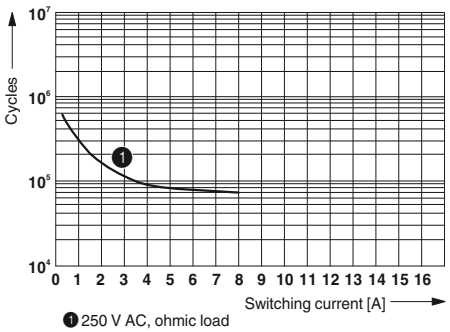

❶DC coils, 0 A contact current
❷DC coils, 8 A contact current
❸AC coils, 0 A contact current
❹AC coils, 8 A contact current

Interrupting rating



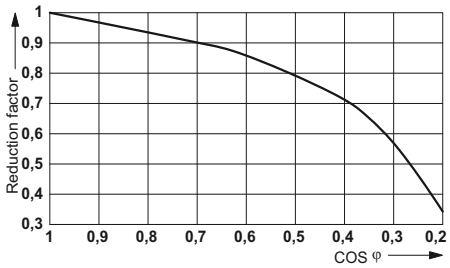

❶ AC, ohmic load
❷ DC, ohmic load, contacts in series
❸ DC, ohmic load

Electrical service life




❶250 V AC, ohmic load

Service life reduction factor with various cos phi



## Plug-in solid-state relays

**Notes:**

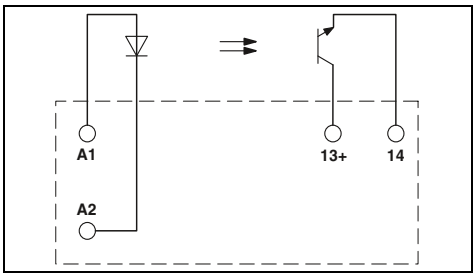
For dimensional drawings and perforations for assembly, see page 425

Plug-in solid-state relays suitable for RIF-1, PR1, and PLC-INTERFACE relay bases.

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

**Max. DC voltage output of 5 A**




### 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 | 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] | 10 | 20 | 25 |
| Typ. shutdown time at $U_N$ | [µs] | 400 | 400 | 400 |
| Transmission frequency $f_{limit}$ | [Hz] | 300 | 300 | 300 |

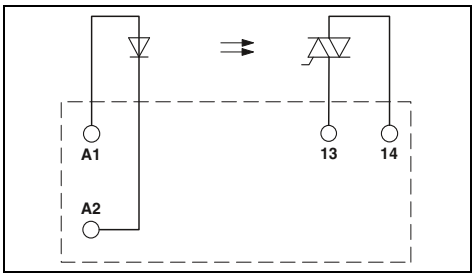
| Output data | |
|---|---|
| Max. switching voltage | 33 V DC |
| Min. switching voltage | 3 V DC |
| Limiting continuous current | 5 A (see derating curve) |
| Min. load current | - |
| Max. inrush current | 15 A (10 ms) |
| Leakage current in off state | - |
| Phase angle (cos φ) | - |
| Output circuit | 2-wire, floating |
| Max. load value | - |
| Output protection | Protection against polarity reversal, surge protection |
| Voltage drop at max. limiting continuous current | ≤ 200 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 | 12.7 mm / 29 mm / 15.7 mm |

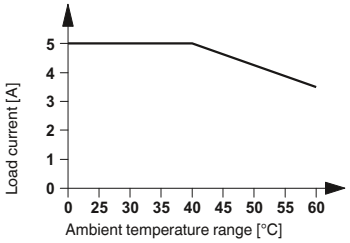
### Ordering data

| Description | | Input voltage $U_N$ | Type | Order No. | Pcs. / Pkt. |
|---|---|---|---|---|---|
| **Plug-in solid-state relay** | | | | | |
| Solid-state power relay | ① | 5 V DC | **OPT- 5DC/ 24DC/ 5** | **2982113** | 10 |
| Solid-state power relay | ② | 24 V DC | **OPT-24DC/ 24DC/ 5** | **2982100** | 10 |
| Solid-state power relay | ③ | 60 V DC | **OPT-60DC/ 24DC/ 5** | **2982126** | 10 |

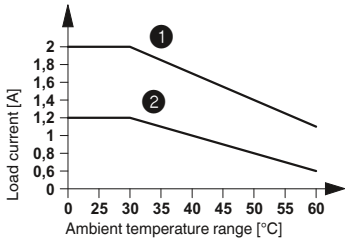
**Max. AC voltage output of 2 A**




**Derating curve for OPT...DC/24DC/5 solid-state relays**




**Derating curve for OPT...DC/230AC/2 solid-state relays**




❶ Aligned with > 10 mm spacing
❷ Aligned without spacing

## 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 $A^2s$ (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, EN 50178, IEC 62103
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 |

## Modular RIF-2 relay base

Relay base that can be fitted with 2 or 4 PDT relays.
Range of accessories includes:
- Plug-in input and interference suppression module
- Plug-in timer module
- Relay retaining bracket with ejector function and holder for marking material
- Comprehensive range of marking material
- Test plug
- FBS 2-6 jumpers for the input side (A2)

**Notes:**

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

For further marking systems and mounting material, see Catalog 5.

**4 PDT relay base for industrial relay**

### Technical data

| | |
|---|---|
| Nominal voltage $U_N$ | 250 V AC/DC |
| Nominal current at $U_N$ | max. 12 A (depending on application/assembly) |
| General data | |
| Ambient temperature (operation) | -40 °C ... 85 °C (depending on application/assembly) |
| Connection data solid / stranded / AWG | 0.14 ... 1.5 mm² / 0.14 ... 1.5 mm² / 26 - 16 |
| Dimensions | |
| Width | 31 mm |
| Depth with retaining bracket | 75 mm |
| Height | 96 mm |

### Ordering data

| Description | Type | Order No. | Pcs. / Pkt. |
|---|---|---|---|
| **RIF-2 relay base**, plug-in option for input/interference suppression module, safe isolation I/O with push-in connection | **RIF-2-BPT/4X21** | **2900934** | 10 |
| **Relay retaining bracket**, with ejector function and holder for marking material, suitable for RIF-2 relay base | | | |
| **Relay retaining bracket**, wire model, suitable for RIF-2 relay base | | | |

### Accessories

| | | | | |
|---|---|---|---|---|
| **Jumper** | | | | |
| 2-pos. red, 32 A | | **FBS 2-6** | **3030336** | 50 |
| 2-pos. red, 24 A | | **FBSR 2-6** | **3033715** | 50 |
| 2-pos. blue, 32 A | | **FBS 2-6 BU** | **3036932** | 50 |
| 2-pos. gray, 32 A | | **FBS 2-6 GY** | **3032237** | 50 |
| **End bracket,** for snapping onto NS 35, 9.5 mm wide, can be marked with ZB 6, ZB 8/27, KLM... | | **CLIPFIX 35** | **3022218** | 50 |
| **Test plug,** consisting of: | | | | |
| **Metal part** for 2.3 mm Ø socket hole and | silver | **MPS-MT** | **0201744** | 10 |
| **Insulating sleeve,** for MPS metal part | red | **MPS-IH RD** | **0201676** | 10 |
| | white | **MPS-IH WH** | **0201663** | 10 |
| | blue | **MPS-IH BU** | **0201689** | 10 |
| | yellow | **MPS-IH YE** | **0201692** | 10 |
| | green | **MPS-IH GN** | **0201702** | 10 |
| | gray | **MPS-IH GY** | **0201728** | 10 |
| | black | **MPS-IH BK** | **0201731** | 10 |
| **Zack marker strip, unprinted** | | | | |
| 10-section | | **ZB 5 :UNBEDRUCKT** | **1050004** | 10 |
| 5-section | | **ZB 15:UNBEDRUCKT** | **0811972** | 10 |
| **Double marker carrier for ZB 5** | | **STP 5-2** | **0800967** | 100 |

Relay retaining bracket

Relay retaining bracket

EAC

## Technical data

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## Technical data

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## Ordering data

| Type | Order No. | Pcs. / Pkt. |
|---|---|---|
| RIF-RH-2 | 2900954 | 10 |

## Ordering data

| Type | Order No. | Pcs. / Pkt. |
|---|---|---|
| RIF-RHM-2 | 2905984 | 10 |

## Accessories

## Accessories

## Industrial relay system with push-in connection - RIFLINE complete

### Plug-in industrial relays

Plug-in industrial relays with 2 or 4 PDT contacts, suitable for RIF-2 and PR2 relay bases.

The advantages:

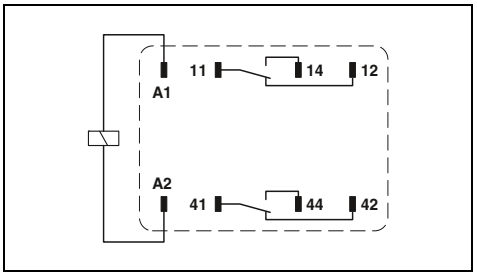
- With detectable manual operation
- Mechanical switch position indicator
- Integrated status LED
- Multi-layer gold contact or power contact
- DC types with integrated freewheeling diode

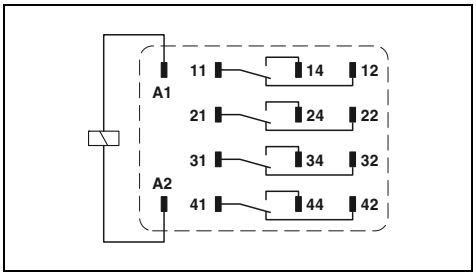
**Notes:**

For other voltages, see phoenixcontact.net/products

2 PDT relay

4 PDT relay




### Technical data

| Input data | | ① | ② | ③ | ④ | ⑤ | ⑥ | ⑦ | ⑧ |
|---|---|---|---|---|---|---|---|---|---|
| Permissible range (with reference to $U_N$) | | see diagram | | | | | | | |
| Typ. input current at $U_N$ | [mA] | 78 | 42 | 8 | 7.7 | 4 | 66 | 13 | 6.5 |
| Typ. response time at $U_N$ | [ms] | 13 | 13 | 13 | 13 | 13 | | | |
| Typ. response time at $U_N$ (depending on phase relation) | [ms] | | | | | | 5 - 15 | 5 - 15 | 5 - 15 |
| Typ. release time at $U_N$ | [ms] | 14 | 14 | 14 | 14 | 14 | | | |
| Typ. release time at $U_N$ (depending on phase relation) | [ms] | | | | | | 5 - 20 | 5 - 20 | 5 - 20 |
| **Output data** | | | | | | | | | |
| Contact type | | 2 PDT | | | | | | | |
| Contact material | | AgNi | | | | | | | |
| Max. switching voltage | | 250 V AC/DC | | | | | | | |
| Min. switching voltage | | 5 V (at 24 mA) | | | | | | | |
| Limiting continuous current | | 12 A | | | | | | | |
| Max. inrush current, AC | | 30 A (20 ms, N/O contact) | | | | | | | |
| Max. inrush current, DC | | 30 A (20 ms, N/O contact) | | | | | | | |
| Min. switching current | | 5 mA (at 24 V) | | | | | | | |
| **General data** | | | | | | | | | |
| Test voltage (winding/contact) | | 2.5 $kV_{rms}$ (50 Hz, 1 min.) | | | | | | | |
| Ambient temperature (operation), AC | | -40 °C ... 55 °C | | | | | | | |
| Ambient temperature (operation), DC | | -40 °C ... 70 °C | | | | | | | |
| Mechanical service life, AC | | Approx. 2 x $10^7$ cycles | | | | | | | |
| Mechanical service life, DC | | Approx. 2 x $10^7$ cycles | | | | | | | |
| Standards/regulations | | IEC 60664 | | | | | | | |

### Technical data

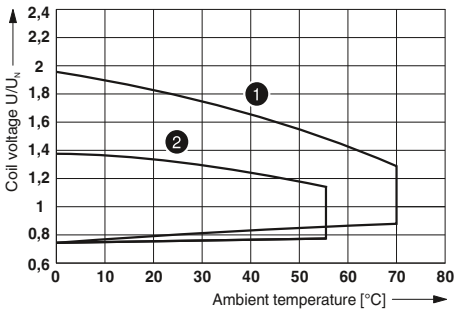
| Input data | | ① | ② | ③ | ④ | ⑤ | ⑥ | ⑦ | ⑧ |
|---|---|---|---|---|---|---|---|---|---|
| Permissible range (with reference to $U_N$) | | see diagram | | | | | | | |
| Typ. input current at $U_N$ | [mA] | 78 | 42 | 8 | 7.7 | 4 | 66 | 13 | 6.5 |
| Typ. response time at $U_N$ | [ms] | 13 | 13 | 13 | 13 | 13 | | | |
| Typ. response time at $U_N$ (depending on phase relation) | [ms] | | | | | | 5 - 15 | 5 - 15 | 5 - 15 |
| Typ. release time at $U_N$ | [ms] | 14 | 14 | 14 | 14 | 14 | | | |
| Typ. release time at $U_N$ (depending on phase relation) | [ms] | | | | | | 5 - 20 | 5 - 20 | 5 - 20 |
| **Output data** | | | | | | | | | |
| Contact type | | 4 PDTs | | | | | 4 PDTs | | |
| 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 (at 24 mA) | | | | | 5 V (at 24 mA) | | |
| Limiting continuous current | | 6 A | | | | | 50 mA | | |
| Max. inrush current, AC | | 16 A (20 ms, N/O contact) | | | | | 50 mA | | |
| Max. inrush current, DC | | 16 A (20 ms, N/O contact) | | | | | 50 mA | | |
| Min. switching current | | 5 mA (at 24 V) | | | | | - | | |
| **General data** | | | | | | | | | |
| Test voltage (winding/contact) | | 2.5 $kV_{rms}$ (50 Hz, 1 min.) | | | | | | | |
| Ambient temperature (operation), AC | | -40 °C ... 55 °C | | | | | | | |
| Ambient temperature (operation), DC | | -40 °C ... 70 °C | | | | | | | |
| Mechanical service life, AC | | Approx. 2 x $10^7$ cycles | | | | | | | |
| Mechanical service life, DC | | Approx. 2 x $10^7$ cycles | | | | | | | |
| Standards/regulations | | IEC 60664 | | | | | | | |

### Ordering data

| Description | | Input voltage $U_N$ | Type | Order No. | Pcs. / Pkt. | Type | Order No. | Pcs. / Pkt. |
|---|---|---|---|---|---|---|---|---|
| **Plug-in industrial relay, with power contacts** | | | | | | | | |
| With freewheeling diode | ① | 12 V DC | **REL-IR2/LDP- 12DC/2X21** | **2903659** | 10 | **REL-IR4/LDP- 12DC/4X21** | **2903676** | 10 |
| With freewheeling diode | ② | 24 V DC | **REL-IR2/LDP- 24DC/2X21** | **2903660** | 10 | **REL-IR4/LDP- 24DC/4X21** | **2903677** | 10 |
| With freewheeling diode | ③ | 110 V DC | **REL-IR2/LDP-110DC/2X21** | **2903663** | 10 | **REL-IR4/LDP-110DC/4X21** | **2903680** | 10 |
| With freewheeling diode | ④ | 125 V DC | **REL-IR2/LDP-125DC/2X21** | **2903664** | 10 | **REL-IR4/LDP-125DC/4X21** | **2903681** | 10 |
| With freewheeling diode | ⑤ | 220 V DC | **REL-IR2/LDP-220DC/2X21** | **2903665** | 10 | **REL-IR4/LDP-220DC/4X21** | **2903682** | 10 |
| | ⑥ | 24 V AC | **REL-IR2/L- 24AC/2X21** | **2903666** | 10 | **REL-IR4/L- 24AC/4X21** | **2903686** | 10 |
| | ⑦ | 120 V AC | **REL-IR2/L-120AC/2X21** | **2903667** | 10 | **REL-IR4/L-120AC/4X21** | **2903687** | 10 |
| | ⑧ | 230 V AC | **REL-IR2/L-230AC/2X21** | **2903668** | 10 | **REL-IR4/L-230AC/4X21** | **2903688** | 10 |
| **Plug-in industrial relay, with multi-layer gold contacts** | | | | | | | | |
| With freewheeling diode | ① | 12 V DC | | | | **REL-IR4/LDP- 12DC/4X21AU** | **2903669** | 10 |
| With freewheeling diode | ② | 24 V DC | | | | **REL-IR4/LDP- 24DC/4X21AU** | **2903670** | 10 |
| With freewheeling diode | ③ | 110 V DC | | | | **REL-IR4/LDP-110DC/4X21AU** | **2903673** | 10 |
| With freewheeling diode | ④ | 125 V DC | | | | **REL-IR4/LDP-125DC/4X21AU** | **2903674** | 10 |
| With freewheeling diode | ⑤ | 220 V DC | | | | **REL-IR4/LDP-220DC/4X21AU** | **2903675** | 10 |
| | ⑥ | 24 V AC | | | | **REL-IR4/L- 24AC/4X21AU** | **2903683** | 10 |
| | ⑦ | 120 V AC | | | | **REL-IR4/L-120AC/4X21AU** | **2903684** | 10 |
| | ⑧ | 230 V AC | | | | **REL-IR4/L-230AC/4X21AU** | **2903685** | 10 |

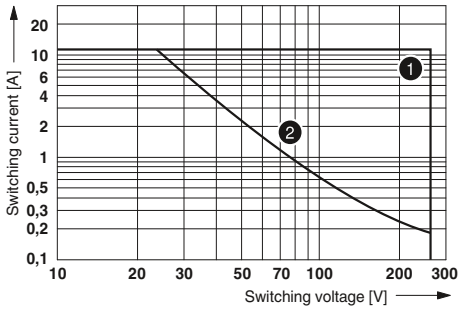
## REL-IR2... (2 PDTs)

Operating voltage range



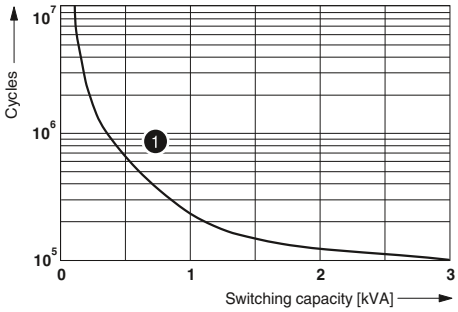

❶ DC coils
❷ AC coils

Interrupting rating



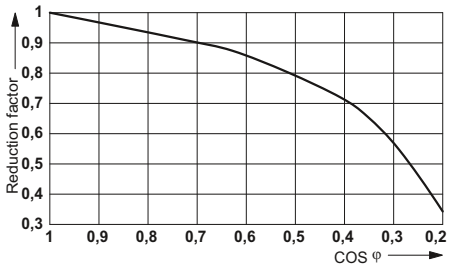

❶ AC, ohmic load
❷ DC, ohmic load

Electrical service life



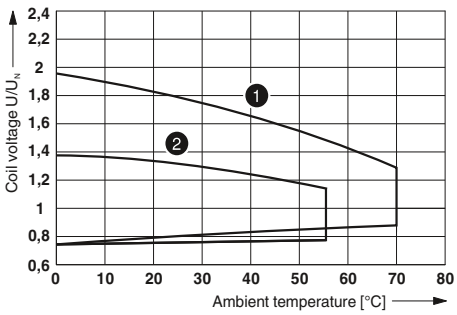

❶ 250 V AC, ohmic load

Service life reduction factor



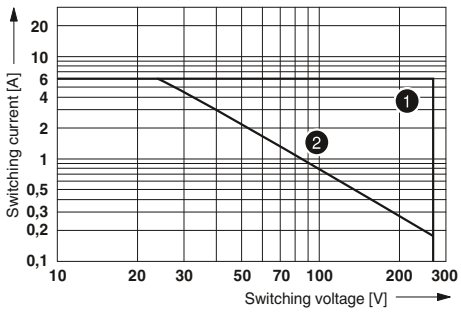

## REL-IR4... (4 PDTs)

Operating voltage range



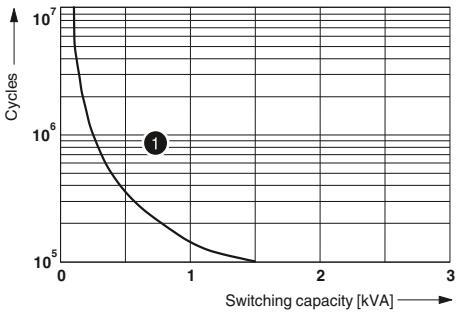

❶ DC coils
❷ AC coils

Interrupting rating



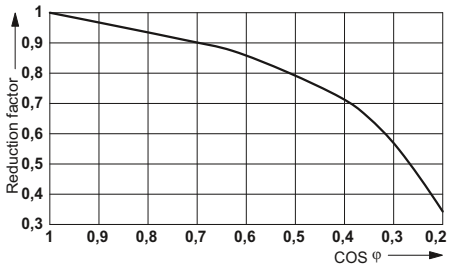

❶ AC, ohmic load
❷ DC, ohmic load

Electrical service life




❶ 250 V AC, ohmic load

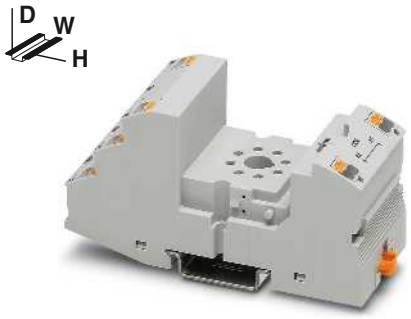
Service life reduction factor



## Modular RIF-3 relay base

Relay base that can be fitted with 2 or 3 PDT relays.
Range of accessories includes:
- Plug-in input and interference suppression module
- Plug-in timer module
- Relay retaining bracket with ejector function and holder for marking material
- Comprehensive range of marking material
- Test plug
- FBS 2-6 jumpers for the input side (A2)

| Notes: |
|---|
| Type of insulating housing:<br>Polyamide PA non-reinforced, color: gray. |
| For further marking systems and mounting material, see Catalog 5. |




**2 PDT relay base for octal relay**

### Technical data

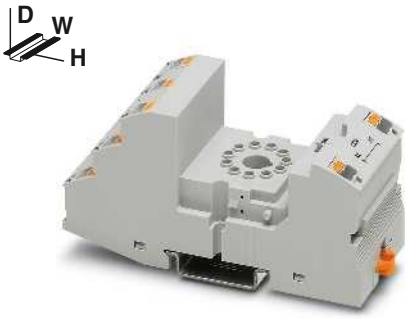
| | |
|---|---|
| Nominal voltage $U_N$ | 250 V AC/DC |
| Nominal current at $U_N$ | max. 12 A (depending on application/assembly) |
| General data | |
| Ambient temperature (operation) | -40 °C ... 85 °C (depending on application/assembly) |
| Connection data solid / stranded / AWG | 0.14 ... 1.5 mm² / 0.14 ... 1.5 mm² / 26 - 16 |
| Dimensions | |
| Width | 40 mm |
| Depth with retaining bracket | 90 mm |
| Height | 103 mm |

### Ordering data

| Description | Type | Order No. | Pcs. / Pkt. |
|---|---|---|---|
| **RIF-3 relay base**, 2 PDT version, plug-in option for input/interference suppression module, safe isolation I/O with push-in connection | **RIF-3-BPT/2X21** | **2900937** | 10 |
| **RIF-3 relay base**, 3 PDT version, plug-in option for input/interference suppression module, safe isolation I/O with push-in connection | | | |
| **Relay retaining bracket**, with holder for marking material, suitable for RIF-3 relay base | | | |
| **Relay retaining bracket**, wire model, suitable for RIF-3 and PR3 relay base | | | |

### Accessories

| | | | | |
|---|---|---|---|---|
| **Jumper** | | | | |
| 2-pos. red, 32 A | | **FBS 2-6** | **3030336** | 50 |
| 2-pos. red, 24 A | | **FBSR 2-6** | **3033715** | 50 |
| 2-pos. blue, 32 A | | **FBS 2-6 BU** | **3036932** | 50 |
| 2-pos. gray, 32 A | | **FBS 2-6 GY** | **3032237** | 50 |
| **End bracket,** for snapping onto NS 35, 9.5 mm wide, can be marked with ZB 6, ZB 8/27, KLM... | | **CLIPFIX 35** | **3022218** | 50 |
| **Test plug,** consisting of: | | | | |
| **Metal part** for 2.3 mm Ø socket hole and | silver | **MPS-MT** | **0201744** | 10 |
| **Insulating sleeve,** for MPS metal part | red | **MPS-IH RD** | **0201676** | 10 |
| | white | **MPS-IH WH** | **0201663** | 10 |
| | blue | **MPS-IH BU** | **0201689** | 10 |
| | yellow | **MPS-IH YE** | **0201692** | 10 |
| | green | **MPS-IH GN** | **0201702** | 10 |
| | gray | **MPS-IH GY** | **0201728** | 10 |
| | black | **MPS-IH BK** | **0201731** | 10 |
| **Zack marker strip, unprinted** | | | | |
| 10-section | | **ZB 5 :UNBEDRUCKT** | **1050004** | 10 |
| 5-section | | **ZB 15:UNBEDRUCKT** | **0811972** | 10 |
| **Double marker carrier for ZB 5** | | **STP 5-2** | **0800967** | 100 |




**3 PDT relay base for octal relay**

**Relay retaining bracket**

**Relay retaining bracket**

| Technical data | | | Technical data | | | Technical data | | |
|---|---|---|---|---|---|---|---|---|
| 250 V AC/DC | | | - | | | - | | |
| max. 12 A (depending on application/assembly) | | | - | | | - | | |
| -40 °C ... 85 °C (depending on application/assembly) | | | - | | | - | | |
| 0.14 ... 1.5 mm² / 0.14 ... 1.5 mm² / 26 - 16 | | | - | | | - | | |
| 40 mm | | | - | | | - | | |
| 90 mm | | | - | | | - | | |
| 103 mm | | | - | | | - | | |
| **Ordering data** | | | **Ordering data** | | | **Ordering data** | | |
| **Type** | **Order No.** | Pcs. / Pkt. | **Type** | **Order No.** | Pcs. / Pkt. | **Type** | **Order No.** | Pcs. / Pkt. |
| **RIF-3-BPT/3X21** | **2900938** | 10 | | | | | | |
| | | | **RIF-RH-3** | **2900955** | 10 | | | |
| | | | | | | **EL3-M52** | **2833628** | 10 |
| **Accessories** | | | **Accessories** | | | **Accessories** | | |
| **FBS 2-6** | **3030336** | 50 | | | | | | |
| **FBSR 2-6** | **3033715** | 50 | | | | | | |
| **FBS 2-6 BU** | **3036932** | 50 | | | | | | |
| **FBS 2-6 GY** | **3032237** | 50 | | | | | | |
| **CLIPFIX 35** | **3022218** | 50 | | | | | | |
| **MPS-MT** | **0201744** | 10 | | | | | | |
| **MPS-IH RD** | **0201676** | 10 | | | | | | |
| **MPS-IH WH** | **0201663** | 10 | | | | | | |
| **MPS-IH BU** | **0201689** | 10 | | | | | | |
| **MPS-IH YE** | **0201692** | 10 | | | | | | |
| **MPS-IH GN** | **0201702** | 10 | | | | | | |
| **MPS-IH GY** | **0201728** | 10 | | | | | | |
| **MPS-IH BK** | **0201731** | 10 | | | | | | |
| **ZB 5 :UNBEDRUCKT** | **1050004** | 10 | | | | | | |
| **ZB 15:UNBEDRUCKT** | **0811972** | 10 | | | | | | |
| **STP 5-2** | **0800967** | 100 | | | | | | |

## Industrial relay system with push-in connection - RIFLINE complete

### Plug-in octal relays

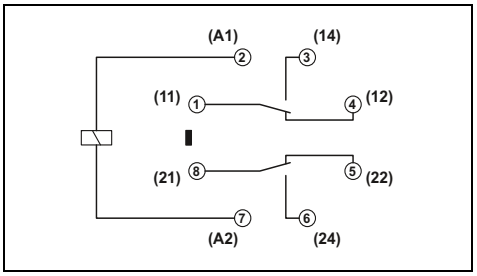
Plug-in octal relays with 2 or 3 PDT contacts, suitable for RIF-3 and PR3 relay bases.

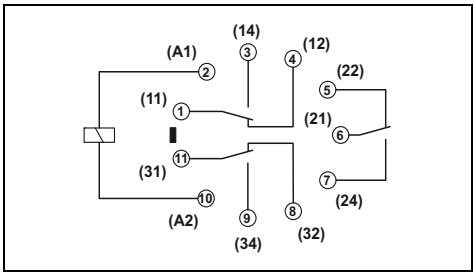
The advantages:

– With detectable manual operation
– Mechanical switch position indicator
– Integrated status LED
– DC types with integrated freewheeling diode

2 PDT relay

3 PDT relay



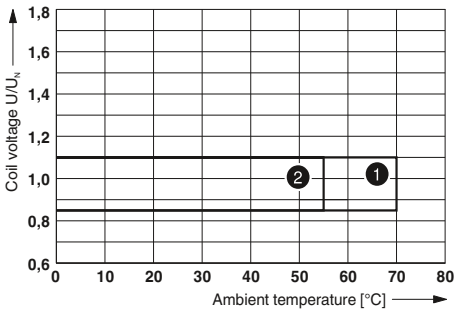




| | | Technical data | | | | Technical data | | | |
|---|---|---|---|---|---|---|---|---|---|
| Input data | | ① | ② | ③ | ④ | ① | ② | ③ | ④ |
| Permissible range (with reference to $U_N$) | | see diagram | | | | see diagram | | | |
| Typ. input current at $U_N$ | [mA] | 60 | 108 | 23 | 13 | 60 | 108 | 23 | 13 |
| Typ. response time at $U_N$ | [ms] | 18 | | | | 18 | | | |
| Typ. response time at $U_N$ (depending on phase relation) | [ms] | | 5 - 15 | 5 - 15 | 5 - 15 | | 5 - 15 | 5 - 15 | 5 - 15 |
| Typ. release time at $U_N$ | [ms] | | | | | | | | |
| Typ. release time at $U_N$ (depending on phase relation) | [ms] | | 5 - 20 | 5 - 20 | 5 - 20 | | 5 - 20 | 5 - 20 | 5 - 20 |
| Output data | | | | | | | | | |
| Contact type | | 2 PDTs | | | | 3 PDTs | | | |
| Contact material | | AgNi | | | | AgNi | | | |
| Max. switching voltage | | 250 V AC/DC | | | | 250 V AC/DC | | | |
| Min. switching voltage | | 10 V (at 24 mA) | | | | 10 V (at 24 mA) | | | |
| Limiting continuous current | | 10 A | | | | 10 A | | | |
| Max. inrush current, AC | | 30 A (20 ms, N/O contact) | | | | 30 A (20 ms, N/O contact) | | | |
| Max. inrush current, DC | | 30 A (20 ms, N/O contact) | | | | 30 A (20 ms, N/O contact) | | | |
| Min. switching current | | 10 mA (at 24 V) | | | | 10 mA (at 24 V) | | | |
| General data | | | | | | | | | |
| Test voltage (winding/contact) | | 2.5 $kV_{rms}$ (50 Hz, 1 min.) | | | | 2.5 $kV_{rms}$ (50 Hz, 1 min.) | | | |
| Ambient temperature (operation), AC | | -40 °C ... 55 °C | | | | -40 °C ... 55 °C | | | |
| Ambient temperature (operation), DC | | -40 °C ... 70 °C | | | | -40 °C ... 70 °C | | | |
| Nominal operating mode | | 100% operating factor | | | | 100% operating factor | | | |
| Mechanical service life, AC | | Approx. 2 x $10^7$ cycles | | | | Approx. 2 x $10^7$ cycles | | | |
| Mechanical service life, DC | | Approx. 2 x $10^7$ cycles | | | | Approx. 2 x $10^7$ cycles | | | |
| Standards/regulations | | IEC 60664 | | | | IEC 60664 | | | |
| Mounting position / mounting | | any | | | | any | | | |
| Dimensions | W / H / D | 35 mm / 54.4 mm / 35 mm | | | | 35 mm / 54.4 mm / 35 mm | | | |

| | | | Ordering data | | | Ordering data | | |
|---|---|---|---|---|---|---|---|---|
| Description | | Input voltage $U_N$ | Type | Order No. | Pcs. / Pkt. | Type | Order No. | Pcs. / Pkt. |
| **Plug-in octal relay, with power contacts** | | | | | | | | |
| With freewheeling diode | ① | 24 V DC | **REL-OR2/LDP- 24DC/2X21** | **2903689** | 10 | **REL-OR3/LDP-24DC/3X21** | **2903693** | 10 |
| | ② | 24 V AC | **REL-OR2/L- 24AC/2X21** | **2903690** | 10 | **REL-OR3/L- 24AC/3X21** | **2903694** | 10 |
| | ③ | 120 V AC | **REL-OR2/L-120AC/2X21** | **2903691** | 10 | **REL-OR3/L-120AC/3X21** | **2903695** | 10 |
| | ④ | 230 V AC | **REL-OR2/L-230AC/2X21** | **2903692** | 10 | **REL-OR3/L-230AC/3X21** | **2903696** | 10 |

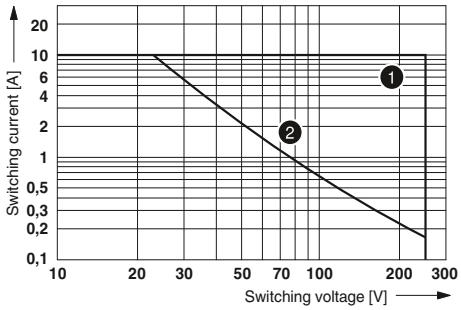
## REL-OR2... (2 PDTs)

Operating voltage range



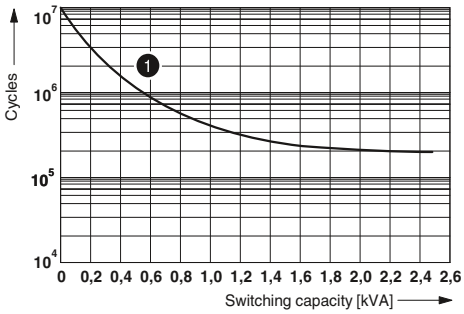

❶ DC coils
❷ AC coils

Interrupting rating



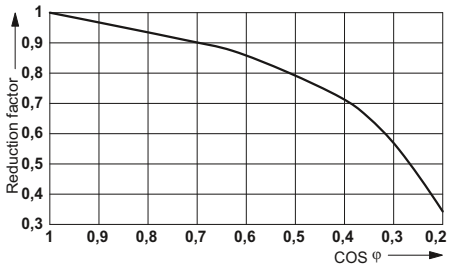

❶ AC, ohmic load
❷ DC, ohmic load

Electrical service life



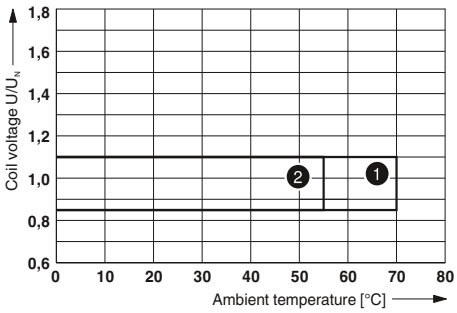

❶ 250 V AC, ohmic load

Service life reduction factor



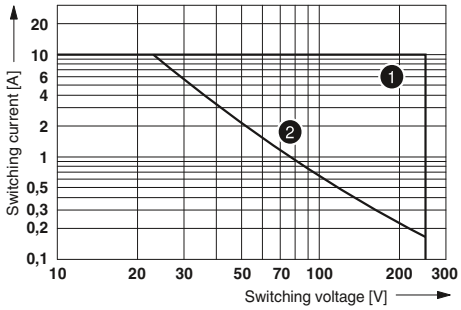

## REL-OR3... (3 PDTs)

Operating voltage range



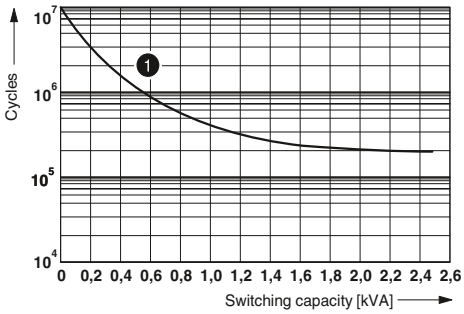

❶ DC coils
❷ AC coils

Interrupting rating



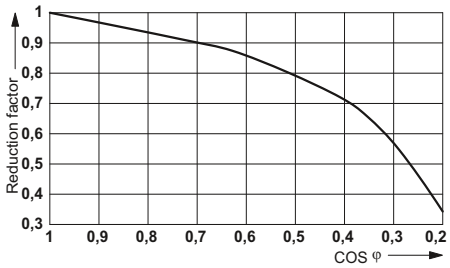

❶ AC, ohmic load
❷ DC, ohmic load

Electrical service life




❶ 250 V AC, ohmic load

Service life reduction factor



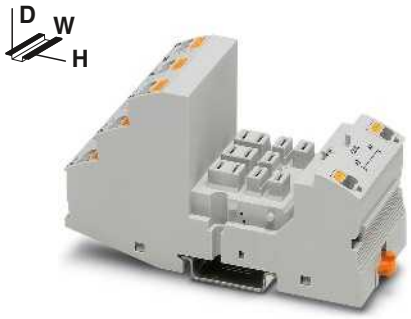
## Modular RIF-4 relay base

Relay base that can be fitted with 2 or 3 PDT relays or 3 N/O relays.
Range of accessories includes:
- Plug-in input and interference suppression module
- Plug-in timer module
- Relay retaining bracket with ejector function and holder for marking material
- Comprehensive range of marking material
- Test plug
- FBS 2-6 jumpers for the input side (A2)

**Notes:**

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

For further marking systems and mounting material, see Catalog 5.




**3 PDT relay base for high-power relay**

### Technical data

| | |
|---|---|
| Nominal voltage $U_N$ | 440 V AC |
| Nominal current at $U_N$ | max. 16 A (depending on application/assembly) |
| General data | |
| Ambient temperature (operation) | -40 °C ... 85 °C (depending on application/assembly) |
| Connection data solid / stranded / AWG | |
| Input side | 0.14 ... 1.5 mm² / 0.14 ... 1.5 mm² / 26 - 16 |
| Output side | 0.14 ... 2.5 mm² / 0.14 ... 2.5 mm² / 26 - 14 |
| Dimensions | |
| Width | 43 mm |
| Depth with retaining bracket | 90 mm |
| Height | 111 mm |

### Ordering data

| Description | Type | Order No. | Pcs. / Pkt. |
|---|---|---|---|
| **RIF-4 relay base**, plug-in option for input/interference suppression module, safe isolation I/O with push-in connection | **RIF-4-BPT/3X21** | **2900961** | 10 |
| **Relay retaining bracket**, with holder for marking material, suitable for RIF-4 relay base | | | |
| **Relay retaining bracket**, wire model, suitable for RIF-4 relay base | | | |

### Accessories

| | | | | |
|---|---|---|---|---|
| **Jumper** | | | | |
| 2-pos. red, 32 A | | **FBS 2-6** | **3030336** | 50 |
| 2-pos. red, 24 A | | **FBSR 2-6** | **3033715** | 50 |
| 2-pos. blue, 32 A | | **FBS 2-6 BU** | **3036932** | 50 |
| 2-pos. gray, 32 A | | **FBS 2-6 GY** | **3032237** | 50 |
| **End bracket,** for snapping onto NS 35, 9.5 mm wide, can be marked with ZB 6, ZB 8/27, KLM... | | **CLIPFIX 35** | **3022218** | 50 |
| **Test plug,** consisting of: | | | | |
| **Metal part** for 2.3 mm Ø socket hole and | silver | **MPS-MT** | **0201744** | 10 |
| **Insulating sleeve,** for MPS metal part | red | **MPS-IH RD** | **0201676** | 10 |
| | white | **MPS-IH WH** | **0201663** | 10 |
| | blue | **MPS-IH BU** | **0201689** | 10 |
| | yellow | **MPS-IH YE** | **0201692** | 10 |
| | green | **MPS-IH GN** | **0201702** | 10 |
| | gray | **MPS-IH GY** | **0201728** | 10 |
| | black | **MPS-IH BK** | **0201731** | 10 |
| **Zack marker strip, unprinted** | | | | |
| 10-section | | **ZB 5 :UNBEDRUCKT** | **1050004** | 10 |
| 5-section | | **ZB 15:UNBEDRUCKT** | **0811972** | 10 |
| **Double marker carrier for ZB 5** | | **STP 5-2** | **0800967** | 100 |

Relay retaining bracket

Relay retaining bracket

EAC UL

## Technical data

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## Technical data

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## Ordering data

| Type | Order No. | Pcs. / Pkt. |
|---|---|---|
| RIF-RH-4 | 2900956 | 10 |

## Ordering data

| Type | Order No. | Pcs. / Pkt. |
|---|---|---|
| RIF-RHM-4 | 2905983 | 10 |

## Accessories

## Accessories

## Industrial relay system with push-in connection - RIFLINE complete

### Plug-in high-power relays

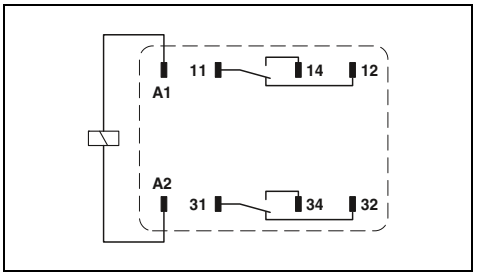
Plug-in high-power relays with 2 or 3 PDT contacts for the RIF-4 relay base.

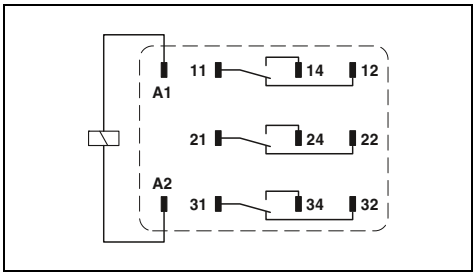
The advantages:

– Use in miniature contactor applications
– Switching current of up to 16 A
– Up to 440 V AC switching voltage

2 PDT relay

3 PDT relay



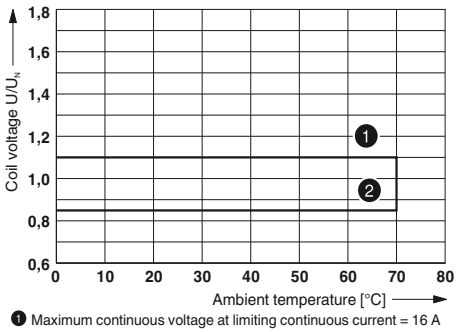




| | | Technical data | | | | Technical data | | | |
|---|---|---|---|---|---|---|---|---|---|
| Input data | | ① | ② | ③ | ④ | ① | ② | ③ | ④ |
| Permissible range (with reference to $U_N$) | | see diagram | | | | see diagram | | | |
| Typ. input current at $U_N$ | [mA] | 56 | 116 | 23 | 12 | 56 | 116 | 23 | 12 |
| Typ. response time at $U_N$ | [ms] | 20 | | | | 20 | | | |
| Typ. response time at $U_N$ (depending on phase relation) | [ms] | | 5 - 25 | 5 - 25 | 5 - 25 | | 5 - 25 | 5 - 25 | 5 - 25 |
| Typ. release time at $U_N$ | [ms] | 15 | | | | 15 | | | |
| Typ. release time at $U_N$ (depending on phase relation) | [ms] | | 5 - 20 | 5 - 20 | 5 - 20 | | 5 - 20 | 5 - 20 | 5 - 20 |
| Output data | | | | | | | | | |
| Contact type | | 2 PDTs | | | | 3 PDTs | | | |
| Contact material | | AgNi | | | | AgNi | | | |
| Max. switching voltage | | 440 V AC / 250 V DC | | | | 440 V AC / 250 V DC | | | |
| Min. switching voltage | | 10 V (at 24 mA) | | | | 10 V (at 24 mA) | | | |
| Limiting continuous current | | 16 A | | | | 16 A | | | |
| Max. inrush current, AC | | 50 A (20 ms, N/O contact) | | | | 50 A (20 ms, N/O contact) | | | |
| Max. inrush current, DC | | 50 A (20 ms, N/O contact) | | | | 50 A (20 ms, N/O contact) | | | |
| Min. switching current | | 10 mA (at 24 V) | | | | 10 mA (at 24 V) | | | |
| Max. interrupting rating, ohmic load | | | | | | | | | |
| | 250 V AC | 4000 VA | | | | 4000 VA | | | |
| | 440 V AC | 4000 VA | | | | 4000 VA | | | |
| Motor load according to UL 508 | | 1/3 HP, 120 V AC (single-phase AC motor)<br>1/2 HP, 240 V AC (single-phase AC motor) | | | | 1/3 HP, 120 V AC (single-phase AC motor)<br>1/2 HP, 240 V AC (single-phase AC motor)<br>1/2 HP, 240 V AC (three-phase induction motor) | | | |
| General data | | | | | | | | | |
| Test voltage (winding/contact) | | 2.5 $kV_{rms}$ (50 Hz, 1 min.) | | | | 2.5 $kV_{rms}$ (50 Hz, 1 min.) | | | |
| Ambient temperature (operation), AC | | -40 °C ... 55 °C | | | | -40 °C ... 55 °C | | | |
| Ambient temperature (operation), DC | | -40 °C ... 70 °C | | | | -40 °C ... 70 °C | | | |
| Nominal operating mode | | 100% operating factor | | | | 100% operating factor | | | |
| Mechanical service life, AC | | Approx. $10^7$ cycles | | | | Approx. $10^7$ cycles | | | |
| Mechanical service life, DC | | Approx. $10^7$ cycles | | | | Approx. $10^7$ cycles | | | |
| Standards/regulations | | IEC 60664 | | | | IEC 60664 | | | |
| Mounting position / mounting | | any | | | | any | | | |
| Dimensions | W / H / D | 38.6 mm / 45.5 mm / 36.1 mm | | | | 38.6 mm / 45.5 mm / 36.1 mm | | | |

| Description | | Input voltage $U_N$ | Ordering data: Type | Order No. | Pcs. / Pkt. | Ordering data: Type | Order No. | Pcs. / Pkt. |
|---|---|---|---|---|---|---|---|---|
| **Plug-in high-power relay**, 2 PDTs with power contacts | | | | | | | | |
| | ① | 24 V DC | **REL-PR2- 24DC/2X21** | **2903698** | 1 | | | |
| | ② | 24 V AC | **REL-PR2- 24AC/2X21** | **2903699** | 1 | | | |
| | ③ | 120 V AC | **REL-PR2-120AC/2X21** | **2903700** | 1 | | | |
| | ④ | 230 V AC | **REL-PR2-230AC/2X21** | **2903701** | 1 | | | |
| **Plug-in high-power relay**, 3 PDTs with power contacts | | | | | | | | |
| | ① | 24 V DC | | | | **REL-PR3- 24DC/3X21** | **2903702** | 1 |
| | ② | 24 V AC | | | | **REL-PR3- 24AC/3X21** | **2903703** | 1 |
| | ③ | 120 V AC | | | | **REL-PR3-120AC/3X21** | **2903704** | 1 |
| | ④ | 230 V AC | | | | **REL-PR3-230AC/3X21** | **2903705** | 1 |

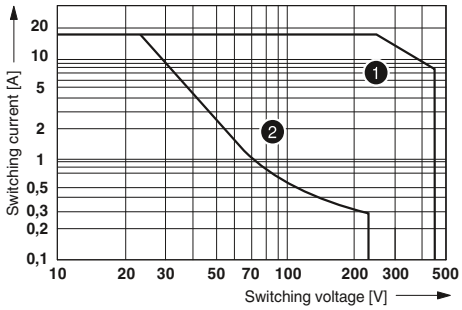
## REL-PR2... (2 PDTs)

Operating voltage range



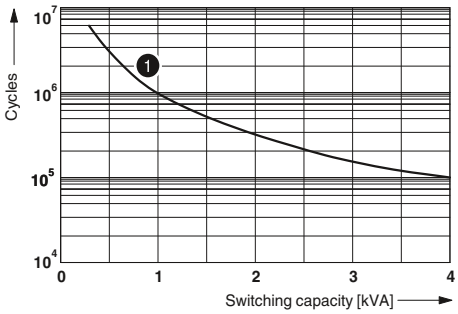

❶ Maximum continuous voltage at limiting continuous current = 16 A
❷ Minimum operate voltage
For pre-excitation with UN and limiting continuous current = 16 A

Interrupting rating



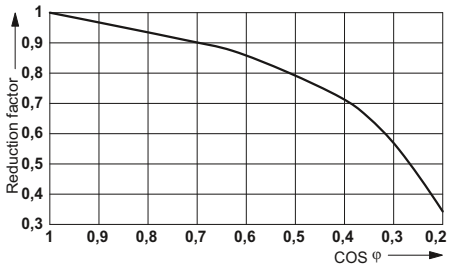

❶ AC, ohmic load
❷ DC, ohmic load

Electrical service life



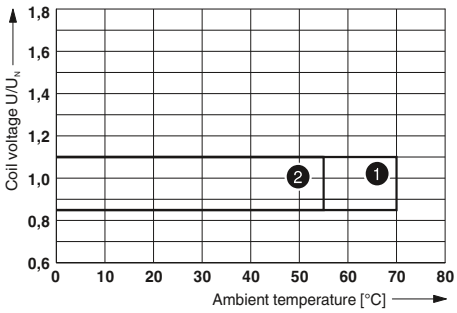

❶ 250 V AC, ohmic load

Service life reduction factor



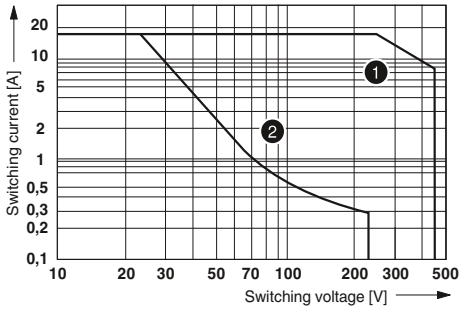

## REL-PR3... (3 PDTs)

Operating voltage range



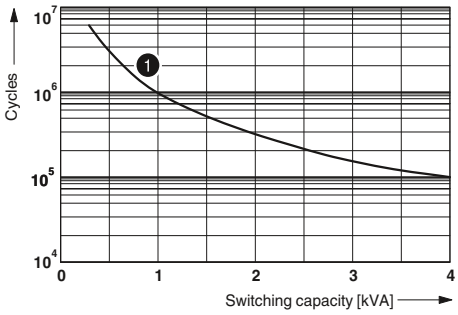

❶ DC coils
❷ AC coils

Interrupting rating



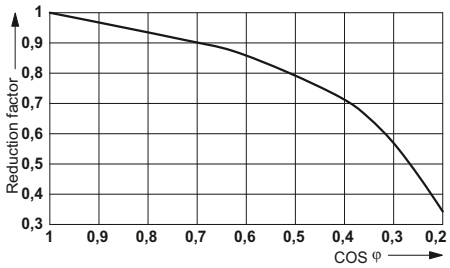

❶ AC, ohmic load
❷ DC, ohmic load

Electrical service life




❶ 250 V AC, ohmic load

Service life reduction factor



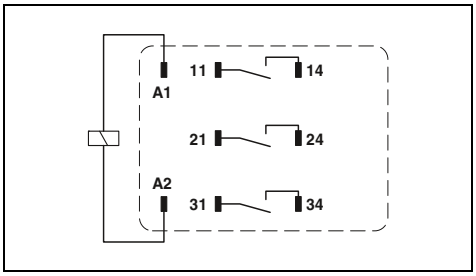
## Plug-in high-power relays

Plug-in high-power relays with 3 N/O contacts suitable for the RIF-4 relay base.

The advantages:

– Use in miniature contactor applications
– Switching current of up to 16 A
– Up to 440 V AC switching voltage
– Full shutdown by means of ≥ 3 mm contact opening

3 N/O relay




### Technical data

| Input data | | ① | ② | ③ | ④ |
|---|---|---|---|---|---|
| Permissible range (with reference to $U_N$) | | see diagram | | | |
| Typ. input current at $U_N$ | [mA] | 70 | 116 | 23 | 12 |
| Typ. response time at $U_N$ | [ms] | 20 | | | |
| Typ. response time at $U_N$ (depending on phase relation) | [ms] | | 5 - 25 | 5 - 25 | 5 - 25 |
| Typ. release time at $U_N$ | [ms] | 15 | | | |
| Typ. release time at $U_N$ (depending on phase relation) | [ms] | | 5 - 20 | 5 - 20 | 5 - 20 |

| Output data | | |
|---|---|---|
| Contact type | | 3 N/O contacts |
| Contact material | | AgNi |
| Max. switching voltage | | 440 V AC / 250 V DC |
| Min. switching voltage | | 10 V (at 24 mA) |
| Limiting continuous current | | 16 A |
| Max. inrush current, AC | | 50 A (20 ms, N/O contact) |
| Max. inrush current, DC | | 50 A (20 ms, N/O contact) |
| Min. switching current | | 10 mA (at 24 V) |
| Max. interrupting rating, ohmic load | | |
| | 250 V AC | 4000 VA |
| | 440 V AC | 4000 VA |
| Motor load according to UL 508 | | 1/3 HP, 120 V AC (single-phase AC motor)<br>1/2 HP, 240 V AC (single-phase AC motor)<br>1/2 HP, 240 V AC (three-phase induction motor) |

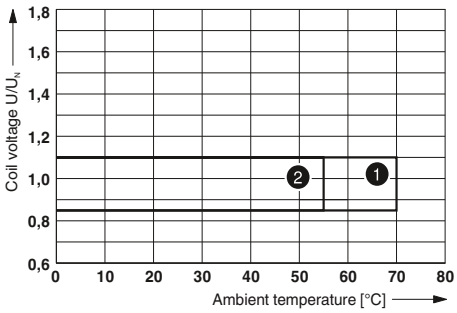
| General data | | |
|---|---|---|
| Test voltage (winding/contact) | | 2.5 $kV_{rms}$ (50 Hz, 1 min.) |
| Ambient temperature (operation), AC | | -40 °C ... 55 °C |
| Ambient temperature (operation), DC | | -40 °C ... 70 °C |
| Nominal operating mode | | 100% operating factor |
| Mechanical service life, AC | | Approx. $10^7$ cycles |
| Mechanical service life, DC | | Approx. $10^7$ cycles |
| Standards/regulations | | IEC 60664 |
| Mounting position / mounting | | any |
| Dimensions | W / H / D | 38.6 mm / 45.5 mm / 36.1 mm |

### Ordering data

| Description | | Input voltage $U_N$ | Type | Order No. | Pcs. / Pkt. |
|---|---|---|---|---|---|
| **Plug-in high-power relay**, 3 N/O contacts with power contacts | | | | | |
| | ① | 24 V DC | **REL-PR3- 24DC/3X1** | **2903706** | 1 |
| | ② | 24 V AC | **REL-PR3- 24AC/3X1** | **2903707** | 1 |
| | ③ | 120 V AC | **REL-PR3-120AC/3X1** | **2903708** | 1 |
| | ④ | 230 V AC | **REL-PR3-230AC/3X1** | **2903709** | 1 |

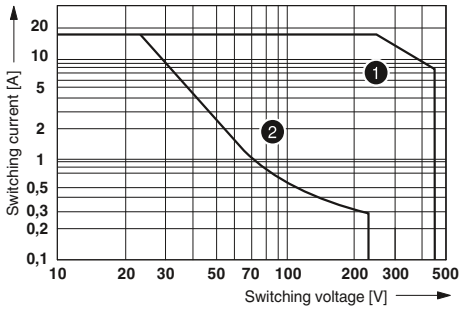
## REL-PR2... (3 N/O contacts)

Operating voltage range



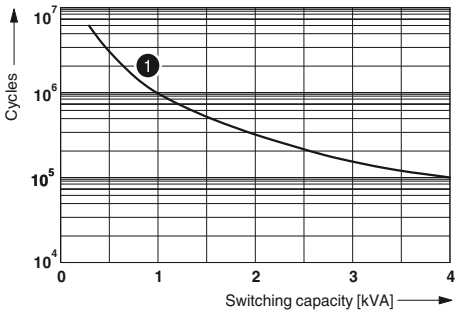

❶ DC coils
❷ AC coils

Interrupting rating



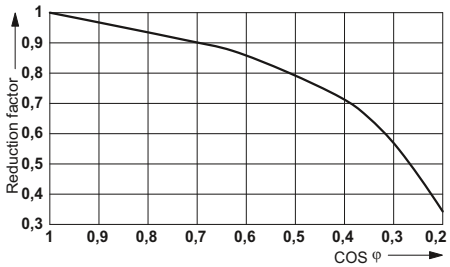

❶ AC, ohmic load
❷ DC, ohmic load

Electrical service life




❶ 250 V AC, ohmic load

Service life reduction factor



## Input modules/interference suppression modules for RIF-1, RIF-2, RIF-3, and RIF-4

Plug-in input modules/interference suppression modules for optional fitting of RIF-1 to RIF-4 relay bases.

The advantages:

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

**Input/interference suppression module**

| Description | Ordering data | | |
|---|---|---|---|
| | **Type** | **Order No.** | Pcs. / Pkt. |
| **Plug-in module**, with LED status indicator and freewheeling diode to effectively limit the coil induction voltage, polarity: **A1+, A2-**, input voltage: | | | |
| - 12-24 V DC ±20% | **RIF-LDP-12-24 DC** | **2900939** | 10 |
| - 48-60 V DC ±20% | **RIF-LDP-48-60 DC** | **2900940** | 10 |
| - 110 V DC ±20% | **RIF-LDP-110 DC** | **2900941** | 10 |
| **Plug-in module**, 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) | **RIF-LV-12-24 UC** | **2900942** | 10 |
| - 48-60 V AC/DC ±20% (75 V varistor) | **RIF-LV-48-60 UC** | **2900943** | 10 |
| - 120-230 V AC/110 V DC ±20% (275 V varistor) | **RIF-LV-120-230 AC/110 DC** | **2900944** | 10 |
| **Plug-in module**, with varistor to limit the coil induction voltage and/or external interference peaks, input voltage: | | | |
| - 12-24 V AC/DC ±20% (30 V varistor) | **RIF-V-12-24 UC** | **2900945** | 10 |
| - 48-60 V AC/DC ±20% (75 V varistor) | **RIF-V-48-60 UC** | **2900947** | 10 |
| - 120-230 V AC/110 V DC ±20% (275 V varistor) | **RIF-V-120-230 UC** | **2900948** | 10 |
| **Plug-in module**, with RC element to limit the coil induction voltage and/or external interference peaks, input voltage: | | | |
| - 12-24 V AC/DC ±20% (220 nF/100 Ω) | **RIF-RC-12-24 UC** | **2900949** | 10 |
| - 48-60 V AC/DC ±20% (220 nF/220 Ω) | **RIF-RC-48-60 UC** | **2900950** | 10 |
| - 120 - 230 V AC/110 DC ±20% (100 nF/470 Ω) | **RIF-RC-120-230 UC** | **2900951** | 10 |

## Timer relay

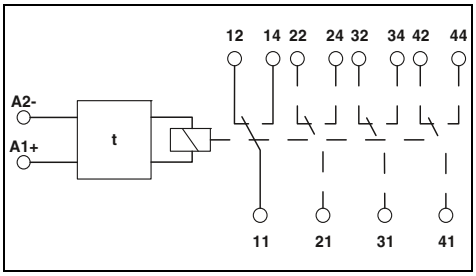
### Plug-in timer module for RIF-1, RIF-2, RIF-3, and RIF-4

The multifunctional plug-in timer module transforms the relay module into a timer relay. The RIF-1 to RIF-4 bases can be fitted with this module. Using DIP switches, you can choose from three time ranges and select four time functions. Fine adjustments to the time are made using a potentiometer. Relays can be operated with an input voltage of 24 V AC/DC.

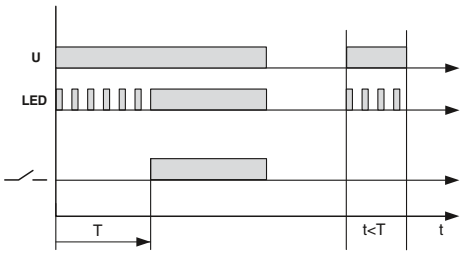
Functions:
- With switch-on delay
- With passing make contact
- Flasher/pulse generator

Time ranges:
- 0.5 s - 10 s
- 5 s - 100 s
- 0.5 min - 10 min
- 5 min - 100 min

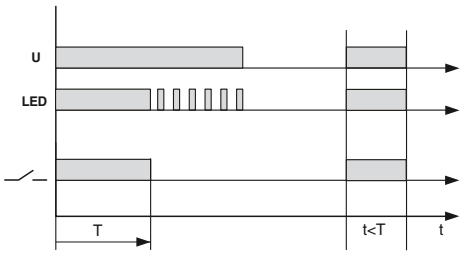
Timer module



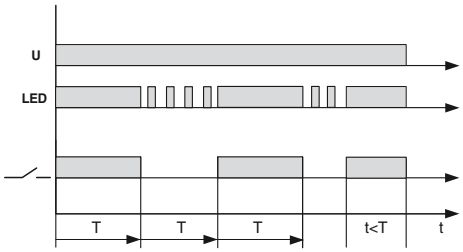

**With switch-on delay**




**With passing make contact**




**Flasher/pulse generator**




### Technical data

| | |
|---|---|
| Input data | |
| Nominal input voltage $U_N$ | 24 V DC (AC operation only permitted for RIF-1) |
| Nominal input voltage range with reference to $U_N$ | 0.4 ... 1.2 |
| Input circuit | Varistor, yellow LED |
| Output data | |
| Limiting continuous current | ≤ 250 mA (relay coil current) |
| General data | |
| Mounting position | any |
| Repeat accuracy | 1 % |
| Ambient temperature (operation) | -25 °C ... 50 °C (RIF-1, AC coil, 2 PDTs at 6 A)<br>-25 °C ... 50 °C (RIF-1, DC coil, 2 PDTs at 5 A)<br>-25 °C ... 40 °C (RIF-2, DC coil, 2 PDTs at 8 A)<br>-25 °C ... 40 °C (RIF-2, DC coil, 4 PDTs at 5 A)<br>-25 °C ... 40 °C (RIF-3, DC coil, 3 PDTs at 6.75 A)<br>-25 °C ... 40 °C (RIF-3, DC coil, 2 PDTs at 8 A)<br>-25 °C ... 35 °C (RIF-4, DC coil, 3 PDTs at 8 A)<br>-25 °C ... 25 °C (RIF-4, DC coil, 3 N/O contacts at 8 A) |
| Standards/specifications | DIN EN 50178 |
| Rated insulation voltage | 50 V DC |
| Rated surge voltage | 0.4 kV |

### Ordering data

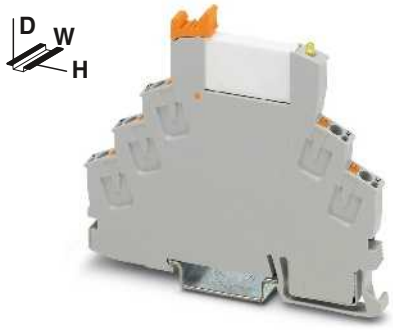
| Description | Type | Order No. | Pcs. / Pkt. |
|---|---|---|---|
| **Timer module**, for mounting on RIF-1 to RIF-4, with LED status indicator for extending a relay module to create a timer relay with an input voltage of 24 V AC/DC | **RIF-T3-24UC** | **2902647** | 1 |

## Fully mounted RIF-0 relay modules

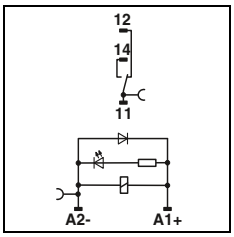
Fully mounted RIF-0 relay modules, consisting of:
– Relay base with push-in connection
– 1 N/O contact or 1 PDT relay
– Relay ejector lever on the housing

The advantages:
– Status LED integrated in the relay base
– Operational reliability thanks to sealed relay
– Safe isolation between coil and contact side
– Professional bridging of adjacent modules saves wiring time

– For FBS 2-6 jumpers for the input and output side, see page 374.




**RIF-0 relay module with 1 PDT relay**



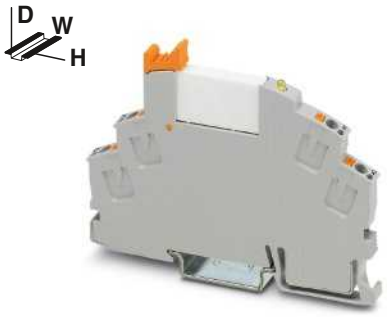

**DC coils**

### Technical data

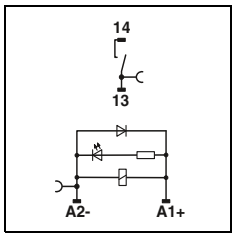
| | | | |
|---|---|---|---|
| Input data | | ① | ② |
| Permissible range (with reference to $U_N$) | | see diagram | |
| Typ. input current at $U_N$ | [mA] | 16 | 9 |
| Typ. response time at $U_N$ | [ms] | 5 | 5 |
| Typ. release time at $U_N$ | [ms] | 8 | 8 |
| Input protection: | | Yellow LED, freewheeling diode | |
| Output data | | | |
| Contact type | | 1 PDT | 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 |
| 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 ... 60 °C | |
| Nominal operating mode | | 100% operating factor | |
| Mechanical service life | | Approx. 2 x $10^7$ cycles | |
| Standards/regulations | | DIN EN 50178, IEC 62103 | |
| Pollution degree / surge voltage category | | 2 / III | |
| Mounting position / mounting | | any / can be aligned without spacing | |
| Connection data solid / stranded / AWG | | 0.14 - 1.5 $mm^2$ / 0.14 - 1.5 $mm^2$ / 26 - 16 | |
| Dimensions | W / H / D | 6.2 mm / 93 mm / 78 mm | |
| EMC note | | Class A product, see page 625 | |

### Ordering data

| Description | | Input voltage $U_N$ | Type | Order No. | Pcs. / Pkt. |
|---|---|---|---|---|---|
| **Coupling relay modules** with power contact relay and push-in connection | | | | | |
| | ① | 12 V DC | **RIF-0-RPT-12DC/21** | **2903371** | 10 |
| | ② | 24 V DC | **RIF-0-RPT-24DC/21** | **2903370** | 10 |
| **Coupling relay modules** with power contact relay, gold contacts, and push-in connection | | | | | |
| | ① | 12 V DC | **RIF-0-RPT-12DC/21AU** | **2903369** | 10 |
| | ② | 24 V DC | **RIF-0-RPT-24DC/21AU** | **2903368** | 10 |




**RIF-0 relay module with 1 N/O relay**




**DC coils**

## Technical data

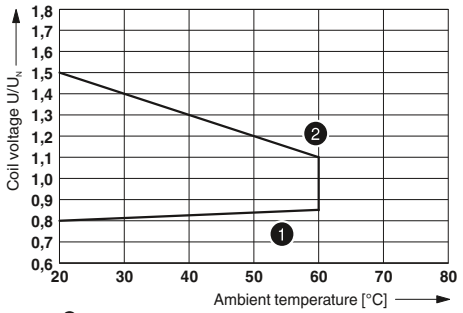
| ① | ② |
|---|---|
| see diagram | |
| 16 | 9 |
| 5 | 5 |
| 8 | 8 |
| Yellow LED, freewheeling diode | |
| | |
| 1 N/O contact | 1 N/O contact |
| AgSnO | AgSnO, hard gold-plated |
| | |
| 250 V AC/DC | 30 V AC / 36 V DC |
| 5 V (at 100 mA) | 100 mV (at 10 mA) |
| 6 A | 50 mA |
| 10 mA (at 12 V) | 1 mA (at 12 V) |
| | |
| 4 $kV_{rms}$ (50 Hz, 1 min.) | |
| -40 °C ... 60 °C | |
| 100% operating factor | |
| Approx. 2 x $10^7$ cycles | |
| DIN EN 50178, IEC 62103 | |
| 2 / III | |
| | |
| any / can be aligned without spacing | |
| 0.14 - 1.5 $mm^2$ / 0.14 - 1.5 $mm^2$ / 26 - 16 | |
| 6.2 mm / 93 mm / 66 mm | |
| Class A product, see page 625 | |

## Ordering data

| Type | Order No. | Pcs. / Pkt. |
|---|---|---|
| **RIF-0-RPT-12DC/ 1** | **2903362** | 10 |
| **RIF-0-RPT-24DC/ 1** | **2903361** | 10 |
| **RIF-0-RPT-12DC/ 1AU** | **2903360** | 10 |
| **RIF-0-RPT-24DC/ 1AU** | **2903359** | 10 |

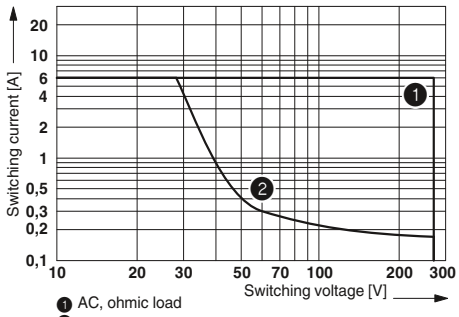
# RIF-0-RPT.../21... (1 PDT)

Operating voltage range



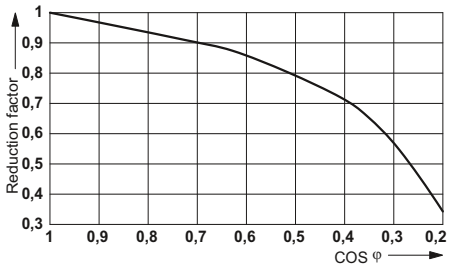

❶ Maximum continuous voltage at limiting continuous current = 6 A
❷ Minimum operate voltage
For pre-excitation with $U_N$ and limiting continuous current = 6 A

Interrupting rating

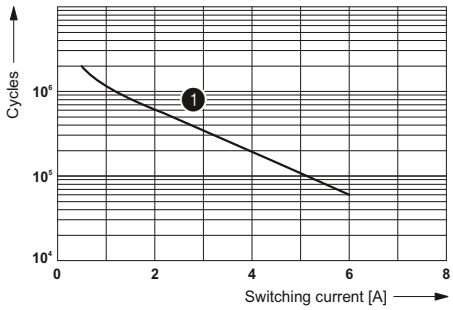



❶ AC, ohmic load
❷ DC, ohmic load

Service life reduction factor



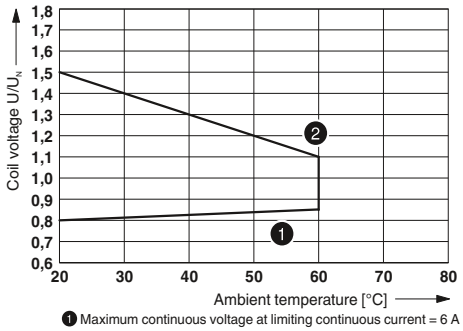

Electrical service life




❶ 250 V AC, ohmic load

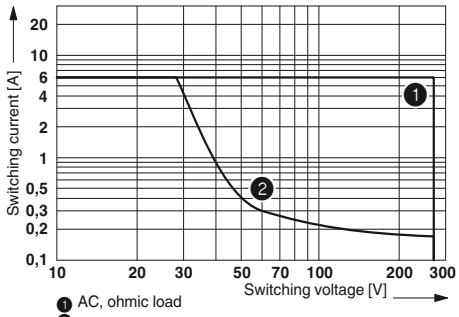
# RIF-0-RPT.../1... (1 N/O contact)

Operating voltage range



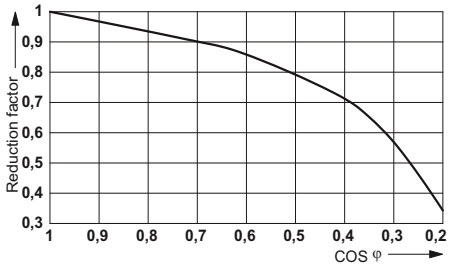

❶ Maximum continuous voltage at limiting continuous current = 6 A
❷ Minimum operate voltage
For pre-excitation with $U_N$ and limiting continuous current = 6 A

Interrupting rating

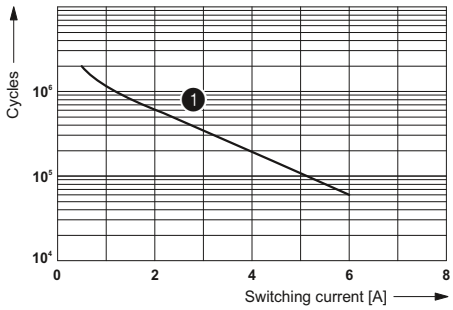



❶ AC, ohmic load
❷ DC, ohmic load

Service life reduction factor




Electrical service life



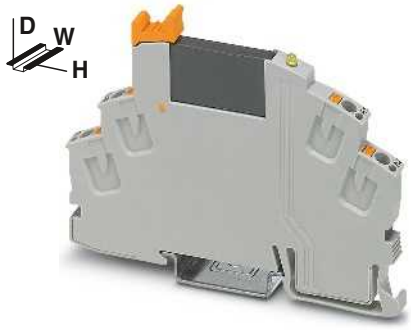

❶ 250 V AC, ohmic load

## Industrial relay system with push-in connection - RIFLINE complete

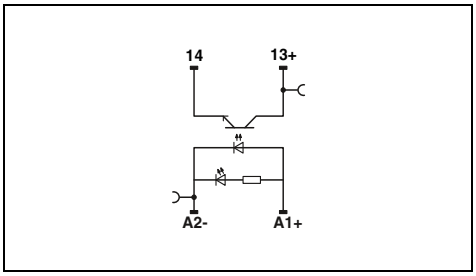
### Fully mounted RIF-0 relay modules

Fully mounted RIF-0 relay modules, consisting of:
– Relay base with push-in connection
– Solid-state relay
– Relay ejector lever on the housing

The advantages:
– Status LED integrated into the base
– RTIII sealed solid-state relay
– Zero voltage switch at AC output
– Professional bridging of adjacent modules saves wiring time




**Max. DC voltage output of 3 A**

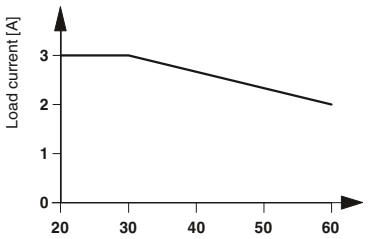



### Technical data

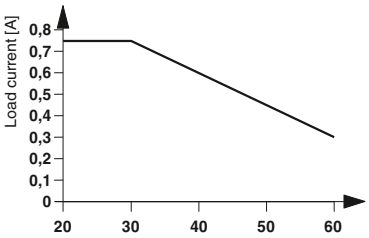
| | | |
|---|---|---|
| Input data | | ① |
| Rated actuating voltage range with reference to $U_C$ | | 0.8 - 1.2 |
| Rated actuating current $I_C$ | [mA] | 8.5 |
| Switching level (with reference to $U_C$) | 1 signal ("H") | > 0.8 |
| | 0 signal ("L") | < 0.4 |
| Typ. switch-on time at $U_N$ | [ms] | 0.02 |
| Typ. shutdown time at $U_N$ | [ms] | 0.3 |
| Transmission frequency $f_{limit}$ | [Hz] | 300 |
| Input circuit DC | | Yellow LED, freewheeling diode |
| Output data | | |
| Max. switching voltage | | 33 V DC |
| Min. switching voltage | | 3 V DC |
| Max. inrush current | | 15 A (10 ms) |
| Min. / max. switching current | | - / 3 A (see derating curve) |
| Output protection | | Protection against polarity reversal, surge protection |
| Voltage drop at max. limiting continuous current | | < 200 mV |
| Leakage current in off state | | - |
| Phase angle (cos φ) | | - |
| Max. load value | | - |
| General data | | |
| Test voltage input/output | | 2.5 $kV_{rms}$ (50 Hz, 1 min.) |
| Ambient temperature (operation) | | -25 °C ... 60 °C |
| Standards/regulations | | DIN EN 50178 |
| Pollution degree / surge voltage category | | 2 / III |
| Connection data solid / stranded / AWG | | 0.14 - 1.5 $mm^2$ / 0.14 - 1.5 $mm^2$ / 26 - 16 |
| Dimensions | W / H / D | 6.2 mm / 93 mm / 66 mm |
| EMC note | | Class A product, see page 625 |

### Ordering data

| Description | Rated actuating voltage $U_C$ | Type | Order No. | Pcs. / Pkt. |
|---|---|---|---|---|
| **Coupling relay modules** with solid-state relay and push-in connection ① | 24 V DC | **RIF-0-OPT-24DC/24DC/2** | **2905293** | 10 |



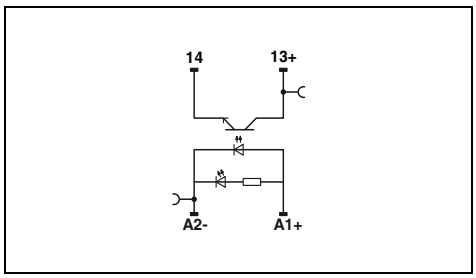

**Derating curve for RIF-0-OPT-24DC/24DC/2**

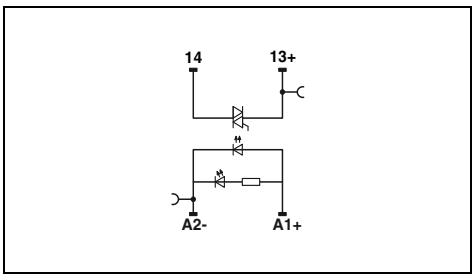



**Derating curve for RIF-0-OPT-24DC/230AC/1**

Max. DC voltage output of 100 mA

Max. AC voltage output of 750 mA




## Technical data

| | |
|---|---|
| ① | |
| 0.8 - | 0.8 - |
| 1.2 | 1.2 |
| 8.5 | 8 |
| > 0.8 | > 0.8 |
| < 0.4 | < 0.4 |
| 0.02 | 10 |
| 0.3 | 10 |
| 300 | 10 |
| Yellow LED, freewheeling diode | Yellow LED, freewheeling diode |
| | |
| 48 V DC | 253 V AC |
| 3 V DC | 24 V AC |
| - | 30 A (10 ms) |
| - / 100 mA | 10 mA / 0.75 A (see derating curve) |
| Protection against polarity reversal, surge protection | RCV circuit |
| < 1 V | < 1 V |
| - | 1 mA (in off state) |
| - | 0.5 |
| - | 4.5 $A^2s$ (tp = 10 ms, at 25 °C) |
| | |
| 2.5 $kV_{rms}$ (50 Hz, 1 min.) | 2.5 $kV_{rms}$ (50 Hz, 1 min.) |
| -25 °C ... 60 °C | -25 °C ... 60 °C |
| DIN EN 50178 | DIN EN 50178 |
| 2 / III | 2 / III |
| 0.14 - 1.5 $mm^2$ / 0.14 - 1.5 $mm^2$ / 26 - 16 | 0.14 - 1.5 $mm^2$ / 0.14 - 1.5 $mm^2$ / 26 - 16 |
| 6.2 mm / 93 mm / 66 mm | 6.2 mm / 93 mm / 66 mm |
| Class A product, see page 625 | Class A product, see page 625 |

## Ordering data

| Type | Order No. | Pcs. / Pkt. |
|---|---|---|
| **RIF-0-OPT-24DC/48DC/100** | **2905294** | 10 |

## Ordering data

| Type | Order No. | Pcs. / Pkt. |
|---|---|---|
| **RIF-0-OPT-24DC/230AC/1** | **2905295** | 10 |

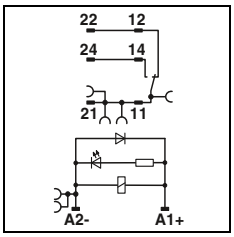
## Fully mounted RIF-1 relay modules

Fully mounted RIF-1 relay modules, consisting of:
- Relay base with push-in connection
- 1 or 2 PDT relay
- Relay retaining bracket
- Input module/interference suppr. module

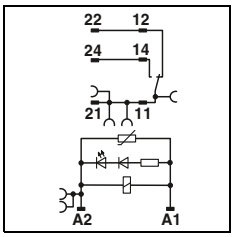
The advantages:
- Logical contact arrangement thanks to 1/3-level relay base
- Operational reliability thanks to sealed relay
- Safe isolation between coil and contact side
- Professional bridging of adjacent modules saves wiring time

- For FBS 2-6 jumpers for the input side (A2), see page 374.
- For FBS 2-8 jumpers for the output side (11/21), see page 374.

RIF-1 relay module with 1 PDT relay




DC coils



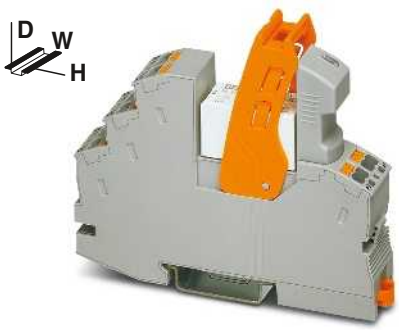

AC coils

### Technical data

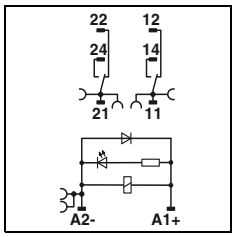
| | | | | | | |
|---|---|---|---|---|---|---|
| Input data | | ① | ② | ③ | ④ | ⑤ |
| Permissible range (with reference to $U_N$) | | see diagram | | | | |
| Typ. input current at $U_N$ | [mA] | 33 | 18 | 33 | 8 | 6 |
| Typ. response time at $U_N$ | [ms] | 8 | 8 | 3 - 12 | 3 - 12 | 3 - 12 |
| Typ. release time at $U_N$ | [ms] | 10 | 10 | 3 - 20 | 3 - 20 | 3 - 20 |
| Input circuit AC | | Yellow LED, varistor | | | | |
| Input circuit DC | | Yellow LED, freewheeling diode | | | | |
| Output data | | | | | | |
| Contact type | | 1 PDT | | | | 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 (at 10 mA) | | | | 100 mV (at 10 mA) |
| Limiting continuous current | | 11 A (see diagram) | | | | 50 mA |
| Max. inrush current, AC | | 25 A (20 ms, N/O contact) | | | | 50 mA |
| Max. inrush current, DC | | 50 A (20 ms, N/O contact) | | | | 50 mA |
| Min. switching current | | 10 mA (at 12 V) | | | | 1 mA (at 24 V) |
| General data | | | | | | |
| Test voltage (winding/contact) | | 4 $kV_{rms}$ (50 Hz, 1 min.) | | | | |
| Ambient temperature (operation), AC | | -40 °C ... 50 °C | | | | |
| Ambient temperature (operation), DC | | -40 °C ... 70 °C | | | | |
| Nominal operating mode | | 100% operating factor | | | | |
| Mechanical service life, AC | | Approx. $10^7$ cycles | | | | |
| Mechanical service life, DC | | Approx. 3 x $10^7$ cycles | | | | |
| Standards/regulations | | DIN EN 50178, IEC 62103 | | | | |
| Pollution degree / surge voltage category | | 2 / III | | | | |
| Mounting position / mounting | | any / can be aligned without spacing | | | | |
| Connection data solid / stranded / AWG | | 0.14 - 1.5 $mm^2$ / 0.14 - 1.5 $mm^2$ / 26 - 16 | | | | |
| Dimensions | W / H / D | 16 mm / 93 mm / 75 mm | | | | |

### Ordering data

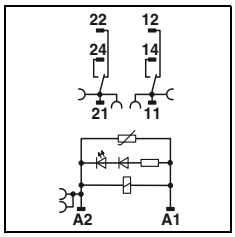
| Description | | Input voltage $U_N$ | Type | Order No. | Pcs. / Pkt. |
|---|---|---|---|---|---|
| **Coupling relay modules** with power contact relay and push-in connection | | | | | |
| | ① | 12 V DC | **RIF-1-RPT-LDP-12DC/1X21** | **2906224** | 10 |
| | ② | 24 V DC | **RIF-1-RPT-LDP-24DC/1X21** | **2903342** | 10 |
| | ③ | 24 V AC | **RIF-1-RPT-LV-24AC/1X21** | **2903341** | 10 |
| | ④ | 120 V AC | **RIF-1-RPT-LV-120AC/1X21** | **2903340** | 10 |
| | ⑤ | 230 V AC | **RIF-1-RPT-LV-230AC/1X21** | **2903339** | 10 |
| | ② | 24 V DC | **RIF-1-RPT-LDP-24DC/1X21AU** | **2903338** | 10 |
| | ③ | 24 V AC | **RIF-1-RPT-LV-24AC/1X21AU** | **2903337** | 10 |
| | ④ | 120 V AC | **RIF-1-RPT-LV-120AC/1X21AU** | **2903336** | 10 |
| | ⑤ | 230 V AC | **RIF-1-RPT-LV-230AC/1X21AU** | **2903335** | 10 |




RIF-1 relay module with
2 PDT relay




DC coils




AC coils

## Technical data

| ① | ② | ③ | ④ | ⑤ |
|---|---|---|---|---|
| see diagram | | | | |
| 33 | 18 | 33 | 8 | 6 |
| 8 | 8 | 3 - 12 | 3 - 12 | 3 - 12 |
| 10 | 10 | 3 - 20 | 3 - 20 | 3 - 20 |
| Yellow LED, varistor | | | | |
| Yellow LED, freewheeling diode | | | | |

| | |
|---|---|
| 2 PDTs | 2 PDTs |
| 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 (see diagram) | 50 mA |
| 12 A (20 ms, N/O contact) | 50 mA |
| 25 A (20 ms, N/O contact) | 50 mA |
| 10 mA (at 5 V) | 1 mA (at 24 V) |

4 $kV_{rms}$ (50 Hz, 1 min.)
-40 °C ... 50 °C
-40 °C ... 70 °C
100% operating factor
Approx. $10^7$ cycles
Approx. 3 x $10^7$ cycles
DIN EN 50178, IEC 62103
2 / III

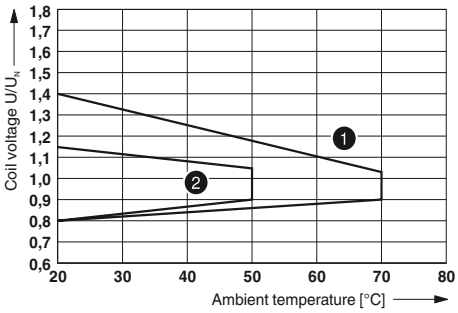
any / can be aligned without spacing
0.14 - 1.5 $mm^2$ / 0.14 - 1.5 $mm^2$ / 26 - 16
16 mm / 93 mm / 75 mm

## Ordering data

| Type | Order No. | Pcs. / Pkt. |
|---|---|---|
| RIF-1-RPT-LDP-12DC/2X21 | 2906223 | 10 |
| RIF-1-RPT-LDP-24DC/2X21 | 2903334 | 10 |
| RIF-1-RPT-LV-24AC/2X21 | 2903333 | 10 |
| RIF-1-RPT-LV-120AC/2X21 | 2903332 | 10 |
| RIF-1-RPT-LV-230AC/2X21 | 2903331 | 10 |
| RIF-1-RPT-LDP-24DC/2X21AU | 2903330 | 10 |
| RIF-1-RPT-LV-24AC/2X21AU | 2903329 | 10 |
| RIF-1-RPT-LV-120AC/2X21AU | 2903328 | 10 |
| RIF-1-RPT-LV-230AC/2X21AU | 2903327 | 10 |

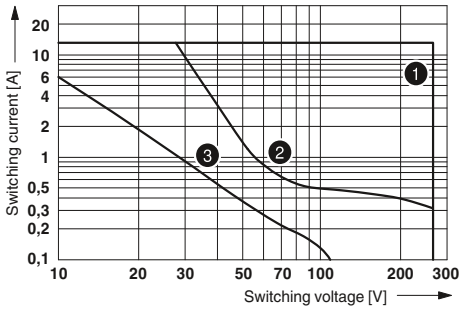
## RIF-1-RPT.../1X21... (1 PDT)

Operating voltage range



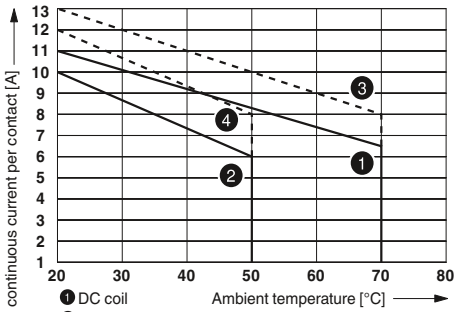

1 DC coils
2 AC coils

Interrupting rating



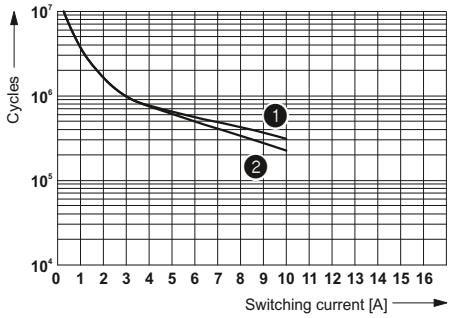

1 AC, ohmic load
2 DC, ohmic load
3 DC, L/R = 40 ms

Contact derating




1 DC coil
2 AC coil
3 DC coil, jumper between 11 and 21
4 AC coil, jumper between 11 and 21

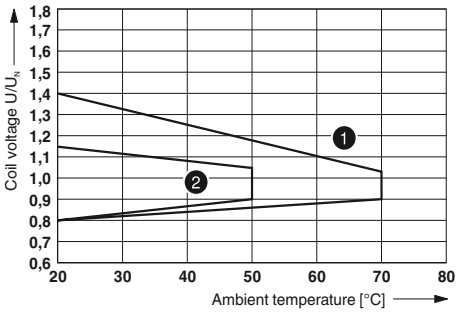
Electrical service life




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

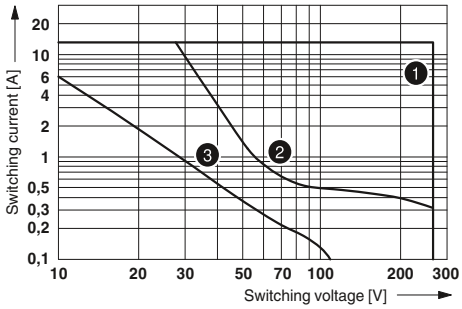
## RIF-1-RPT.../2X21... (2 PDTs)

Operating voltage range



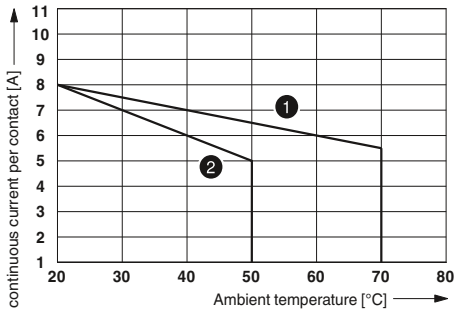

1 DC coils
2 AC coils

Interrupting rating



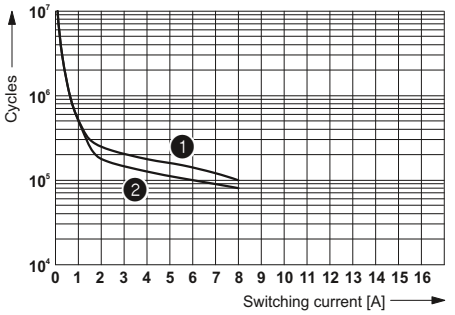

1 AC, ohmic load
2 DC, ohmic load
3 DC, L/R = 40 ms

Contact derating




1 DC coil
2 AC coil

Electrical service life



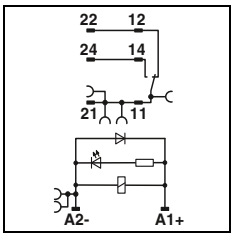

1 250 V AC, ohmic load (DC coils)
2 250 V AC, ohmic load (AC coils)

## Fully mounted RIF-1 relay modules

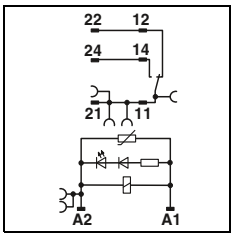
Fully mounted RIF-1 relay modules, consisting of:
- Relay base with push-in connection
- 1 or 2 PDT relay with detectable manual operation
- Relay retaining bracket
- Input module/interference suppr. module (AC types only)

The advantages:
- Relay with lockable manual operation and status LED
- With DC types, freewheeling diode is integrated into relay
- Mechanical switch position indicator
- Professional bridging of adjacent modules saves wiring time

**RIF-1 relay module with 1 PDT relay with manual operation**




**DC coils**



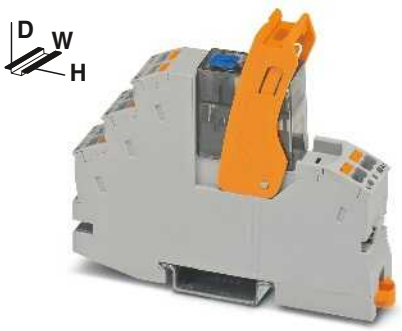

**AC coils**

### Technical data

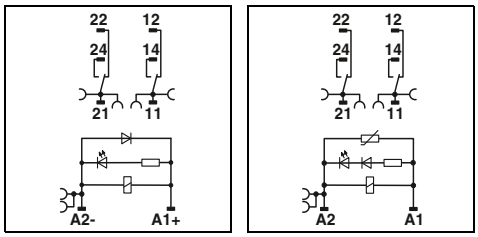
| | | | |
|---|---|---|---|
| Input data | | ① | ② |
| Permissible range (with reference to $U_N$) | | see diagram | |
| Typ. input current at $U_N$ | [mA] | 18 | 4.5 |
| Typ. response time at $U_N$ | [ms] | 9 | 4 - 12 |
| Typ. release time at $U_N$ | [ms] | 10 | 4 - 20 |
| Input circuit AC | | Yellow LED, varistor | |
| Input circuit DC | | Yellow LED, freewheeling diode | |
| Output data | | | |
| Contact type | | 1 PDT | |
| Contact material | | AgNi | |
| Max. switching voltage | | 250 V AC/DC | |
| Min. switching voltage | | 12 V (at 10 mA) | |
| Limiting continuous current | | see diagram | |
| Max. inrush current | | 32 A (20 ms, N/O contact) | |
| Min. switching current | | 10 mA (at 12 V) | |
| General data | | | |
| Test voltage (winding/contact) | | 4 $kV_{rms}$ (50 Hz, 1 min.) | |
| Ambient temperature (operation), AC | | -40 °C ... 50 °C | |
| Ambient temperature (operation), DC | | -40 °C ... 70 °C | |
| Nominal operating mode | | 100% operating factor | |
| Mechanical service life | | Approx. 5 x $10^6$ cycles | |
| Standards/regulations | | DIN EN 50178, IEC 62103 | |
| Pollution degree / surge voltage category | | 2 / III | |
| Mounting position / mounting | | any / can be aligned without spacing | |
| Connection data solid / stranded / AWG | | 0.14 - 1.5 $mm^2$ / 0.14 - 1.5 $mm^2$ / 26 - 16 | |
| Dimensions | W / H / D | 16 mm / 93 mm / 75 mm | |
| EMC note | | Class A product, see page 625 | |

### Ordering data

| Description | | Input voltage $U_N$ | Type | Order No. | Pcs. / Pkt. |
|---|---|---|---|---|---|
| **Coupling relay modules** with power contact relay with manual operation and push-in connection | | | | | |
| | ① | 24 V DC | **RIF-1-RPT-LDP-24DC/1X21MS** | **2905289** | 10 |
| | ② | 230 V AC | **RIF-1-RPT-LV-230AC/1X21MS** | **2905290** | 10 |




**RIF-1 relay module with 2 PDT relay with manual operation**




DC coils | AC coils

## Technical data

| ① | ② |
|---|---|
| see diagram | |
| 18 | 4.5 |
| 9 | 4 - 12 |
| 10 | 4 - 20 |
| Yellow LED, varistor | |
| Yellow LED, freewheeling diode | |

2 PDTs
AgNi
250 V AC/DC
12 V (at 10 mA)
see diagram
16 A (20 ms, N/O contact)
10 mA (at 12 V)

4 $kV_{rms}$ (50 Hz, 1 min.)
-40 °C ... 50 °C
-40 °C ... 70 °C
100% operating factor
Approx. 5 x $10^6$ cycles
DIN EN 50178, IEC 62103
2 / III

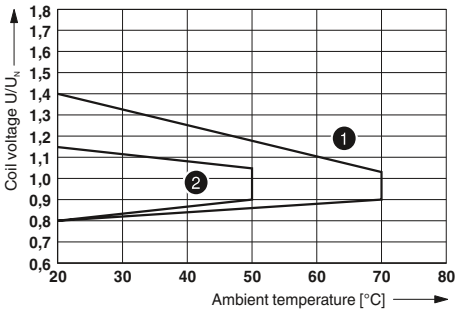
any / can be aligned without spacing
0.14 - 1.5 $mm^2$ / 0.14 - 1.5 $mm^2$ / 26 - 16
16 mm / 93 mm / 75 mm
Class A product, see page 625

## Ordering data

| Type | Order No. | Pcs. / Pkt. |
|---|---|---|
| **RIF-1-RPT-LDP-24DC/2X21MS** | **2905291** | 10 |
| **RIF-1-RPT-LV-230AC/2X21MS** | **2905292** | 10 |

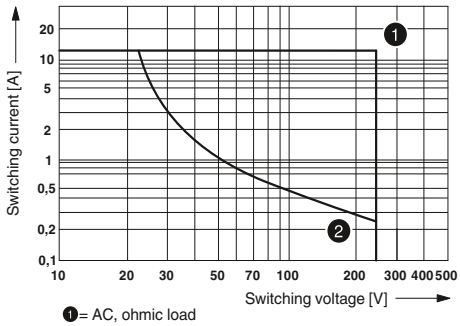
# RIF-1-RPT.../1X21... (1 PDT)

Operating voltage range



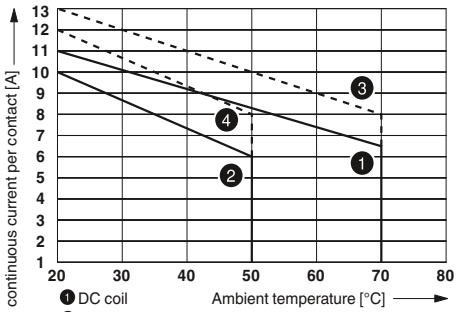

❶ DC coils
❷ AC coils

Interrupting rating



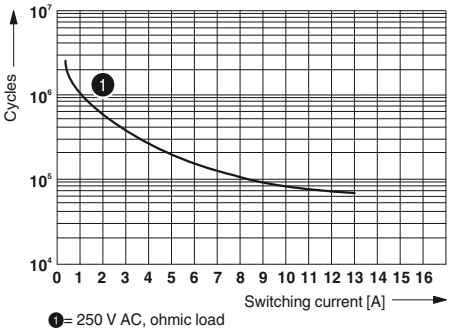

❶ = AC, ohmic load
❷ = DC, ohmic load

Contact derating




❶ DC coil
❷ AC coil
❸ DC coil, jumper between 11 and 21
❹ AC coil, jumper between 11 and 21

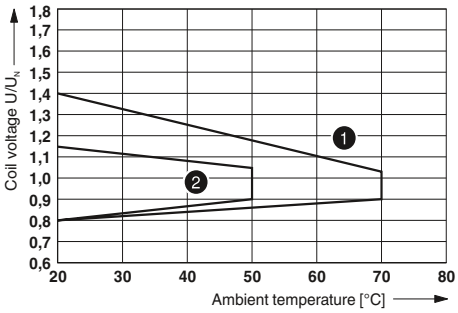
Electrical service life




❶ = 250 V AC, ohmic load

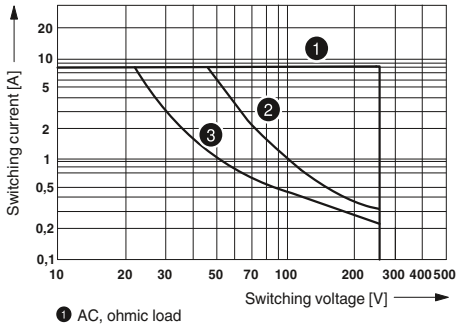
# RIF-1-RPT.../2X21... (2 PDTs)

Operating voltage range



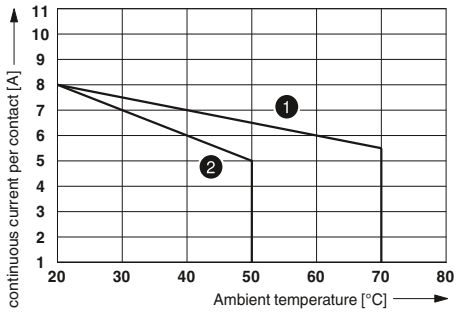

❶ DC coils
❷ AC coils

Interrupting rating



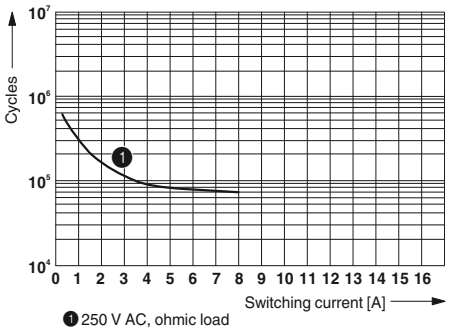

❶ AC, ohmic load
❷ DC, ohmic load, contacts in series
❸ DC, ohmic load

Contact derating




❶ DC coil
❷ AC coil

Electrical service life



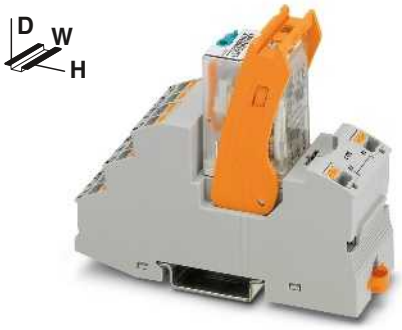

❶ 250 V AC, ohmic load

## Fully mounted RIF-2 relay modules

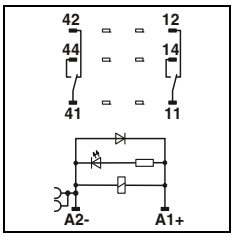
Fully mounted RIF-2 relay modules, consisting of:
- Relay base with push-in connection
- 1 or 2 PDT relay
- Relay retaining bracket
- Input module/interference suppr. module (AC types only)

The advantages:
- Relay with lockable manual operation and status LED
- With DC types, freewheeling diode is integrated into relay
- Mechanical switch position indicator
- Logical contact arrangement thanks to 1/3-level relay base
- Professional bridging of adjacent modules saves wiring time

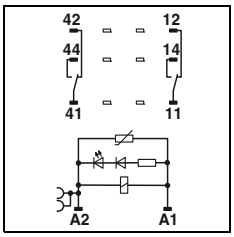
- For FBS 2-6 jumpers for the input side (A2), see page 374.




RIF-2 relay module with 2 PDT relay




DC coils



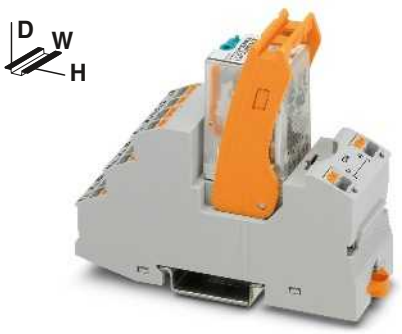

AC coils

### Technical data

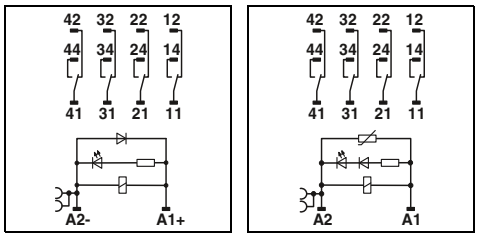
| | | | | | |
|---|---|---|---|---|---|
| Input data | | ① | ② | ③ | ④ |
| Permissible range (with reference to $U_N$) | | see diagram | | | |
| Typ. input current at $U_N$ | [mA] | 42 | 66 | 13 | 6.5 |
| Typ. response time at $U_N$ | [ms] | 13 | 5 - 15 | 5 - 15 | 5 - 15 |
| Typ. release time at $U_N$ | [ms] | 14 | 5 - 20 | 5 - 20 | 5 - 20 |
| Input circuit AC | | Yellow LED, varistor | | | |
| Input circuit DC | | Yellow LED, freewheeling diode | | | |
| Output data | | | | | |
| Contact type | | 2 PDTs | | | |
| Contact material | | AgNi | | | |
| Max. switching voltage | | 250 V AC/DC | | | |
| Min. switching voltage | | 5 V (at 24 mA) | | | |
| Limiting continuous current | | 10 A (see diagram) | | | |
| Max. inrush current, AC | | 30 A (20 ms, N/O contact) | | | |
| Max. inrush current, DC | | 30 A (20 ms, N/O contact) | | | |
| Min. switching current | | 5 mA (at 24 V) | | | |
| General data | | | | | |
| Test voltage (winding/contact) | | 2.5 $kV_{rms}$ (50 Hz, 1 min.) | | | |
| Ambient temperature (operation), AC | | -40 °C ... 50 °C | | | |
| Ambient temperature (operation), DC | | -40 °C ... 60 °C | | | |
| Nominal operating mode | | 100% operating factor | | | |
| Mechanical service life, AC | | Approx. 2 x $10^7$ cycles | | | |
| Mechanical service life, DC | | Approx. 2 x $10^7$ cycles | | | |
| Standards/regulations | | DIN EN 50178, IEC 62103 | | | |
| Pollution degree / surge voltage category | | 2 / III | | | |
| Mounting position / mounting | | any / can be aligned without spacing | | | |
| Connection data solid / stranded / AWG | | 0.14 - 1.5 $mm^2$ / 0.14 - 1.5 $mm^2$ / 26 - 16 | | | |
| Dimensions | W / H / D | 31 mm / 96 mm / 75 mm | | | |
| EMC note | | Class A product, see page 625 | | | |

### Ordering data

| Description | | Input voltage $U_N$ | Type | Order No. | Pcs. / Pkt. |
|---|---|---|---|---|---|
| **Pre-assembled coupling relay modules** with power contact relay and push-in connection | | | | | |
| | ① | 24 V DC | **RIF-2-RPT-LDP-24DC/2X21** | **2903315** | 10 |
| | ② | 24 V AC | **RIF-2-RPT-LV-24AC/2X21** | **2903313** | 10 |
| | ③ | 120 V AC | **RIF-2-RPT-LV-120AC/2X21** | **2903311** | 10 |
| | ④ | 230 V AC | **RIF-2-RPT-LV-230AC/2X21** | **2903310** | 10 |




RIF-2 relay module with
4 PDT relay




DC coils AC coils

## Technical data

| ① | ② | ③ | ④ |
|---|---|---|---|
| see diagram | | | |
| 42 | 66 | 13 | 6.5 |
| 13 | 5 - 15 | 5 - 15 | 5 - 15 |
| 14 | 5 - 20 | 5 - 20 | 5 - 20 |
| Yellow LED, varistor | | | |
| Yellow LED, freewheeling diode | | | |

4 PDTs
AgNi
250 V AC/DC
5 V (at 24 mA)
6 A (see diagram)
16 A (20 ms, N/O contact)
16 A (20 ms, N/O contact)
5 mA (at 24 V)

2.5 $kV_{rms}$ (50 Hz, 1 min.)
-40 °C ... 50 °C
-40 °C ... 60 °C
100% operating factor
Approx. 2 x $10^7$ cycles
Approx. 2 x $10^7$ cycles
DIN EN 50178, IEC 62103
2 / II

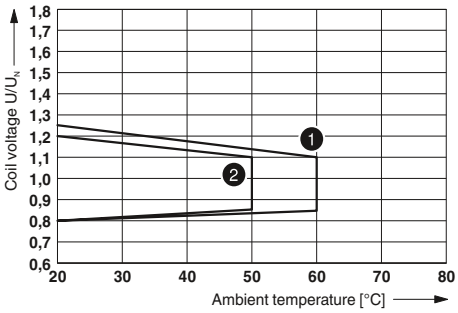
any / can be aligned without spacing
0.14 - 1.5 $mm^2$ / 0.14 - 1.5 $mm^2$ / 26 - 16
31 mm / 96 mm / 75 mm
Class A product, see page 625

## Ordering data

| Type | Order No. | Pcs. / Pkt. |
|---|---|---|
| RIF-2-RPT-LDP-24DC/4X21 | 2903308 | 10 |
| RIF-2-RPT-LV-24AC/4X21 | 2903306 | 10 |
| RIF-2-RPT-LV-120AC/4X21 | 2903305 | 10 |
| RIF-2-RPT-LV-230AC/4X21 | 2903304 | 10 |

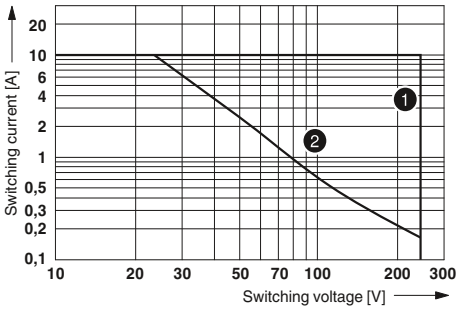
## RIF-2-RPT.../2X21 (2 PDTs)

Operating voltage range



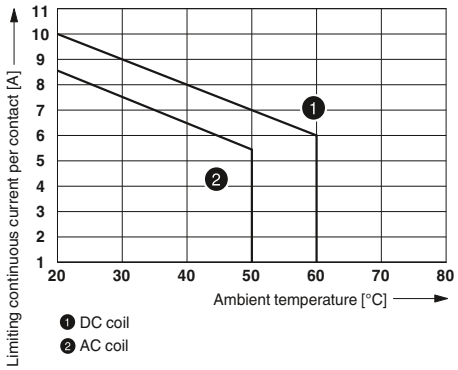

❶ DC coil (observe contact derating)
❷ AC coil (observe contact derating)

Interrupting rating



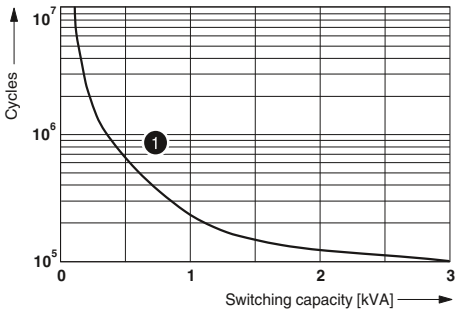

❶ AC, ohmic load
❷ DC, ohmic load

Contact derating




❶ DC coil
❷ AC coil

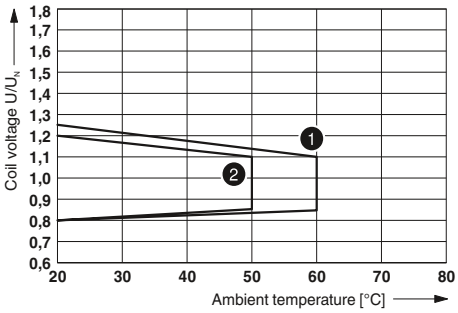
Electrical service life




❶ 250 V AC, ohmic load

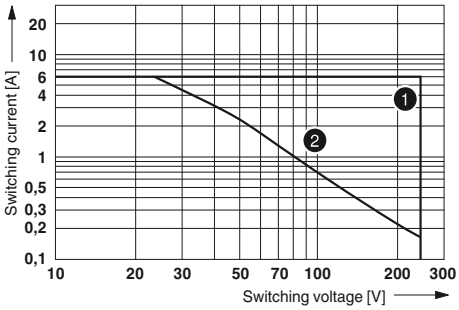
## RIF-2-RPT.../4X21 (4 PDTs)

Operating voltage range



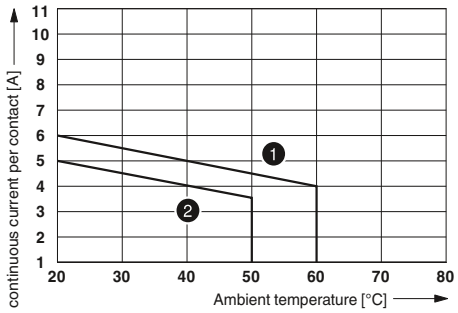

❶ DC coil (observe contact derating)
❷ AC coil (observe contact derating)

Interrupting rating



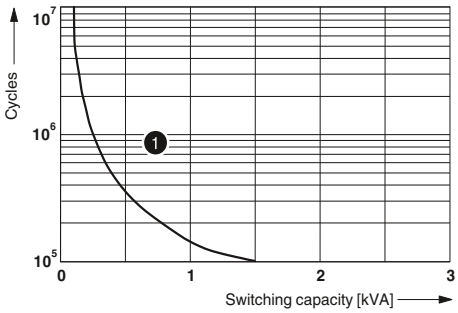

❶ AC, ohmic load
❷ DC, ohmic load

Contact derating




❶ DC coil
❷ AC coil

Electrical service life



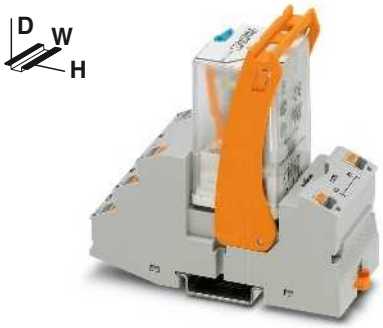

❶ 250 V AC, ohmic load

## Fully mounted RIF-3 relay modules

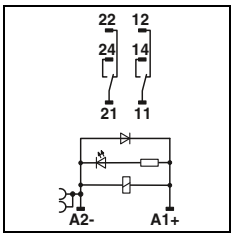
Fully mounted RIF-3 relay modules, consisting of:
- Relay base with push-in connection
- 2 or 3 PDT relay
- Relay retaining bracket
- Input module/interference suppr. module (AC types only)

The advantages:
- Relay with lockable manual operation and status LED
- With DC types, freewheeling diode is integrated into relay
- Mechanical switch position indicator
- Logical contact arrangement thanks to 1/3-level relay base
- Professional bridging of adjacent modules saves wiring time

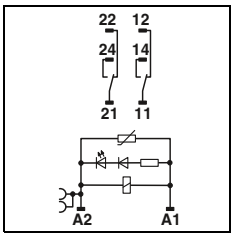
- For FBS 2-6 jumpers for the input side (A2), see page 374.




**RIF-3 relay module with 2 PDT relay**




**DC coils**



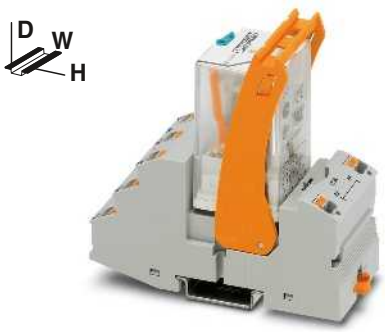

**AC coils**

### Technical data

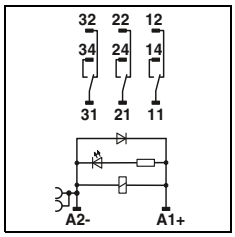
| | | | | |
|---|---|---|---|---|
| Input data | | ① | ② | ③ |
| Permissible range (with reference to $U_N$) | | see diagram | | |
| Typ. input current at $U_N$ | [mA] | 60 | 23 | 13 |
| Typ. response time at $U_N$ | [ms] | 18 | 5 - 15 | 5 - 15 |
| Typ. release time at $U_N$ | [ms] | 20 | 5 - 20 | 5 - 20 |
| Input circuit AC | | Yellow LED, varistor | | |
| Input circuit DC | | Yellow LED, freewheeling diode | | |
| Output data | | | | |
| Contact type | | 2 PDTs | | |
| Contact material | | AgNi | | |
| Max. switching voltage | | 250 V AC/DC | | |
| Min. switching voltage | | 10 V (at 24 mA) | | |
| Limiting continuous current | | 10 A (see diagram) | | |
| Max. inrush current, AC | | 30 A (20 ms, N/O contact) | | |
| Max. inrush current, DC | | 30 A (20 ms, N/O contact) | | |
| Min. switching current | | 10 mA (at 24 V) | | |
| General data | | | | |
| Test voltage (winding/contact) | | 2.5 $kV_{rms}$ (50 Hz, 1 min.) | | |
| Ambient temperature (operation), AC | | -40 °C ... 50 °C | | |
| Ambient temperature (operation), DC | | -40 °C ... 60 °C | | |
| Nominal operating mode | | 100% operating factor | | |
| Mechanical service life, AC | | Approx. 2 x $10^7$ cycles | | |
| Mechanical service life, DC | | Approx. 2 x $10^7$ cycles | | |
| Standards/regulations | | DIN EN 50178, IEC 62103 | | |
| Pollution degree / surge voltage category | | 2 / III | | |
| Mounting position / mounting | | any / can be aligned without spacing | | |
| Connection data solid / stranded / AWG | | 0.14 - 1.5 $mm^2$ / 0.14 - 1.5 $mm^2$ / 26 - 16 | | |
| Dimensions | W / H / D | 40 mm / 103 mm / 90 mm | | |
| EMC note | | Class A product, see page 625 | | |

### Ordering data

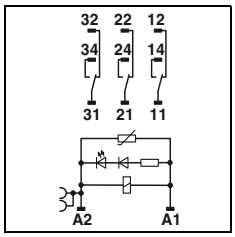
| Description | | Input voltage $U_N$ | Type | Order No. | Pcs. / Pkt. |
|---|---|---|---|---|---|
| **Pre-assembled coupling relay modules** with power contact relay and push-in connection | | | | | |
| | ① | 24 V DC | **RIF-3-RPT-LDP-24DC/2X21** | **2903297** | 5 |
| | ② | 120 V AC | **RIF-3-RPT-LV-120AC/2X21** | **2903296** | 5 |
| | ③ | 230 V AC | **RIF-3-RPT-LV-230AC/2X21** | **2903295** | 5 |




RIF-3 relay module with 3 PDT relay




DC coils




AC coils

## Technical data

| ① | ② | ③ |
|---|---|---|
| see diagram | | |
| 60 | 23 | 13 |
| 18 | 5 - 15 | 5 - 15 |
| 20 | 5 - 20 | 5 - 20 |
| Yellow LED, varistor | | |
| Yellow LED, freewheeling diode | | |

3 PDTs
AgNi
250 V AC/DC
10 V (at 24 mA)
8.5 A (see diagram)
30 A (20 ms, N/O contact)
30 A (20 ms, N/O contact)
10 mA (at 24 V)

2.5 $kV_{rms}$ (50 Hz, 1 min.)
-40 °C ... 50 °C
-40 °C ... 60 °C
100% operating factor
Approx. 2 x $10^7$ cycles
Approx. 2 x $10^7$ cycles
DIN EN 50178, IEC 62103
2 / III

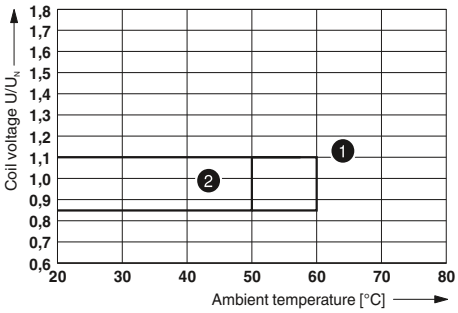
any / can be aligned without spacing
0.14 - 1.5 $mm^2$ / 0.14 - 1.5 $mm^2$ / 26 - 16
40 mm / 103 mm / 90 mm
Class A product, see page 625

## Ordering data

| Type | Order No. | Pcs. / Pkt. |
|---|---|---|
| **RIF-3-RPT-LDP-24DC/3X21** | **2903294** | 5 |
| **RIF-3-RPT-LV-120AC/3X21** | **2903293** | 5 |
| **RIF-3-RPT-LV-230AC/3X21** | **2903292** | 5 |

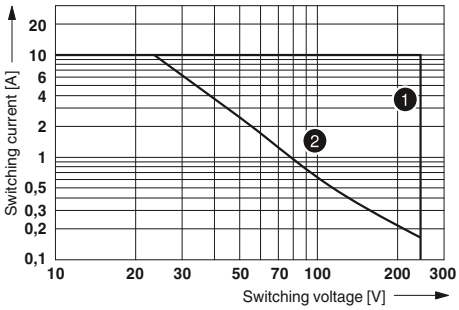
## RIF-3-RPT.../2X21 (2 PDTs)

Operating voltage range



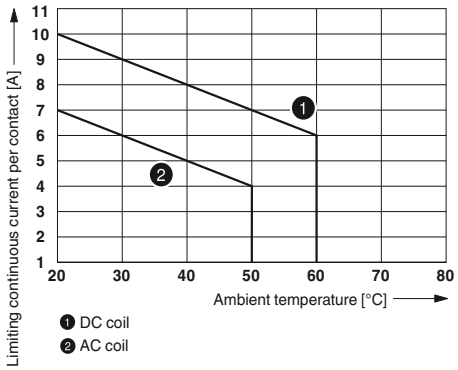

❶ DC coil (observe contact derating)
❷ AC coil (observe contact derating)

Interrupting rating



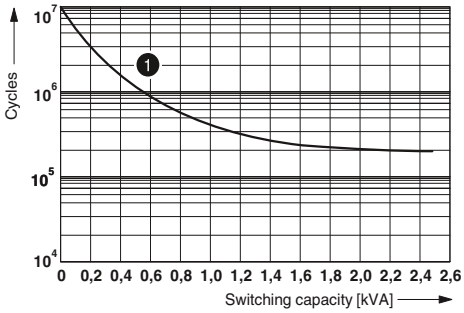

❶ AC, ohmic load
❷ DC, ohmic load

Contact derating




❶ DC coil
❷ AC coil

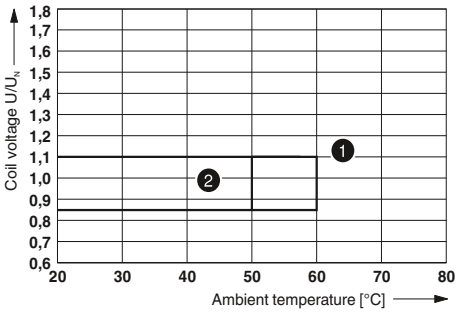
Electrical service life




❶ 250 V AC, ohmic load

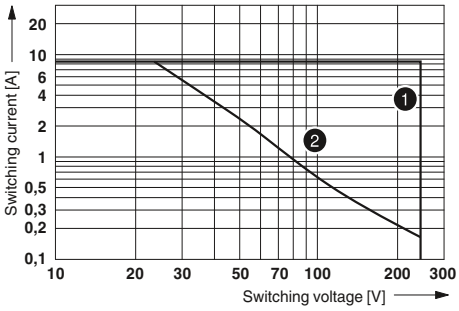
## RIF-3-RPT.../3X21 (3 PDTs)

Operating voltage range



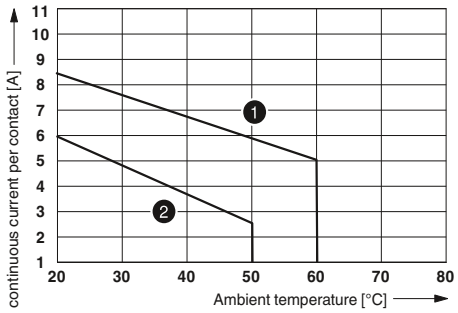

❶ DC coil (observe contact derating)
❷ AC coil (observe contact derating)

Interrupting rating



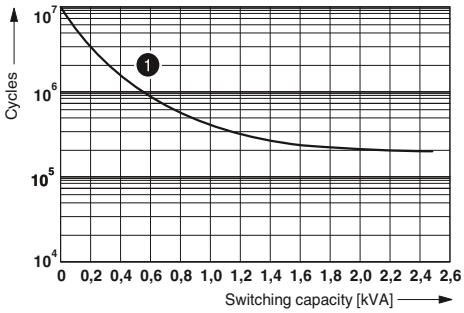

❶ AC, ohmic load
❷ DC, ohmic load

Contact derating




❶ DC coil
❷ AC coil

Electrical service life



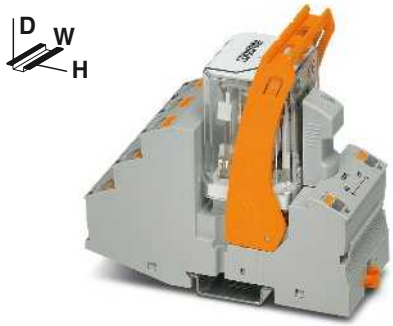

❶ 250 V AC, ohmic load

## Fully mounted RIF-4 relay modules

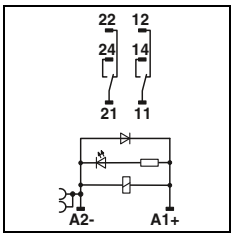
Fully mounted RIF-4 relay modules, consisting of:
- Relay base with push-in connection
- 2 or 3 PDT relay
- Relay retaining bracket
- Input module/interference suppr. module

The advantages:
- Logical contact arrangement thanks to 1/3-level relay base
- Professional bridging of adjacent modules saves wiring time

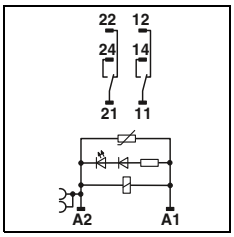
- For FBS 2-6 jumpers for the input side (A2), see page 374.




RIF-4 relay module with 2 PDT relay




DC coils



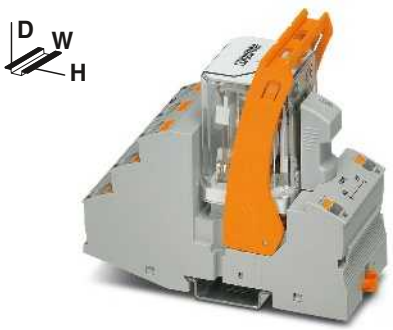

AC coils

### Technical data

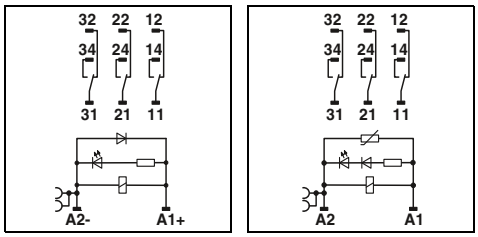
| | | | | |
|---|---|---|---|---|
| Input data | | ① | ② | ③ |
| Permissible range (with reference to $U_N$) | | see diagram | | |
| Typ. input current at $U_N$ | [mA] | 56 | 24 | 14 |
| Typ. response time at $U_N$ | [ms] | 20 | 5 - 25 | 5 - 25 |
| Typ. release time at $U_N$ | [ms] | 20 | 5 - 20 | 5 - 20 |
| Input circuit AC | | Yellow LED, varistor | | |
| Input circuit DC | | Yellow LED, freewheeling diode, polarity protection diode | | |
| Output data | | | | |
| Contact type | | 2 PDTs | | |
| Contact material | | AgNi | | |
| Max. switching voltage | | 440 V AC / 250 V DC | | |
| Min. switching voltage | | 10 V (at 24 mA) | | |
| Limiting continuous current | | 11 A (see diagram) | | |
| Max. inrush current, AC | | 50 A (20 ms, N/O contact) | | |
| Max. inrush current, DC | | 50 A (20 ms, N/O contact) | | |
| Min. switching current | | 10 mA (at 24 V) | | |
| Max. interrupting rating, ohmic load | | | | |
| | 250 V AC | 2500 VA | | |
| | 440 V AC | 4000 VA | | |
| Motor load according to UL 508 | | 1/3 HP, 120 V AC (single-phase AC motor)<br>1/2 HP, 240 V AC (single-phase AC motor) | | |
| General data | | | | |
| Test voltage (winding/contact) | | 2.5 $kV_{rms}$ (50 Hz, 1 min.) | | |
| Ambient temperature (operation), AC | | -40 °C ... 40 °C | | |
| Ambient temperature (operation), DC | | -40 °C ... 60 °C | | |
| Nominal operating mode | | 100% operating factor | | |
| Mechanical service life, AC | | Approx. $10^7$ cycles | | |
| Mechanical service life, DC | | Approx. $10^7$ cycles | | |
| Standards/regulations | | DIN EN 50178, IEC 62103 | | |
| Pollution degree / surge voltage category | | 2 / III | | |
| Mounting position / mounting | | any / can be aligned without spacing | | |
| Connection data solid / stranded / AWG | | | | |
| Input side | | 0.14 ... 1.5 $mm^2$ / 0.14 ... 1.5 $mm^2$ / 26 - 16 | | |
| Output side | | 0.14 ... 2.5 $mm^2$ / 0.14 ... 2.5 $mm^2$ / 26 - 14 | | |
| Dimensions | W / H / D | 43 mm / 111 mm / 90 mm | | |
| EMC note | | Class A product, see page 625 | | |

### Ordering data

| Description | | Input voltage $U_N$ | Type | Order No. | Pcs. / Pkt. |
|---|---|---|---|---|---|
| **Pre-assembled coupling relay modules** with power contact relay and push-in connection | | | | | |
| | ① | 24 V DC | **RIF-4-RPT-LDP-24DC/2X21** | **2903281** | 5 |
| | ② | 120 V AC | **RIF-4-RPT-LV-120AC/2X21** | **2903280** | 5 |
| | ③ | 230 V AC | **RIF-4-RPT-LV-230AC/2X21** | **2903279** | 5 |




RIF-4 relay module with 3 PDT relay




DC coils AC coils

## Technical data

| ① | ② | ③ |
|---|---|---|
| see diagram | | |
| 56 | 24 | 14 |
| 20 | 5 - 25 | 5 - 25 |
| 20 | 5 - 20 | 5 - 20 |
| Yellow LED, varistor | | |
| Yellow LED, freewheeling diode, polarity protection diode | | |

3 PDTs
AgNi
440 V AC / 250 V DC
10 V (at 24 mA)
10 A (see diagram)
50 A (20 ms, N/O contact)
50 A (20 ms, N/O contact)
10 mA (at 24 V)

2500 VA
4000 VA
1/3 HP, 120 V AC (single-phase AC motor)
1/2 HP, 240 V AC (single-phase AC motor)
1/2 HP, 240 V AC (three-phase induction motor)

2.5 $kV_{rms}$ (50 Hz, 1 min.)
-40 °C ... 40 °C
-40 °C ... 60 °C
100% operating factor
Approx. $10^7$ cycles
Approx. $10^7$ cycles
DIN EN 50178, IEC 62103
2 / III
any / can be aligned without spacing

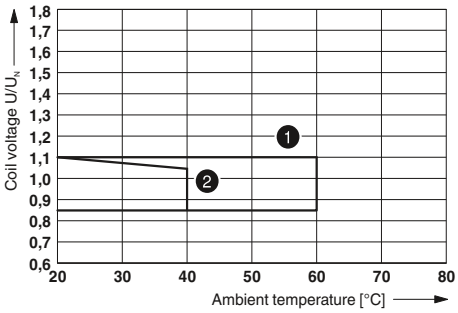
0.14 ... 1.5 $mm^2$ / 0.14 ... 1.5 $mm^2$ / 26 - 16
0.14 ... 2.5 $mm^2$ / 0.14 ... 2.5 $mm^2$ / 26 - 14
43 mm / 111 mm / 90 mm
Class A product, see page 625

## Ordering data

| Type | Order No. | Pcs. / Pkt. |
|---|---|---|
| **RIF-4-RPT-LDP-24DC/3X21** | **2903278** | 5 |
| **RIF-4-RPT-LV-120AC/3X21** | **2903277** | 5 |
| **RIF-4-RPT-LV-230AC/3X21** | **2903276** | 5 |

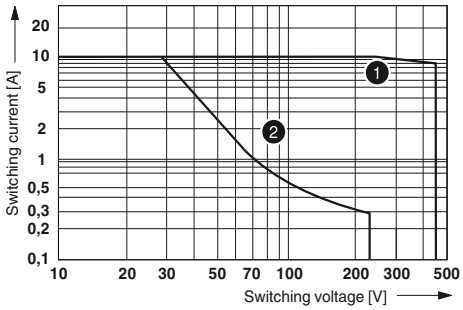
## RIF-4-RPT.../2X21 (2 PDTs)

Operating voltage range



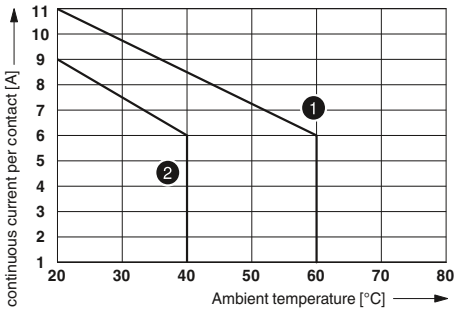

❶ DC coil (observe contact derating)
❷ AC coil (observe contact derating)

Interrupting rating



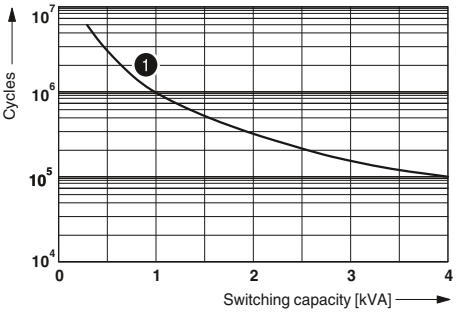

❶ AC, ohmic load
❷ DC, ohmic load

Contact derating




❶ DC coil
❷ AC coil

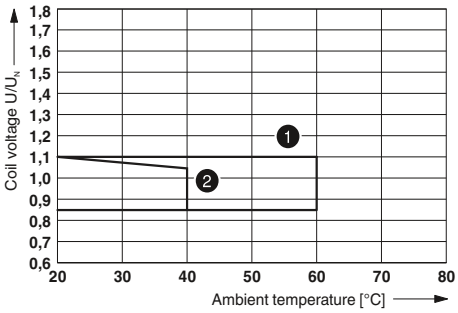
Electrical service life




❶ 250 V AC, ohmic load

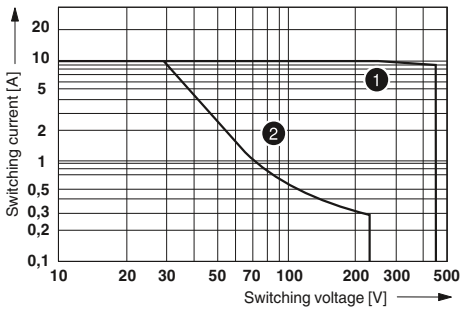
## RIF-4-RPT.../3X21 (3 PDTs)

Operating voltage range



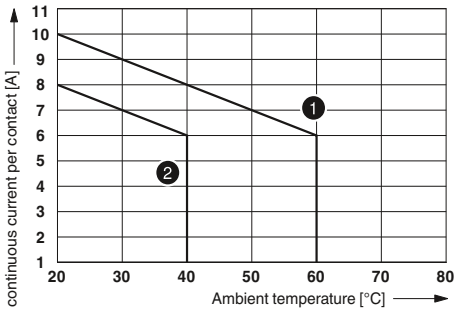

❶ DC coil (observe contact derating)
❷ AC coil (observe contact derating)

Interrupting rating



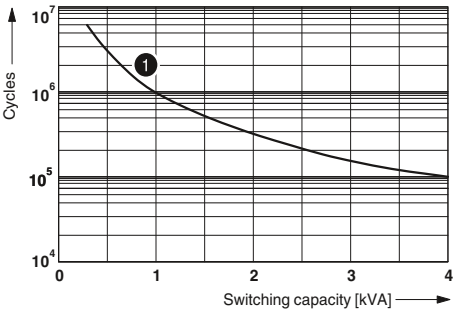

❶ AC, ohmic load
❷ DC, ohmic load

Contact derating




❶ DC coil
❷ AC coil

Electrical service life



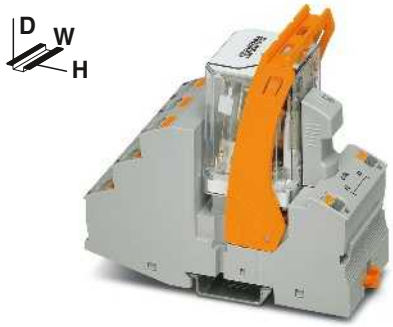

❶ 250 V AC, ohmic load

## Fully mounted RIF-4 relay modules

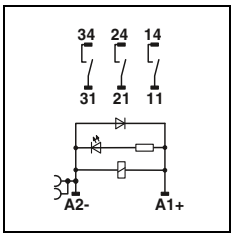
Fully mounted RIF-4 relay modules, consisting of:
– Relay base with push-in connection
– 3 N/O relay
– Relay retaining bracket
– Input module/interference suppr. module

The advantages:
– Logical contact arrangement thanks to 1/3-level relay base
– Full shutdown by means of ≥ 3 mm contact opening
– Professional bridging of adjacent modules saves wiring time

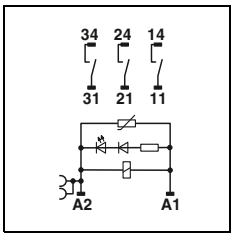
– For FBS 2-6 jumpers for the input side (A2), see page 374.




**RIF-4 relay module with 3 N/O relay**




**DC coils**




**AC coils**

### Technical data

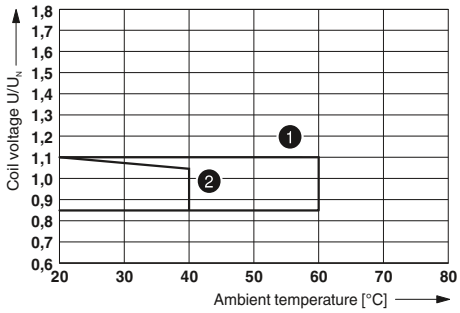
| | | ① | ② | ③ |
|---|---|---|---|---|
| **Input data** | | | | |
| Permissible range (with reference to $U_N$) | | see diagram | | |
| Typ. input current at $U_N$ | [mA] | 70 | 24 | 14 |
| Typ. response time at $U_N$ | [ms] | 20 | 5 - 25 | 5 - 25 |
| Typ. release time at $U_N$ | [ms] | 20 | 5 - 20 | 5 - 20 |
| Input circuit AC | | Yellow LED, varistor | | |
| Input circuit DC | | Yellow LED, freewheeling diode, polarity protection diode | | |
| **Output data** | | | | |
| Contact type | | 3 N/O contacts | | |
| Contact material | | AgNi | | |
| Max. switching voltage | | 440 V AC / 250 V DC | | |
| Min. switching voltage | | 10 V (at 24 mA) | | |
| Limiting continuous current | | 10 A (see diagram) | | |
| Max. inrush current, AC | | 50 A (20 ms, N/O contact) | | |
| Max. inrush current, DC | | 50 A (20 ms, N/O contact) | | |
| Min. switching current | | 10 mA (at 24 V) | | |
| Max. interrupting rating, ohmic load | | | | |
| | 250 V AC | 2500 VA | | |
| | 440 V AC | 4000 VA | | |
| Motor load according to UL 508 | | 1/3 HP, 120 V AC (single-phase AC motor)<br>1/2 HP, 240 V AC (single-phase AC motor)<br>1/2 HP, 240 V AC (three-phase induction motor) | | |
| **General data** | | | | |
| Test voltage (winding/contact) | | 2.5 $kV_{rms}$ (50 Hz, 1 min.) | | |
| Ambient temperature (operation), AC | | -40 °C ... 40 °C | | |
| Ambient temperature (operation), DC | | -40 °C ... 60 °C | | |
| Nominal operating mode | | 100% operating factor | | |
| Mechanical service life, AC | | Approx. $10^7$ cycles | | |
| Mechanical service life, DC | | Approx. $10^7$ cycles | | |
| Standards/regulations | | DIN EN 50178, IEC 62103 | | |
| Pollution degree / surge voltage category | | 2 / III | | |
| Mounting position / mounting | | any / can be aligned without spacing | | |
| Connection data solid / stranded / AWG | | | | |
| Input side | | 0.14 ... 1.5 $mm^2$ / 0.14 ... 1.5 $mm^2$ / 26 - 16 | | |
| Output side | | 0.14 ... 2.5 $mm^2$ / 0.14 ... 2.5 $mm^2$ / 26 - 14 | | |
| Dimensions | W / H / D | 43 mm / 111 mm / 90 mm | | |
| EMC note | | Class A product, see page 625 | | |

### Ordering data

| Description | | Input voltage $U_N$ | Type | Order No. | Pcs. / Pkt. |
|---|---|---|---|---|---|
| **Pre-assembled coupling relay modules** with power contact relay and push-in connection | | | | | |
| | ① | 24 V DC | **RIF-4-RPT-LDP-24DC/3X1** | **2903275** | 5 |
| | ② | 120 V AC | **RIF-4-RPT-LV-120AC/3X1** | **2903274** | 5 |
| | ③ | 230 V AC | **RIF-4-RPT-LV-230AC/3X1** | **2903273** | 5 |

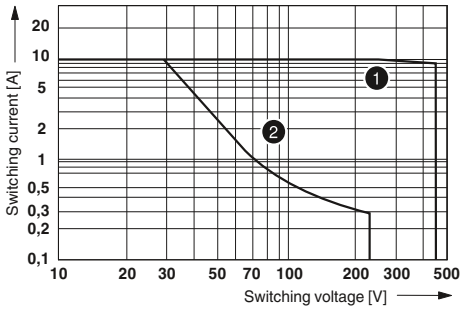
## RIF-4-RPT.../3X1 (3 N/O contacts)

Operating voltage range



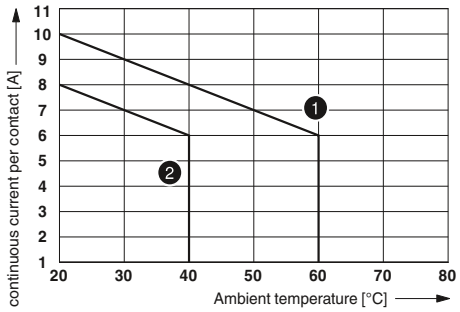

❶ DC coil (observe contact derating)
❷ AC coil (observe contact derating)

Interrupting rating



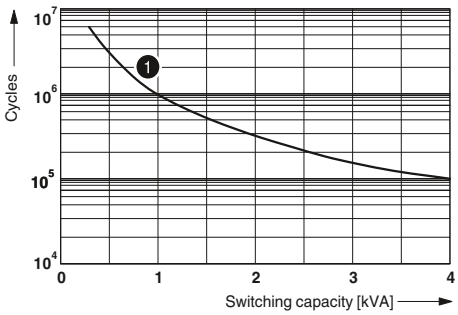

❶ AC, ohmic load
❷ DC, ohmic load

Contact derating




❶ DC coil
❷ AC coil

Electrical service life




❶ 250 V AC, ohmic load

## RIFLINE complete accessories
## Jumpers

The jumpers can be used for simple potential distribution via all relay bases.
The end bracket is used for safe isolation between adjacent modules and to visually separate the various function groups.

| Description | Color | Ordering data: Type | | Order No. | Pcs. / Pkt. | Ordering data: Type | Order No. | Pcs. / Pkt. |
|---|---|---|---|---|---|---|---|---|
| **Jumper** | | | | | | | | |
| 2-pos. red, 32 A | | **FBS 2-6** | | **3030336** | 50 | | | |
| 2-pos. blue, 32 A | | **FBS 2-6 BU** | | **3036932** | 50 | | | |
| 2-pos. gray, 32 A | | **FBS 2-6 GY** | | **3032237** | 50 | | | |
| 5-pos. red, 32 A | | **FBS 5-6** | | **3030349** | 50 | | | |
| 10-pos. red, 32 A | | **FBS 10-6** | | **3030271** | 10 | | | |
| 20-pos. red, 32 A | | **FBS 20-6** | | **3030365** | 10 | | | |
| 50-pos. red, 32 A | | **FBS 50-6** | | **3032224** | 10 | | | |
| 2-pos. red, 41 A | | **FBS 2-8** | | **3030284** | 10 | | | |
| 2-pos. blue, 41 A | | **FBS 2-8 BU** | | **3032567** | 10 | | | |
| 2-pos. gray, 41 A | | **FBS 2-8 GY** | **7042** | **3032541** | 10 | | | |
| **End bracket,** for snapping onto NS 35, 9.5 mm wide, can be marked with ZB 6, ZB 8/27, KLM... | | | | | | **CLIPFIX 35** | **3022218** | 50 |

## RIFLINE complete accessories
## Marking material

The ZB zack band system offers numerous marking options that can be attached directly to the relay retaining brackets. In addition, further markings can be fixed to the relay base by means of double marker carriers.

**5.2 mm, 6.2 mm, and 15.2 mm wide**

**Double marker carrier**

| Description | Color | Ordering data: Type | Order No. | Pcs. / Pkt. | Ordering data: Type | Order No. | Pcs. / Pkt. |
|---|---|---|---|---|---|---|---|
| **Zack marker strip, unprinted** | | | | | | | |
| 10-section | white | **ZB 5 :UNBEDRUCKT** | **1050004** | 10 | | | |
| 10-section | white | **ZB 6:UNBEDRUCKT** | **1051003** | 10 | | | |
| 5-section | white | **ZB 15:UNBEDRUCKT** | **0811972** | 10 | | | |
| **Double marker carrier for ZB 5** | gray | | | | **STP 5-2** | **0800967** | 100 |

## RIFLINE complete accessories
## Test plug

The two-piece test plug offers individual plug color combinations. The test plug is inserted directly in the function shaft of the push-in connection.

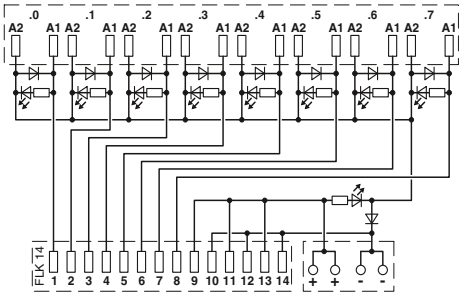
**Ordering data**

| Description | Color | Type | Order No. | Pcs. / Pkt. |
|---|---|---|---|---|
| **Test plug,** consisting of: | | | | |
| **Metal part** for 2.3 mm Ø socket hole and | silver | **MPS-MT** | **0201744** | 10 |
| **Insulating sleeve,** for MPS metal part | red | **MPS-IH RD** | **0201676** | 10 |
| | white | **MPS-IH WH** | **0201663** | 10 |
| | blue | **MPS-IH BU** | **0201689** | 10 |
| | yellow | **MPS-IH YE** | **0201692** | 10 |
| | green | **MPS-IH GN** | **0201702** | 10 |
| | gray | **MPS-IH GY** | **0201728** | 10 |
| | black | **MPS-IH BK** | **0201731** | 10 |

## Adapter for RIFLINE complete

new

RIF-1-V8... is the VARIOFACE adapter which connects the RIF-1 relay modules with the VARIOFACE system cabling. This allows easy connection of eight relay modules to a controller.



**VARIOFACE adapter for RIFLINE complete RIF-1**

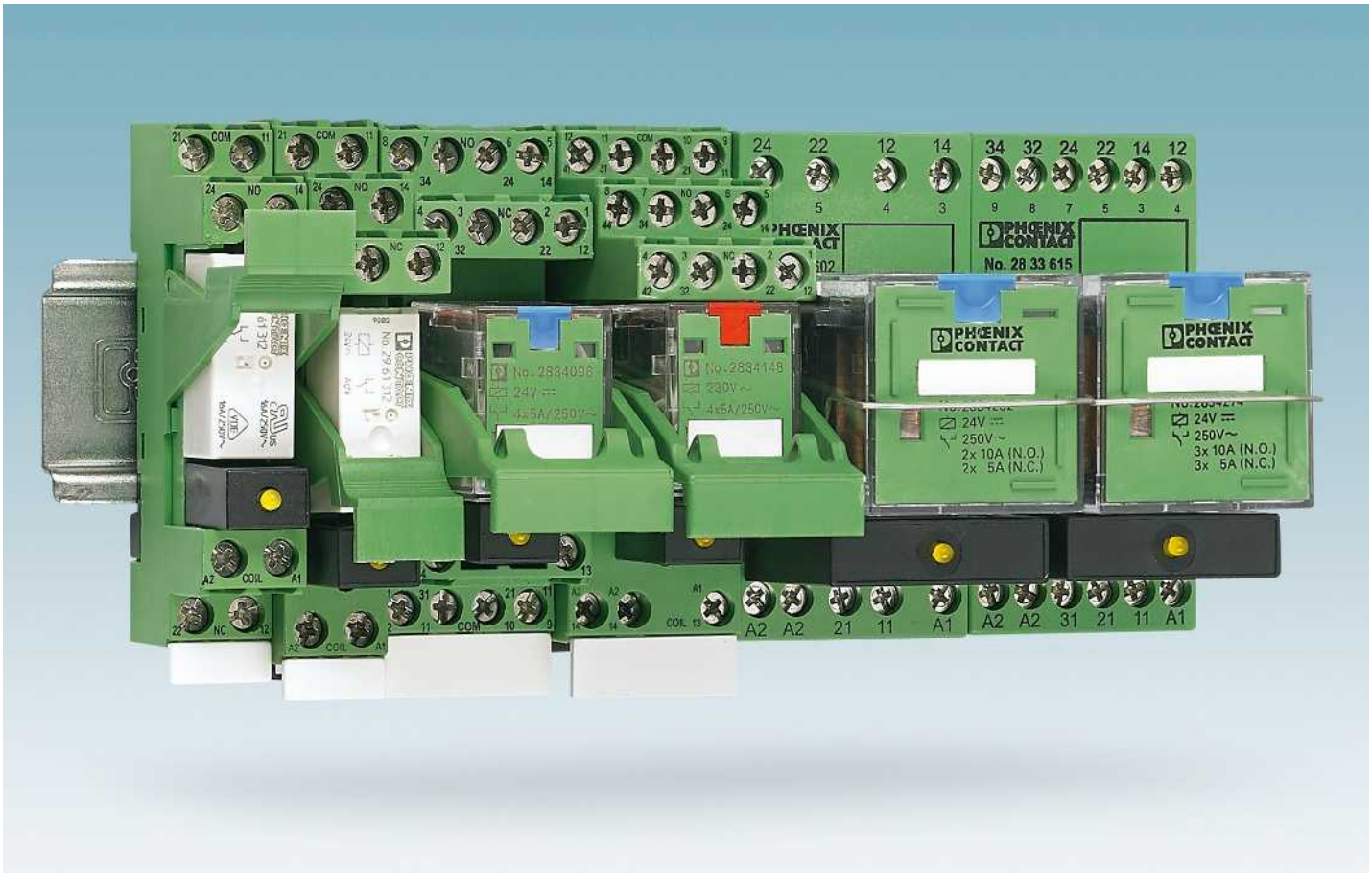
**Technical data**

| | |
|---|---|
| Max. perm. operating voltage | 30 V DC |
| Max. perm. current (per branch) | 1 A (per signal path) |
| Max total current (voltage supply) | 3 A |
| Rated surge voltage | 0.6 kV (functional insulation) |
| Ambient temperature (operation) | -40 °C ... 60 °C |
| Mounting position | any |
| Standards/regulations | IEC 60664, IEC 62103, DIN EN 50178 |
| Connection data solid / stranded / AWG | 0.2 ... 1.5 mm² / 0.2 ... 1.5 mm² / 24 - 16 |
| Dimensions H / D | 101 mm / 75 mm |

**Ordering data**

| Description | No. of pos. | Module width W | Type | Order No. | Pcs. / Pkt. |
|---|---|---|---|---|---|
| **V8 adapter,** for eight RIF-1 relay modules, with FLK connection for PLC system cabling, **positive switching** | | 128 mm | **RIF-1-V8/PT/FLK14/OUT** | **2905195** | 1 |

## Industrial relay system with screw connection - PR series




The PR series is a low-priced relay modular system, consisting of 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.

The PR series also boasts its own particular features:

– Relay retaining bracket: the EL... plastic relay retaining brackets, with which the relays can be held and, if necessary, ejected, 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 marking cannot be lost.
– Industrial relays: as standard, all REL-IR... industrial relays have an LED status display and all DC types also have an integrated freewheeling diode. In most cases, this eliminates the plug-in input modules that are otherwise also used.
– 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. In contrast, the RC-120-230UC and RC3-120-230UC plug-in module series for mains voltage applications have a filter function that is improved up to a factor of 10. Unlike with the discharge resistors that are normally used for such applications, using RC plug-in modules does not result in any additional heating.

**PR1 series**

The narrow 16 mm PR1 base series for relays with one or two contacts.

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.

Just like the PR1 series, the bases are available in traditional 2/2-level and the modern "logical" 1/3-level versions.

**PR3 series**

The robust octal relays with two or three PDT contacts that are widely used in some areas fit on the PR3 base with shock-proof screw connections. All the base connections have a wide connection cross section and are arranged on one level with 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 marking 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.

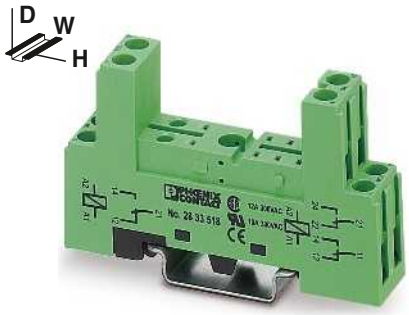
The PR2 modular system is specifically designed for plug-in industrial relays. Industrial relays from Phoenix Contact feature the following as standard: a manual test button, switch position indicator, status LED, and freewheeling diode (DC coils only). Interference suppression modules with a varistor or RC element can also be plugged in as an option. Relay retaining brackets with integrated marking 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 marked with an 8 x 20 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:
- Plug-in input modules/interference suppr. modules
- Relay retaining bracket with marking field and ejection function
- Marking labels
- Loop bridges

| Notes: |
|---|
| Type of housing:<br>Polyamide fiber reinforced PA-F, color: green. |
| Marking systems and mounting material<br>See Catalog 5 |




**2/2-level design with screw connection**

### Technical data

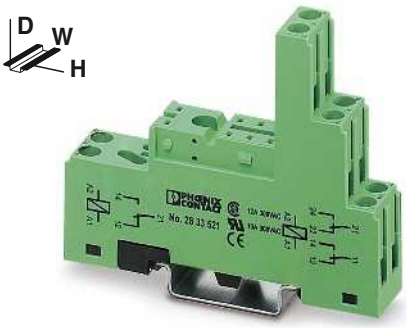
| | |
|---|---|
| Nominal voltage $U_N$ | 300 V AC/DC |
| Nominal current at $U_N$ | 12 A |
| General data | |
| Ambient temperature (operation) | -25 °C ... 85 °C |
| Connection data solid / stranded / AWG | 0.2 ... 2.5 mm² / 0.2 ... 2.5 mm² / 26 - 14 |
| Dimensions | |
| Width | 16 mm |
| Depth with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

### Ordering data

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

### Accessories

| | | | |
|---|---|---|---|
| **Equipment marking label**, marking area 6 x 15 mm | **MP 1** | **2833631** | 10 |
| **Device marking label**, for thermal transfer printer, marking area 6 x 15 mm<br>2500 labels per roll | **EML (15X6) R YE** | **0819288** | 1 |
| **Loop bridge**, 50-pos., divisible, 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

Relay retaining bracket

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

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

| Accessories | | | 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 | | | |

## Industrial relay system with screw connection - PR series

### Plug-in miniature power relays

Plug-in miniature power relays with 1 or 2 PDT contacts, suitable for RIF-1, PR1, and PLC-INTERFACE relay bases.

The advantages:

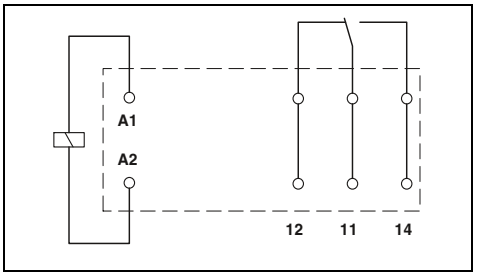
- Power contacts up to 16 A
- Multi-layer gold contact or power contact
- High degree of protection up to RT III (comparable with IP67) depending on type

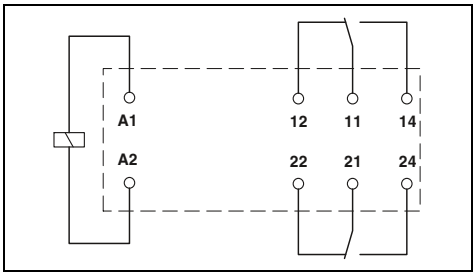
**Notes:**

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



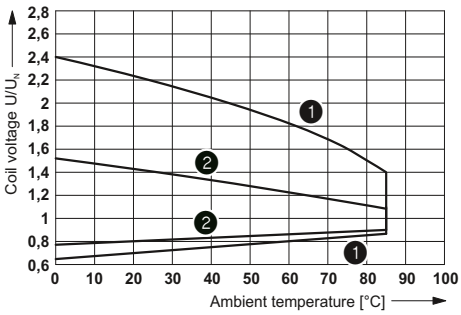

| | | Technical data | | | | | | | | Technical data | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Input data | | ① | ② | ③ | ④ | ⑤ | ⑥ | ⑦ | ⑧ | ① | ② | ③ | ④ | ⑤ | ⑥ | ⑦ | ⑧ |
| Permissible range (with reference to $U_N$) | | see diagram | | | | | | | | see diagram | | | | | | | |
| Typ. input current at $U_N$ | [mA] | 33 | 17 | 8.7 | 8.2 | 4.1 | 32 | 7 | 3 | 33 | 17 | 8.7 | 8.2 | 4.1 | 32 | 7 | 3 |
| Typ. response time at $U_N$ | [ms] | 7 | 7 | 7 | 7 | 7 | | | | 7 | 7 | 7 | 7 | 7 | | | |
| Typ. response time at $U_N$ (depending on phase relation) | [ms] | | | | | | 3 - 12 | 3 - 12 | 3 - 12 | | | | | | 3 - 12 | 3 - 12 | 3 - 12 |
| Typ. release time at $U_N$ | [ms] | 3 | 3 | 3 | 3 | 3 | | | | 3 | 3 | 3 | 3 | 3 | | | |
| Typ. release time at $U_N$ (depending on phase relation) | [ms] | | | | | | 2 - 9 | 2 - 9 | 2 - 9 | | | | | | 2 - 9 | 2 - 9 | 2 - 9 |

| | | | | |
|---|---|---|---|---|
| Output data | | | | |
| Contact type | 1 PDT | 1 PDT | 2 PDTs | 2 PDTs |
| Contact material | AgNi | AgNi, hard gold-plated | AgNi | AgNi, hard gold-plated |
| Max. switching voltage | 250 V AC/DC | 30 V AC / 36 V DC | 250 V AC/DC | 30 V AC / 36 V DC |
| Min. switching voltage | 12 V (at 10 mA) | 100 mV (at 10 mA) | 5 V (at 10 mA) | 100 mV (at 10 mA) |
| Limiting continuous current | 16 A | 50 mA | 8 A | 50 mA |
| Max. inrush current | 25 A (20 ms) | 50 mA | 12 A (20 ms) | 50 mA |
| Min. switching current | 10 mA (at 12 V) | 1 mA (at 24 V) | 10 mA (at 5 V) | 1 mA (at 24 V) |
| Max. interrupting rating, ohmic load 250 V AC | 4000 VA | - | 2000 VA | - |
| General data | | | | |
| Test voltage (winding/contact) | 5 kV AC (50 Hz, 1 min.) | | 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 | | -40 °C ... 85 °C | |
| Mechanical service life | 1 x $10^7$ cycles | | 1 x $10^7$ cycles | |
| Electrical service life | see diagram | | see diagram | |
| Standards/regulations | IEC 60664, EN 50178, IEC 62103 | | IEC 60664, EN 50178, IEC 62103 | |

| Description | | Input voltage $U_N$ | Ordering data: Type | Order No. | Pcs. / Pkt. | Ordering data: Type | Order No. | Pcs. / Pkt. |
|---|---|---|---|---|---|---|---|---|
| **Plug-in miniature power relay** | | | | | | | | |
| with power contacts | ① | 12 V DC | **REL-MR- 12DC/21HC** | **2961309** | 10 | **REL-MR- 12DC/21-21** | **2961257** | 10 |
| with power contacts | ② | 24 V DC | **REL-MR- 24DC/21HC** | **2961312** | 10 | **REL-MR- 24DC/21-21** | **2961192** | 10 |
| with power contacts | ③ | 48 V DC | **REL-MR- 48DC/21HC** | **2834821** | 10 | **REL-MR- 48DC/21-21** | **2834834** | 10 |
| with power contacts | ④ | 60 V DC | **REL-MR- 60DC/21HC** | **2961325** | 10 | **REL-MR- 60DC/21-21** | **2961273** | 10 |
| with power contacts | ⑤ | 110 V DC | **REL-MR-110DC/21HC** | **2961338** | 10 | **REL-MR-110DC/21-21** | **2961202** | 10 |
| with power contacts | ⑥ | 24 V AC | **REL-MR- 24AC/21HC** | **2961406** | 10 | **REL-MR- 24AC/21-21** | **2961435** | 10 |
| with power contacts | ⑦ | 120 V AC | **REL-MR-120AC/21HC** | **2961419** | 10 | **REL-MR-120AC/21-21** | **2961448** | 10 |
| with power contacts | ⑧ | 230 V AC | **REL-MR-230AC/21HC** | **2961422** | 10 | **REL-MR-230AC/21-21** | **2961451** | 10 |
| **Plug-in miniature power relay** | | | | | | | | |
| with multi-layer gold contacts | ① | 12 V DC | **REL-MR- 12DC/21HC AU** | **2961532** | 10 | **REL-MR- 12DC/21-21AU** | **2961299** | 10 |
| with multi-layer gold contacts | ② | 24 V DC | **REL-MR- 24DC/21HC AU** | **2961545** | 10 | **REL-MR- 24DC/21-21AU** | **2961215** | 10 |
| with multi-layer gold contacts | ③ | 48 V DC | | | | **REL-MR- 48DC/21-21AU** | **2834847** | 10 |
| with multi-layer gold contacts | ④ | 60 V DC | | | | **REL-MR- 60DC/21-21AU** | **2961286** | 10 |
| with multi-layer gold contacts | ⑤ | 110 V DC | **REL-MR-110DC/21HC AU** | **2961561** | 10 | **REL-MR-110DC/21-21AU** | **2961228** | 10 |
| with multi-layer gold contacts | ⑥ | 24 V AC | **REL-MR- 24AC/21HC AU** | **2961503** | 10 | **REL-MR- 24AC/21-21AU** | **2961464** | 10 |
| with multi-layer gold contacts | ⑦ | 120 V AC | **REL-MR-120AC/21HC AU** | **2961516** | 10 | **REL-MR-120AC/21-21AU** | **2961477** | 10 |
| with multi-layer gold contacts | ⑧ | 230 V AC | **REL-MR-230AC/21HC AU** | **2961529** | 10 | **REL-MR-230AC/21-21AU** | **2961480** | 10 |

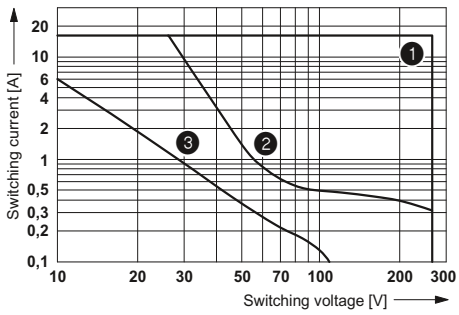
## REL-MR...21HC... (1 PDT)

Operating voltage range



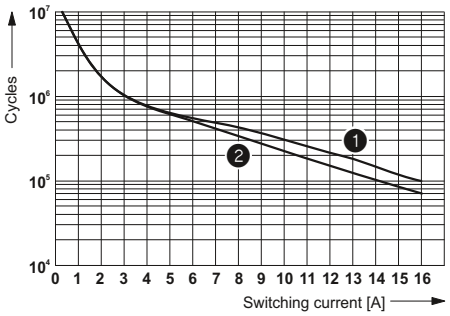

❶ DC coils
❷ AC coils

Interrupting rating



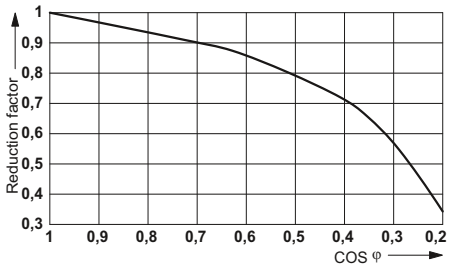

❶ AC, ohmic load
❷ DC, ohmic load
❸ DC, L/R = 40 ms

Electrical service life



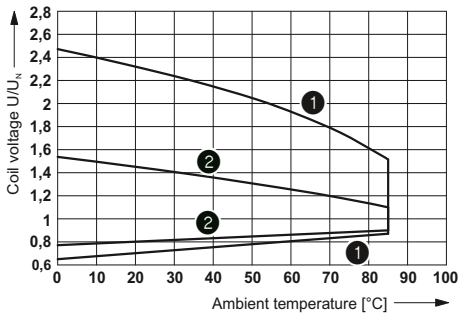

❶ 250 V AC, ohmic load (DC coils)
❷ 250 V AC, ohmic load (AC coils)

Service life reduction factor with various cos phi



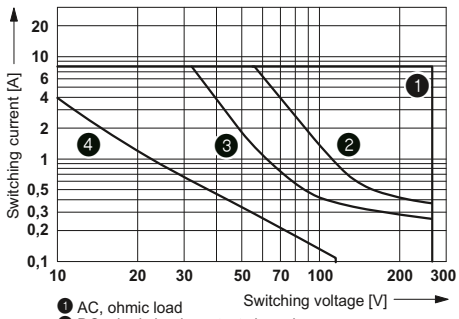

## REL-MR...21-21... (2 PDTs)

Operating voltage range



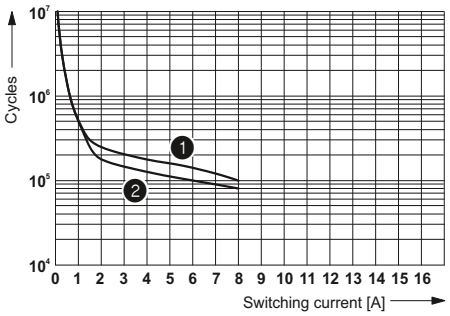

❶ DC coils
❷ AC coils

Interrupting rating



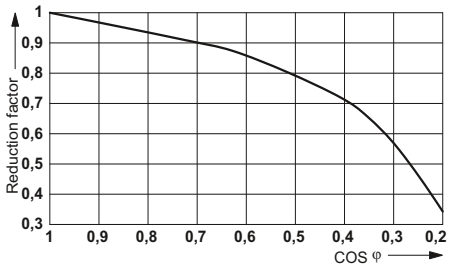

❶ AC, ohmic load
❷ DC, ohmic load, contacts in series
❸ DC, ohmic load
❹ DC, L/R = 40 ms

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



## Industrial relay system with screw connection - PR series

### Plug-in miniature power relays

Plug-in miniature power relays with 1 or 2 PDT contacts, suitable for RIF-1 and PR1 relay bases.

The advantages:

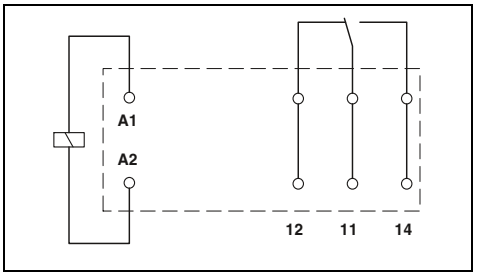
- Switching current of up to 16 A
- With lockable manual operation
- Mechanical switch position indicator
- Integrated status LED
- Multi-layer gold contact or power contact
- DC types with integrated freewheeling diode
- Can be soldered in on PCB

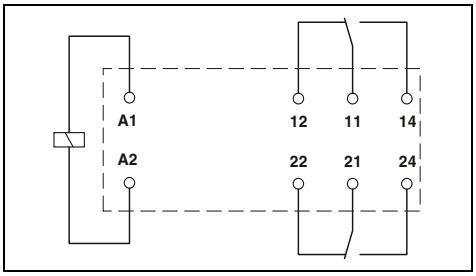
1 PDT relay

2 PDT relay

**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.




### Technical data

| | | | | | |
|---|---|---|---|---|---|
| Input data | | ① | ② | ③ | ④ |
| Permissible range (with reference to $U_N$) | | see 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 | | 1 PDT | 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 (at 10 mA) | 12 V (at 1 mA) |
| Limiting continuous current | | 16 A | 50 mA |
| Max. inrush current | | 32 A (20 ms) | 50 mA |
| Min. switching current | | 10 mA (at 12 V) | 1 mA (at 12 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 ... 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

| | | | | | |
|---|---|---|---|---|---|
| Input data | | ① | ② | ③ | ④ |
| Permissible range (with reference to $U_N$) | | see 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 | | 2 PDTs | 2 PDTs |
| 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 (at 10 mA) | 12 V (at 1 mA) |
| Limiting continuous current | | 8 A | 50 mA |
| Max. inrush current | | 16 A (20 ms) | 50 mA |
| Min. switching current | | 10 mA (at 12 V) | 1 mA (at 12 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 ... 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

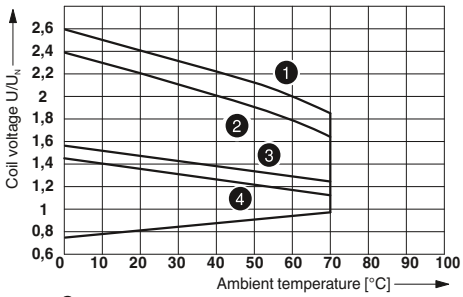
| Description | | Input voltage $U_N$ | Type | Order No. | Pcs. / Pkt. |
|---|---|---|---|---|---|
| **Plug-in miniature power relay, with power contacts** | | | | | |
| - Status LED, freewheeling diode A1+, A2- | ① | 24 V DC | **REL-MR- 24DC/21HC/MS** | **2987888** | 10 |
| - Status LED | ② | 24 V AC | **REL-MR- 24AC/21HC/MS** | **2987891** | 10 |
| - Status LED | ③ | 120 V AC | **REL-MR-120AC/21HC/MS** | **2987901** | 10 |
| - Status LED | ④ | 230 V AC | **REL-MR-230AC/21HC/MS** | **2987914** | 10 |
| **Plug-in miniature power relay**, with multi-layer gold contacts, with manual operation, mechanical switch position indicator | | | | | |
| - Status LED, freewheeling diode A1+, A2- | ① | 24 V DC | **REL-MR- 24DC/21HC AU/MS** | **2987927** | 10 |
| - Status LED | 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 |

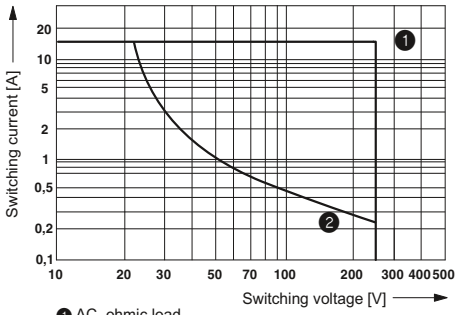
## REL-MR...21HC...MS (1 PDT)

Operating voltage range



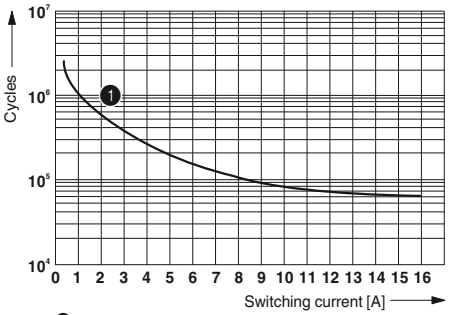

❶ DC coils, 0 A contact current
❷ DC coils, 16 A contact current
❸ AC coils, 0 A contact current
❹ AC coils, 16 A contact current

Interrupting rating



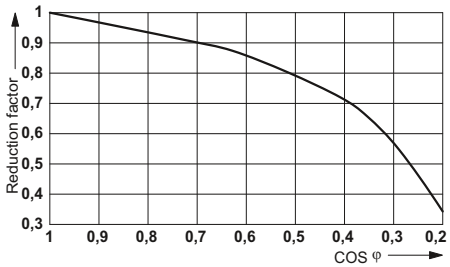

❶ AC, ohmic load
❷ DC, ohmic load

Electrical service life



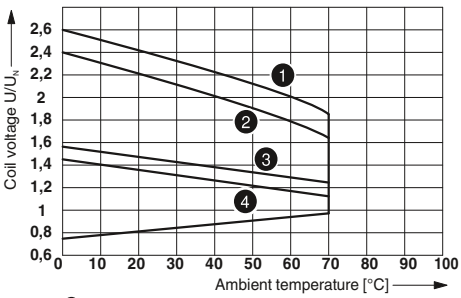

❶250 V AC, ohmic load

Service life reduction factor with various cos phi



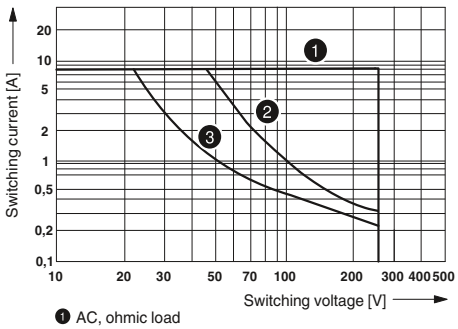

## REL-MR...21-21...MS (2 PDTs)

Operating voltage range



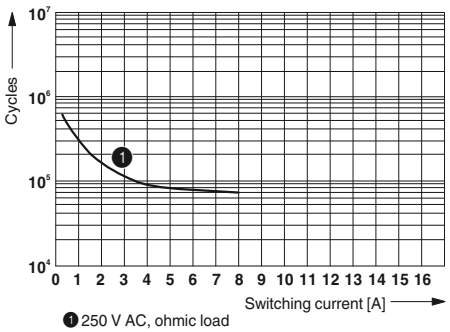

❶DC coils, 0 A contact current
❷DC coils, 8 A contact current
❸AC coils, 0 A contact current
❹AC coils, 8 A contact current

Interrupting rating



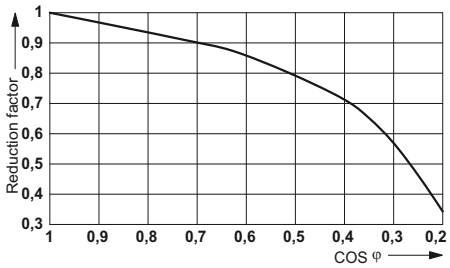

❶ AC, ohmic load
❷ DC, ohmic load, contacts in series
❸ DC, ohmic load

Electrical service life




❶250 V AC, ohmic load

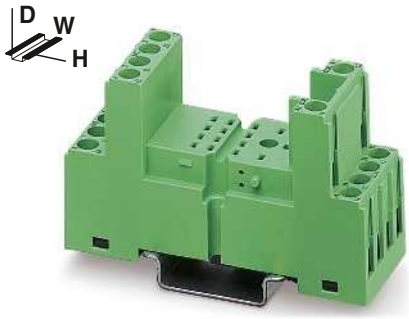
Service life reduction factor with various cos phi



## Modular PR2 relay base

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

| Notes: |
|---|
| Type of housing:<br>Polyamide fiber reinforced PA-F, color: green. |
| Marking systems and mounting material<br>See Catalog 5 |




2/2-level design with screw connection

### Technical data

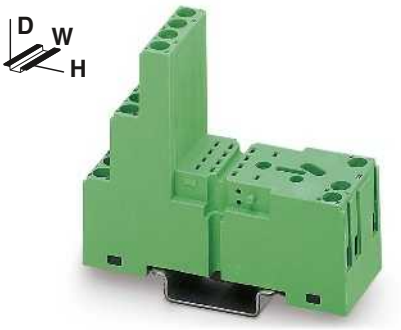
| | |
|---|---|
| Nominal voltage $U_N$ | 300 V AC/DC |
| Nominal current at $U_N$ | 12 A |
| General data | |
| Ambient temperature (operation) | -25 °C ... 85 °C |
| Connection data solid / stranded / AWG | 0.2 ... 2.5 mm² / 0.2 ... 2.5 mm² / 26 - 14 |
| Dimensions | |
| Width | 27 mm |
| Depth with retaining bracket | 84 mm (EL2-P35) |
| Height | 75 mm |

### Ordering data

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

### Accessories

| | | | |
|---|---|---|---|
| **Equipment marking label**, marking area 9 x 25 mm | **MP 2** | **2833644** | 10 |
| **Device marking label**, for thermal transfer printer, marking area 6 x 15 mm<br>2500 labels per roll | **EML (15X6) R YE** | **0819288** | 1 |
| **Device marking label**, for thermal transfer printer, marking area 6 x 15 mm<br>2500 labels per roll | **EML (15X6) R YE** | **0819288** | 1 |
| **Loop bridge**, 50-pos., divisible, 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

Relay retaining bracket

| Technical data | Technical data |
|---|---|
| 300 V AC/DC | - |
| 12 A | - |
| | |
| -25 °C ... 85 °C | - |
| 0.2 ... 2.5 mm² / 0.2 ... 2.5 mm² / 26 - 14 | - |
| | |
| 27 mm | - |
| 86 mm (EL2-P35) | - |
| 78.5 mm | - |

| Ordering data | | | Ordering data | | |
|---|---|---|---|---|---|
| Type | Order No. | Pcs. / Pkt. | Type | Order No. | Pcs. / Pkt. |
| | | | | | |
| | | | | | |
| PR2-BSC3/4X21 | 2833576 | 10 | | | |
| | | | | | |
| EL2-P35 | 2833592 | 10 | EL2-P35 | 2833592 | 10 |

| Accessories | | | Accessories | | |
|---|---|---|---|---|---|
| | | | | | |
| MP 2 | 2833644 | 10 | | | |
| | | | | | |
| EML (15X6) R YE | 0819288 | 1 | | | |
| | | | | | |
| EML (15X6) R YE | 0819288 | 1 | | | |
| | | | | | |
| DB 50- 90 BU | 2821180 | 1 | | | |
| DB 50- 90 BK | 2820916 | 1 | | | |
| DB 50- 90 GY | 2820929 | 1 | | | |

## Industrial relay system with screw connection - PR series

### Plug-in industrial relays suitable for PR2 relay base

Plug-in industrial relays with 2 or 4 PDT contacts, suitable for PR2 and RIF-2 relay bases.

The advantages:

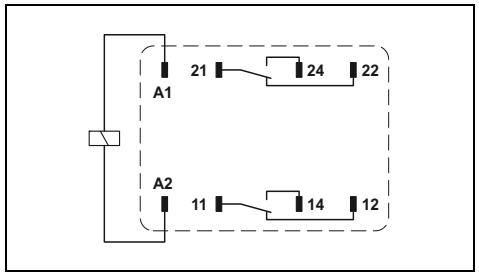
- With lockable manual operation
- Mechanical switch position indicator
- Integrated status LED
- Multi-layer gold contact or power contact
- DC types with integrated freewheeling diode

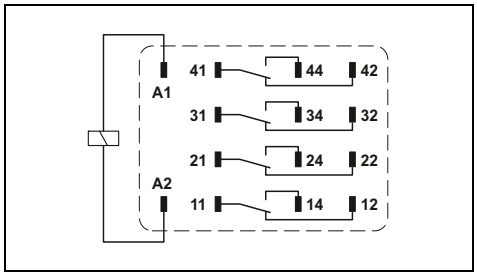
**Notes:**

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

**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 $U_N$) | | see 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 | | 2 PDTs | | | | | | | |
| 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 PR2 relay base | | | | | | | |

### Technical data

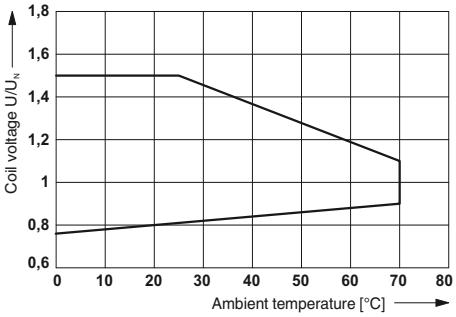
| Input data | | ① | ② | ③ | ④ | ⑤ | ⑥ | ⑦ | ⑧ |
|---|---|---|---|---|---|---|---|---|---|
| Permissible range (with reference to $U_N$) | | see diagram | | | | | | | |
| Typ. input current at $U_N$ | [mA] | 75 | 38 | 10 | 7.2 | 3.6 | 54 | 11 | 5 |
| Typ. response time at $U_N$ | [ms] | 13 | 13 | 13 | 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 | | 4 PDTs | | | | | | | |
| 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 PR2 relay base | | | | | | | |

### Ordering data

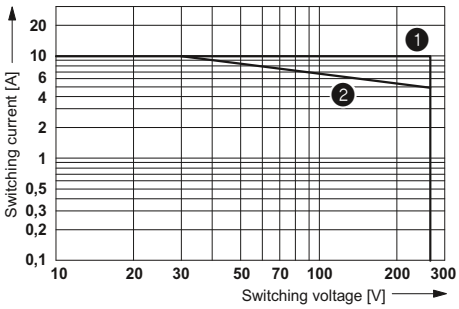
| Description | | Input voltage $U_N$ | Type | Order No. | Pcs. / Pkt. | Type | Order No. | Pcs. / Pkt. |
|---|---|---|---|---|---|---|---|---|
| **Plug-in industrial relay** with a test button, status LED, mechanical switch position indicator | | | | | | | | |
| with freewheeling diode, **A1 +, A2 -** | ① | 12 V DC | **REL-IR/LDP- 12DC/2X21** | **2834012** | 10 | **REL-IR/LDP- 12DC/4X21AU** | **2834083** | 10 |
| with freewheeling diode, **A1 +, A2 -** | ② | 24 V DC | **REL-IR/LDP- 24DC/2X21** | **2834025** | 10 | **REL-IR/LDP- 24DC/4X21AU** | **2834096** | 10 |
| with freewheeling diode, **A1 +, A2 -** | ③ | 110 V DC | **REL-IR/LDP-110DC/2X21** | **2834041** | 10 | **REL-IR/LDP-110DC/4X21AU** | **2834119** | 10 |
| with freewheeling diode, **A1 +, A2 -** | ④ | 125 V DC | **REL-IR/LDP-125DC/2X21** | **2834960** | 10 | **REL-IR/LDP-125DC/4X21AU** | **2834313** | 10 |
| with freewheeling diode, **A1 +, A2 -** | ⑤ | 220 V DC | **REL-IR/LDP-220DC/2X21** | **2834957** | 10 | **REL-IR/LDP-220DC/4X21AU** | **2834973** | 10 |
| | ⑥ | 24 V AC | **REL-IR/L- 24AC/2X21** | **2834054** | 10 | **REL-IR/L- 24AC/4X21AU** | **2834122** | 10 |
| | ⑦ | 120 V AC | **REL-IR/L-120AC/2X21** | **2834067** | 10 | **REL-IR/L-120AC/4X21AU** | **2834135** | 10 |
| | ⑧ | 230 V AC | **REL-IR/L-230AC/2X21** | **2834070** | 10 | **REL-IR/L-230AC/4X21AU** | **2834148** | 10 |
| **Plug-in industrial relay** with a test button, status LED, mechanical switch position indicator, (Japanese standard) | | | | | | | | |
| with freewheeling diode, **A1 -, A2 +** | ① | 12 V DC | **REL-IR/LDM- 12DC/2X21** | **2834151** | 10 | **REL-IR/LDM- 12DC/4X21AU** | **2834193** | 10 |
| with freewheeling diode, **A1 -, A2 +** | ② | 24 V DC | **REL-IR/LDM- 24DC/2X21** | **2834164** | 10 | **REL-IR/LDM- 24DC/4X21AU** | **2834203** | 10 |
| with freewheeling diode, **A1 -, A2 +** | ③ | 48 V DC | **REL-IR/LDM- 48DC/2X21** | **2834177** | 10 | **REL-IR/LDM- 48DC/4X21AU** | **2834216** | 10 |
| with freewheeling diode, **A1 -, A2 +** | ④ | 110 V DC | **REL-IR/LDM-110DC/2X21** | **2834180** | 10 | **REL-IR/LDM-110DC/4X21AU** | **2834229** | 10 |

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

Operating voltage range

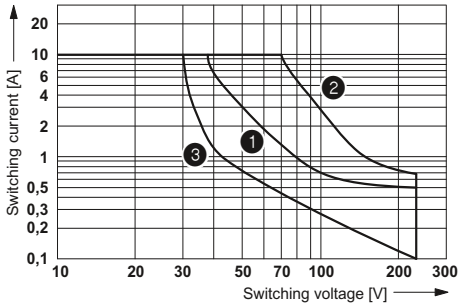



AC interrupting rating



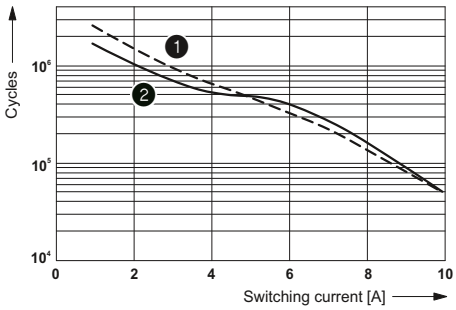

❶ Ohmic load
❷ cos φ = 0.4

DC interrupting rating



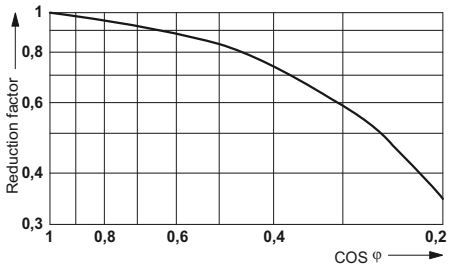

❶ Ohmic load
❷ ohmic load, contacts in series
❸ L/R < 7 ms

Electrical service life



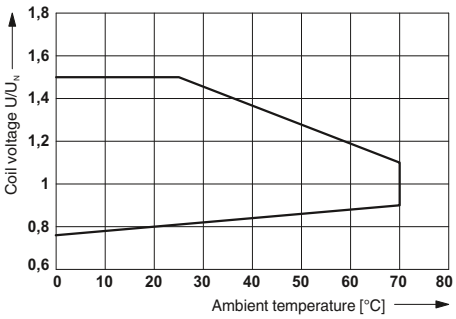

❶ 250 V AC, ohmic load
❷ 30 V DC, ohmic load

Service life reduction factor

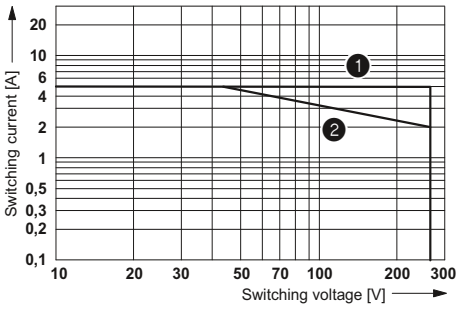



## REL-IR...4x21AU (4 PDTs)

Operating voltage range

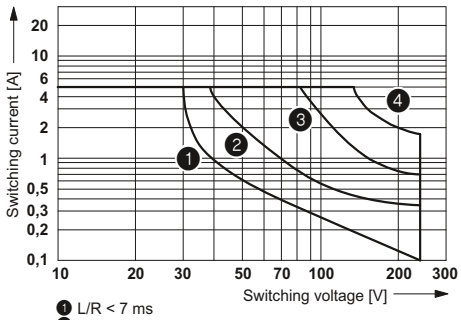



AC interrupting rating



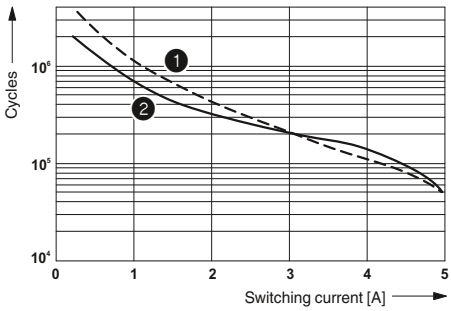

❶ Ohmic load
❷ cos φ = 0.4

DC interrupting rating



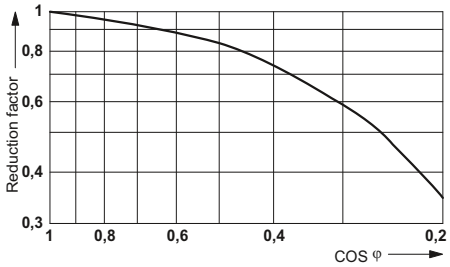

❶ L/R < 7 ms
❷ ohmic load
❸ ohmic load, 2 contacts in series
❹ ohmic load, 4 contacts in series

Electrical service life




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

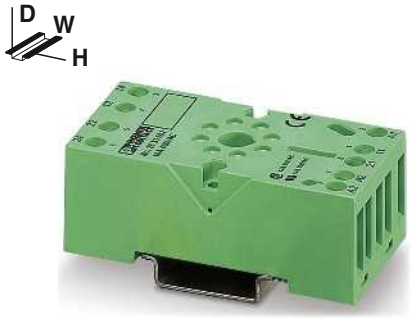
Service life reduction factor



## Modular PR3 relay base

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

| Notes: |
|---|
| Type of housing:<br>Polyamide fiber reinforced PA-F, color: green. |
| Marking systems and mounting material<br>See Catalog 5 |




**Relay base for 2 PDT octal relay**

### Technical data

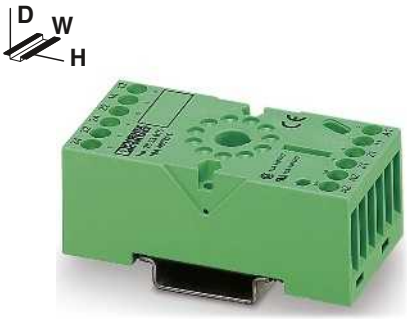
| | |
|---|---|
| Nominal voltage $U_N$ | 400 V AC/DC |
| Nominal current at $U_N$ | 10 A |
| General data | |
| Ambient temperature (operation) | -40 °C ... 85 °C |
| Connection data solid / stranded / AWG | 0.2 ... 2.5 mm² / 0.2 ... 2.5 mm² / 26 - 14 |
| Dimensions | |
| Width | 38 mm |
| Depth with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

### Ordering data

| Description | Type | Order No. | Pcs. / Pkt. |
|---|---|---|---|
| **PR3 relay base**, for REL-OR octal relay with two PDTs, plug-in option for input/interference suppression modules<br><br>With screw connection | **PR3-BSC1/2X21** | **2833602** | 10 |
| **PR3 relay base,** for REL-OR octal relay with three PDTs, plug-in option for input/interference suppression modules<br><br>With screw connection | | | |
| **Relay retaining bracket**, wire model, suitable for RIF-3 and PR3 relay base | **EL3-M52** | **2833628** | 10 |

### Accessories

| | | | |
|---|---|---|---|
| **Loop bridge**, 50-pos., divisible, 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 | | | |

## Plug-in octal relays suitable for PR3 relay base

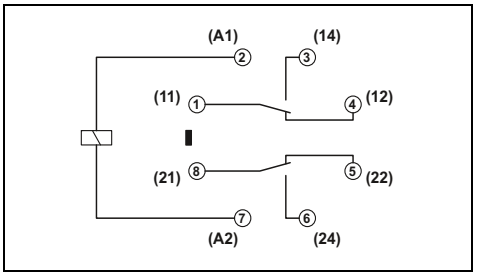
Plug-in octal relays with 2 or 3 PDT contacts, suitable for PR3 and RIF-3 relay bases.

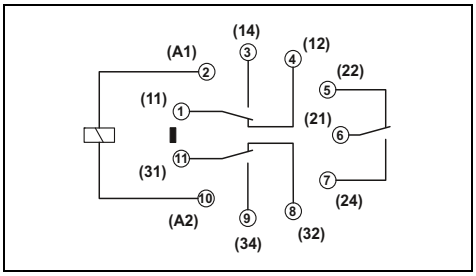
The advantages:

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

2 PDT relay with power contacts

3 PDT relay with power contacts



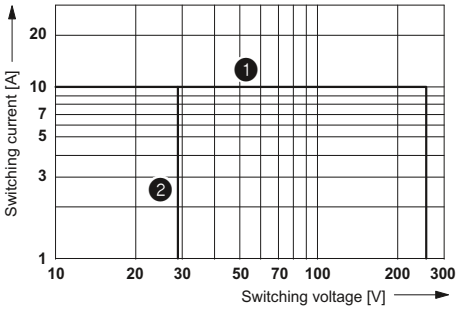




| | | Technical data | | | | Technical data | | | |
|---|---|---|---|---|---|---|---|---|---|
| Input data | | ① | ② | ③ | ④ | ① | ② | ③ | ④ |
| Typ. input current at $U_N$ | [mA] | 56 | 110 | 22 | 10 | 56 | 110 | 22 | 10 |
| Typ. response time at $U_N$ | [ms] | 12 | | | | 12 | | | |
| Typ. response 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 | | 2 PDTs | | | | 3 PDTs | | | |
| Contact material | | AgSnIn | | | | AgSnIn | | | |
| Max. switching voltage | | 250 V AC/DC | | | | 250 V AC/DC | | | |
| Min. switching voltage | | 1 V | | | | 1 V | | | |
| Limiting continuous current | | 10 A (N/O contact) | | | | 10 A (N/O contact) | | | |
| 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) | | -40 °C ... 60 °C | | | | -40 °C ... 60 °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 PR3 relay base | | | | any / on PR3 relay base | | | |

| | | Ordering data | | | Ordering data | | |
|---|---|---|---|---|---|---|---|
| Description | Input voltage $U_N$ | Type | Order No. | Pcs. / Pkt. | Type | Order No. | Pcs. / Pkt. |
| **Plug-in 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 |

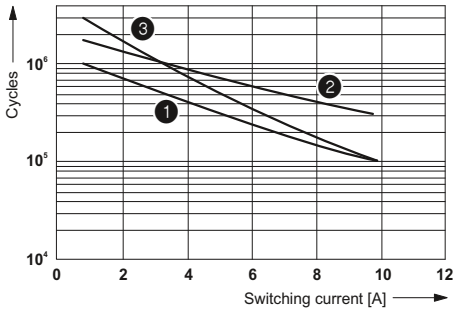
## REL-OR...2x21 (2 PDTs)

Interrupting rating



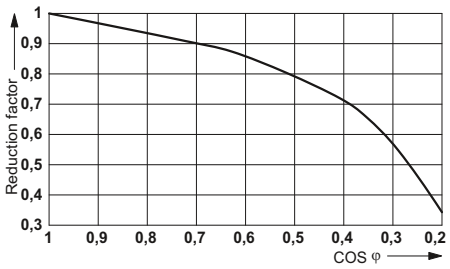

❶ AC, ohmic load
❷ DC, ohmic load

Electrical service life



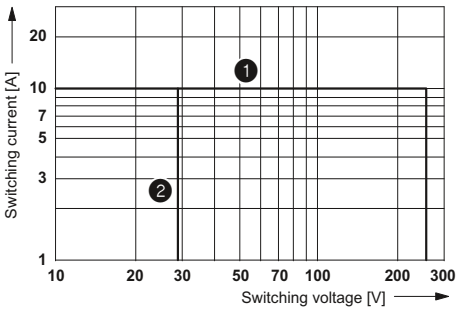

❶ 250V AC, ohmic load
❷ 120VDC, ohmic load
❸ 28V DC, ohmic load

Service life reduction factor with various cos phi



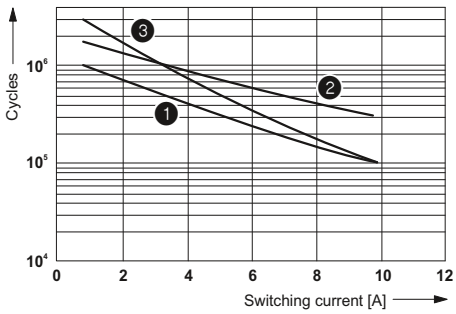

## REL-OR...3x21 (3 PDTs)

Interrupting rating



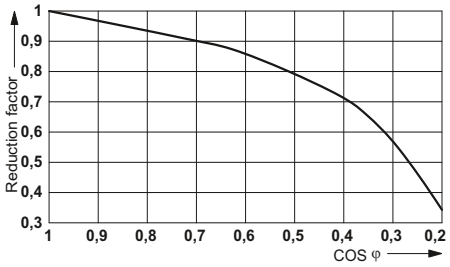

❶ AC, ohmic load
❷ DC, ohmic load

Electrical service life




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

Service life reduction factor with various cos phi



## Input modules/interference suppression modules for PR1, PR2, and PR3

Plug-in input modules/interference suppression modules for optional fitting of PR... relay bases.

The advantages:

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

Input/interference suppression module to match PR1 and PR2

Input/interference suppression module to match PR3

| Description | Ordering data | | | Ordering data | | |
|---|---|---|---|---|---|---|
| | Type | Order No. | Pcs. / Pkt. | Type | Order No. | Pcs. / Pkt. |
| **Plug-in module**, for mounting on PR..., with LED status indicator and freewheeling 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 freewheeling 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- 48- 60UC** | **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 of 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 | | | |

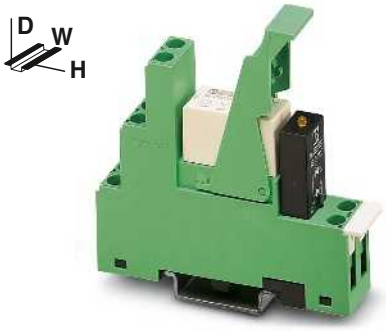
The relay bases of the PR1 series can also be equipped with wear-free solid-state relays (OPT… or SIM-EI...) as an alternative to the electromechanical relay.
LDP… and LV… plug-in modules cannot be used in conjunction with SIM-EI... solid-state relays.

## Fully mounted PR1 relay modules with screw connection

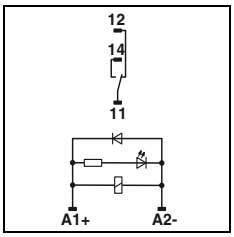
Fully mounted PR1 relay modules, consisting of:
- Relay base
- 1/2 PDT relay
- Relay retaining bracket
- Input module/interference suppr. module
- Marking labels

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

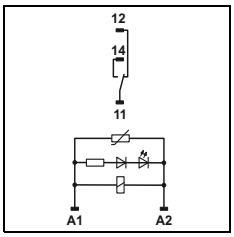
| Notes: |
|---|
| Type of housing:<br>Polyamide fiber reinforced PA-F, color: green. |
| For the protection of input and output, inductive loads must be dampened with an effective protection circuit. |
| If the specified maximum values for multi-layer contact relays are exceeded, the gold plating is 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

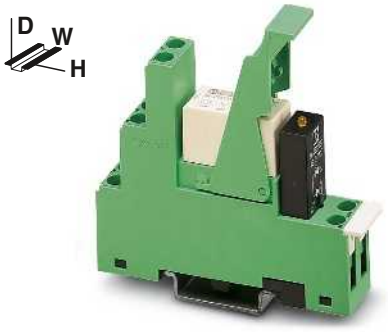
| | | | | | |
|---|---|---|---|---|---|
| Input data | | ① | ② | ③ | ④ |
| Permissible range (with reference to $U_N$) | | see diagram | | | |
| Typ. input current at $U_N$ | [mA] | 19 | 34 | 9 | 6 |
| Typ. response time at $U_N$ | [ms] | 8 | 3 - 12 | 3 - 12 | 3 - 12 |
| Typ. release time at $U_N$ | [ms] | 10 | 1.5 - 14 | 1.5 - 16 | 2 - 22 |
| Input circuit AC | | Yellow LED, varistor | | | |
| Input circuit DC | | Yellow LED, freewheeling diode | | | |
| Output data | | | | | |
| Contact type | | 1 PDT | | 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 (at 10 mA) | | 100 mV (at 10 mA) | |
| Limiting continuous current | | 12 A | | 50 mA | |
| Max. inrush current | | 30 A (300 ms) | | 50 mA | |
| Min. switching current | | 10 mA (at 12 V) | | 1 mA (at 24 V) | |
| Interrupting rating (ohmic load) | | 3000 W (for 250 V AC) | | 1.2 W (at 24 V DC) | |
| General data | | | | | |
| Test voltage (winding/contact) | | 4 kV (50 Hz, 1 min.) | | | |
| Test voltage (contact/contact) | | - | | | |
| Ambient temperature (operation) | | -25 °C ... 60 °C | | | |
| Nominal operating mode | | 100% operating factor | | | |
| Mechanical service life | | 3 x $10^7$ cycles | | | |
| 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 | | | |
| EMC note | | Class A product, see page 625 | | | |

### Ordering data

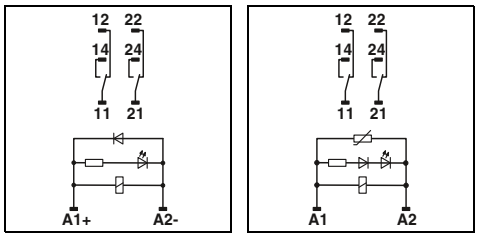
| Description | | Input voltage $U_N$ | Type | Order No. | Pcs. / Pkt. |
|---|---|---|---|---|---|
| **Pre-assembled coupling relay modules** with miniature power contact relay | | | | | |
| | ① | 24 V DC | **PR1-RSC3-LDP-24DC/21** | **2834326** | 5 |
| | ② | 24 V AC | **PR1-RSC3-LV- 24AC/21** | **2834339** | 5 |
| | ③ | 120 V AC | **PR1-RSC3-LV-120AC/21** | **2834342** | 5 |
| | ④ | 230 V AC | **PR1-RSC3-LV-230AC/21** | **2834355** | 5 |
| **Pre-assembled coupling relay modules** with multi-layer contact relay | | | | | |
| | ① | 24 V DC | **PR1-RSC3-LDP-24DC/21AU** | **2834368** | 5 |
| | ② | 24 V AC | **PR1-RSC3-LV- 24AC/21AU** | **2834371** | 5 |
| | ③ | 120 V AC | **PR1-RSC3-LV-120AC/21AU** | **2834384** | 5 |
| | ④ | 230 V AC | **PR1-RSC3-LV-230AC/21AU** | **2834397** | 5 |

### Accessories

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




PR1 relay module with
2 PDT relay




DC coils AC coils

## Technical data

| ① | ② | ③ | ④ |
|---|---|---|---|
| see diagram | | | |
| 19 | 34 | 9 | 6 |
| 8 | 3 - 12 | 3 - 12 | 3 - 12 |
| 10 | 1.5 - 14 | 1.5 - 16 | 2 - 22 |
| Yellow LED, varistor | | | |
| Yellow LED, freewheeling diode | | | |

| | |
|---|---|
| 2 PDTs | 2 PDTs |
| 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 W (for 250 V AC) | 1.2 W (at 24 V DC) |

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
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
Class A product, see page 625

## Ordering data

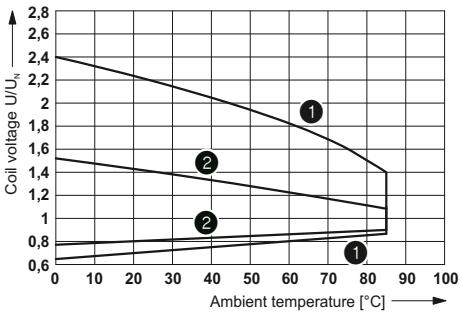
| Type | Order No. | Pcs. / Pkt. |
|---|---|---|
| PR1-RSC3-LDP-24DC/2X21 | 2834481 | 5 |
| PR1-RSC3-LV- 24AC/2X21 | 2834494 | 5 |
| PR1-RSC3-LV-120AC/2X21 | 2834504 | 5 |
| PR1-RSC3-LV-230AC/2X21 | 2834517 | 5 |
| PR1-RSC3-LDP-24DC/2X21AU | 2834520 | 5 |
| PR1-RSC3-LV- 24AC/2X21AU | 2834533 | 5 |
|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

## Accessories

| | | |
|---|---|---|
| EML (15X6) R YE | 0819288 | 1 |

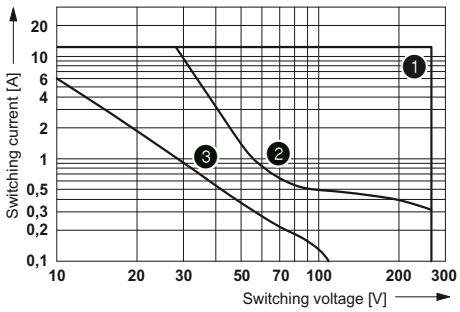
# PR1-RSC3.../21 (1 PDT)

Operating voltage range of the relay



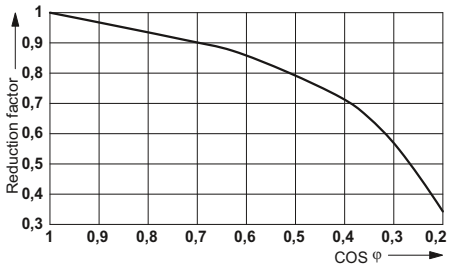

❶ DC coils
❷ AC coils

Interrupting rating

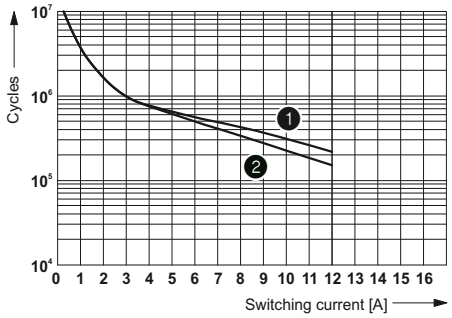



❶ AC, ohmic load
❷ DC, ohmic load
❸ DC, L/R = 40 ms

Service life reduction factor



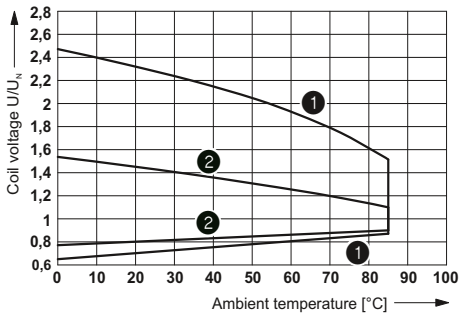

Electrical service life




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

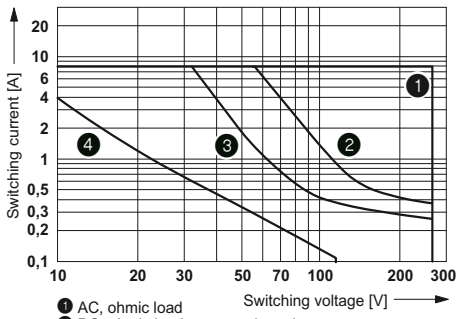
# PR1-RSC3.../2x21 (2 PDTs)

Operating voltage range of the relay



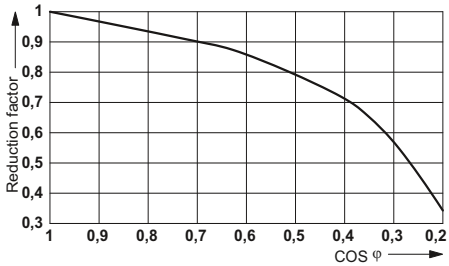

❶ DC coils
❷ AC coils

Interrupting rating

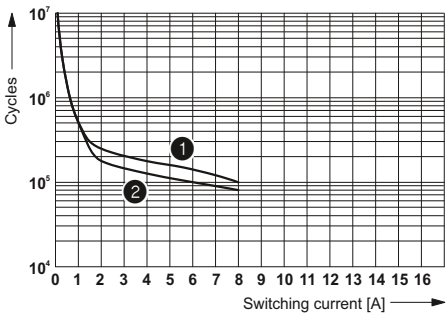



❶ AC, ohmic load
❷ DC, ohmic load, contacts in series
❸ DC, ohmic load
❹ DC, L/R = 40 ms

Service life reduction factor with various cos phi




Electrical service life



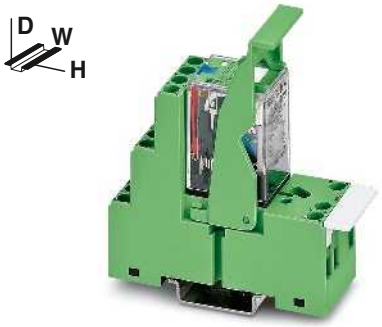

❶ 250 V AC, ohmic load (DC coils)
❷ 250 V AC, ohmic load (AC coils)

## Fully mounted PR2 relay modules

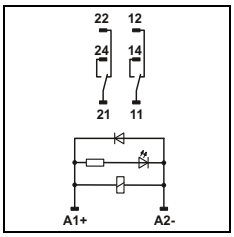
Fully mounted PR2 relay modules, consisting of:
- Relay base
- 2/4 PDT relay
- Relay retaining bracket
- Input module/interference suppr. module (AC types only)
- Marking labels

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

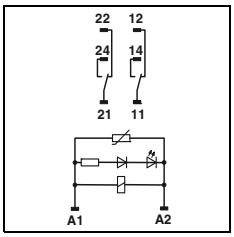
| Notes: |
|---|
| Type of housing:<br>Polyamide fiber reinforced PA-F, color: green. |
| For the protection of input and output, inductive loads must be dampened with an effective protection circuit. |
| If the specified maximum values for multi-layer contact relays are exceeded, the gold plating is 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 freewheeling diode are integrated directly into the relay. |




**PR2 relay module with 2 PDT relay**




**DC coils**




**AC coils**

### Technical data

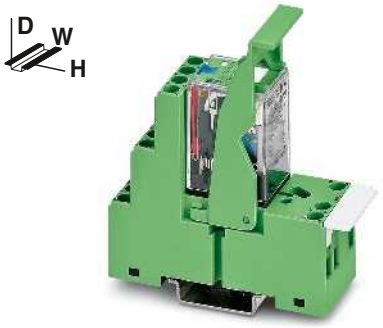
| | | | | | |
|---|---|---|---|---|---|
| Input data | | ① | ② | ③ | ④ |
| Permissible range (with reference to $U_N$) | | see diagram | | | |
| Typ. input current at $U_N$ | [mA] | 38 | 54 | 11 | 5 |
| Typ. response time at $U_N$ | [ms] | 13 | 4 - 10 | 4 - 10 | 4 - 10 |
| Typ. release time at $U_N$ | [ms] | 5 | 3 - 12 | 3 - 12 | 3 - 12 |
| Input circuit AC | | Red LED, varistor | | | |
| Input circuit DC | | Green LED, freewheeling diode | | | |
| Output data | | | | | |
| Contact type | | 2 PDTs | | | |
| Contact material | | Ag | | | |
| Max. switching voltage | | 250 V AC/DC | | | |
| Min. switching voltage | | 5 V | | | |
| Limiting continuous current | | 10 A | | | |
| Max. inrush current | | 20 A (15 ms) | | | |
| Min. switching current | | 1 mA | | | |
| Interrupting rating (ohmic load) | | 2500 VA (for 250 V AC) | | | |
| General data | | | | | |
| Test voltage (winding/contact) | | 2 kV (50 Hz, 1 min.) | | | |
| Test voltage (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 | | | |
| 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 | | | |
| EMC note | | Class A product, see page 625 | | | |

### Ordering data

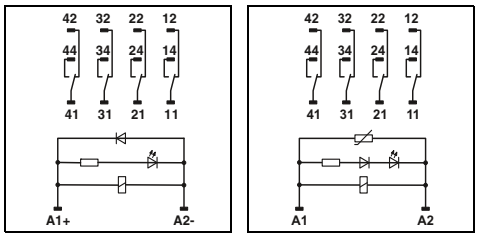
| Description | | Input voltage $U_N$ | Type | Order No. | Pcs. / Pkt. |
|---|---|---|---|---|---|
| **Pre-assembled coupling relay modules** with 2-PDT contact relay | | | | | |
| | ① | 24 V DC | **PR2-RSC3-LDP-24DC/2X21** | **2834643** | 5 |
| | ② | 24 V AC | **PR2-RSC3-LV- 24AC/2X21** | **2834656** | 5 |
| | ③ | 120 V AC | **PR2-RSC3-LV-120AC/2X21** | **2834669** | 5 |
| | ④ | 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 | | | | | |
| | ① | 24 V DC | | | |
| | ② | 24 V AC | | | |
| | ③ | 120 V AC | | | |
| | ④ | 230 V AC | | | |

### Accessories

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




**PR2 relay module with 4 PDT relay**




**DC coils** **AC coils**

## Technical data

| ① | ② | ③ | ④ |
|---|---|---|---|
| see diagram | | | |
| 38 | 54 | 11 | 5 |
| 13 | 4 - 10 | 4 - 10 | 4 - 10 |
| 5 | 3 - 12 | 3 - 12 | 3 - 12 |
| Red LED, varistor | | | |
| Green LED, freewheeling diode | | | |

4 PDTs
AgNi, hard gold-plated
250 V AC/DC
1 V
5 A
12 A (15 ms)
1 mA
1250 VA (for 250 V AC)

2 kV (50 Hz, 1 min.)
2 kV (50 Hz, 1 min.)
-25 °C ... 60 °C
100% operating factor
5 x $10^7$ cycles
IEC 60664, EN 50178, IEC 62103
2 / II

any / can be aligned without spacing
0.14 - 2.5 $mm^2$ / 0.14 - 2.5 $mm^2$ / 26 - 14
27 mm / 78.5 mm / 86 mm
Class A product, see page 625

## Ordering data

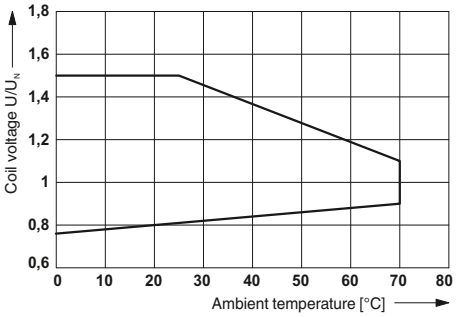
| Type | Order No. | Pcs. / Pkt. |
|---|---|---|
| PR2-RSC3-LDP-24DC/4X21AU | 2834724 | 5 |
| PR2-RSC3-LV- 24AC/4X21AU | 2834737 | 5 |
| PR2-RSC3-LV-120AC/4X21AU | 2834740 | 5 |
| PR2-RSC3-LV-230AC/4X21AU | 2834753 | 5 |

## Accessories

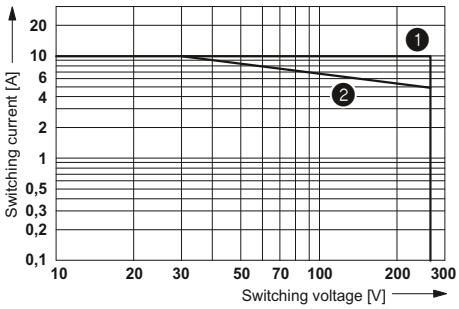
| | | |
|---|---|---|
| EML (15X6) R YE | 0819288 | 1 |

# PR2-RS.../2x21 (2 PDTs)

Operating voltage range of relay $T_a=T_{coil}$

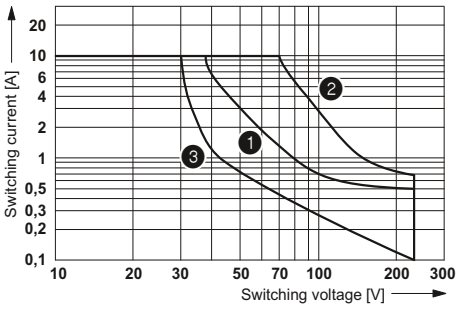



AC interrupting rating



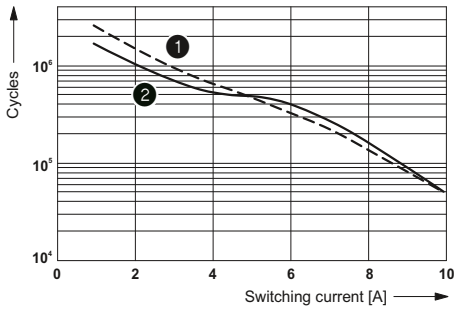

❶ Ohmic load
❷ cos φ = 0.4

DC interrupting rating




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

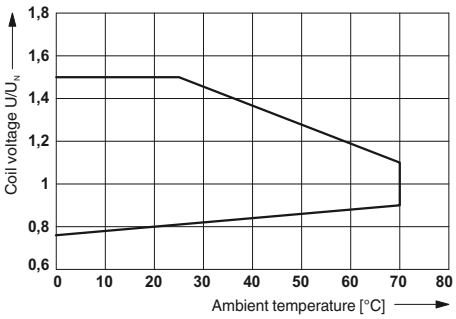
Electrical service life



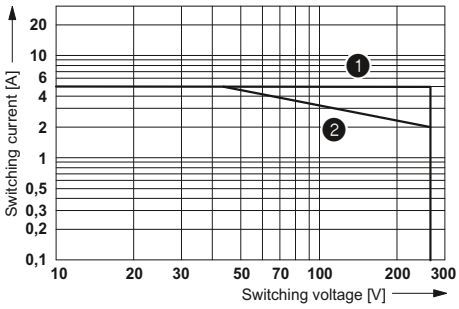

❶ 250 V AC, ohmic load
❷ 30 V DC, ohmic load

# PR2-RS.../4x21 (4 PDTs)

Operating voltage range of relay $T_a=T_{coil}$

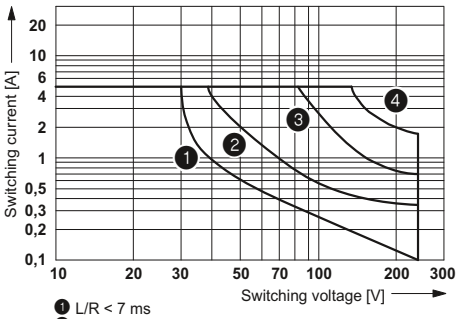



AC interrupting rating



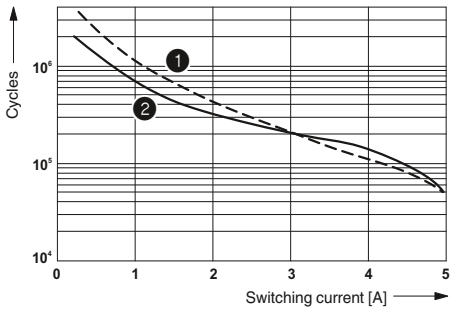

❶ Ohmic load
❷ cos φ = 0.4

DC interrupting rating



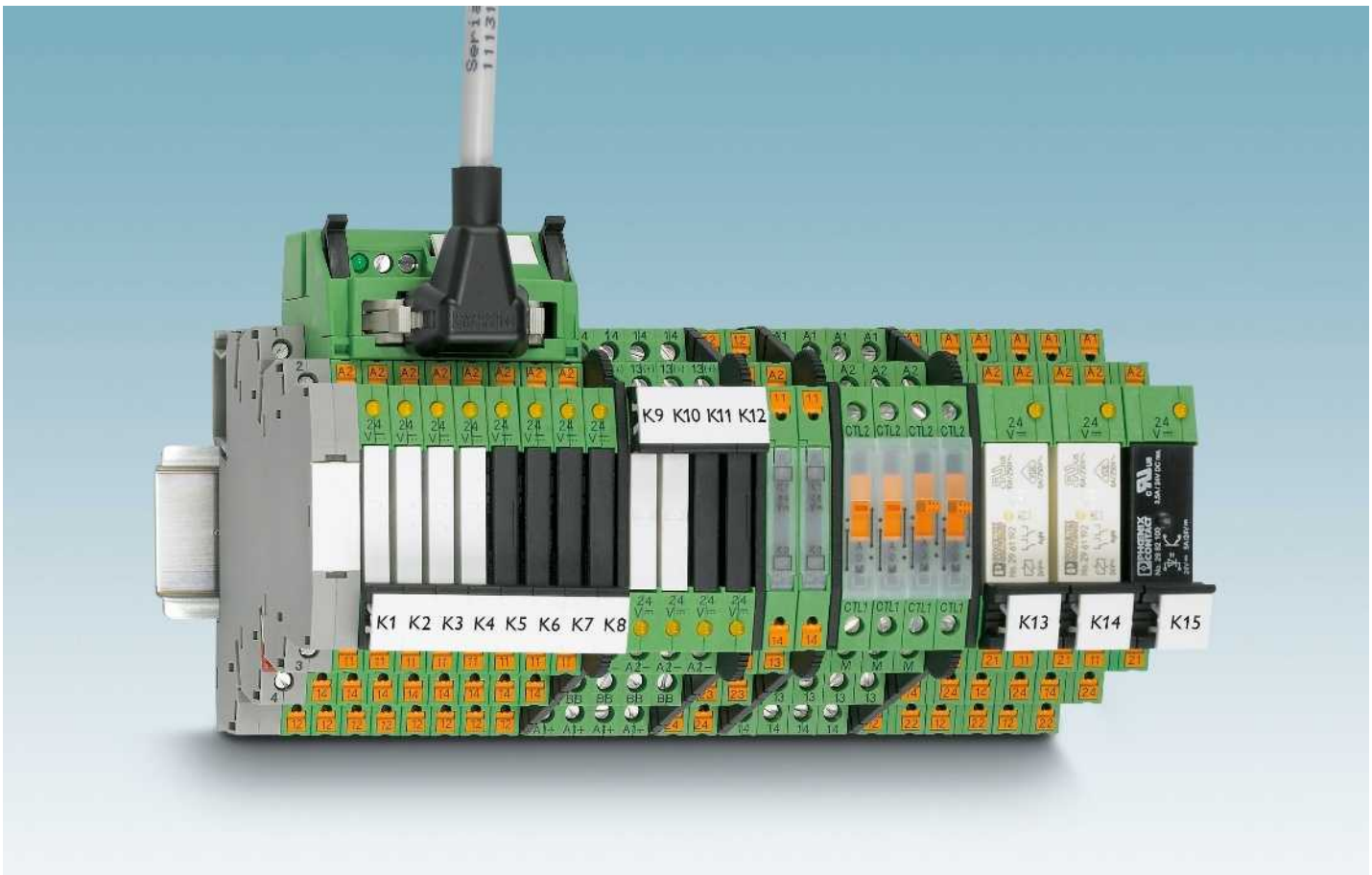

❶ L/R < 7 ms
❷ ohmic load
❸ ohmic load, 2 contacts in series
❹ ohmic load, 4 contacts in series

Electrical service life




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

## Highly compact relay modules - PLC-INTERFACE




The PLC-INTERFACE relay system is the interface between the controller and system I/O devices.

The universal design is compact and space-saving. While the narrow 6.2 mm module has one contact, the 14 mm version is available with two contacts. The modules can be equipped with either an electromechanical or a solid-state relay.

They are protected against environmental influences by RTIII (IP67). The relays also offer safe isolation according to DIN EN 50178 (VDE 0160).

PLC-INTERFACE is available in three connection technologies. Depending on the usage range, screw or push-in connection can be selected.

In addition to the universal types, PLC-INTERFACE is also available in numerous special versions. These include:

– Sensor and actuator modules that can accommodate all connections directly on the interface
– Modules for high inrush or continuous currents
– Railway modules, which meet specific railway requirements
– Filter modules, which filter out interference on the input side

Jumpers are available for all modules for simple potential distribution. In addition, solutions from system cabling applications offer easy connection to the plant control system. VARIOFACE adapters can be used to reduce wiring effort considerably. Installation is simplified significantly thanks to the integrated input and protective circuit.

Standard marking material from CLIPLINE complete modular terminal blocks can be used to mark PLC-INTERFACE.

**Universal modules**

PLC-R... and PLC-O... relay and solid-state relay modules with PDT or N/O contact, designed for universal use. Available in an overall width of 6.2 mm with one contact or in 14 mm with two contacts.

Available either with screw or push-in connection.

**Sensors/actuators**

PLC...SEN and PLC...ACT offer space-saving sensor and actuator wiring without additional supply or output terminal blocks. The sensor or actuator connections are incorporated directly at the relay module.

Available either with screw or push-in connection.

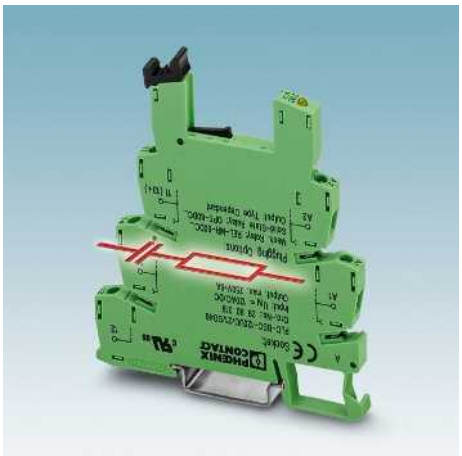
**High currents**

PLC...IC is particularly suitable for applications with high switch-on currents, e.g. from lamp loads. The PLC...HC relay modules are designed for applications with high continuous currents.

Available either with screw or push-in connection.

**Railway applications**

PLC...RW relay or solid-state relay modules are suitable for railway requirements. These cover, for example, the extended temperature and input voltage range of railway applications.



**Interference signals on the input side**

PLC-B...SO46 basic terminal blocks are used for filtering interference currents and interference voltages on the input side.

Available either with screw or push-in connection.

**Accessories**

The entire PLC-INTERFACE system can be extended by a range of accessories such as power terminals, adapters for system cabling or jumpers for potential distribution.

## Highly compact relay modules - PLC-INTERFACE

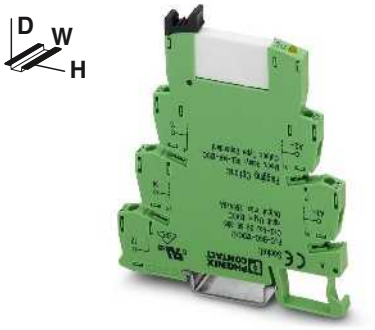
### Universal PLC series with PDT relay

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

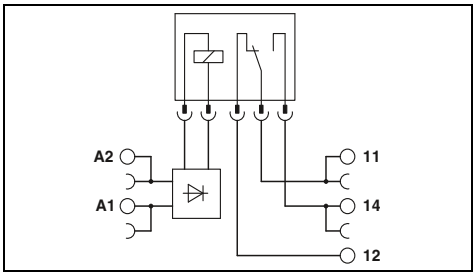
The advantages:

- Slim design
- Screw and push-in connection technology
- Functional jumpers
- 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:<br>Polyamide PA non-reinforced, color: green. |
| Marking systems and mounting material<br>See Catalog 5 |
| 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 423 |
| Note: for marking material (ZB 6), see “CLIPLINE industrial connection technology, marking material for terminals, conductors, and cables”. |
| [1]) 120 and 230 V types up to 55 °C |
| [2]) 230 V types up to 55 °C |




1 PDT with power contact



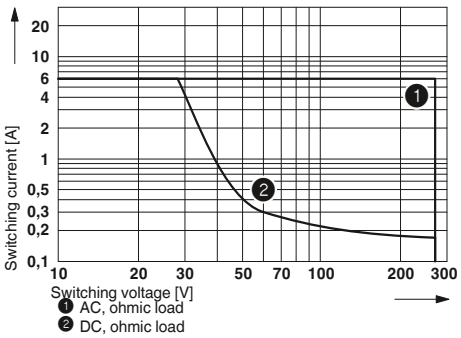

### Technical data

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 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, freewheeling 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 | | | | | | |
| EMC note | | Class A product, see page 625 | | | | | | |

### Ordering data

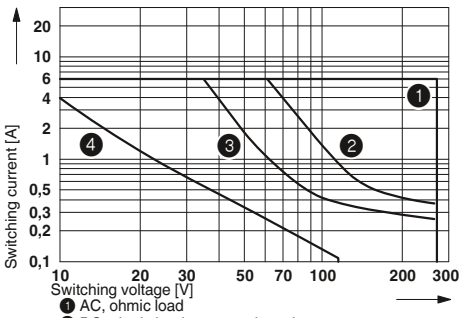
| Description | | Input voltage $U_N$ | Type | Order No. | Pcs. / Pkt. |
|---|---|---|---|---|---|
| **PLC-INTERFACE,** with **screw connection** | | | | | |
| | ① | 12 V DC | **PLC-RSC- 12DC/21** | **2966906** | 10 |
| | ② | 24 V DC | **PLC-RSC- 24DC/21** | **2966171** | 10 |
| | ③ | 24 V AC/DC | **PLC-RSC- 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 **push-in connection** | | | | | |
| | ① | 12 V DC | **PLC-RPT- 12DC/21** | **2900316** | 10 |
| | ② | 24 V DC | **PLC-RPT- 24DC/21** | **2900299** | 10 |
| | ③ | 24 V AC/DC | **PLC-RPT- 24UC/21** | **2900300** | 10 |
| | ④ | 48 V DC | **PLC-RPT- 48DC/21** | **2900301** | 10 |
| | ⑤ | 60 V DC | **PLC-RPT- 60DC/21** | **2900303** | 10 |
| | ⑥ | 120 V AC (110 V DC) | **PLC-RPT-120UC/21** | **2900304** | 10 |
| | ⑦ | 230 V AC (220 V DC) | **PLC-RPT-230UC/21** | **2900305** | 10 |

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

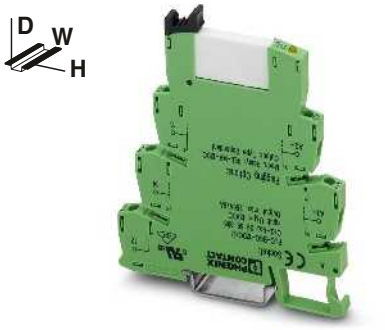



❶ AC, ohmic load
❷ DC, ohmic load

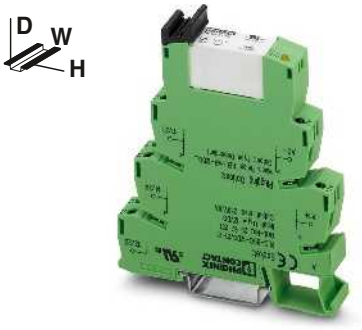
**Electrical interrupting rating for PLC...21-21 with 2-PDT relay**



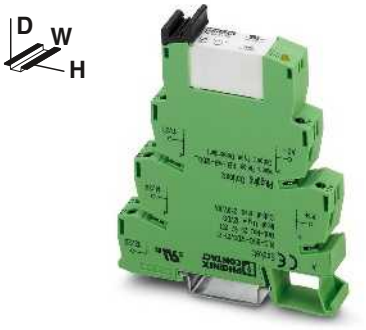

❶ AC, ohmic load
❷ DC, ohmic load, contacts in series
❸ DC, ohmic load
❹ DC, L/R = 40 ms



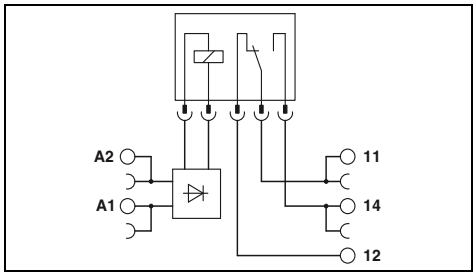

**1 PDT with multi-layer gold contact**

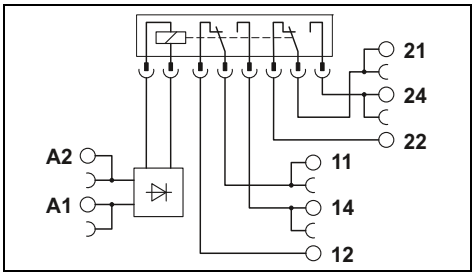


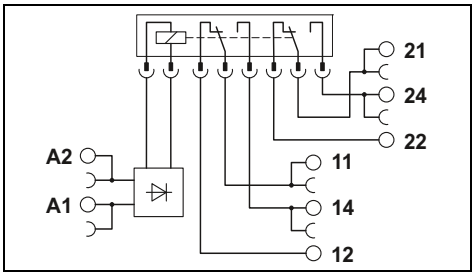

**2 PDT with power contact**




**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, freewheeling 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
Class A product, see page 625

## 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-RPT- 12DC/21AU** | **2900317** | 10 |
| **PLC-RPT- 24DC/21AU** | **2900306** | 10 |
| **PLC-RPT- 24UC/21AU** | **2900307** | 10 |
| **PLC-RPT- 48DC/21AU** | **2900308** | 10 |
| **PLC-RPT- 60DC/21AU** | **2900309** | 10 |
| **PLC-RPT-120UC/21AU** | **2900310** | 10 |
| **PLC-RPT-230UC/21AU** | **2900311** | 10 |

## 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, freewheeling 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
Class A product, see page 625

## 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-RPT- 12DC/21-21** | **2900329** | 10 |
| **PLC-RPT- 24DC/21-21** | **2900330** | 10 |
| **PLC-RPT- 24UC/21-21** | **2900332** | 10 |
| **PLC-RPT- 48DC/21-21** | **2900333** | 10 |
| **PLC-RPT- 60DC/21-21** | **2900334** | 10 |
| **PLC-RPT-120UC/21-21** | **2900335** | 10 |
| **PLC-RPT-230UC/21-21** | **2900336** | 10 |

## 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, freewheeling 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
Class A product, see page 625

## 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-RPT- 12DC/21-21AU** | **2900337** | 10 |
| **PLC-RPT- 24DC/21-21AU** | **2900338** | 10 |
| **PLC-RPT- 24UC/21-21AU** | **2900339** | 10 |
| **PLC-RPT- 48DC/21-21AU** | **2900340** | 10 |
| **PLC-RPT- 60DC/21-21AU** | **2900341** | 10 |
| **PLC-RPT-120UC/21-21AU** | **2900342** | 10 |
| **PLC-RPT-230UC/21-21AU** | **2900343** | 10 |

## Highly compact relay modules - PLC-INTERFACE

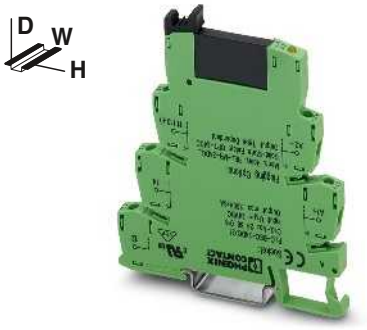
### Universal PLC series with solid-state relays

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

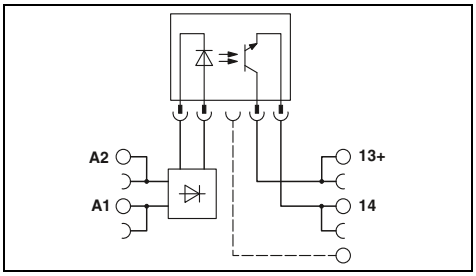
The advantages:

- Slim design
- Screw and push-in connection technology
- Functional jumpers
- 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:<br>Polyamide PA non-reinforced, color: green. |
| Marking systems and mounting material<br>See Catalog 5 |
| 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 425 |




**Max. DC voltage output of 100 mA**

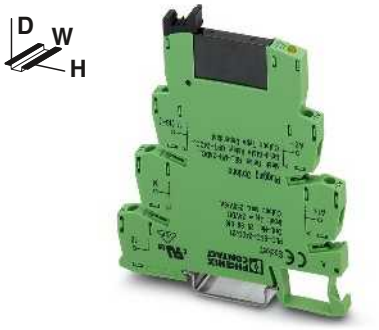



### Technical data

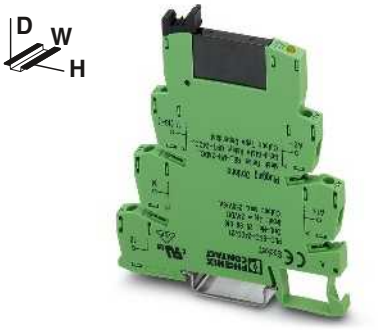
| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Input data | | ① | ② | ③ | ④ | ⑤ | ⑥ |
| Permissible range (with reference to $U_N$) | | 0.8 - 1.2 | 0.8 - 1.2 | 0.8 - 1.2 | 0.8 - 1.1 | 0.9 - 1.1 | 0.9 - 1.1 |
| Switching level (with reference to $U_N$) | 1 signal ("H") | ≥ 0.8 | ≥ 0.8 | ≥ 0.8 | ≥ 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. shutdown 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, freewheeling 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 | | - | | | | | |
| 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 | | | | | |
| EMC note | | Class A product, see page 625 | | | | | |

### Ordering data

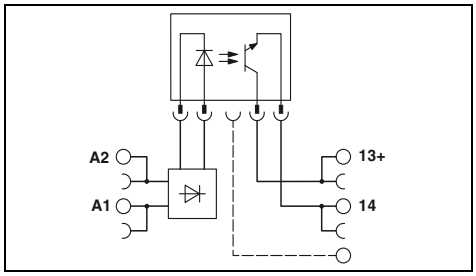
| Description | | Input voltage $U_N$ | Type | Order No. | Pcs. / Pkt. |
|---|---|---|---|---|---|
| **PLC-INTERFACE,** with **screw connection** | | | | | |
| | ① | 24 V DC | **PLC-OSC- 24DC/ 48DC/100** | **2966728** | 10 |
| | ② | 48 V DC | **PLC-OSC- 48DC/ 48DC/100** | **2966993** | 10 |
| | ③ | 60 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 **push-in connection** | | | | | |
| | ① | 24 V DC | **PLC-OPT- 24DC/ 48DC/100** | **2900352** | 10 |
| | ② | 48 V DC | **PLC-OPT- 48DC/ 48DC/100** | **2900353** | 10 |
| | ③ | 60 V DC | **PLC-OPT- 60DC/ 48DC/100** | **2900354** | 10 |
| | ⑤ | 120 V AC (110 V DC) | **PLC-OPT-120UC/ 48DC/100** | **2900355** | 10 |
| | ⑥ | 230 V AC (220 V DC) | **PLC-OPT-230UC/ 48DC/100** | **2900356** | 10 |

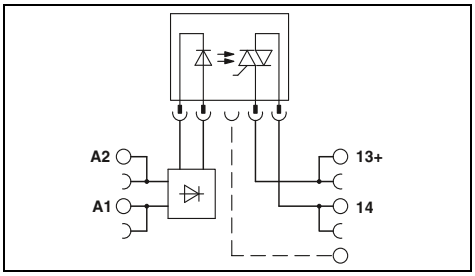



**Max. DC voltage output of 3 A**




**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, freewheeling 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
Class A product, see page 625

## 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-OPT- 24DC/ 24DC/2** | **2900364** | 10 |
| **PLC-OPT- 48DC/ 24DC/2** | **2900365** | 10 |
| **PLC-OPT- 60DC/ 24DC/2** | **2900366** | 10 |
| **PLC-OPT-120UC/ 24DC/2** | **2900367** | 10 |
| **PLC-OPT-230UC/ 24DC/2** | **2900368** | 10 |

## 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, freewheeling 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)
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
Class A product, see page 625

## 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-OPT- 24DC/230AC/1** | **2900369** | 10 |
| **PLC-OPT- 48DC/230AC/1** | **2900370** | 10 |
| **PLC-OPT- 60DC/230AC/1** | **2900371** | 10 |
| **PLC-OPT-120UC/230AC/1** | **2900372** | 10 |
| **PLC-OPT-230UC/230AC/1** | **2900374** | 10 |

## Highly compact relay modules - PLC-INTERFACE

### PLC actuator series for output functions

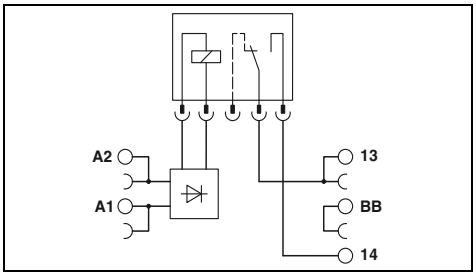
PLC actuator series for coupling controller and actuators, such as motors, contactors, valves, etc.

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 and push-in connection technology
- Relay modules with safe isolation according to DIN EN 50178 between coil and contact
- Functional jumpers
- Efficient connection to system cabling using V8 adapter

| Notes: |
|---|
| Type of housing:<br>Polyamide PA non-reinforced, color: green. |
| Marking systems and mounting material<br>See Catalog 5 |
| 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 423 |
| For derating curves see page 425 |

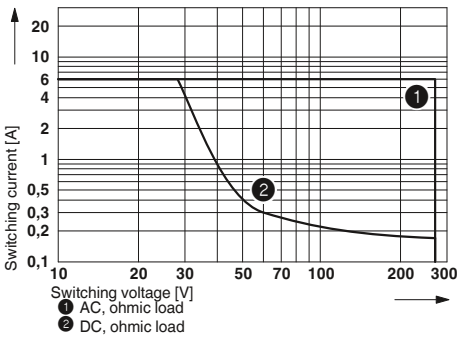
**1 N/O contact with power contact**



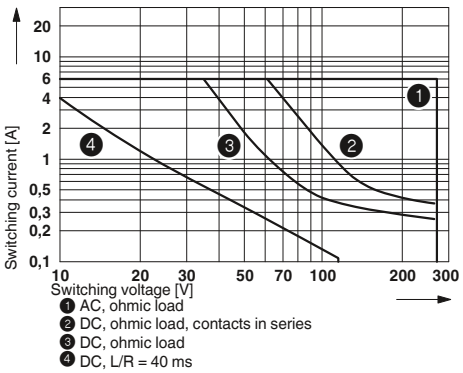

### Technical data

| | | |
|---|---|---|
| Input data | | ② |
| Permissible range (with reference to $U_N$) | | See diagram |
| Switching level (with reference to $U_N$) | 1 signal ("H")<br>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/shutdown time at $U_n$ | [ms] | 8 |
| Transmission frequency $f_{limit}$ | [Hz] | |
| Input circuit DC | | Yellow LED, protection against polarity reversal, freewheeling 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 |
| EMC note | | Class A product, see page 625 |

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

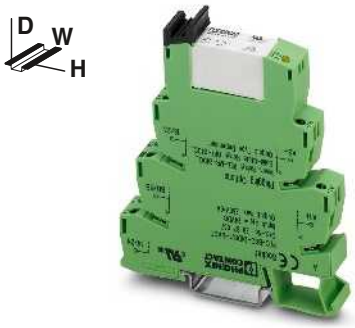



**Electrical interrupting rating for PLC...24DC/1-1/ACT with 2-N/O relay**

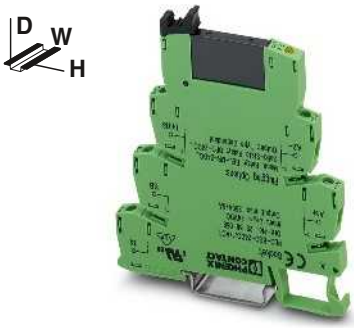



### Ordering data

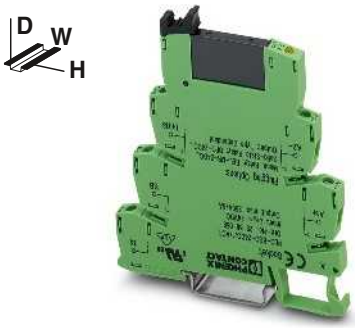
| Description | Input voltage $U_N$ | Type | Order No. | Pcs. / Pkt. |
|---|---|---|---|---|
| **PLC-INTERFACE,** with **screw connection** | | | | |
| ① | 5 V DC | | | |
| ② | 24 V DC | **PLC-RSC- 24DC/ 1/ACT** | **2966210** | 10 |
| **PLC-INTERFACE**, with **push-in connection** | | | | |
| ① | 5 V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



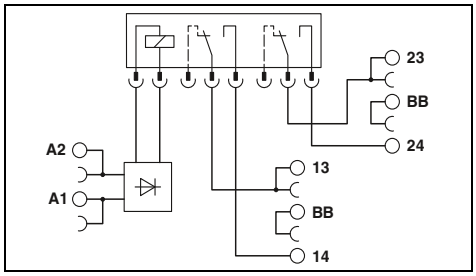

**2 N/O contacts with power contact**

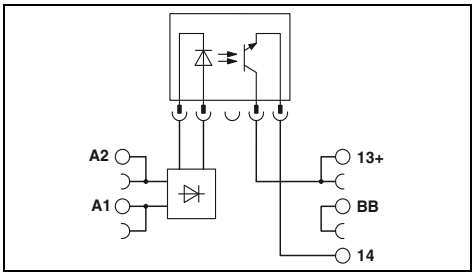


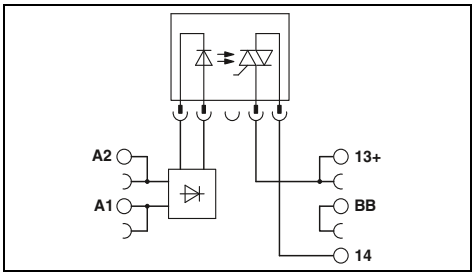

**Max. DC voltage output of 3 A**




**Max. AC voltage output of 750 mA**




## Technical data

| | |
|---|---|
| ② | |
| See diagram | |
| | |
| | |
| | |
| | |
| 18 | |
| 8 | |
| 10 | |
| | |
| Yellow LED, protection against polarity reversal, freewheeling 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 | |
| Class A product, see page 625 | |

## 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, freewheeling 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 | |
| Class A product, see page 625 | |

## Technical data

| | |
|---|---|
| ② | |
| 0.8 - 1.2 | |
| ≥ 0.8 | |
| ≤ 0.25 | |
| 9 | |
| 3 | |
| 9 | |
| 10 | |
| Yellow LED, protection against polarity reversal, freewheeling 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 | |
| Class A product, see page 625 | |

## Ordering data

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

## Ordering data

| Type | Order No. | Pcs. / Pkt. |
|---|---|---|
| **PLC-OSC- 5DC/ 24DC/ 2/ACT** | **2980144** | 10 |
| **PLC-OSC- 24DC/ 24DC/ 2/ACT** | **2966676** | 10 |
| **PLC-OPT- 5DC/ 24DC/2/ACT** | **2900375** | 10 |
| **PLC-OPT- 24DC/ 24DC/2/ACT** | **2900376** | 10 |

## Ordering data

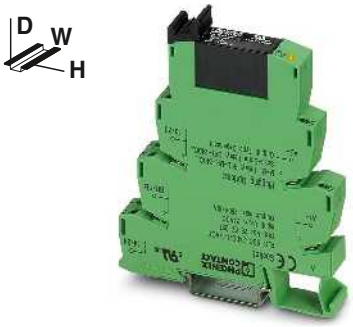
| Type | Order No. | Pcs. / Pkt. |
|---|---|---|
| **PLC-OSC- 24DC/230AC/ 1/ACT** | **2967947** | 10 |

## Highly compact relay modules - PLC-INTERFACE

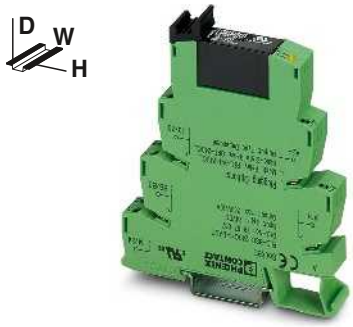
### PLC actuator series for output functions

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

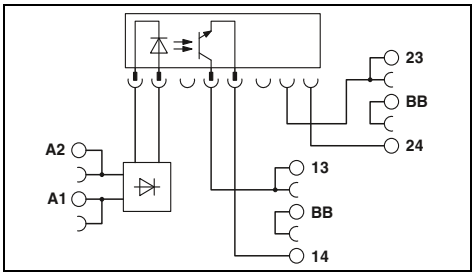
| Notes: |
|---|
| Type of housing:<br>Polyamide PA non-reinforced, color: green. |
| Marking systems and mounting material<br>See Catalog 5 |
| Separating plate PLC-ATP must be installed for voltages larger than 250 V (L1, L2, L3) between identical terminal blocks in adjacent modules. Potential bridging is then carried out with FBST 8-PLC... or FBST 500.... |
| For derating curves see page 425 |

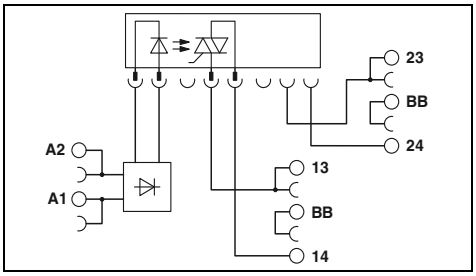



**Max. DC voltage output of 5 A**




**Max. AC voltage output of 2 A**



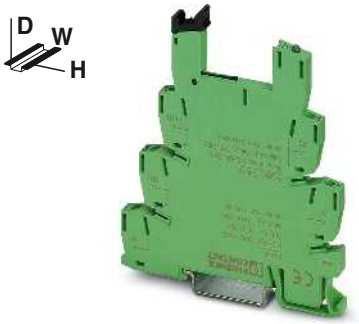

| | | Technical data | Technical data |
|---|---|---|---|
| Input data | | ① | ① |
| Permissible range (with reference to $U_N$) | | 0.8 -<br>1.2 | 0.8 -<br>1.2 |
| Switching level (with reference to $U_N$) | 1 signal ("H") | ≥ 0.8 | ≥ 0.8 |
| | 0 signal ("L") | ≤ 0.4 | ≤ 0.4 |
| Typ. input current at $U_N$ | [mA] | 9 | 9 |
| Typ. switch-on time at $U_N$ | [ms] | 0.02 | 10 |
| Typ. shutdown time at $U_N$ | [ms] | 0.4 | 10 |
| Transmission frequency $f_{limit}$ | [Hz] | 300 | 10 |
| Input circuit DC | | Yellow LED, protection against polarity reversal, freewheeling diode | Yellow LED, protection against polarity reversal, freewheeling 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 $A^2s$ (tp = 10 ms, at 25 °C) |
| General data | | | |
| Rated insulation voltage | | - | - |
| Rated surge voltage | | Basic insulation | 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 | | see derating / can be aligned without spacing | see derating / can be aligned without spacing |
| 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 | 14 mm / 80 mm / 94 mm | 14 mm / 80 mm / 94 mm |

| Description | Input voltage $U_N$ | Ordering data<br>Type | Order No. | Pcs. / Pkt. | Ordering data<br>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 |

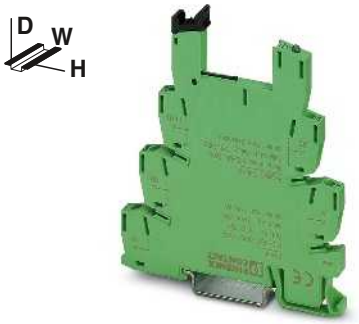
## PLC actuator series for output functions

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.

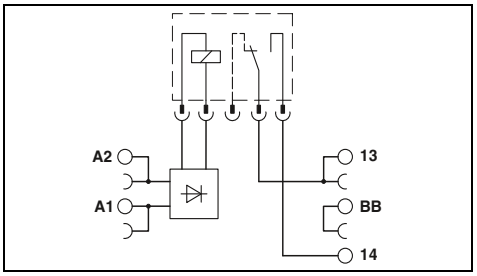
| Notes: |
|---|
| Maximum interrupting rating diagrams, see page 426 |
| For derating curves see page 425 |

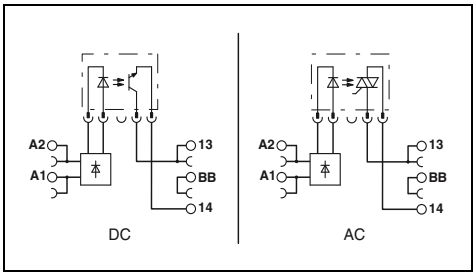



**Basic terminal block that can be fitted with mech. relay**




**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 | | |
| Clearance 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 | | |

| | | Ordering data | | | Ordering data | | |
|---|---|---|---|---|---|---|---|
| Description | Voltage $U_N$ | Type | Order No. | Pcs. / Pkt. | 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 **push-in connection** | 24 V AC/DC | **PLC-BPT- 24UC/ 1/ACT** | **2900450** | 10 | **PLC-BPT- 24UC/ 1/ACT** | **2900450** | 10 |

| | Accessories | | | Accessories | | |
|---|---|---|---|---|---|---|
| **Plug-in miniature relay** | | | | | | |
| with multi-layer gold contacts | **REL-MR- 24DC/21AU** | **2961121** | 10 | | | |
| with power contacts | **REL-MR- 24DC/21** | **2961105** | 10 | | | |
| **Plug-in solid-state relay** | | | | | | |
| Solid-state input relay | | | | **OPT-24DC/ 48DC/100** | **2966618** | 10 |
| Solid-state power relay | | | | **OPT-24DC/ 24DC/ 2** | **2966595** | 10 |
| Solid-state power relay | | | | **OPT-24DC/230AC/ 1** | **2967950** | 10 |

## Highly compact relay modules - PLC-INTERFACE

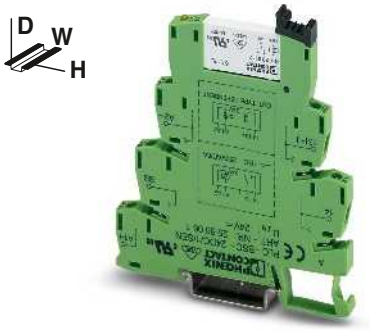
### PLC sensor series for input functions

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

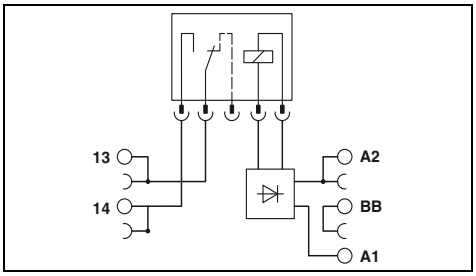
The advantages:

- 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 and push-in connection technology
- Relay modules with safe isolation according to DIN EN 50178 between coil and contact
- Functional jumpers
- Efficient connection to system cabling using V8 adapter

| Notes: |
|---|
| Type of housing:<br>Polyamide PA non-reinforced, color: green. |
| Marking systems and mounting material<br>See Catalog 5 |
| 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 423 |
| [1]) 120 and 230 V types up to 55 °C |




**Relay module**
**1 N/O contact**

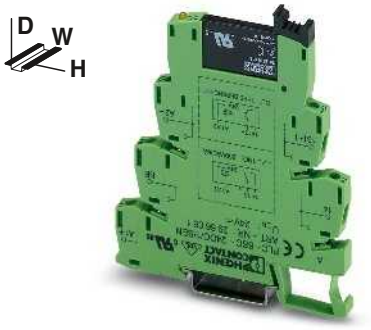



### Technical data

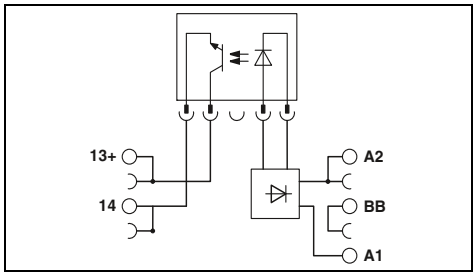
| | | | | |
|---|---|---|---|---|
| Input data | | ① | ② | ③ |
| Permissible range (with reference to $U_N$) | | See diagram | | |
| Switching level (with reference to $U_N$) | 1 signal ("H") | | | |
| | 0 signal ("L") | | | |
| Typ. input current at $U_N$ | [mA] | 9 | 3.5 | 3.2 |
| Typ. response time/switch-on time at $U_N$ | [ms] | 5 | 6 | 7 |
| Typ. release time/shutdown time at $U_n$ | [ms] | 8 | 15 | 15 |
| Transmission frequency $f_{limit}$ | [Hz] | | | |
| Input circuit DC | | Yellow LED, protection against polarity reversal, freewheeling 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 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 | | |
| EMC note | | Class A product, see page 625 | | |

### 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 **push-in connection** | | | | | |
| | ① | 24 V DC | **PLC-RPT- 24DC/ 1AU/SEN** | **2900313** | 10 |
| | ② | 120 V AC (110 V DC) | **PLC-RPT-120UC/ 1AU/SEN** | **2900314** | 10 |
| | ③ | 230 V AC (220 V DC) | **PLC-RPT-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, freewheeling 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 $mm^2$ / 0.14 - 2.5 $mm^2$ / 26 - 14
6.2 mm / 80 mm / 94 mm
Class A product, see page 625

## 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-OPT- 24DC/ 48DC/100/SEN** | **2900358** | 10 |
| **PLC-OPT-120UC/ 48DC/100/SEN** | **2900359** | 10 |
| **PLC-OPT-230UC/ 48DC/100/SEN** | **2900361** | 10 |

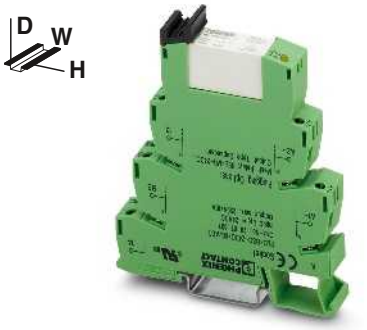
## PLC-INTERFACE for high inrush currents

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

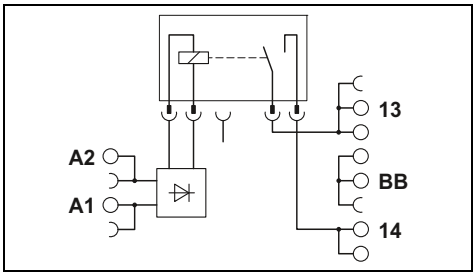
The advantages:

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

| Notes: |
|---|
| Type of housing:<br>Polyamide PA non-reinforced, color: green. |
| Marking systems and mounting material<br>See Catalog 5 |
| 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 423 |



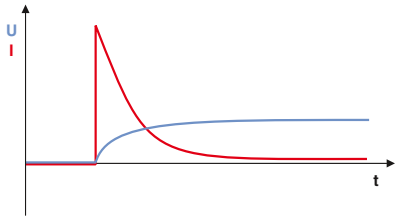

**1 N/O contact of up to 130 A peak**




### 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, freewheeling 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 |
| EMC note | | Class A product, see page 625 |

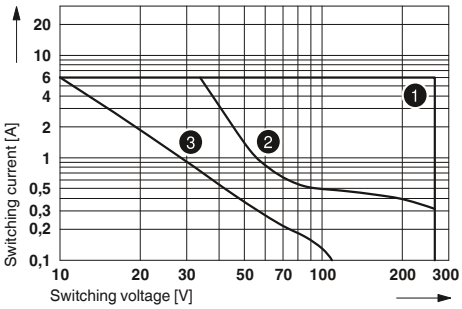
**Basic behavior of capacitive loads:**
- Very high input current
- Voltage increases with an e-function




### 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 **push-in connection** ① | 24 V DC | **PLC-RPT- 24DC/ 1IC/ACT** | **2900298** | 10 |

**Maximum interrupting rating**




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

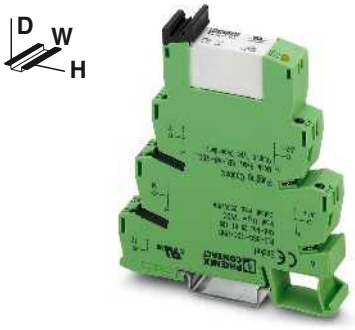
## PLC-INTERFACE for high continuous currents

PLC relay modules for high continuous switching currents

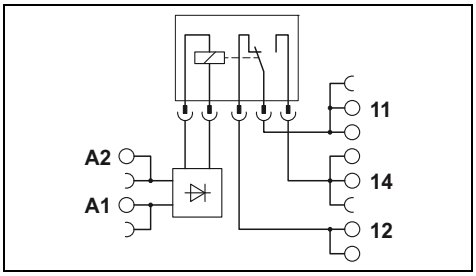
The advantages:

- Max. continuous current of 10 A
- Safe isolation according to DIN EN 50178 between coil and contact
- Screw and push-in connection technology
- Functional jumpers
- 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:<br>Polyamide PA non-reinforced, color: green. |
| Marking systems and mounting material<br>See Catalog 5 |
| 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 423 |
| [1]) 230 V types up to 55 °C |




**1 PDT up to 10 A**

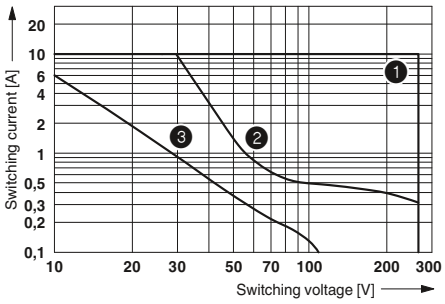



### Technical data

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 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, freewheeling 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 | | | | | | |
| EMC note | | Class A product, see page 625 | | | | | | |

### 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 **push-in connection** | | | | | |
| | ① | 12 V DC | **PLC-RPT- 12DC/21HC** | **2900290** | 10 |
| | ② | 24 V DC | **PLC-RPT- 24DC/21HC** | **2900291** | 10 |
| | ③ | 24 V AC/DC | **PLC-RPT- 24UC/21HC** | **2900293** | 10 |
| | ④ | 48 V DC | **PLC-RPT- 48DC/21HC** | **2900294** | 10 |
| | ⑤ | 60 V DC | **PLC-RPT- 60DC/21HC** | **2900295** | 10 |
| | ⑥ | 120 V AC (110 V DC) | **PLC-RPT-120UC/21HC** | **2900296** | 10 |
| | ⑦ | 230 V AC (220 V DC) | **PLC-RPT-230UC/21HC** | **2900297** | 10 |




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

**Max. interrupting rating**

## Highly compact relay modules - PLC-INTERFACE

### PLC-INTERFACE for hazardous areas

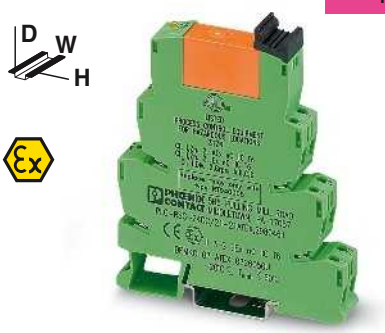
Relay modules with ATEX and/or Class 1, Division 2 approval for potentially explosive applications.

The advantages:

- Slim design
- Functional jumpers
- Integrated input and interference suppression circuit
- RTIII-sealed relays
- Safe isolation according to DIN EN 50178 between coil and contact
- Efficient connection to system cabling using V8 adapter

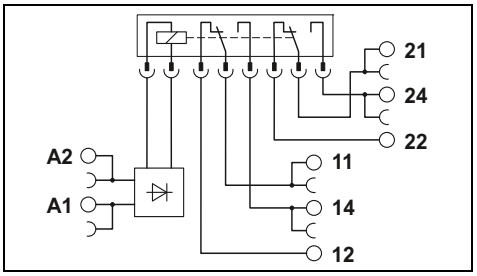
| Notes: |
|---|
| Type of housing:<br>Polyamide PA non-reinforced, color: green. |
| Marking systems and mounting material<br>See Catalog 5 |
| Separating plate PLC-ATP must be installed for voltages larger than 250 V (L1, L2, L3) between identical terminal blocks in adjacent modules. Potential bridging is then carried out with FBST 8-PLC... or FBST 500.... |

new

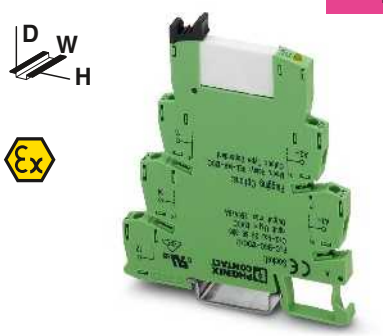


**2 PDT with power contact**

Ex:

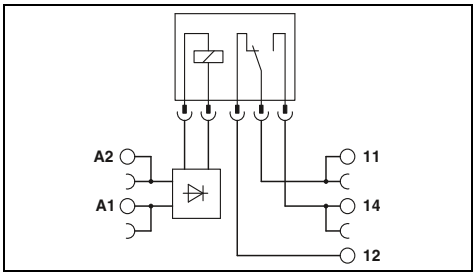



new



**1 PDT with power contact**

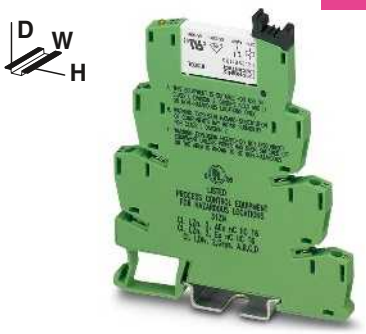
Ex:




| | | Technical data | Technical data | |
|---|---|---|---|---|
| Input data | | ② | ② | ③ |
| Permissible range (with reference to $U_N$) | | See diagram | See diagram | |
| Switching level (with reference to $U_N$) | 1 signal ("H")<br>0 signal ("L") | | | |
| Typ. input current at $U_N$ | [mA] | 18 | 9 | 3.5 |
| Typ. response time/switch-on time at $U_N$ | [ms] | 8 | 5 | 6 |
| Typ. release time/shutdown time at $U_n$ | [ms] | 10 | 8 | 15 |
| Transmission frequency $f_{limit}$ | [Hz] | | | |
| Input circuit DC | | Yellow LED, protection against polarity reversal, surge protection | Yellow LED, protection against polarity reversal, freewheeling diode | |
| Input circuit AC/DC | | | Yellow LED, bridge rectifier | |
| Output data | | | | |
| Contact material | | AgNi | AgSnO | |
| Max. switching voltage | | 250 V AC/DC | 250 V AC/DC | |
| Min. switching voltage | | 5 V AC/DC (at 10 mA) | 5 V (at 100 mA) | |
| Limiting continuous current | | 6 A | 6 A | |
| Max. inrush current | | 15 A (300 ms) | on request | |
| Min. switching current | | 10 mA (at 5 V) | 10 mA (at 12 V) | |
| Output protection | | - | - | |
| Voltage drop at max. limiting continuous current | | - | - | |
| General data | | | | |
| Test voltage input/output | | 4 kV (50 Hz, 1 min.) | 4 kV AC (50 Hz, 1 min.) | |
| Ambient temperature (operation) | | -20 °C ... 60 °C (UL) | -20 °C ... 60 °C | |
| Mechanical service life | | 3 x $10^7$ cycles | 2 x $10^7$ cycles | |
| Standards/regulations | | IEC 60664, EN 50178, IEC 62103, EN 60079-0, EN 60079-15 | IEC 60664, EN 50178, IEC 62103, EN 60079-0, EN 60079-15 | |
| Pollution degree / surge voltage category | | 2 / III | 3 / 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 | 14 mm / 80 mm / 94 mm | 6.2 mm / 80 mm / 94 mm | |
| EMC note | | | | |
| Conformance / approvals | | | | |
| Conformance | | CE-compliant | CE-compliant | |
| ATEX | | DEMKO 03 ATEX 0326050U; II 3G Ex nA nC IIC Gc | DEMKO 11 ATEX 1111531U; II 3G Ex nC IIC Gc | |
| UL, USA | | Class I, Zone 2, AEx nA nC IIC T6 | Class I, Zone 2, AEx nA nC IIC T6 | |
| UL, USA / Canada | | Class I, Div. 2, Groups A, B, C, D | Class I, Div. 2, Groups A, B, C, D | |
| UL, Canada | | Class I, Zone 2, Ex nA nC IIC Gc T6 X | Class I, Zone 2, Ex nA nC IIC Gc T6 X | |

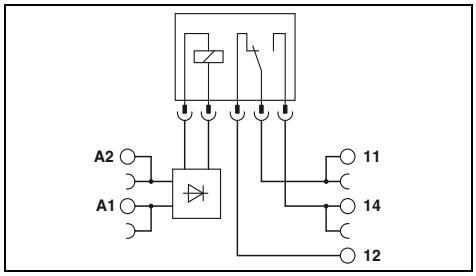
| Description | Input voltage $U_N$ | Ordering data: Type | Order No. | Pcs. / Pkt. | Ordering data: Type | Order No. | Pcs. / Pkt. |
|---|---|---|---|---|---|---|---|
| **PLC-INTERFACE**, with **screw connection** | | | | | | | |
| ① | 12 V DC | | | | | | |
| ② | 24 V DC | **PLC-RSC- 24DC/21-21ATEX** | **2980461** | 10 | **PLC-RSC- 24DC/21 ATEX** | **2902955** | 1 |
| ③ | 120 V AC (110 V DC) | | | | **PLC-RSC-120UC/21 ATEX** | **2902956** | 1 |
| ④ | 230 V AC | | | | | | |
| **PLC-INTERFACE**, with **spring-cage connection** | | | | | | | |
| ① | 12 V DC | | | | | | |
| ③ | 120 V AC (110 V DC) | | | | | | |

new



**1 PDT with power contact**

Ex:



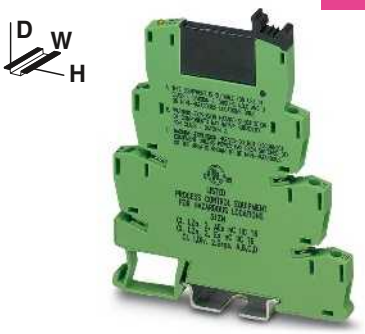

## Technical data

| ① | ② | ③ | ④ |
|---|---|---|---|
| See diagram | | | |
| | | | |
| | | | |
| | | | |
| 15.3 | 9 | 3.5 | 3.2 |
| 5 | 5 | 6 | 7 |
| 8 | 8 | 15 | 15 |
| | | | |
| Yellow LED, protection against polarity reversal, protection against polarity reversal | | | |
| Yellow LED, bridge rectifier | | | |
| | | | |
| AgSnO | | | |
| 250 V AC/DC | | | |
| 12 V AC/DC | | | |
| 6 A | | | |
| - | | | |
| 10 mA | | | |
| - | | | |
| - | | | |
| | | | |
| 4 kV AC (50 Hz, 1 min.) | | | |
| -25 °C ... 60 °C | | | |
| 2 x $10^7$ cycles | | | |
| IEC 60664, EN 50178, IEC 62103, EN 60079-0, EN 60079-15 | | | |
| 3 / III | | | |
| 0.14 - 2.5 $mm^2$ / 0.14 - 2.5 $mm^2$ / 26 - 14 | | | |
| 6.2 mm / 80 mm / 94 mm | | | |
| Class A product, see page 625 | | | |
| | | | |
| CE-compliant | | | |
| - | | | |
| Class I, Zone 2, AEx nA nC IIC T6 | | | |
| Class I, Div. 2, Groups A, B, C, D | | | |
| Class I, Zone 2, Ex nA nC IIC Gc T6 X | | | |

## Ordering data

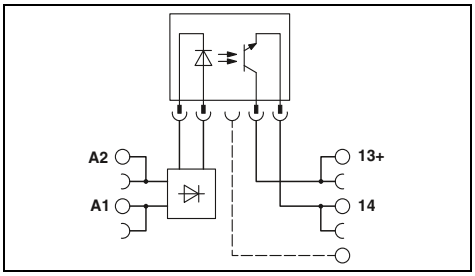
| Type | Order No. | Pcs. / Pkt. |
|---|---|---|
| **PLC-RSC-12DC/21-C1D2** | **5606331** | 1 |
| **PLC-RSC-24DC/21 C1D2** | **5603154** | 1 |
| **PLC-RSC-120UC/21 C1D2** | **5603157** | 1 |
| **PLC-RSC-230UC/21-CID2** | **5607072** | 1 |
| **PLC-RSP-12DC/21 CID2** | **5606332** | 1 |
| **PLC-RSP-120UC/21 C1D2** | **5603683** | 1 |

new



**Max. DC voltage output of 3 A**

Ex:



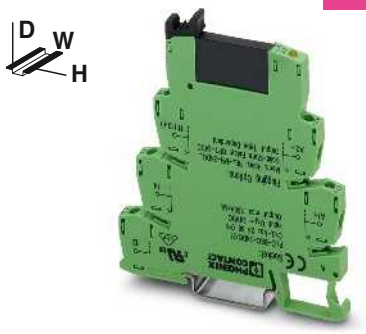

## Technical data

| ② | ③ |
|---|---|
| 0.8 - 1.2 | 0.9 - 1.1 |
| ≥ 0.8 | ≥ 0.8 |
| ≤ 0.4 | ≤ 0.3 |
| 8.5 | 3.5 |
| 0.02 | 3.5 |
| 0.3 | 7 |
| 300 | 10 |
| Yellow LED, protection against polarity reversal, freewheeling diode | |
| Yellow LED, bridge rectifier | |
| | |
| - | |
| 33 V DC | |
| 3 V DC | |
| 3 A | |
| 15 A (10 ms) | |
| - | |
| Protection against polarity reversal, surge protection | |
| ≤ 200 mV | |
| | |
| 2.5 kV (50 Hz, 1 min.) | |
| -20 °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 | |
| Class A product, see page 625 | |
| | |
| CE-compliant | |
| - | |
| Class I, Zone 2, AEx nA nC IIC T6 | |
| Class I, Div. 2, Groups A, B, C, D | |
| Class I, Zone 2, Ex nA nC IIC Gc T6 X | |

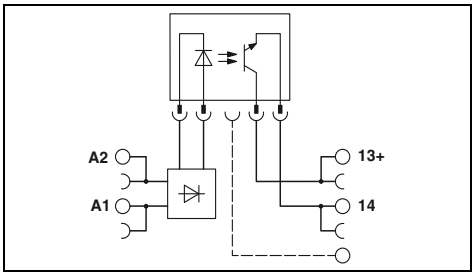
## Ordering data

| Type | Order No. | Pcs. / Pkt. |
|---|---|---|
| **PLC-OSC- 24DC/ 24DC/ 2 C1D2** | **5603260** | 1 |
| **PLC-OSC-120UC/ 24DC/ 2 C1D2** | **5603262** | 1 |

new



**Max. DC voltage output of 100 mA**




## Technical data

| ② | ③ |
|---|---|
| 0.8 - 1.2 | 0.9 - 1.1 |
| ≥ 0.8 | ≥ 0.9 |
| ≤ 0.4 | ≤ 0.3 |
| 8.5 | 3.5 |
| 0.02 | 3 |
| 0.3 | 4 |
| 300 | 10 |
| Yellow LED, protection against polarity reversal, freewheeling 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 $mm^2$ / 0.14 - 2.5 $mm^2$ / 26 - 14 | |
| 6.2 mm / 80 mm / 94 mm | |
| Class A product, see page 625 | |
| | |
| CE-compliant | |
| - | |
| Class I, Zone 2, AEx nA nC IIC T6 | |
| Class I, Div. 2, Groups A, B, C, D | |
| Class I, Zone 2, Ex nA nC IIC Gc T6 X | |

## Ordering data

| Type | Order No. | Pcs. / Pkt. |
|---|---|---|
| **PLC-OSC- 24DC/ 48DC/100 C1D2** | **5603261** | 1 |
| **PLC-OSC-120UC/ 48DC/100 C1D2** | **5603263** | 1 |

## Highly compact relay modules - PLC-INTERFACE

### 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

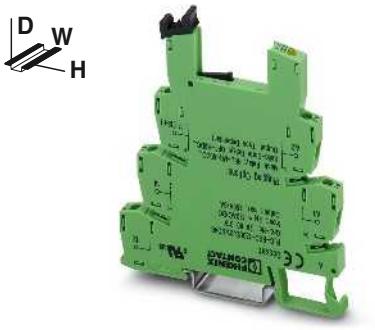
The advantages:

– Resistant to interference currents
– High relay release voltage

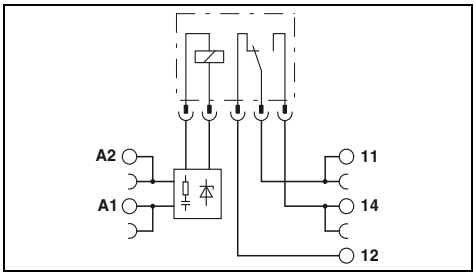
Typical applications:

– Applications with long control lines
– Use of AC output boards, resulting in residual AC currents
– Screw and push-in connection technology

| Notes: |
|---|
| Type of housing:<br>Polyamide PA non-reinforced, color: green. |
| Marking systems and mounting material<br>See Catalog 5 |
| 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 423 |
| Maximum interrupting rating diagrams, see page 426 |

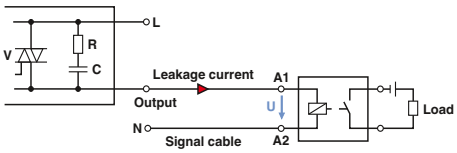



**Universal design**

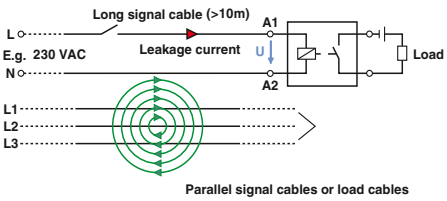



### Technical data

| | | | |
|---|---|---|---|
| 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 | |
| EMC note | | Class A product, see page 625 | |




**Occurrence of interference signals**
**Scenario 1: controller - AC output card**



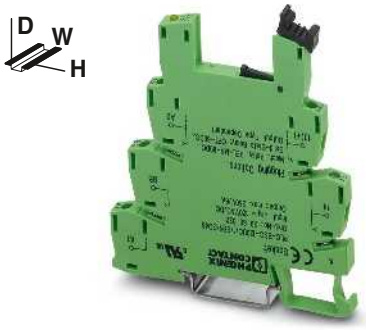

**Occurrence of interference signals**
**Scenario 2: long signal cables**

### Ordering data

| Description | Voltage $U_N$ | Type | Order No. | Pcs. / Pkt. |
|---|---|---|---|---|
| **PLC-INTERFACE basic terminal block**, for plug-in 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 push-in connection | 120 V AC | **PLC-BPT-120UC/21/SO46** | **2900453** | 10 |
| With push-in connection | 230 V AC | **PLC-BPT-230UC/21/SO46** | **2900455** | 10 |

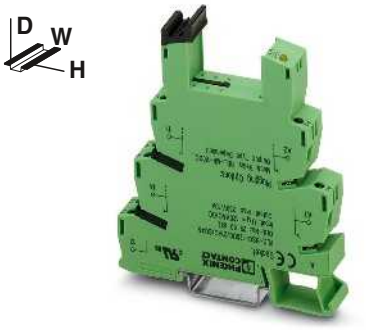
### Accessories

| | | | |
|---|---|---|---|
| **Plug-in miniature relay** | | | |
| with gold contact | **REL-MR- 60DC/21AU** | **2961134** | 10 |
| with power contact | **REL-MR- 60DC/21** | **2961118** | 10 |

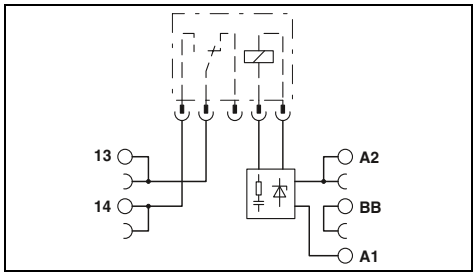


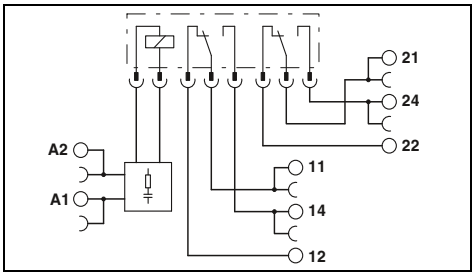
Sensor design

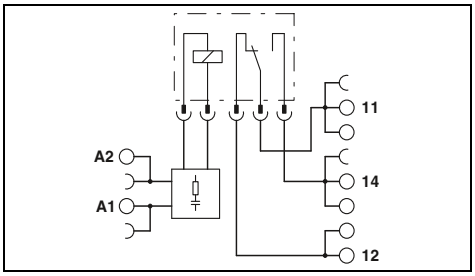
2 PDT universal design



1 PDT for high continuous currents




## Technical data

| | |
|---|---|
| 120 V AC | 230 V AC |
| 0.8 ... 1.4 | 0.78 ... 1.14 |
| 50 V AC | 80 V AC |
| 7 mA / 8 mA | 8.8 mA / 10 mA |
| 7 ms | 7 ms |
| 20 ms | 20 ms |
| Yellow LED, bridge rectifier, filter | |
| REL-MR-60DC/21 | REL-MR-60DC/21AU |
| Single contact, 1 N/O contact | Single contact, 1 N/O contact |
| AgSnO | AgSnO, hard gold-plated |
| 250 V AC/DC | 30 V AC / 36 V DC |
| 5 V (at 100 mA) | 100 mV (at 10 mA) |
| 6 A | 50 mA |
| on request | 50 mA |
| 10 mA (at 12 V) | 1 mA (at 24 V) |
| 4 kV (50 Hz, 1 min.) | |
| -20 °C ... 55 °C | |
| 2 x $10^7$ cycles | |
| IEC 60664, EN 50178, IEC 62103 | |
| 3 / III | |
| 0.14 - 2.5 mm² / 0.14 - 2.5 mm² / 26 - 14 | |
| 6.2 mm / 80 mm / 94 mm | |
| Class A product, see page 625 | |

## Ordering data

| Type | Order No. | Pcs. / Pkt. |
|---|---|---|
| **PLC-BSC-120UC/ 1/SEN/SO46** | **2980322** | 10 |
| **PLC-BSC-230UC/ 1/SEN/SO46** | **2980348** | 10 |
| **PLC-BPT-120UC/ 1/SEN/SO46** | **2900456** | 10 |
| **PLC-BPT-230UC/ 1/SEN/SO46** | **2900457** | 10 |

## Accessories

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

## Technical data

| | |
|---|---|
| 120 V AC | 230 V AC |
| 0.78 ... 1.4 | 0.78 ... 1.14 |
| 16 V AC | 70 V AC |
| 6 mA / 7 mA | 8.5 mA / 10 mA |
| 7 ms | 7 ms |
| 10 ms | 10 ms |
| Yellow LED, bridge rectifier, filter | |
| REL-MR-110DC/21-21 | REL-MR-110DC/21-21AU |
| Single contact, 2-PDT | Single contact, 2-PDT |
| AgNi | AgNi, + 5 µm Au |
| 250 V AC/DC | 30 V AC / 36 V DC |
| 5 V AC/DC | 100 mV |
| 6 A | 50 mA |
| 15 A (300 ms) | 50 mA |
| 10 mA | 1 mA |
| 4 kV (50 Hz, 1 min.) | |
| -20 °C ... 55 °C | |
| 3 x $10^7$ cycles | |
| IEC 60664, EN 50178, IEC 62103 | |
| 3 / III | |
| 0.14 - 2.5 mm² / 0.14 - 2.5 mm² / 26 - 14 | |
| 14 mm / 80 mm / 94 mm | |
| Class A product, see page 625 | |

## 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 |

## Technical data

| | |
|---|---|
| 120 V AC | 230 V AC |
| 0.85 ... 1.4 | 0.78 ... 1.14 |
| 16 V AC | 70 V AC |
| 6 mA / 7 mA | 8.5 mA / 10 mA |
| 7 ms | 7 ms |
| 20 ms | 20 ms |
| Yellow LED, bridge rectifier, filter | |
| REL-MR-110DC/21HC | |
| Single contact, 1-PDT | |
| AgNi | |
| 250 V AC/DC | |
| 12 V AC/DC | |
| 10 A | |
| 30 A (300 ms) | |
| 100 mA | |
| 4 kV (50 Hz, 1 min.) | |
| -20 °C ... 55 °C | |
| 3 x $10^7$ cycles | |
| IEC 60664, EN 50178, IEC 62103 | |
| 3 / III | |
| 0.14 - 2.5 mm² / 0.14 - 2.5 mm² / 26 - 14 | |
| 14 mm / 80 mm / 94 mm | |
| Class A product, see page 625 | |

## 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 |

## Highly compact relay modules - PLC-INTERFACE

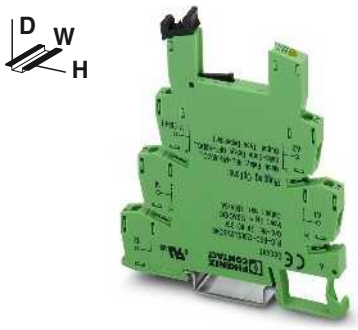
### Basic terminal blocks with interference current filter that can be fitted with solid-state relays

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

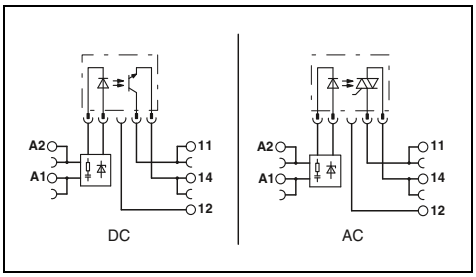
The advantages:
- Resistant to interference currents
- High relay release voltage

Typical applications:
- Applications with long control lines
- Use of AC output boards, resulting in residual AC currents
- Screw and push-in connection technology

| Notes: |
|---|
| Type of housing:<br>Polyamide PA non-reinforced, color: green. |
| Marking systems and mounting material<br>See Catalog 5 |
| 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 425 |




Universal design




### Technical data

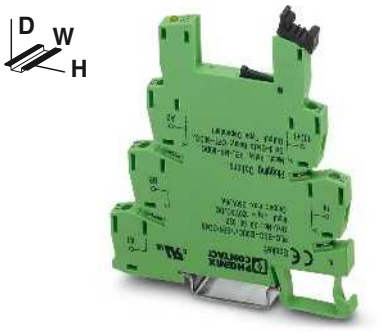
| | | | |
|---|---|---|---|
| Input data | | | |
| Nominal input voltage $U_N$ | 120 V AC | | 230 V AC |
| Permissible range (with reference to $U_N$) | 0.85 ... 1.1 | | 0.8 ... 1.1 |
| Switching level (with optocoupler) 0 signal ("L") | ≤ 0.4 | | ≤ 0.4 |
| Typ. input current with $U_N$ (50 /60 Hz) | 7 mA / 8 mA | | 8.8 mA / 10 mA |
| Typ. response time/switch-on time at $U_N$ | 6 ms | | 6 ms |
| Typ. shutdown 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 load) | - | - | 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 | | |
| EMC note | Class A product, see page 625 | | |

### Ordering data

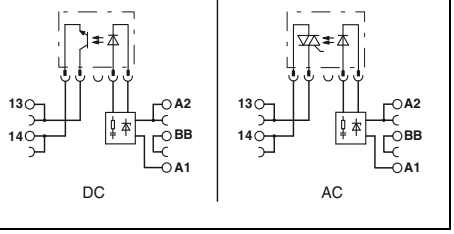
| Description | Voltage $U_N$ | Type | Order No. | Pcs. / Pkt. |
|---|---|---|---|---|
| **PLC-INTERFACE basic terminal block**, for plug-in miniature relays or solid-state relays | | | | |
| With screw connection | 120 V AC | **PLC-BSC-120UC/21/SO46** | **2980319** | 10 |
| With screw connection | 230 V AC | **PLC-BSC-230UC/21/SO46** | **2980335** | 10 |
| With push-in connection | 120 V AC | **PLC-BPT-120UC/21/SO46** | **2900453** | 10 |
| With push-in connection | 230 V AC | **PLC-BPT-230UC/21/SO46** | **2900455** | 10 |

### Accessories

| | | | |
|---|---|---|---|
| **Plug-in solid-state relay** | | | |
| Solid-state input relay | **OPT-60DC/ 48DC/100** | **2966621** | 10 |
| Solid-state power relay | **OPT-60DC/ 24DC/ 2** | **2966605** | 10 |
| Solid-state power relay | **OPT-60DC/230AC/ 1** | **2967963** | 10 |




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 | | |
| Class A product, see page 625 | | |

## Ordering data

| Type | Order No. | Pcs. / Pkt. |
|---|---|---|
| **PLC-BSC-120UC/ 1/SEN/SO46** | **2980322** | 10 |
| **PLC-BSC-230UC/ 1/SEN/SO46** | **2980348** | 10 |
| **PLC-BPT-120UC/ 1/SEN/SO46** | **2900456** | 10 |
| **PLC-BPT-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 |

## Highly compact relay modules - PLC-INTERFACE

### Plug-in miniature power relays

Plug-in miniature power relays suitable for PLC-INTERFACE and RIF-0, RIF-1, and PR1 relay bases.

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

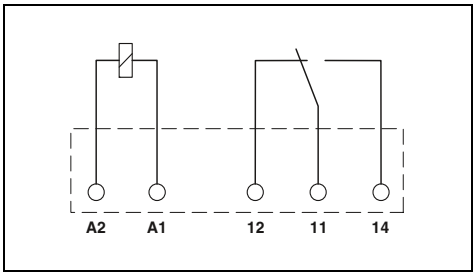
**Notes:**

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.

For dimensional drawings and perforations for assembly, see page 424

For diagrams of operating voltage ranges, see page 423

**1 PDT**




### Technical data

| | | | | | | |
|---|---|---|---|---|---|---|
| Input data | | ① | ② | ③ | ④ | ⑤ |
| Permissible range (with reference to $U_N$) | | see 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 | | 1 PDT | | | | 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 | | | | |

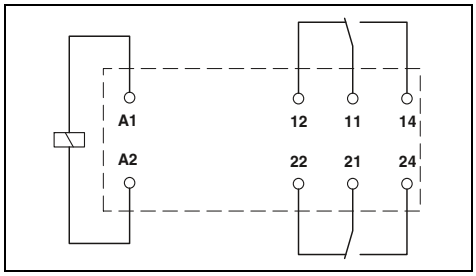
### Ordering data

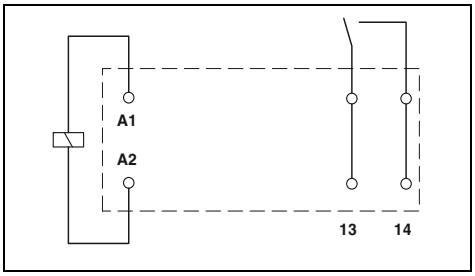
| Description | | Input voltage $U_N$ | Type | Order No. | Pcs. / Pkt. |
|---|---|---|---|---|---|
| **Plug-in miniature power relay** | | | | | |
| with power contact | ① | 4.5 V DC | **REL-MR- 4,5DC/21** | **2961367** | 10 |
| with power contacts | ② | 12 V DC | **REL-MR- 12DC/21** | **2961150** | 10 |
| with power contact | ③ | 18 V DC | **REL-MR- 18DC/21** | **2961383** | 10 |
| with power contacts | 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 | | | |
| **Plug-in miniature power relay** | | | | | |
| with gold contact | ① | 4.5 V DC | **REL-MR 4,5DC/21AU** | **2961370** | 10 |
| with multi-layer gold contacts | ② | 12 V DC | **REL-MR- 12DC/21AU** | **2961163** | 10 |
| with gold contact | ③ | 18 V DC | **REL-MR- 18DC/21AU** | **2961493** | 10 |
| with multi-layer gold contacts | 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 | | | |

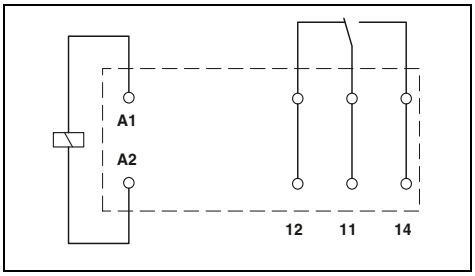
**2 PDT**

**1 N/O contact,**
**for high inrush currents**

**1 PDT**
**for high continuous currents**




## Technical data

| ② | ④ | ⑤ | ⑥ |
|---|---|---|---|
| see diagram | | | |
| 33 | 17 | 8.2 | 4.1 |
| 7 | 7 | 7 | 7 |
| 3 | 3 | 3 | 3 |
| 2 PDT | | 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 | |
| 25 A (20 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 |
|---|
| see diagram |
| 17 |
| 8 |
| 3 |
| 1 N/O contact |
| AgSnO |
| 250 V AC/DC |
| 12 V (at 100 mA) |
| 16 A |
| 80 A (20 ms) |
| 100 mA (at 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 |
|---|---|---|---|
| see diagram | | | |
| 33 | 17 | 8.2 | 4.1 |
| 7 | 7 | 7 | 7 |
| 3 | 3 | 3 | 3 |
| 1 PDT | | | |
| AgNi | | | |
| 250 V AC/DC | | | |
| 12 V (at 10 mA) | | | |
| 16 A | | | |
| 50 A (20 ms) | | | |
| 10 mA (at 12 V) | | | |
| 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 |

## Highly compact relay modules - PLC-INTERFACE

### Plug-in solid-state relays

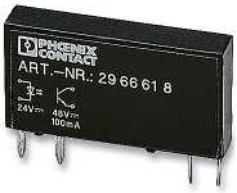
Plug-in solid-state relays suitable for PLC-INTERFACE and RIF-0, RIF-1, and PR1 relay bases.

The advantages:

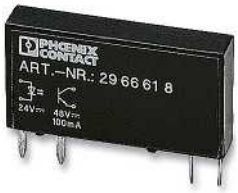
– Switching capacity of up to 24 V DC/5 A
– RT III wash tight (comparable to IP67)
– Vibration and shock-resistant
– Wear-free and long-lasting
– Zero voltage switch at AC output
– Can be soldered in on PCB

**Notes:**

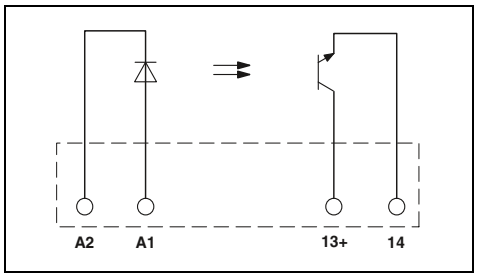
For dimensional drawings and perforations for assembly, see page 425

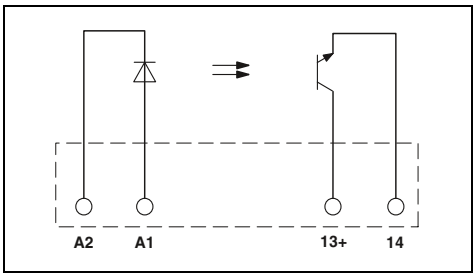



**Max. DC voltage output of 3 A**




**Max. DC voltage output of 100 mA**




### Technical data

| | | ① | ② | ③ |
|---|---|---|---|---|
| **Input data** | | | | |
| 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. shutdown 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

| | | ① | ② | ③ |
|---|---|---|---|---|
| **Input data** | | | | |
| 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. shutdown 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 | | |

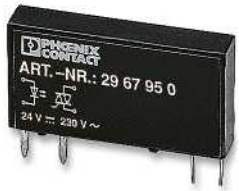
### Ordering data

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

### Ordering data

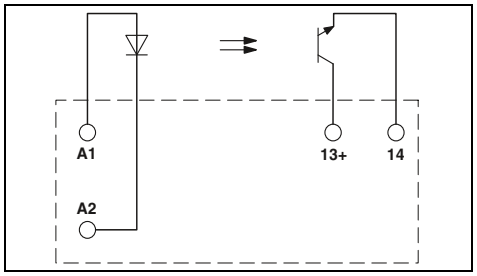
| Type | Order No. | Pcs. / Pkt. |
|---|---|---|
| **OPT- 5DC/ 48DC/100** | **2967992** | 10 |
| **OPT-24DC/ 48DC/100** | **2966618** | 10 |
| **OPT-60DC/ 48DC/100** | **2966621** | 10 |

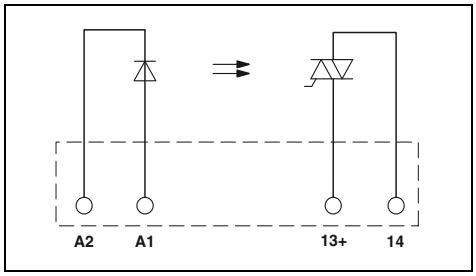
**Max. DC voltage output of 5 A**

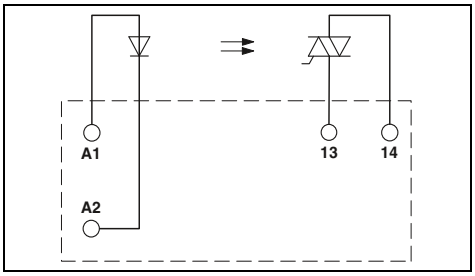



**Max. AC voltage output of 750 mA**

**Max. AC voltage output of 2 A**




## Technical data

| ① | ② | ③ |
|---|---|---|
| 0.8 - | 0.8 - | 0.9 - |
| 1.2 | 1.2 | 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 - | 0.9 - |
| 1.2 | 1.1 |
| 10 | 50 |
| 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 - | 0.8 - | 0.9 - |
| 1.2 | 1.2 | 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

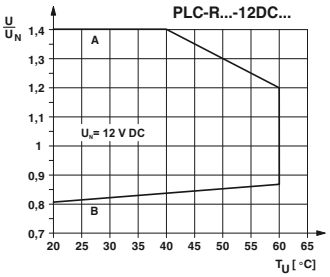
## Ordering data

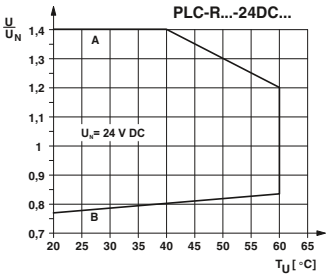
| Type | Order No. | Pcs. / Pkt. |
|---|---|---|
| **OPT- 5DC/230AC/ 2** | **2982168** | 10 |
| **OPT-24DC/230AC/ 2** | **2982171** | 10 |
| **OPT-60DC/230AC/ 2** | **2982184** | 10 |

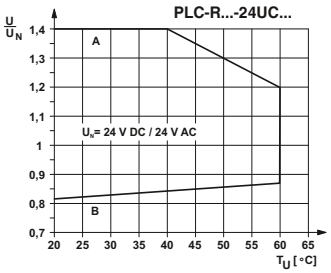
## Relay options for PLC basic terminal blocks

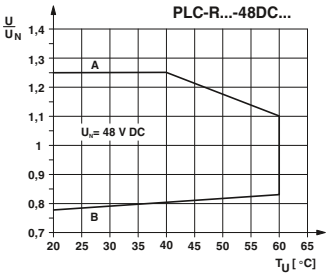
| Relay and solid-state relay options | | 1 PDT basic terminal block | | | | | | | | | | 2 PDT basic terminal block | | | | | | | | HC basic terminal block | | | | | | | | Sensor basic terminal block | | | | | Actuator basic terminal block | | | | IC basic terminal block | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 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-230UC/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-230UC/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-230UC/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 |
| | 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-230UC/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-230UC/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-230UC/21HC | | | PLC-BPT-24DC/1/SEN | PLC-BPT-120UC/1/SEN | PLC-BPT-230UC/1/SEN | | PLC-BPT-5DC/1/ACT | PLC-BPT-24DC/1/ACT | PLC-BPT-24UC/1/ACT | PLC-BPT-24DC/21RW | | PLC-BPT-24DC/1IC/ACT |
| | | | 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 |
| | | | 2900443 | 2900444 | 2900445 | 2900446 | 2900447 | 2900279 | 2900280 | | 2900281 | | 2900282 | 2900283 | 2900284 | 2900285 | 2900286 | 2900287 | 2900288 | | 2900253 | 2900254 | 2900255 | 2900256 | 2900257 | 2900258 | 2900259 | | | 2900262 | 2900451 | 2900452 | | 2900448 | 2900449 | 2900450 | 2900261 | | 2900260 |
| REL-MR-4,5DC/21 | 2961367 | | X | | | | | | | | | | | | | | | | | | | | | | | | | | X | | | | | X | | | | | |
| REL-MR-4,5DC/21AU | 2961370 | | X | | | | | | | | | | | | | | | | | | | | | | | | | | X | | | | | | | | | | |
| REL-MR-12DC/21 | 2961150 | | | X | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| REL-MR-12DC/21AU | 2961163 | | | X | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| REL-MR-24DC/21 | 2961105 | | | | X | 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 | | | | | | | | | | | | | | |

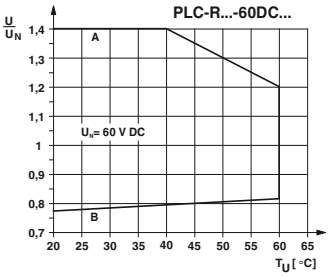
## Operating voltage ranges for PLC-INTERFACE, 6.2 mm versions, equipped with relay

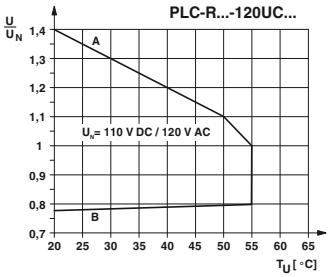


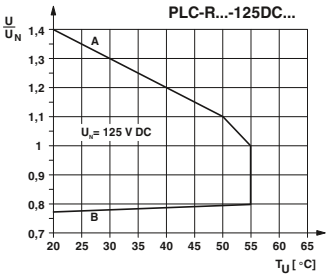



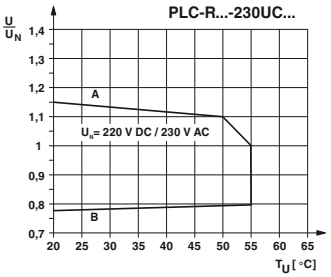



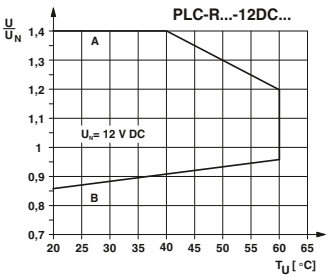



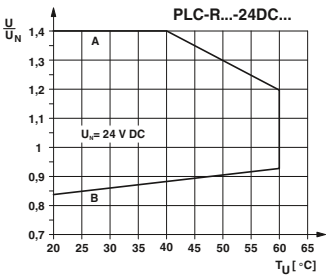



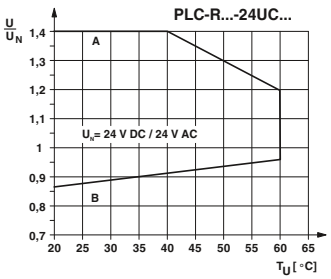



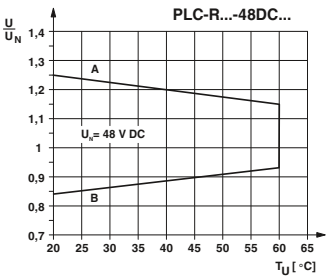



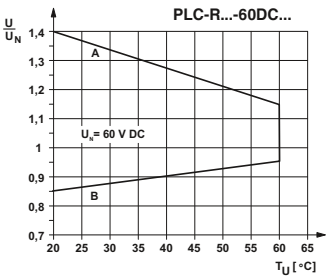

## Operating voltage ranges for PLC-INTERFACE, 14 mm versions, equipped with relay

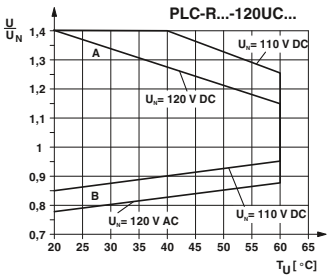


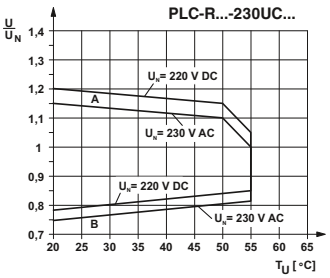




**General conditions:**
Direct alignment in the block, all devices 100% operating time, horizontal or vertical mounting.

**Curve A**
Maximum permitted continuous voltage $U_{max}$ with limiting continuous current on the contact side (see relevant technical data).

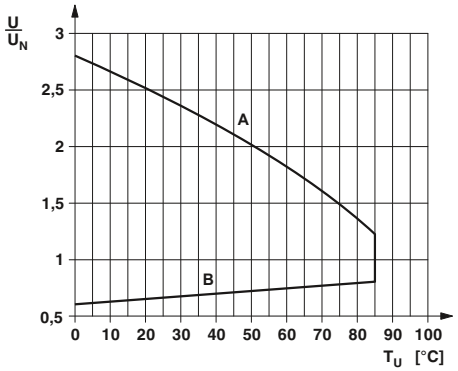
**Curve B**
Minimum permitted pick-up voltage $U_{op}$ after pre-excitation[1]) (see relevant technical data).

[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 relevant 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 power relays

### REL-MR...21

**Permitted input voltage range for REL-MR...21**




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

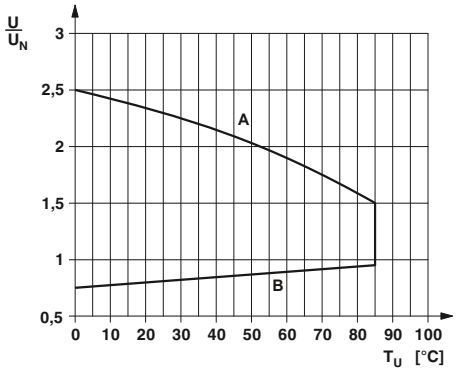
**Curve A**
**Maximum permitted continuous voltage $U_{max}$ with limiting continuous current on the contact side (see relevant technical data).**

**Curve B**
**Minimum permitted pick-up voltage $U_{op}$ after pre-excitation[1]) (see relevant technical data).**

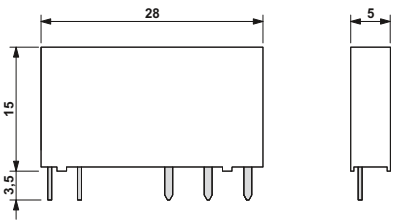
[1]) **Pre-excitation**: relay has been operated in a thermally steady state at the ambient temperature $T_A$ with nominal voltage $U_N$ and limiting continuous current on the contact side (see relevant technical data) (warm coil). After being switched off for a short time, the relay must reliably pick 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

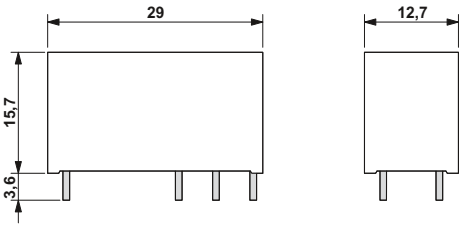
**Permitted input voltage range for REL-MR...21-21, REL-MR-24DC/1IC, REL-MR...21HC**



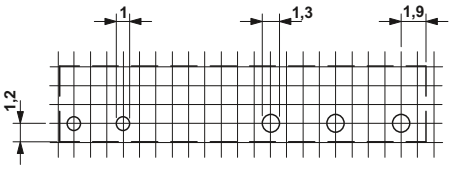

**5 mm overall width**




**12.7 mm overall width**

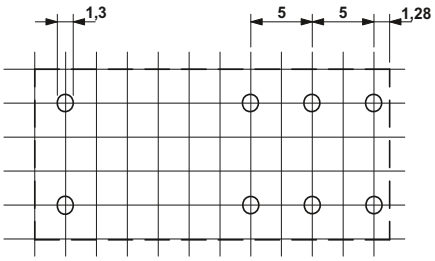



**Perforations for assembly:** view of the connections




Pitch division: 1.25 mm and 1.27 mm

**Perforations for assembly:** view of the connections

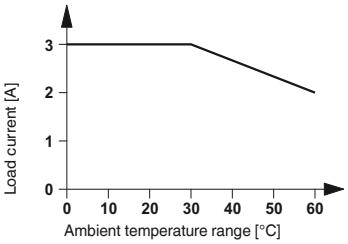



Pitch division: 2.5 mm

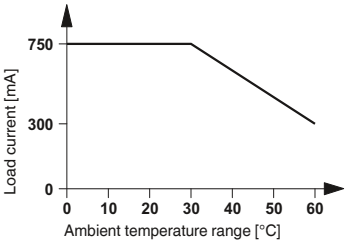
## Plug-in solid-state relays

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

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

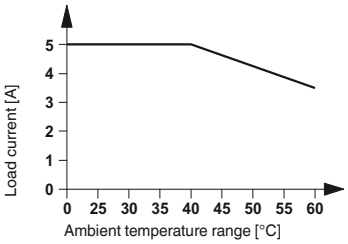



**Derating curve for OPT...DC/230AC/1 and PLC-OS.../230AC/1 solid-state relays**

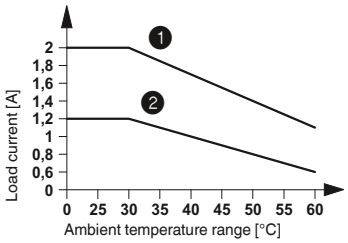



### OPT...DC/24DC/5
### OPT...DC/230AC/2

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

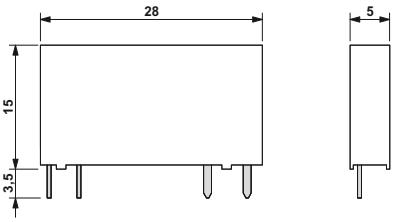



**Derating curve for OPT...DC/230AC/2 and PLC-OS.../230AC/2/ACT solid-state relays**

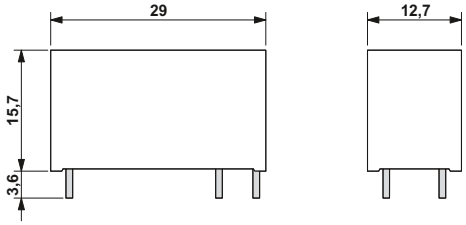



❶ Aligned with > 10 mm spacing
❷ Aligned without spacing

**5 mm overall width**

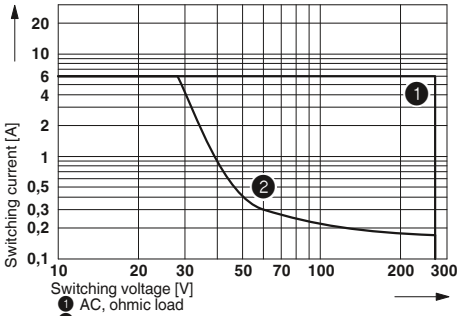



**12.7 mm overall width**



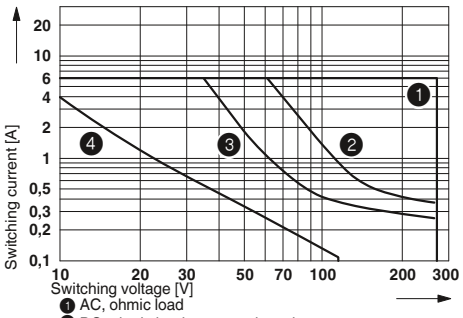
## Electrical interrupting rating for PLC-INTERFACE

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



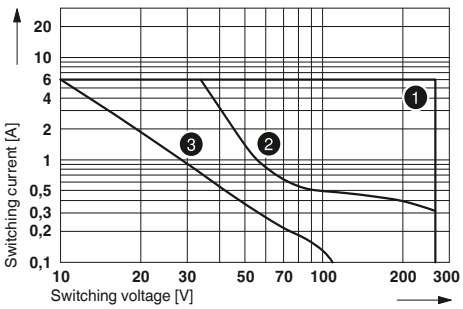

❶ AC, ohmic load
❷ DC, ohmic load

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



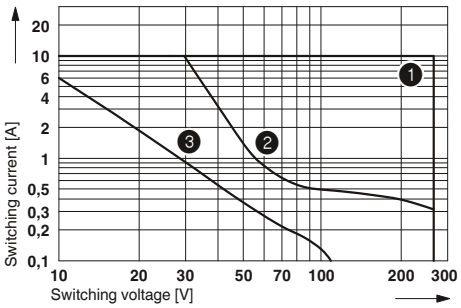

❶ AC, ohmic load
❷ DC, ohmic load, contacts in series
❸ DC, ohmic load
❹ DC, L/R = 40 ms

**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

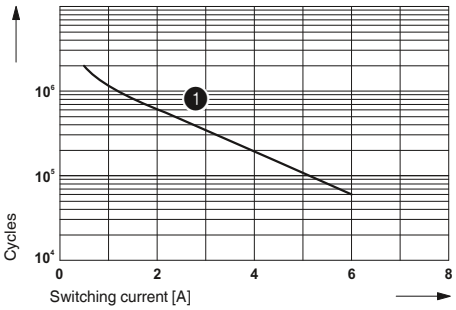
**Electrical interrupting rating for PLC...21HC for high continuous currents**




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

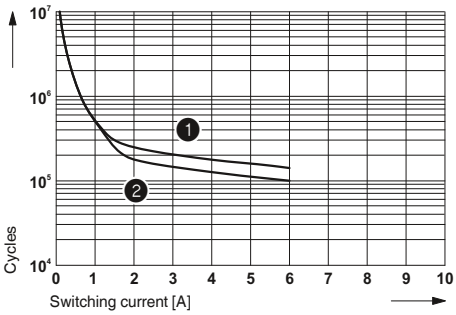
## PLC-INTERFACE for railway applications

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



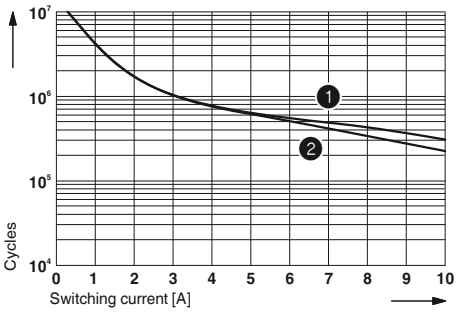

❶ 250 V AC, ohmic load

**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)

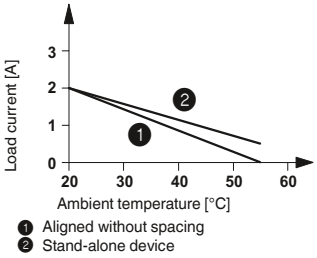
**Electrical service life for PLC-RSP...UC/21HC/RW**




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

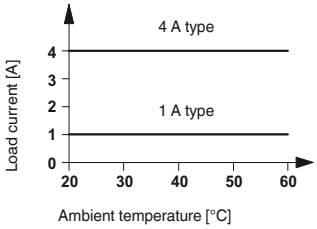
## EMG-OV solid-state power relays

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

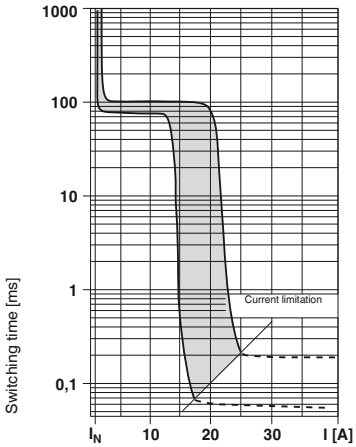



## ST-OV 4-24DC/24DC...PRO power circuit breaker solid-state relays with signal logic

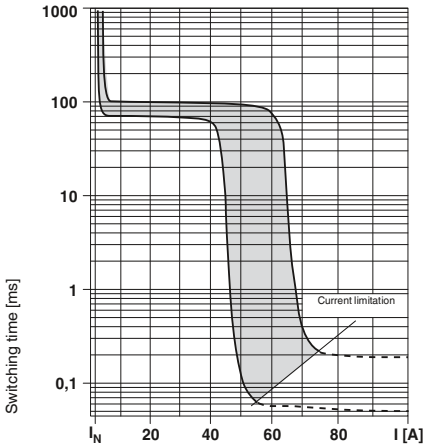
**Derating curve for ST-OV 4-24DC/24DC...PRO**




**Time-current characteristic, 1 A version**




**Time-current characteristic, 4 A version**




**State diagram**

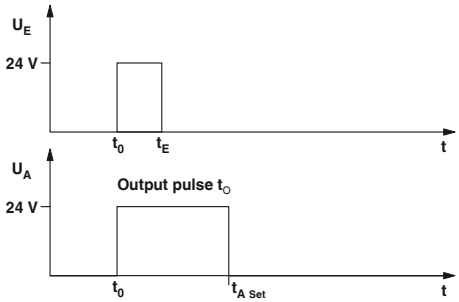
| Operating state | Switching level Input | Light indicator, yellow LED | Light indicator, red LED | Alarm contact/ CONTROL |
|---|---|---|---|---|
| Not activated | L | L | L | |
| Normal operation | H | H | L | |
| Overload/s hort circuit | H | H | H | |
| Open circuit | L | L | H | |

## 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**

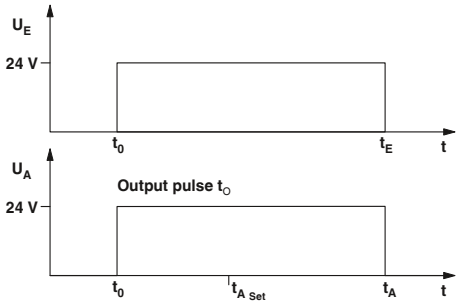



**Table of adjustable output pulse lengths**

| | DIP switches[1]) | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | S1 | S2 | S3 | S4 | S5 | S6 | S7 | S8 |
| Length of output pulses [ms] (when in "on" switch position) | 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:

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

## PLC-INTERFACE with two integrated relays

Relay module with two permanently soldered-in power relays

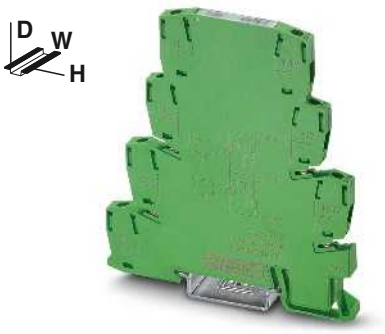
The advantages:

- 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 and push-in connection technology

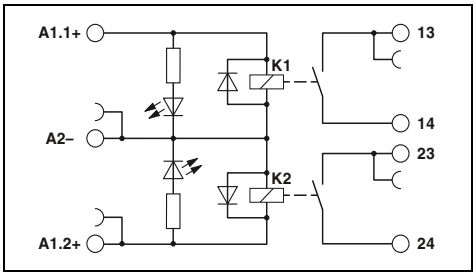
**Notes:**

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

Marking systems and mounting material
See Catalog 5




Two integrated relays



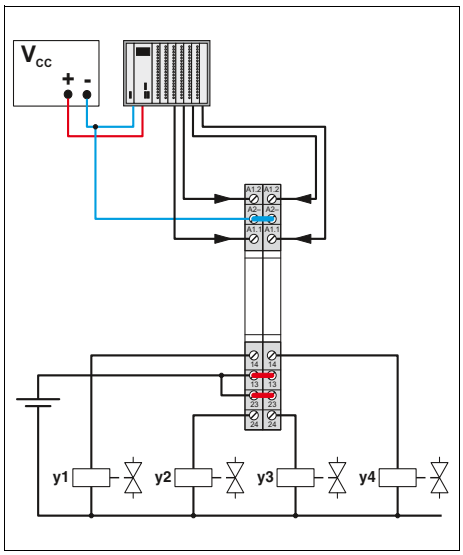

### Technical data

| | | |
|---|---|---|
| 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, freewheeling 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 |
| EMC note | | Class A product, see page 625 |

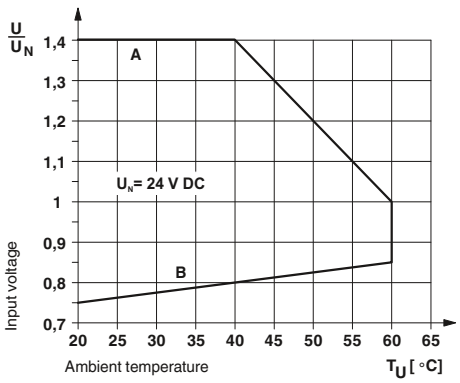
### Ordering data

| 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 **push-in connection** ① | 24 V DC | **PLC-2RPT-24DC/1** | **2901639** | 10 |

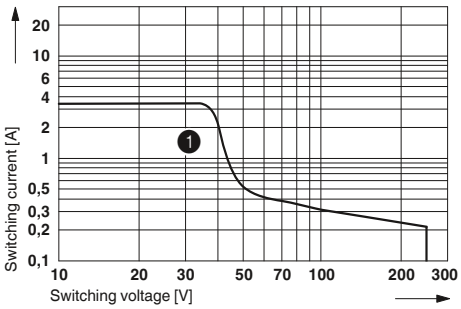
**Application example for PLC-2RS...24DC/1**




**Operating voltage range**




**Interrupting rating**




❶ DC, ohmic load

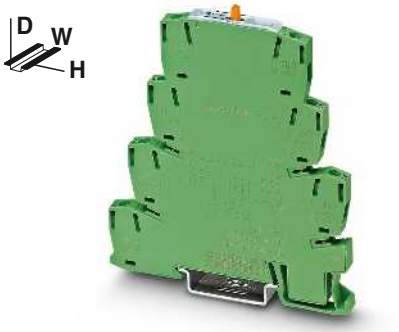
## PLC-INTERFACE with manual switch and relay

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

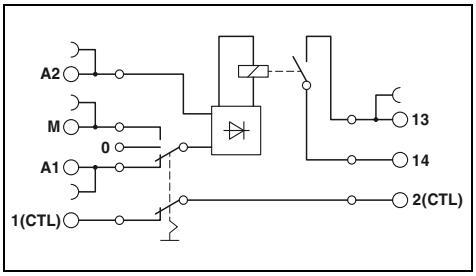
### The advantages are:

- 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 and push-in connection technology

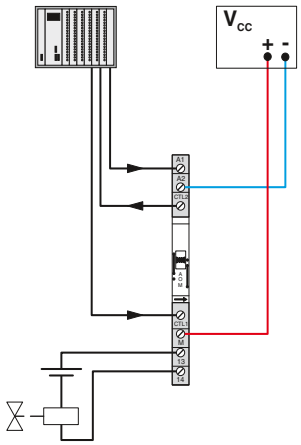
| Notes: |
|---|
| Type of housing:<br>Polyester PBT non-reinforced, color: green. |
| Marking systems and mounting material<br>See Catalog 5 |
| For the protection of input and output, inductive loads must be dampened with an effective protection circuit. |
| Separating plate PLC-ATP is to be used in 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<br>PLC...**L** - operation using screwdriver |



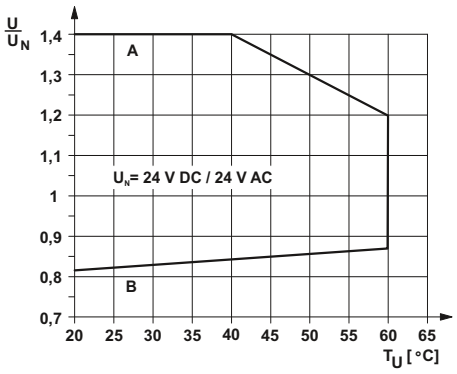

**Relay module with manual switch and integrated relay**




**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

| | | | |
|---|---|---|---|
| Input data | | ① | ② |
| 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<br>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 | |
| EMC note | | Class A product, see page 625 | |

## 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 **push-in connection** | | | | |
| ① | 24 V AC/DC | **PLC-RPT- 24UC/ 1/S/H** | **2900328** | 10 |
| ② | 24 V AC/DC | **PLC-RPT- 24UC/ 1/S/L** | **2900327** | 10 |

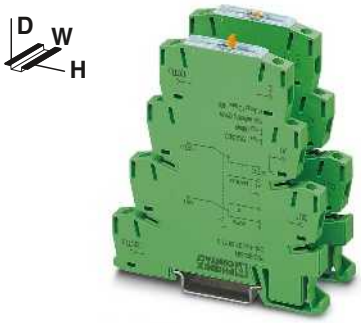
## PLC-INTERFACE with manual switch without relay

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

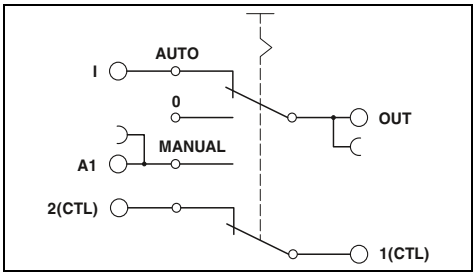
The advantages:

– Only 6.2 mm wide
– Floating confirmation contact
– Screw and spring-cage connection technology

| Notes: |
|---|
| Type of housing:<br>Polyester PBT non-reinforced, color: green. |
| Marking systems and mounting material<br>See Catalog 5 |
| For the protection of input and output, inductive loads must be dampened with an effective protection 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<br>PLC...**L** - operation using screwdriver |




**Module with manual switch without relay**



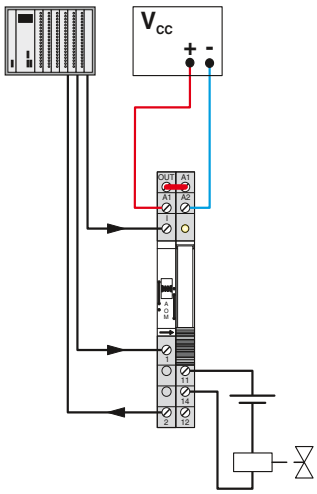

### Technical data

| | | |
|---|---|---|
| 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...**

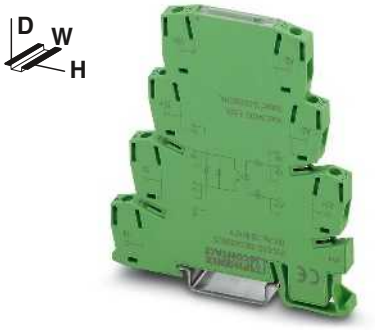


## PLC RELAY with an integrated solid-state relay

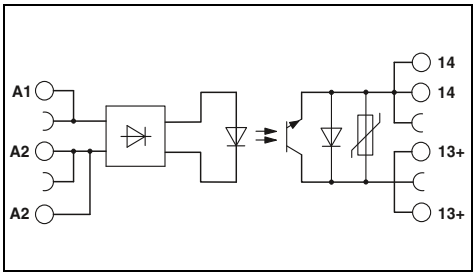
The slim 6.2 mm PLC housing with integrated electronics in various versions offers the following advantages:

- Option of bridging adjacent modules
- Status display
- Protection circuits in input and output
- Wear-resistant and bounce-free switching
- Integrated protection 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
- Screw and push-in connection technology

| Notes: |
|---|
| Type of housing:<br>Polyester PBT non-reinforced, color: green. |
| Marking systems and mounting material<br>See Catalog 5 |
| For the protection of input and output, inductive loads must be dampened with an effective protection 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:<br>- PLC-OS...-...-300DC/1<br>- PLC-OS...-24DC/24DC/10/R |




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

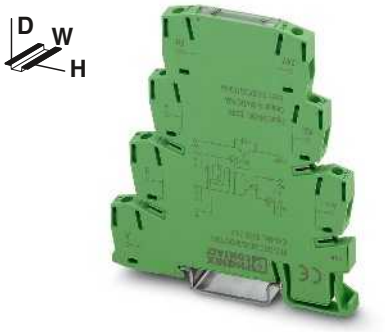



### Technical data

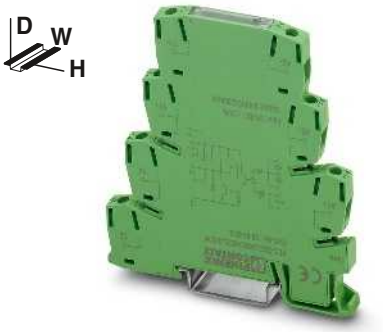
| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Input data | | ① | ② | ③ | ④ | ⑤ | ⑥ | ⑦ | ⑧ |
| Permissible range (with reference to $U_N$) | | 0.8 - 1.2 | 0.8 - 1.2 | 0.8 - 1.2 | 0.8 - 1.2 | 0.8 - 1.2 | 0.8 - 1.2 | 0.8 - 1.1 | 0.8 - 1.1 |
| Switching level (with reference to $U_N$) | 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] | 15 | 6 | 8 | 5 | 5 | 3 | 5.6 | 8.4 |
| 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 | | | | | | | |
| EMC note | | Class A product, see page 625 | | | | | | | |

### Ordering data

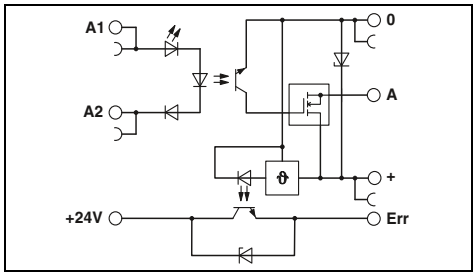
| Description | | Input voltage $U_N$ | Type | Order No. | Pcs. / Pkt. |
|---|---|---|---|---|---|
| **PLC-INTERFACE**, with **screw connection** | | | | | |
| | ① | 5 V DC | **PLC-OSC- 5DC/300DC/ 1** | **2980652** | 10 |
| | ② | 12 V DC | **PLC-OSC- 12DC/300DC/ 1** | **2980665** | 10 |
| | ③ | 24 V 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 **push-in connection** | | | | | |
| | ① | 5 V DC | **PLC-OPT- 5DC/300DC/1** | **2900381** | 10 |
| | ② | 12 V DC | **PLC-OPT- 12DC/300DC/1** | **2900382** | 10 |
| | ③ | 24 V DC | **PLC-OPT- 24DC/300DC/1** | **2900383** | 10 |
| 48 V DC ... 60 V DC | ④ | 60 V DC | **PLC-OPT- 60DC/300DC/1** | **2900384** | 10 |
| | ⑤ | 110 V DC | **PLC-OPT-110DC/300DC/1** | **2900385** | 10 |
| | ⑥ | 220 V DC | **PLC-OPT-220DC/300DC/1** | **2900387** | 10 |
| | ⑦ | 120 V AC | **PLC-OPT-120AC/300DC/1** | **2900388** | 10 |
| | ⑧ | 230 V AC | **PLC-OPT-230AC/300DC/1** | **2900389** | 10 |

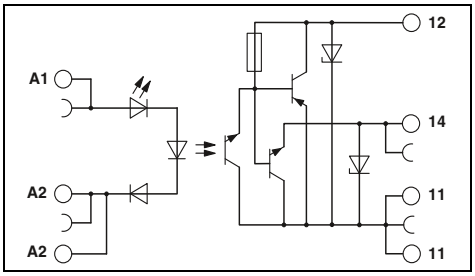



**Power solid-state relay with short-circuit-proof DC voltage output, max. 10 A, with feedback**

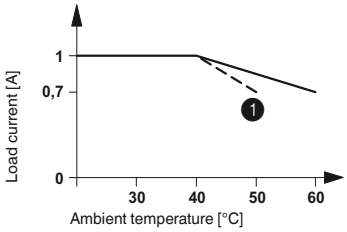



**Input solid-state relay with DC voltage output, max. 500 mA, with electronic PDT**



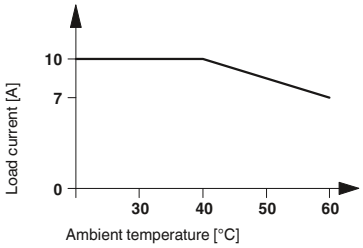




**Derating curve for PLC...300DC/1**

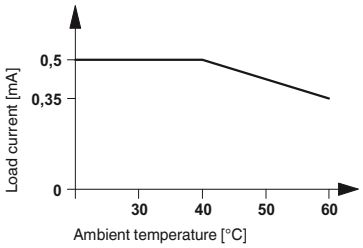



1 For input voltages 220 V DC and 230 V AC

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




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




## 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 | |
| Class A product, see page 625 | |

## Ordering data

| Type | Order No. | Pcs. / Pkt. |
|---|---|---|
| **PLC-OSC- 24DC/ 24DC/ 10/R** | **2982702** | 10 |
| **PLC-OPT- 24DC/ 24DC/10/R** | **2900398** | 10 |

## 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 V | |
| | |
| 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 | |
| Class A product, see page 625 | |

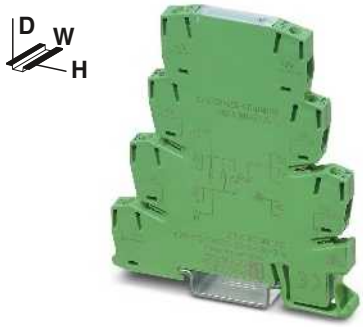
## Ordering data

| Type | Order No. | Pcs. / Pkt. |
|---|---|---|
| **PLC-OSC- 24DC/ 48DC/500/W** | **2980636** | 10 |
| **PLC-OPT- 24DC/ 48DC/500/W** | **2900378** | 10 |

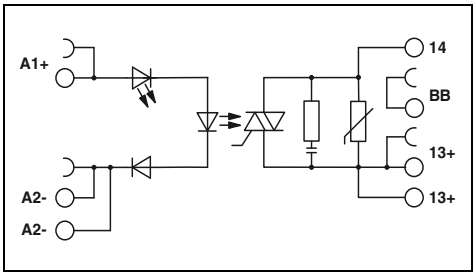
## Highly compact relay modules - PLC-INTERFACE

### PLC RELAY with an integrated solid-state relay

6.2 mm narrow solid-state relay for switching AC loads
– Status display
– Protection circuits in input and output
– Wear-free
– Switching capacity up to 230 V AC/2.4 A
– Screw and push-in connection technology




**Solid-state power relay with AC voltage output, max. 2.4 A**

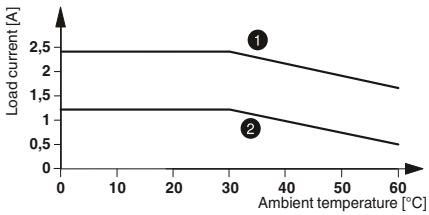



### Technical data

| | | |
|---|---|---|
| Input data | | ① |
| Rated actuating voltage range with reference to $U_C$ | | 0.8 - 1.2 |
| Rated actuating current $I_C$ | [mA] | 8 |
| Switching level (with reference to $U_C$) | 1 signal ("H") | > 0.8 |
| | 0 signal ("L") | < 0.4 |
| Typ. switch-on time at $U_N$ | [ms] | 10 |
| Typ. shutdown time at $U_N$ | [ms] | 10 |
| Transmission frequency $f_{limit}$ | [Hz] | 10 |
| Input circuit DC | | Yellow LED, protection against polarity reversal, surge protection |
| Output data | | |
| Max. switching voltage | | 253 V AC |
| Min. switching voltage | | 24 V AC |
| Max. inrush current | | 250 A (20 ms) |
| Min. / max. switching current | | 10 mA / 2.4 A (see to derating) |
| Output protection | | RCV circuit |
| Voltage drop at max. limiting continuous current | | < 1 V |
| Leakage current in off state | | < 1 mA |
| Phase angle (cos ϕ) | | - |
| Max. load value | | 340 $A^2s$ (tp = 10 ms, at 25 °C) |
| General data | | |
| Rated insulation voltage | | 260 V AC |
| Rated surge voltage | | 4 kV |
| Insulation | | Basic insulation |
| Ambient temperature (operation) | | -25 °C ... 60 °C |
| Standards/regulations | | DIN EN 50178 |
| 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 / 86 mm |
| EMC note | | Class A product, see page 625 |

### Ordering data

| Description | Rated actuating voltage $U_C$ | Type | Order No. | Pcs. / Pkt. |
|---|---|---|---|---|
| **PLC-INTERFACE,** with **screw connection** ① | 24 V DC | **PLC-OSC- 24DC/230AC/2.4/ACT** | **2904631** | 10 |
| **PLC-INTERFACE**, with **push-in connection** ① | 24 V DC | **PLC-OPT- 24DC/230AC/2.4/ACT** | **2904632** | 10 |

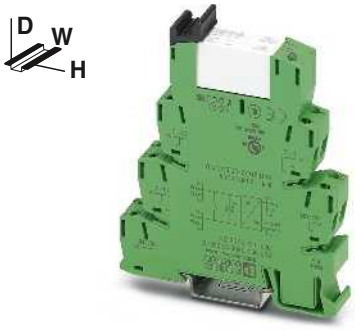



❶= aligned with > 20 mm spacing
❷= aligned without spacing

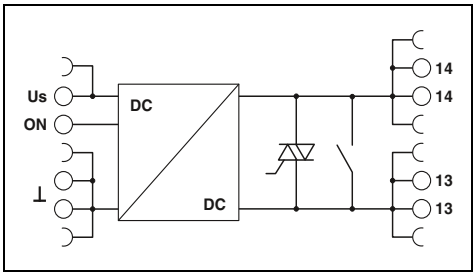
**Load current as a function of the ambient temperature**
**Operating time: 100% operating factor**

## PLC-INTERFACE with hybrid solid-state relay

The solid-state relay, combined with a mechanical relay, offers the following advantages:
– Higher electrical service life
– Lower power dissipation
– Option of bridging adjacent modules
– Status display
– Protection circuits in input and output
– Switching capacity up to 230 V AC/10 A
– Screw and push-in connection technology




**Hybrid solid-state relay with AC voltage output, max. 10 A**




### Technical data

| | | |
|---|---|---|
| Input data | | ① |
| Rated control supply voltage $U_S$ | [V DC] | 24 |
| Rated control supply voltage range with reference to $U_S$ | | 0.8 - 1.2 |
| Rated control supply current $I_S$ | | 14 mA (input low, output low)<br>19 mA (input high, output high) |
| Rated actuation voltage $U_C$ ON | [V DC] | 24 |
| Rated actuating voltage range with reference to $U_C$ | | 0.8 - 1.2 |
| Rated actuating current $I_C$ | [mA] | 6.8 |
| Input circuit DC | | Yellow LED, protection against polarity reversal, surge protection |
| Output data | | |
| Max. switching voltage | | 253 V AC |
| Min. switching voltage | | 24 V AC |
| Max. inrush current | | - |
| Min. / max. switching current | | 100 mA / 10 A (see derating curve) |
| Output protection | | RCV circuit |
| Voltage drop at max. limiting continuous current | | - |
| Leakage current in off state | | < 1 mA |
| Phase angle (cos ϕ) | | - |
| Max. load value | | 350 $A^2s$ (tp = 10 ms, at 25 °C) |
| General data | | |
| Rated insulation voltage | | 260 V AC |
| Rated surge voltage | | 6 kV |
| Insulation | | safe isolation |
| Ambient temperature (operation) | | -25 °C ... 60 °C |
| Standards/regulations | | DIN EN 50178 |
| 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 / 86 mm |

### Ordering data

| Description | Rated actuating voltage $U_C$ | Type | Order No. | Pcs. / Pkt. |
|---|---|---|---|---|
| **PLC-INTERFACE,** with **screw connection** ① | 24 V DC | **PLC-HSC-24DC/230AC/10** | **2905214** | 1 |
| **PLC-INTERFACE**, with **push-in connection** ① | 24 V DC | **PLC-HPT-24DC/230AC/10** | **2905215** | 1 |

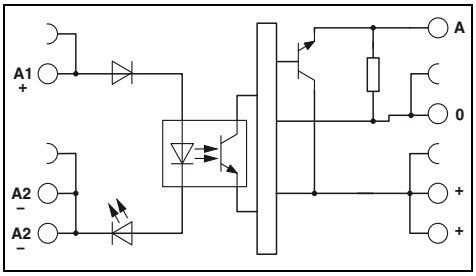
## PLC-INTERFACE
## Solid-state relays up to 100 kHz

A solid-state relay for the safe acquisition of short pulses.
– Status display
– Bridging options
– Cut-off frequency of up to 100 kHz
– Push-pull stage on output side
– Features a capacitor on the input side for interference suppression

| Notes: |
|---|
| Type of housing:<br>Polyamide PA non-reinforced, color: green. |
| Marking systems and mounting material<br>See Catalog 5 |

**With DC voltage output**
**Transmission frequency 100 kHz**

EAC




### Technical data

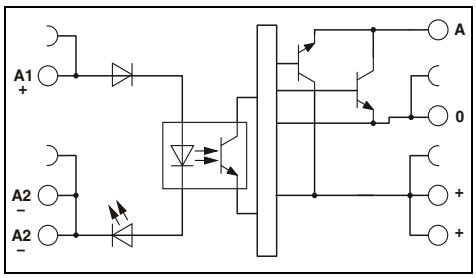
| | | ① | ② |
|---|---|---|---|
| **Input data** | | | |
| Permissible range (with reference to $U_N$) | | 0.8 - 1.2 | 0.8 - 1.2 |
| Switching level with reference to $U_N$ | 1 signal ("H") | > 0.8 | > 0.8 |
| | 0 signal ("L") | < 0.4 | < 0.4 |
| Typ. input current at $U_N$ | [mA] | 7 | 6 |
| Typ. switch-on time at $U_N$ | [µs] | 1.5 | 1.5 |
| Typ. shutdown 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 | |
| Output circuit | | 3-conductor, ground-referenced | |
| Output protection | | Protection against polarity reversal, surge protection | |
| **General data** | | | |
| Test voltage input/output | | 2.5 $kV_{rms}$ (50 Hz, 1 min.) | |
| Ambient temperature (operation) | | -20 °C ... 60 °C | |
| Standards/regulations | | DIN EN 50178 | |
| Pollution degree / surge voltage category | | 2 / II | |
| 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 | |
| EMC note | | Class A product, see page 625 | |

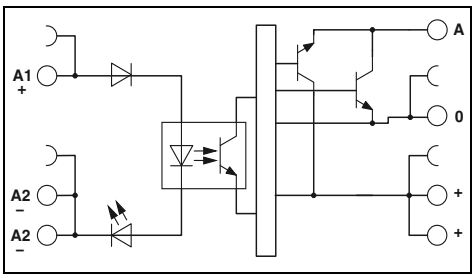
### Ordering data

| Description | | Input voltage $U_N$ | Type | Order No. | Pcs. / Pkt. |
|---|---|---|---|---|---|
| **Input solid-state relay** with screw connection | | | | | |
| | ① | 5 V DC | **PLC-OSC- 5DC/ 24DC/100KHZ** | **2902963** | 1 |
| | ② | 24 V DC | **PLC-OSC- 24DC/ 24DC/100KHZ** | **2902964** | 1 |
| **Input solid-state relay** with push-in connection | | | | | |
| | ① | 5 V DC | **PLC-OPT- 5DC/ 24DC/100KHZ** | **2902969** | 1 |
| | ② | 24 V DC | **PLC-OPT- 24DC/24DC/100KHZ** | **2902970** | 1 |

**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 |
| 3-conductor push-pull, ground referenced |
| Protection against polarity reversal, surge protection |

| |
|---|
| 2.5 $kV_{rms}$ (50 Hz, 1 min.) |
| -20 °C ... 60 °C |
| DIN EN 50178 |
| 2 / II |
| 0.14 - 2.5 $mm^2$ / 0.14 - 2.5 $mm^2$ / 26 - 14 |
| 6.2 mm / 80 mm / 86 mm |
| Class A product, see page 625 |

## Ordering data

| Type | Order No. | Pcs. / Pkt. |
|---|---|---|
| **PLC-OSC- 5DC/ 5DC/100KHZ-G** | **2902965** | 1 |
| **PLC-OSC- 24DC/ 5DC/100KHZ-G** | **2902966** | 1 |
| **PLC-OPT- 5DC/ 5DC/100KHZ-G** | **2902971** | 1 |
| **PLC-OPT- 24DC/ 5DC/100KHZ-G** | **2902972** | 1 |

## 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 |
| 3-conductor push-pull, ground referenced |
| Protection against polarity reversal, surge protection |

| |
|---|
| 2.5 $kV_{rms}$ (50 Hz, 1 min.) |
| -20 °C ... 60 °C |
| DIN EN 50178 |
| 2 / II |
| 0.14 - 2.5 $mm^2$ / 0.14 - 2.5 $mm^2$ / 26 - 14 |
| 6.2 mm / 80 mm / 86 mm |
| Class A product, see page 625 |

## Ordering data

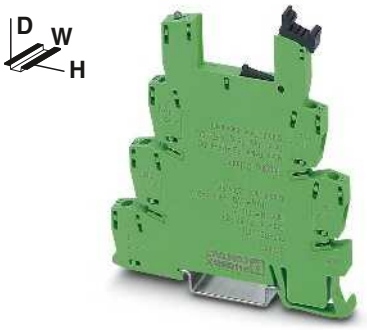
| Type | Order No. | Pcs. / Pkt. |
|---|---|---|
| **PLC-OSC- 5DC/ 24DC/100KHZ-G** | **2902967** | 1 |
| **PLC-OSC- 24DC/ 24DC/100KHZ-G** | **2902968** | 1 |
| **PLC-OPT- 5DC/24DC/100KHZ-G** | **2902973** | 1 |
| **PLC-OPT- 24DC/24DC/100KHZ-G** | **2902974** | 1 |

## PLC-INTERFACE for the TTL signal at input

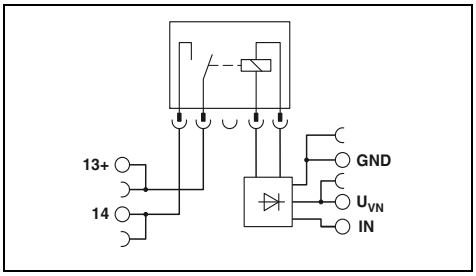
The PLC-BS...TTL/1 basic terminal block is controlled using a TTL (5 V) input signal and can be equipped with a mechanical relay or a solid-state relay as an option. The basic terminal block equipped with a robust miniature relay offers the following advantages:

- 6.2 mm slim overall width
- Bridging options
- Status display
- RTIII degree of protection
- Safe isolation in accordance with EN 50178 (VDE 0160)
- 4 $kV_{rms}$ electrical isolation between coil and contact
- Screw and push-in connection technology

| Notes: |
|---|
| Type of housing:<br>Polyester PBT non-reinforced, color: green. |
| Marking systems and mounting material<br>See Catalog 5 |




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




### Technical data

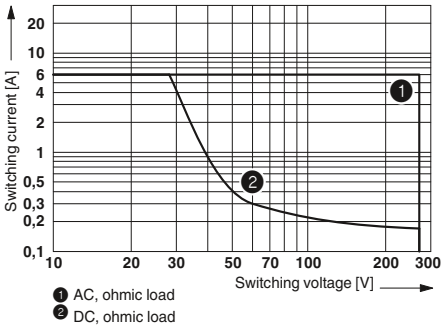
| | | |
|---|---|---|
| **Input data** | | |
| Rated control supply voltage $U_{VN}$ | 5 V DC | |
| Rated control supply voltage range with reference to $U_{VN}$ | 0.9 ... 1.2 | |
| Rated control supply current $I_{VN}$ | 41 mA | |
| Rated actuating voltage $U_c$ (IN) | 5 V DC (TTL) | |
| Rated actuating 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 | |
| Clearance and creepage distances between the power circuits | IEC 60664, EN 50178, IEC 62103 | |
| Pollution degree / Surge voltage category | 2 / 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 | 6.2 mm / 80 mm / 94 mm | |
| EMC note | Class A product, see page 625 | |

### Ordering data

| Description | Type | Order No. | Pcs. / Pkt. |
|---|---|---|---|
| **PLC-INTERFACE** | | | |
| With screw connection | **PLC-BSC-TTL/1** | **2982689** | 10 |
| With push-in connection | **PLC-BPT-TTL/1** | **2900458** | 10 |

### Accessories

| | | | |
|---|---|---|---|
| **Plug-in miniature power relay** | | | |
| with gold contact | **REL-MR 4,5DC/21AU** | **2961370** | 10 |
| with power contact | **REL-MR- 4,5DC/21** | **2961367** | 10 |



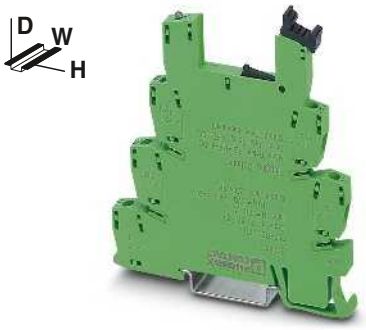

**Max. interrupting rating**

## PLC-INTERFACE for the TTL signal at input

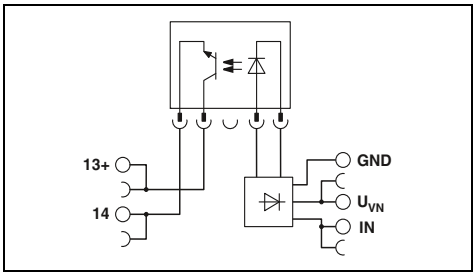
The PLC-BS...TTL/1 basic terminal block is controlled using a TTL (5 V) input signal and can be equipped with a mechanical relay or a solid-state relay as an option. The basic terminal block equipped with a solid-state relay offers the following advantages:

- 6.2 mm slim overall width
- Bridging options
- Status display
- IP67-protected solid-state relay electronic unit
- Switching capacity of up to 24 V DC/3 A
- Alternative input or power solid-state relay
- Wear-free and output-free
- Integrated protective circuit
- 2.5 $kV_{rms}$ electrical isolation between input and output
- Screw and push-in connection technology

| Notes: |
|---|
| Type of housing:<br>Polyester PBT non-reinforced, color: green. |
| Marking systems and mounting material<br>See Catalog 5 |
| For derating curves see page 425 |




**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. shutdown 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 | |
| Clearance 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 | |
| EMC note | Class A product, see page 625 | |

### Ordering data

| Description | Type | Order No. | Pcs. / Pkt. |
|---|---|---|---|
| **PLC-INTERFACE** | | | |
| With screw connection | **PLC-BSC-TTL/1** | **2982689** | 10 |
| With push-in connection | **PLC-BPT-TTL/1** | **2900458** | 10 |

### Accessories

| | | | |
|---|---|---|---|
| **Plug-in solid-state relay** | | | |
| Solid-state input relay | **OPT- 5DC/ 48DC/100** | **2967992** | 10 |
| Solid-state power relay | **OPT- 5DC/ 24DC/ 2** | **2967989** | 10 |

## 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.

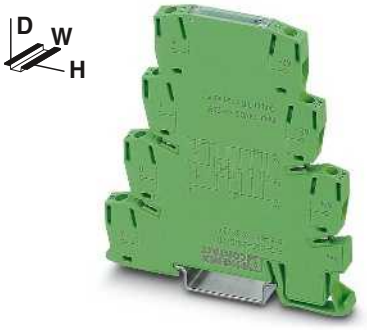
The module offers the following advantages:

– Switching capacity TTL (5 V), fan out = 1
– 6.2 mm slim overall width
– Bridging options
– Status display
– Integrated protective circuit
– Screw and push-in connection technology

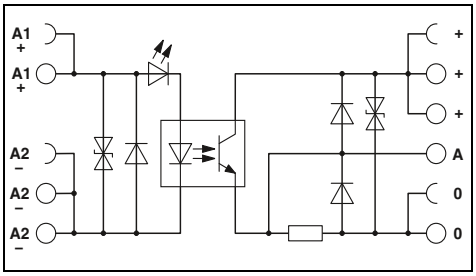
**Notes:**

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

Marking systems and mounting material
See Catalog 5




**Input solid-state relay with TTL (5 V) output**



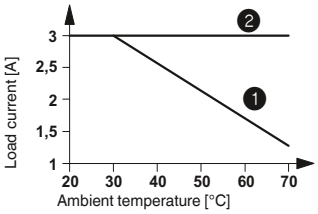

### Technical data

| | | |
|---|---|---|
| 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. shutdown 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 |
| Clearance 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 |
| EMC note | | Class A product, see page 625 |

### Ordering data

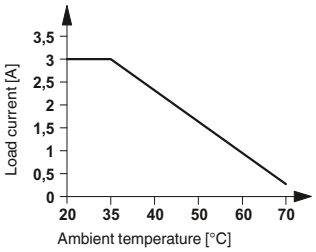
| Description | Type | Order No. | Pcs. / Pkt. |
|---|---|---|---|
| **PLC-INTERFACE** | | | |
| With screw connection | **PLC-OSC- 24DC/TTL** | **2982728** | 10 |
| With push-in connection | **PLC-OPT- 24DC/TTL** | **2900363** | 10 |

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




❶ Aligned without spacing
❷ Aligned with ≥ 20 mm spacing

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

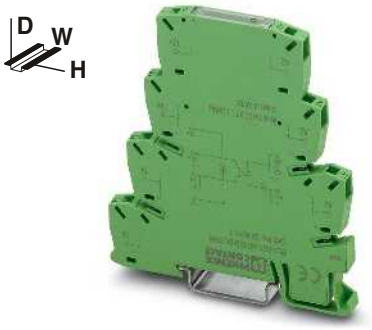


## PLC RELAY with solid-state relays for railway applications

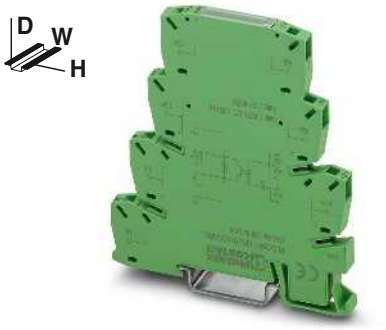
The PLC-OSP...RW interface modules are intended for use as per DIN EN 50155 (VDE 0115 Part 200) "Railway applications, Part 200: Electronic equipment used on rolling stock".

The advantages:

- 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)
- Spring-cage and push-in connection technology

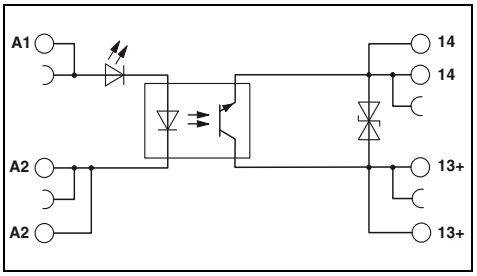


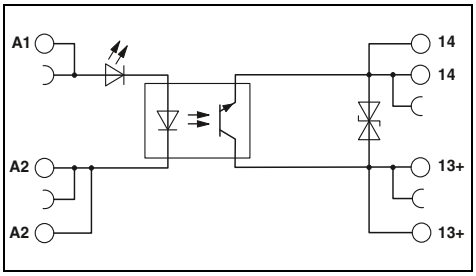

**Power solid-state relay with DC voltage output, max. 3 A**




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

| Notes: |
|---|
| Type of housing: Polyester PBT non-reinforced, color: green. |
| Marking systems and mounting material See Catalog 5 |
| For derating curves see page 440 |




### 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. shutdown 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 | |
| EMC note | | | |

### 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. shutdown 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 | | | | | |
| EMC note | | Class A product, see page 625 | | | | | |

### 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-OPT- 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-OPT-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-OPT- 24DC/110DC/3RW** | **2900391** | 10 |
| **PLC-OPT- 36DC/110DC/3RW** | **2900392** | 10 |
| **PLC-OPT- 48DC/110DC/3RW** | **2900393** | 10 |
| **PLC-OPT- 72DC/110DC/3RW** | **2900394** | 10 |
| **PLC-OPT- 96DC/110DC/3RW** | **2900395** | 10 |
| **PLC-OPT-110DC/110DC/3RW** | **2900396** | 10 |

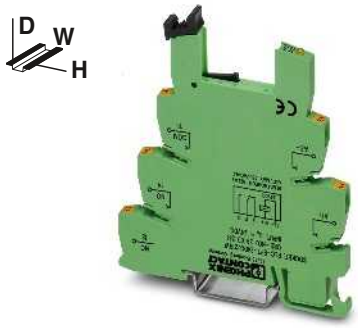
## PLC-INTERFACE for railway applications

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

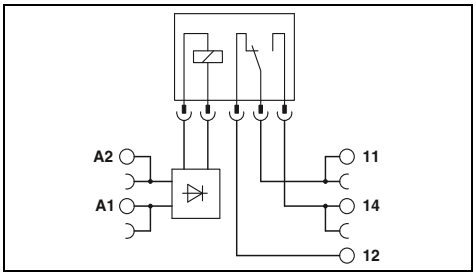
The advantages:

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

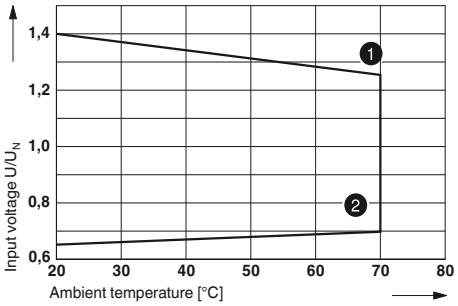
| Notes: |
|---|
| Type of housing:<br>Polyamide PA non-reinforced, color: green. |
| Marking systems and mounting material<br>See Catalog 5 |
| Separating plate PLC-ATP must be installed for voltages larger than 250 V (L1, L2, L3) between identical terminal blocks in adjacent modules. Potential bridging 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 for fitting with 1 PDT relay**

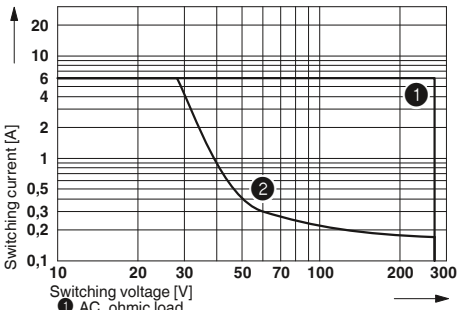



**Permitted input voltage range for PLC-BSP-24DC/21RW (with REL-MR-18DC/21... relay)**




❶ Maximum continuous voltage at limiting continuous current = 3 A
❷ Minimum pick-up voltage for pre-excitation with $U_N$ and limiting continuous current = 3 A

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




❶ AC, ohmic load
❷ DC, ohmic load

### 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, freewheeling 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 | |
| EMC note | Class A product, see page 625 | |

### Ordering data

| Description | Voltage $U_N$ | Type | Order No. | Pcs. / Pkt. |
|---|---|---|---|---|
| **PLC-INTERFACE basic terminal block**, for plug-in miniature relay<br>With push-in connection | 24 V DC | **PLC-BPT- 24DC/21RW** | **2900261** | 10 |

### Accessories

| | | | |
|---|---|---|---|
| **Plug-in miniature relay** | | | |
| with power contact | | **REL-MR- 18DC/21** | **2961383** | 10 |
| with gold contact | | **REL-MR- 18DC/21AU** | **2961493** | 10 |

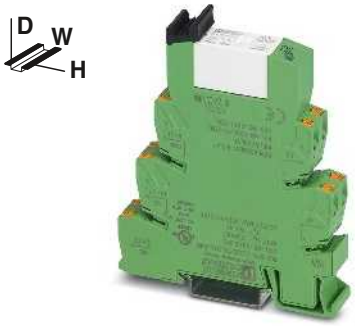
## PLC-INTERFACE for railway applications

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

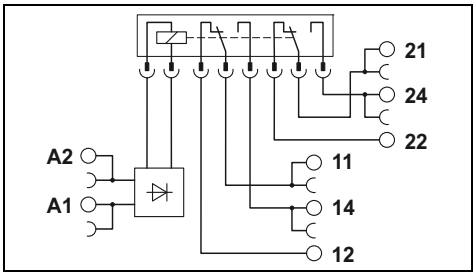
The advantages:

- Input nominal frequency 16.7 Hz
- Vibration and shock resistance according to EN 50155
- Safe isolation according to DIN EN 50178 between coil and contact
- Push-in connection technology

| Notes: |
|---|
| Type of housing:<br>Polyamide PA non-reinforced, color: green. |
| Marking systems and mounting material<br>See Catalog 5 |
| 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**



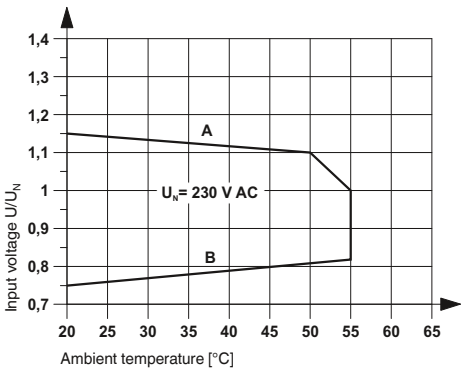

### Technical data

| | | |
|---|---|---|
| **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 $U_N$ | - | |
| 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 | 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 ... 55 °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 | |
| EMC note | Class A product, see page 625 | |

### Ordering data

| Description | Voltage $U_N$ | Type | Order No. | Pcs. / Pkt. |
|---|---|---|---|---|
| **PLC-INTERFACE** | | | | |
| With push-in connection | 230 V AC | **PLC-RPT-230UC/21-21AU/RWF** | **2900345** | 10 |

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




**Curve A**
Maximum continuous voltage at limiting continuous current = 6 A

**Curve B**
Minimum pick-up voltage for pre-excitation with $U_N$ and limiting continuous current = 6 A

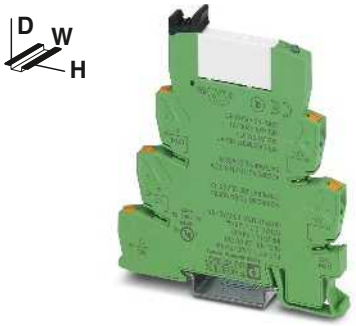
## PLC-INTERFACE for railway applications

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

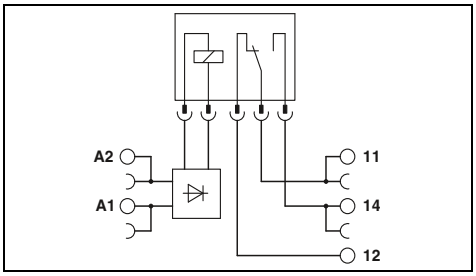
The advantages:

- 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 according to EN 50155
- Safe isolation according to DIN EN 50178 between coil and contact
- Push-in connection technology

| Notes: |
|---|
| Type of housing:<br>Polyamide PA non-reinforced, color: green. |
| Marking systems and mounting material<br>See Catalog 5 |
| 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 426 |




1 PDT



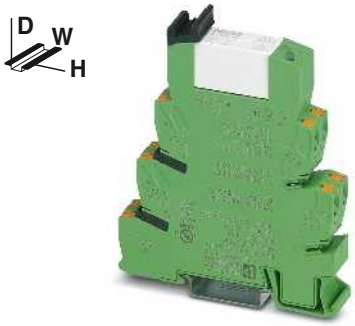

### Technical data

| 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] | 9 | 3 | 2 |
| Typ. response time at $U_N$ | [ms] | 4 | 4 | 4 |
| Typ. release time at $U_N$ | [ms] | 4 | 4 | 4 |
| Input protection: | | Yellow LED, bridge rectifier, freewheeling diode | | |

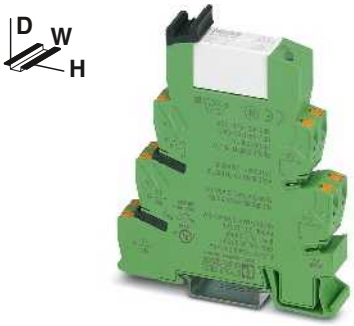
| Output data | | | |
|---|---|---|---|
| Contact type | | 1 PDT | 1 PDT |
| Contact material | | AgSnO | AgSnO, hard gold-plated |
| Max. switching voltage | | 250 V AC/DC | 30 V AC / 36 V DC |
| Min. switching voltage | | 5 V (at 100 mA) | 100 mV (at 10 mA) |
| Limiting continuous current | | 6 A | 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 (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 | |
| EMC note | | Class A product, see page 625 | |

### Ordering data

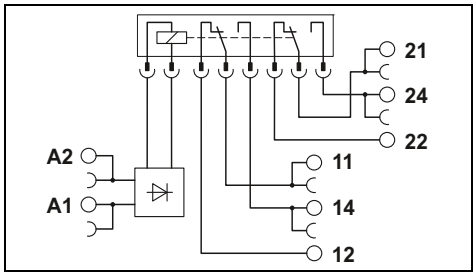
| Description | | Input voltage $U_N$ | Type | Order No. | Pcs. / Pkt. |
|---|---|---|---|---|---|
| **PLC-INTERFACE**, with **power contact** | | | | | |
| With push-in connection | ① | 24 V DC | **PLC-RPT- 24UC/21/RW** | **2900318** | 10 |
| | ② | 72 V DC | **PLC-RPT- 72UC/21/RW** | **2900319** | 10 |
| | ③ | 110 V DC | **PLC-RPT-110UC/21/RW** | **2900320** | 10 |
| **PLC-INTERFACE**, with **hard gold-plated contact** | | | | | |
| With push-in connection | ① | 24 V DC | **PLC-RPT- 24UC/21AU/RW** | **2900321** | 10 |
| | ② | 72 V DC | **PLC-RPT- 72UC/21AU/RW** | **2900322** | 10 |
| | ③ | 110 V DC | **PLC-RPT-110UC/21AU/RW** | **2900323** | 10 |

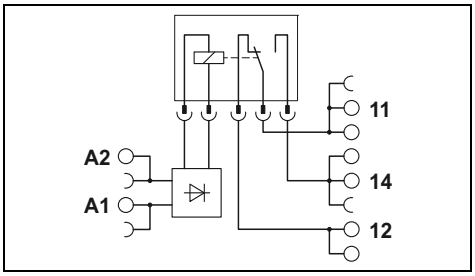


2 PDTs



1 PDT up to 10 A




## Technical data

| ① | ② | ③ |
|---|---|---|
| 0.7 - 1.25 | 0.7 - 1.25 | 0.7 - 1.25 |
| 20 | 6 | 4.5 |
| 5 | 5 | 5 |
| 11 | 11 | 11 |

Yellow LED, bridge rectifier, freewheeling diode

| | |
|---|---|
| 2 PDTs | 2 PDTs |
| 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) |
| 6 A | 50 mA |
| 15 A (300 ms) | 50 mA |
| 10 mA (at 5 V) | 1 mA (at 24 V) |

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
Class A product, see page 625

## Ordering data

| Type | Order No. | Pcs. / Pkt. |
|---|---|---|
| **PLC-RPT- 24UC/21-21/RW** | **2900346** | 10 |
| **PLC-RPT- 72UC/21-21/RW** | **2900347** | 10 |
| **PLC-RPT-110UC/21-21/RW** | **2900348** | 10 |
| **PLC-RPT- 24UC/21-21AU/RW** | **2900349** | 10 |
| **PLC-RPT- 72UC/21-21AU/RW** | **2900350** | 10 |
| **PLC-RPT-110UC/21-21AU/RW** | **2900351** | 10 |

## Technical data

| ① | ② | ③ |
|---|---|---|
| 0.7 - 1.25 | 0.7 - 1.25 | 0.7 - 1.25 |
| 20 | 6 | 4.5 |
| 5 | 5 | 5 |
| 11 | 11 | 11 |

Yellow LED, bridge rectifier, freewheeling diode

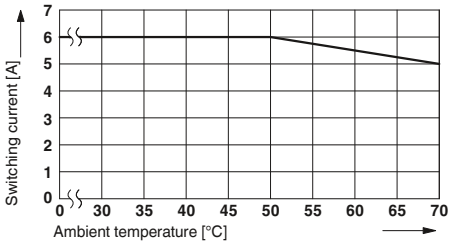
| |
|---|
| 1 PDT |
| AgNi |
| 250 V AC/DC |
| 12 V (at 10 mA) |
| 10 A (with inserted bridge 2967691) |
| 30 A (300 ms) |
| 10 mA (at 12 V) |

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
Class A product, see page 625

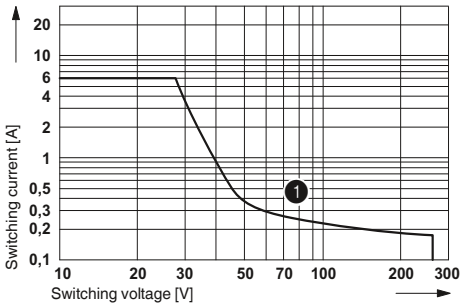
## Ordering data

| Type | Order No. | Pcs. / Pkt. |
|---|---|---|
| **PLC-RPT- 24UC/21HC/RW** | **2900324** | 10 |
| **PLC-RPT- 72UC/21HC/RW** | **2900325** | 10 |
| **PLC-RPT-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**

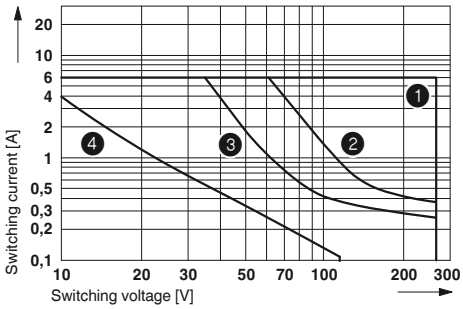



**Interrupting rating for PLC-RSP...UC/21RW**



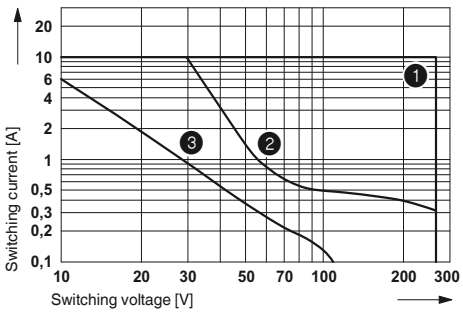

❶ Ohmic load

**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

## Highly compact relay modules - PLC-INTERFACE

### PLC electronic sensor terminal block for NAMUR proximity sensors

The PLC-...-EIK 1-SVN electronic sensor terminal block 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-circuit or open circuit 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-circuit and/or open circuit.

In addition to a high packing density, this switching amplifier features the following:

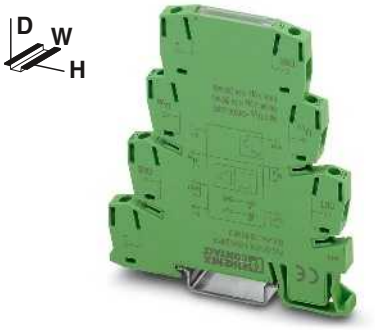
- Regulated power supply for the NAMUR proximity switch
- 24 V/50 mA digital output for directly connecting programmable logic controls
- Connection option for PLC-V8 adapter
- Screw and push-in connection technology

**Notes:**

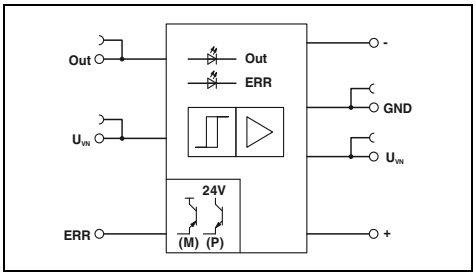
Type of housing:
Polyamide PA non-reinforced, color: green.

Marking systems and mounting material
See Catalog 5

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 inductive proximity sensors acc. to NAMUR, with light indicators for sensor signal and faults**




### Technical data

| | | |
|---|---|---|
| **Supply** | | |
| Input supply nominal voltage $U_{VN}$ | | 24 V DC ±20 % |
| 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)<br>≤ 1.2 mA (in blocking state)<br>6.3 mA ... 10 mA (in the event of a short-circuit)<br>0 mA ... 0.35 mA (in the event of an open circuit) |
| Protective circuit | | Surge protection |
| **Alarm output** | | |
| Operating voltage range (positive switching) | | $U_{VN}$ - $U_{Res}$ |
| 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 |
| EMC note | | Class A product, see page 625 |

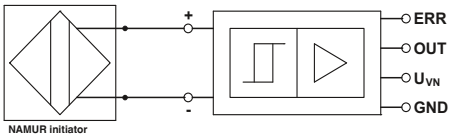
### Ordering data

| 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 push-in connection | **PLC-PT-EIK 1-SVN 24P/P** | **2900397** | 10 |

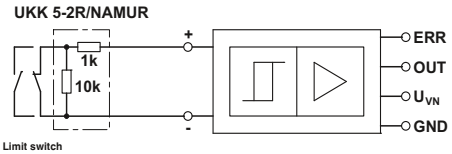
### Accessories

| | | | |
|---|---|---|---|
| **Double-level terminal block**, with pre-assembled resistors | | | |
| With screw connection | **UKK 5-2R/NAMUR** | **2941662** | 50 |

**Application 1**




**Application 2**



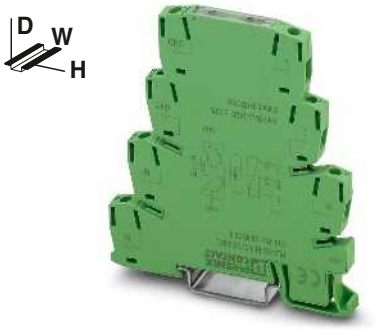

| Initiator state | Switching level | | LED | |
|---|---|---|---|---|
| | OUT | ERR | Green | Red |
| conductive | L | L | OFF | OFF |
| blocking | H | L | ON | OFF |
| short circuit | L | H | OFF | ON |
| open circuit | L | H | OFF | ON |

## PLC series
## Electronic reversing load relay for DC motors

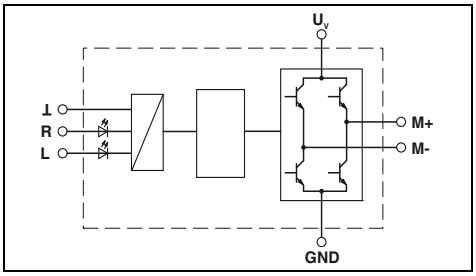
The PLC-S...-ELR W 1/2-24DC electronic reversing load relays are used to switch mechanically commutated DC motors up to 24 V/2 A.

- Wear-free reversing
- Braking by controlling both inputs
- Short-circuit and surge and overload-proof output
- Integrated locking circuit and load wiring
- Screw-type, spring-cage, and push-in technology

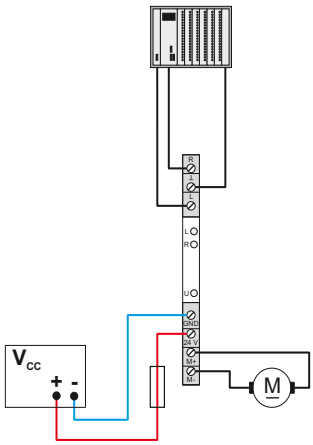
| Notes: |
|---|
| Type of housing:<br>Polyester PBT non-reinforced, color: green. |
| Marking systems and mounting material<br>See Catalog 5 |
| Separating plate PLC-ATP is to be used in the following cases: always at the start and end of a PLC terminal strip, for voltages greater than 250 V (L1, L2, 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 protection circuit. |
| PWM = Pulse Width Modulation |




**With overload and short-circuit-proof output**



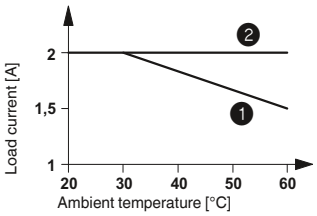

**Application example for PLC-S...ELR W 1/2-24DC**




**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 | | Can be aligned without 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 |
| EMC note | | Class A product, see page 625 |

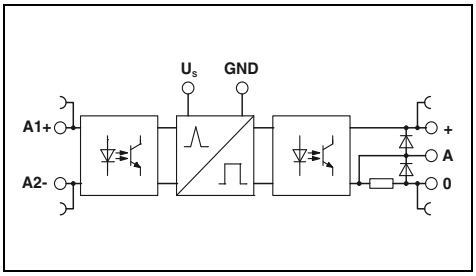
### Ordering data

| Description | Type | Order No. | Pcs. / Pkt. |
|---|---|---|---|
| **Electronic reversing load relay,** for driving DC motors, with light indicator and protection 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-INTERFACE
### Pulse expansion module

A solid-state relay for acquiring and extending short pulses.
- Pulse detection can be set from > 0.1 ms or > 2 ms
- Status display
- Delay times of 10 to 2550, can be set via DIP switches
- Bridging options
- Can be retriggered
- Screw and push-in connection technology

**With DC voltage output**
**Max. 100 mA**

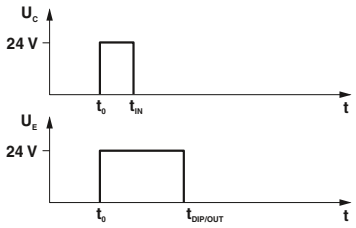



### Technical data

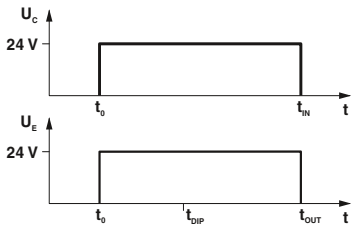
| | | |
|---|---|---|
| Input data | | |
| Rated control supply voltage $U_S$ | | 24 V DC |
| Rated control supply voltage range with reference to $U_S$ | | 0.8 ... 1.2 |
| Rated control supply current $I_S$ | | |
| - Input low, output low | | 13 mA |
| - Input high, output high | | 19 mA |
| Rated actuating voltage $U_C$ | | 24 V DC |
| Rated actuating current $I_C$ | | 3 mA |
| Switching threshold “0” signal in reference to $U_C$ | | < 0.4 |
| Switching threshold “1” signal in reference to $U_C$ | | > 0.8 |
| Status indication | | Yellow LED |
| Operating voltage display | | Green LED |
| Input circuit | | Protection against polarity reversal, surge protection |
| Output data | | |
| Output voltage range $U_E$ | | 3 V DC ... 48 V DC |
| Limiting continuous current | | 100 mA |
| Voltage drop at max. limiting continuous current | | < 1 V DC |
| Output circuit | | 3-conductor, ground-referenced |
| Output protection | | Protection against polarity reversal, surge protection, freewheeling |
| General data | | |
| Rated insulation voltage | | 50 V DC |
| Rated surge voltage | | 0.5 kV |
| Ambient temperature (operation) | | -25 °C ... 60 °C |
| Standards/regulations | | DIN EN 50178 |
| 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 |
| EMC note | | Class A product, see page 625 |

### Ordering data

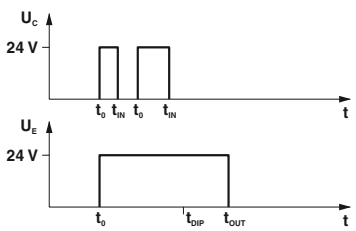
| Description | Type | Order No. | Pcs. / Pkt. |
|---|---|---|---|
| **PLC-INTERFACE**, with **screw connection** | **PLC-OSC-LPE-24DC/48DC/100** | **2903171** | 1 |
| **PLC-INTERFACE**, with **push-in connection** | **PLC-OPT-LPE-24DC/48DC/100** | **2903173** | 1 |




**Input pulse t1 < set output pulse t3**
**(no restart when triggered again)**




**Input pulse t1 ≥ set output pulse t3,**
**then input pulse t1 = output pulse t2**
**(no restart when triggered again)**

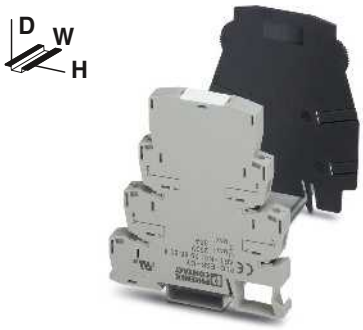



**Input pulse t1 < set output pulse t3**
**(restart when triggered again)**

| DIP | | | | | | | |
|---|---|---|---|---|---|---|---|
| S1 | S2 | S3 | S4 | S5 | S6 | S7 | S8 |
| 10 | - | - | - | - | - | - | - |
| - | 20 | - | - | - | - | - | - |
| - | - | 40 | - | - | - | - | - |
| - | - | - | 80 | - | - | - | - |
| - | - | - | - | 160 | - | - | - |
| - | - | - | - | - | 320 | - | - |
| - | - | - | - | - | - | 640 | - |
| - | - | - | - | - | - | - | 1280 |

## PLC accessories

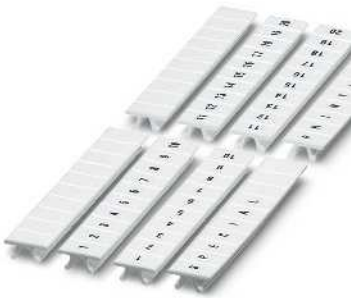
The **PLC-ESK** power terminal helps in supplying the bridge potentials, the **PLC-ATP** partition plate helps in optical and safe disconnection of the adjacent PLC modules. The **PLC-BP (A1-14)** passive feed-through bridge is used instead of a relay and connects the A1 and 14 terminal points.



| 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 also serves in 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 jumpers save up to 70% wiring time for PLC-INTERFACE. The 500 mm long **FBST 500-PLC** "continuous bridges" are especially effective. The **FBST 6** 2-pos. individual jumpers are particularly suitable for bridging a smaller number of PLC modules.



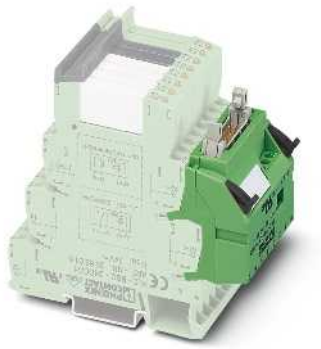
| Description | Color | Ordering data: Type | Order No. | Pcs. / Pkt. | Ordering data: Type | Order No. | Pcs. / Pkt. |
|---|---|---|---|---|---|---|---|
| **Continuous bridge**, 500 mm long, isolated, can be cut to length, for potential distribution Nominal current: 32 A | red | **FBST 500-PLC RD** | **2966786** | 20 | | | |
| | blue | **FBST 500-PLC BU** | **2966692** | 20 | | | |
| | gray | **FBST 500-PLC GY** | **2966838** | 20 | | | |
| **Jumper**, 2-pos., 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 | | | |
| **Jumper**, 2-pos., 8 mm long, for potential distribution with a partition plate Nominal current: 6 A | gray | **FBST 8-PLC GY** | **2967688** | 50 | | | |
| **Jumper**, 2-pos., 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 |

## Adapters for PLC-INTERFACE

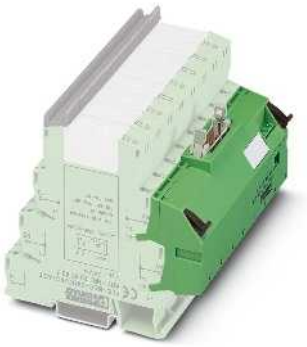
**PLC-V8/...** are the VARIOFACE adapters which connect the narrow PLC-INTERFACE modules to the VARIOFACE system cabling:

**Notes:**

For cross-reference list with matching PLC-INTERFACE modules, see page 572



**VARIOFACE adapter for 6.2 mm PLC RELAY**

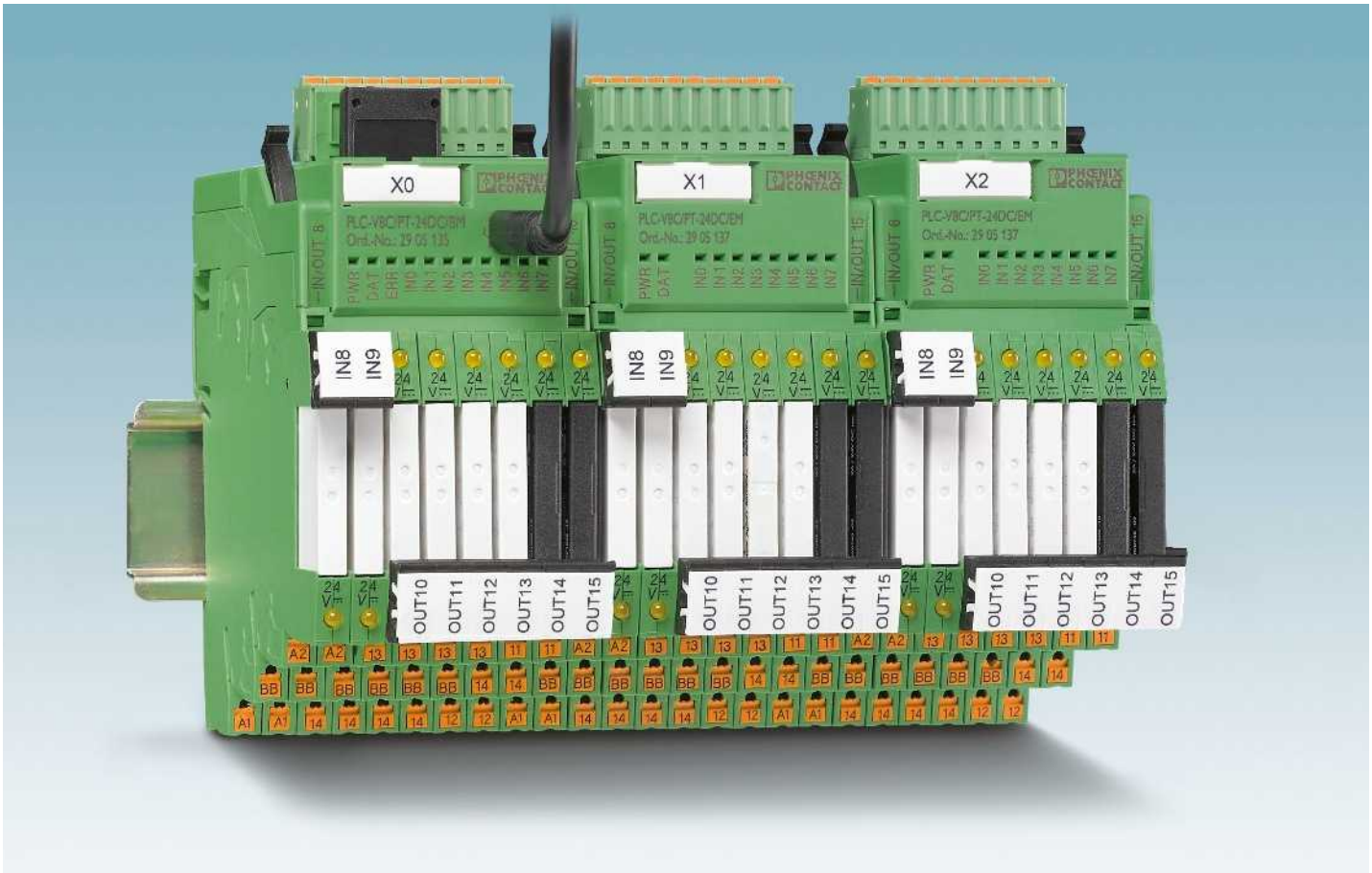


**VARIOFACE adapter for 14 mm PLC RELAY**

| | | Technical data | Technical data |
|---|---|---|---|
| Max. perm. operating voltage | | 30 V DC | 30 V DC |
| Max. perm. current (per branch) | | 1 A (per signal path) | 1 A (per signal path) |
| Max total current (voltage supply) | | 3 A | 3 A |
| 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 | IDC/FLK pin strip (2.54 mm) | IDC/FLK pin strip (2.54 mm) |
| 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 pos. | 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-pos. 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-pos. 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 |

## Programmable logic relay system - PLC logic




### Extremely compact control

The PLC logic programmable logic relay system is the extremely compact way to carry out small automation tasks easily and flexibly. It consists of the PLC-V8C logic modules, the PLC-INTERFACE relay system, and the LOGIC+ software. The logic modules are simply plugged into a row of eight PLC-INTERFACE terminal blocks and combine the logic and interface level in one unit. Depending on the switching requirements, plug-in electromechanical and solid-state relays can be combined in order to flexibly switch and control the I/O signals.

PLC logic processes digital and analog input signals as well as logic functions and timer modules - and replaces conventional switching and control devices. Up to 16 I/O signals can be processed using the stand-alone logic modules - that's with an overall width of just 50 mm. If more I/O signals are required, a maximum of 48 I/O signals can be linked using the basic and extension modules.

### Switching and controlling with plug-in relays

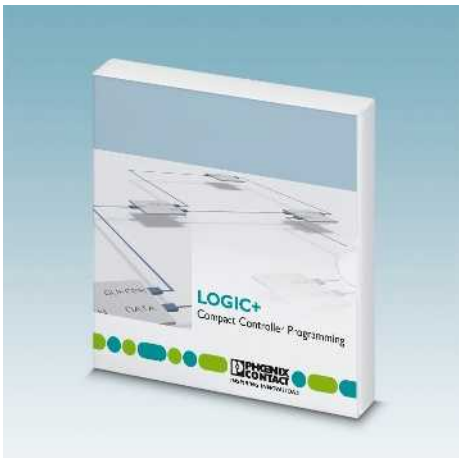
- PLC logic brings together the standard combination of logic module and separate plug-in relay and eliminates wiring effort and additional switching elements
- Convenient connections with screw or push-in connection technology, which also accommodate return conductors, eliminate the need for separate potential terminal blocks
- Each relay channel can be freely configured as an input or output. PLC logic therefore perfectly adapts to fit the application at hand

### Intuitive programming

Programming is quick and easy with the intuitive LOGIC+ programming software. Ladder (LD) and function block diagrams (FBD) can be created by selecting the relevant functions and their connection using drag & drop. The graphical representation of PLC logic in the hardware editor supports intuitive operation. The programs created can be simulated offline on the PC and tested online during operation. Basic functions, such as AND, OR, NOT, etc. are complemented by special functions, such as counters, seven-day timers, timer modules, and mathematical functions, to name a few.

**Logic module with plug-in relays**

PLC logic combines a logic module and plug-in relay and eliminates wiring effort and additional switching elements. Each relay channel can be flexibly equipped with an electromechanical or a solid-state relay. PLC logic processes 16 I/O signals with just one logic module and boasts an extremely compact overall width of just 50 mm.




**Intuitive programming with LOGIC+**

- Function block diagram or ladder diagram
- Numerous integrated function blocks
- Specific function blocks are available to download
- Hardware view in the program
- Can be downloaded free of charge

**Your web code: #0139**

**Standard programming cable**

PLC logic is connected to a PC via a standard micro USB cable. The drivers for PLC logic can be downloaded at phoenixcontact.com.

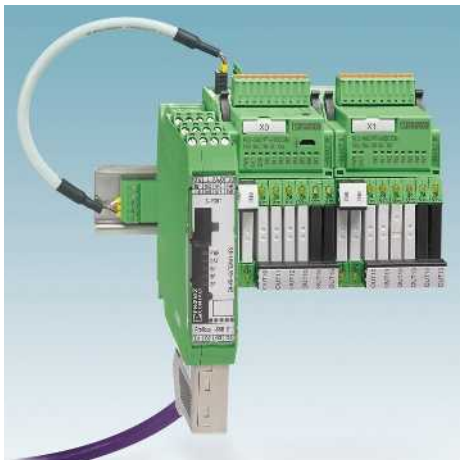
**Easily connect extension modules**

The basic module and the extension module are connected via integrated connectors - no tools required. A maximum of two extension modules can be connected to a basic module. This means that PLC logic can work with up to 48 I/Os.

**Saving and copying data**

PLC logic programs are saved by the memory module or can be easily copied to other devices.

If settings such as time or date are required on the new device, these values can be configured via the integrated web server. The new device does not need access to the LOGIC+ software for this.



**Integration into common bus systems**

PLC logic is integrated into various networks via optional adaptable fieldbus gateways. This enables bidirectional communication with a higher-level controller for remote control as well as diagnostics and visualization.

Gateways are available for transmitting data via PROFIBUS DP, RS-232, RS-485, Modbus/TCP, DeviceNet™, CANopen®, PROFINET, and EtherNet/IP™.

## Logic modules

PLC-V8C are the plug-in logic modules which form the PLC logic relay system in conjunction with the narrow 6.2 mm PLC-INTERFACE terminal blocks. Eight freely-selectable PLC-INTERFACE terminal blocks must be separately ordered for each logic module. You can find an overview of matching PLC-INTERFACE terminal blocks on page 458.

All logic modules feature these properties:

– 8 integrated digital inputs (of which two inputs are configurable as analog inputs), connection via connector with screw or push-in connection technology
– A further 8 channels can be configured with matching PLC-INTERFACE terminal blocks as digital inputs or outputs
– Programming with the LOGIC+ software

### PLC-V8C.../SAM

– Stand-alone logic module with 16 I/Os, not extendable
– Connection to PC via micro USB socket
– Integrated realtime clock (RTC)
– Accommodates external IFS-CONFSTICK memory module

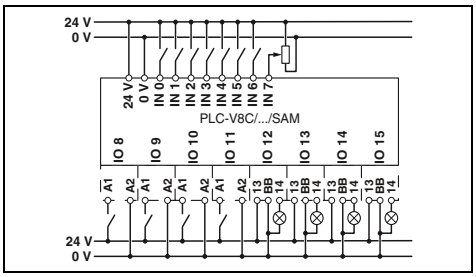
### PLC-V8C.../BM

– Basic logic module with 16 I/Os, can be extended with a maximum of two extension modules (PLC-V8C.../EM) to 48 I/Os
– Connection to PC via micro USB socket
– Integrated realtime clock (RTC)
– Accommodates external IFS-CONFSTICK memory module
– Optional connection to IFS gateways

### PLC-V8C.../EM

– Extension logic module with 16 I/Os, for extending the basic module

Stand-alone module




### Technical data

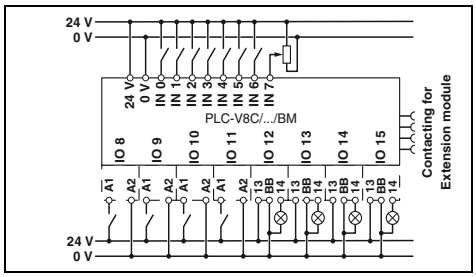
| | |
|---|---|
| Supply | |
| Supply voltage | 24 V DC |
| Supply voltage range | 19.2 V DC ... 26.4 V DC |
| Max. input current at $U_N$ | 120 mA |
| Input data (digital) | |
| Number of inputs | 8 (2 configurable as analog) |
| Input voltage | 24 V DC |
| Description of the input | EN 61131-2, type 3 |
| Input current 0-signal | < 1 mA |
| Input current 1-signal | typ. 2.5 mA |
| Input data (analog) | |
| Number of inputs | 2 (IN6 and IN7 are configurable as analog) |
| Input voltage range | 0 V ... 10 V |
| Input resistance | > 3.5 kΩ |
| Input data (PLC-INTERFACE) | |
| Number of inputs | ≤ 8 |
| Output data (for controlling PLC-INTERFACE) | |
| Number of outputs | ≤ 8 |
| Nominal voltage | 24 V DC |
| Nominal current | 9 mA |
| Realtime clock (basic module only) | |
| Buffer time (capacitor) | 24 h (capacitor) |
| Realtime clock accuracy | ±2 s/d |
| General data | |
| Ambient temperature (operation) | -20 °C ... 45 °C |
| Ambient temperature (storage/transport) | -20 °C ... 70 °C |
| Permissible humidity (operation) | 95 % |
| Clearance and creepage distances between the power circuits | DIN EN 50178 |
| Rated insulation voltage | 50 V |
| Rated surge voltage | 0.8 kV |
| Insulation | Basic insulation |
| Mounting type | Can be plugged onto 8 x PLC-INTERFACE |
| Degree of protection | IP20 |
| Screw connection solid / stranded / AWG | 0.14 - 1.5 mm² / 0.14 - 1.5 mm² / 28 - 16 |
| Push-in connection solid / stranded / AWG | 0.14 - 1.5 mm² / 0.14 - 1.5 mm² / 26 - 16 |

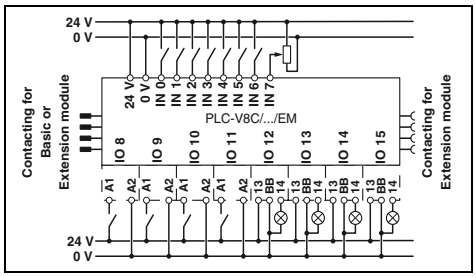
### Ordering data

| Description | Type | Order No. | Pcs. / Pkt. |
|---|---|---|---|
| **PLC-V8C plug-in logic modules** | | | |
| With screw connection | **PLC-V8C/SC-24DC/SAM** | **2905082** | 1 |
| With push-in connection | **PLC-V8C/PT-24DC/SAM** | **2905136** | 1 |

Basic module

Extension module




## Technical data

| | |
|---|---|
| 24 V DC<br>19.2 V DC ... 26.4 V DC<br>120 mA | 24 V DC<br>19.2 V DC ... 26.4 V DC<br>65 mA |
| 8 (2 configurable as analog)<br>24 V DC<br>EN 61131-2, type 3<br>< 1 mA<br>typ. 2.5 mA | 8 (2 configurable as analog)<br>24 V DC<br>EN 61131-2, type 3<br>< 1 mA<br>typ. 2.5 mA |
| 2 (IN6 and IN7 are configurable as analog)<br><br>0 V ... 10 V<br>> 3.5 kΩ | 2 (IN6 and IN7 are configurable as analog)<br><br>0 V ... 10 V<br>> 3.5 kΩ |
| ≤ 8 | ≤ 8 |
| ≤ 8<br>24 V DC<br>9 mA | ≤ 8<br>24 V DC<br>9 mA |
| 24 h (capacitor)<br>±2 s/d | -<br>- |
| -20 °C ... 45 °C<br>-20 °C ... 70 °C<br>95 %<br>DIN EN 50178<br><br>50 V<br>0.8 kV<br>Basic insulation<br>Can be plugged onto 8 x PLC-INTERFACE<br>IP20<br>0.14 - 1.5 mm² / 0.14 - 1.5 mm² / 28 - 16<br>0.14 - 1.5 mm² / 0.14 - 1.5 mm² / 26 - 16 | -20 °C ... 45 °C<br>-20 °C ... 70 °C<br>95 %<br>DIN EN 50178<br><br>50 V<br>0.8 kV<br>Basic insulation<br>Can be plugged onto 8 x PLC-INTERFACE<br>IP20<br>0.14 - 1.5 mm² / 0.14 - 1.5 mm² / 28 - 16<br>0.14 - 1.5 mm² / 0.14 - 1.5 mm² / 26 - 16 |

## Ordering data

| Type | Order No. | Pcs. / Pkt. |
|---|---|---|
| **PLC-V8C/SC-24DC/BM** | **2903094** | 1 |
| **PLC-V8C/PT-24DC/BM** | **2905135** | 1 |

## Ordering data

| Type | Order No. | Pcs. / Pkt. |
|---|---|---|
| **PLC-V8C/SC-24DC/EM** | **2903095** | 1 |
| **PLC-V8C/PT-24DC/EM** | **2905137** | 1 |

## Accessories
## Programming cable and memory module

– The programming cable (MICRO USB B to USB A) is used to connect PLC logic to a PC, length: 2 m
– PLC logic programs are saved by the memory module or can be easily copied to other devices

| | Technical data | Technical data |
|---|---|---|
| General data | | |
| EMC note | | Class A product, see page 625 |

| | Ordering data | | | Ordering data | | |
|---|---|---|---|---|---|---|
| Description / Color | Type | Order No. | Pcs. / Pkt. | Type | Order No. | Pcs. / Pkt. |
| **Programming cable** | | | | | | |
| | **CAB-USB A/MICRO USB B/2,0M** | **2701626** | 1 | | | |
| **Multifunctional memory module** for the INTERFACE system | | | | | | |
| - Flat design | | | | **IFS-CONFSTICK** | **2986122** | 1 |

## Accessories
## PLC logic starter kit

The PLC logic starter kit contains all the components needed to get started quickly and easily with PLC logic with push-in connection technology and 8 inputs and 8 outputs.
– PLC-V8C-PT/24DC/BM plug-in logic module
– PLC-RPT-24DC/1/ACT eight relay output terminal blocks
– Micro USB programming cable
– LOGIC+ software
– “PLC logic quick start guide” poster

| | Ordering data | | |
|---|---|---|---|
| Description / Color | Type | Order No. | Pcs. / Pkt. |
| **PLC logic starter kit 1,** 8 integrated inputs (24 V DC) and 8 outputs via PLC-INTERFACE (switching capacity 250 V AC/DC, max. 6 A) | **PLC-LOGIC-STARTERKIT1** | **2905504** | 1 |

## Accessories
## IFS gateways

The gateways are connected to the PLC-V8C.../BM PLC logic basic modules via the ME 22,5 TBUS... DIN rail connector and the PLC-V8C/CAB... connecting cable.

The gateways are connected to a PC and configured via the integrated S-PORT interface and the IFS-USB-DATACABLE.

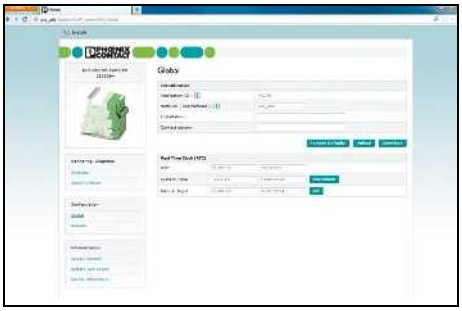
| | Technical data | Technical data |
|---|---|---|
| General data | | |
| EMC note | Class A product, see page 625 | |

| | | Ordering data | | | Ordering data | | |
|---|---|---|---|---|---|---|---|
| Description | Color | Type | Order No. | Pcs. / Pkt. | Type | Order No. | Pcs. / Pkt. |
| **IFS gateway** for | | | | | | | |
| PROFIBUS DP | green | **EM-PB-GATEWAY-IFS** | **2297620** | 1 | | | |
| RS-232 | green | **EM-RS232-GATEWAY-IFS** | **2901526** | 1 | | | |
| RS-485 | green | **EM-RS485-GATEWAY-IFS** | **2901527** | 1 | | | |
| Modbus/TCP | green | **EM-MODBUS-GATEWAY-IFS** | **2901528** | 1 | | | |
| DeviceNet™ | green | **EM-DNET-GATEWAY-IFS** | **2901529** | 1 | | | |
| CANopen® | green | **EM-CAN-GATEWAY-IFS** | **2901504** | 1 | | | |
| PROFINET | green | **EM-PNET-GATEWAY-IFS** | **2904472** | 1 | | | |
| Ethernet/IP™ | green | **EM-ETH-GATEWAY-IFS** | **2901988** | 1 | | | |
| **Programming adapter** for configuring modules with S-PORT interface<br>Cable length: 3 m | | **IFS-USB-DATACABLE** | **2320500** | 1 | | | |
| **DIN rail connector** | green | **ME 22,5 TBUS 1,5/ 5-ST-3,81 GN** | **2707437** | 50 | | | |
| **Connecting cable** for connecting PLC logic with the ME 22,5 TBUS DIN rail connector, cable length: 0.3 m | | | | | **PLC-V8C/CAB/TBUS/0,3M** | **2905263** | 1 |

## Selection table for PLC-INTERFACE

| | Push-in connection | | Screw connection | |
|---|---|---|---|---|
| **Relay output** | **Type** | **Order No.** | **Type** | **Order No.** |
| 1 PDT, output data 6 A, 250 V AC/DC | PLC-RPT-24DC/21 | 2900299 | PLC-RSC-24DC/21 | 2966171 |
| 1 PDT, output data 50 mA, 36 V DC, gold contact | PLC-RPT-24DC/21AU | 2900306 | PLC-RSC-24DC/21AU | 2966265 |
| 1 N/O contact, output data 6 A, 250 V AC/DC, actuator type | PLC-RPT-24DC/1/ACT | 2900312 | PLC-RSC-24DC/1/ACT | 2966210 |
| 1 N/O contact with switch, output data 6 A, 250 V AC/DC | PLC-RPT-24UC/1/S/H | 2900328 | PLC-RSC-24UC/1/S/H | 2982236 |
| **Solid-state relay output** | | | | |
| Output data 100 mA, 3 V DC - 48 V DC | PLC-OPT-24DC/48DC/100 | 2900352 | PLC-OSC-24DC/48DC/100 | 2966728 |
| Output data 3 A, 3 V DC - 33 V DC | PLC-OPT-24DC/24DC/2 | 2900364 | PLC-OSC-24DC/24DC/2 | 2966634 |
| Output data 750 mA, 24 V AC - 253 V AC | PLC-OPT-24DC/230AC/1 | 2900369 | PLC-OSC-24DC/230AC/1 | 2967840 |
| Output data 3 A, 3 V DC - 33 V DC, actuator type | PLC-OPT-24DC/24DC/2/ACT | 2900376 | PLC-OSC-24DC/24DC/2/ACT | 2966676 |
| Output data 750 mA, 24 V AC - 253 V AC, actuator type | | | PLC-OSC-24DC/230AC/1/ACT | 2967947 |
| Output data 1 A, 12 V DC - 300 V DC | PLC-OPT-24DC/300DC/1 | 2900383 | PLC-OSC-24DC/300DC/1 | 2980678 |
| Output data 10 A, 3 V DC - 33 V DC | PLC-OPT-24DC/24 DC/10/R | 2900398 | PLC-OSC-24DC/24DC/10/R | 2982702 |
| Output data 500 mA, 3 V DC - 48 V DC, electronic PDT | PLC-OPT-24DC/48DC/500/W | 2900378 | PLC-OSC-24DC/48DC/500/W | 2980636 |
| Output data, TTL, 50 mA, 5 V DC | PLC-OPT-24DC/TTL | 2900363 | PLC-OSC-24DC/TTL | 2982728 |
| **Relay input** | | | | |
| Input voltage 24 V DC | PLC-RPT-24DC/1AU/SEN | 2900313 | PLC-RSC-24DC/1AU/SEN | 2966317 |
| Input voltage 120 V AC/DC | PLC-RPT-120UC/1AU/SEN | 2900314 | PLC-RSC-120UC/1AU/SEN | 2966320 |
| Input voltage 230 V AC/DC | PLC-RPT-230UC/1AU/SEN | 2900315 | PLC-RSC-230UC/1AU/SEN | 2966333 |
| Input voltage 5 V DC (basic terminal block without relay) | | | PLC-BSC- 5DC/ 1/SEN | 2980267 |
| Relay for 5 V DC basic terminal block | | | REL-MR-4,5DC/21AU | 2961370 |
| **Solid-state relay input** | | | | |
| Input voltage 24 V DC | PLC-OPT-24DC/48DC/100/V8C/SEN | 2904693 | PLC-OSC-24DC/48DC/100/V8C/SEN | 2904690 |
| Input voltage 120 V AC/DC | PLC-OPT-120UC/48DC/100/V8C/SEN | 2904694 | PLC-OSC-120UC/48DC/100/V8C/SEN | 2904691 |
| Input voltage 230 V AC/DC | PLC-OPT-230UC/48DC/100/V8C/SEN | 2904695 | PLC-OSC-230UC/48DC/100/V8C/SEN | 2904692 |
| **Dummy or reserve** | | | | |
| Basic terminal blocks output | PLC-BPT-24DC/21 | 2900445 | PLC-BSC-24DC/21 | 2966016 |
| Basic terminal blocks input | PLC-BPT-24DC/1/SEN | 2900262 | PLC-BSC-24DC/1/SEN | 2966061 |

## LOGIC+ programming software



### Integrated web server

PLC logic basic settings are easily configured via the integrated web server. The LOGIC+ software does not need to be installed in order to do so.

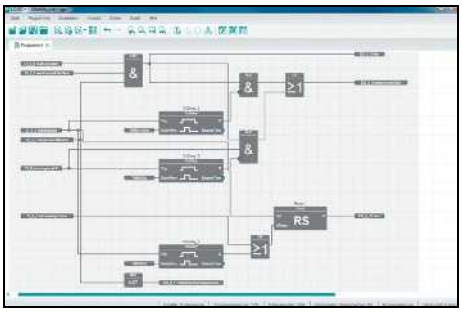
– Time and date
– Password and access control
– Firmware update
– Status indicators for inputs and outputs
– General device information

### LOGIC+ user interface

– Clear separation in program editor, toolbox, hardware view, and signaling window
– All elements can be easily placed using drag & drop
– Notes and errors are highlighted in color in the program editor

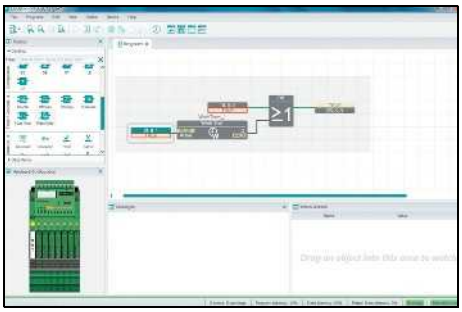
### Hardware configurator

– Each relay channel can be configured as an input or output with an electromechanical or a solid-state relay
– Clear assignment of the inputs and outputs thanks to the graphical representation of the hardware connections



### Function blocks

– Basic functions: AND, OR, NOT, XOR
– Mathematical functions: add, divide, multiply, subtract, generate absolute value
– Positive and negative edge detection
– RS and SR flip-flops
– Switch-on and switch-off delay, pulse encoder, pulse stretching, weekly clock timer
– Up and down counter
– Analog and digital comparators
– Special functions, e.g., solar altitude calculations are available for download



### Simulation and online values

Offline simulation:
– Simulation of the created program directly in LOGIC+
– Virtualization of the values in the program editor, hardware view, and in the observation window

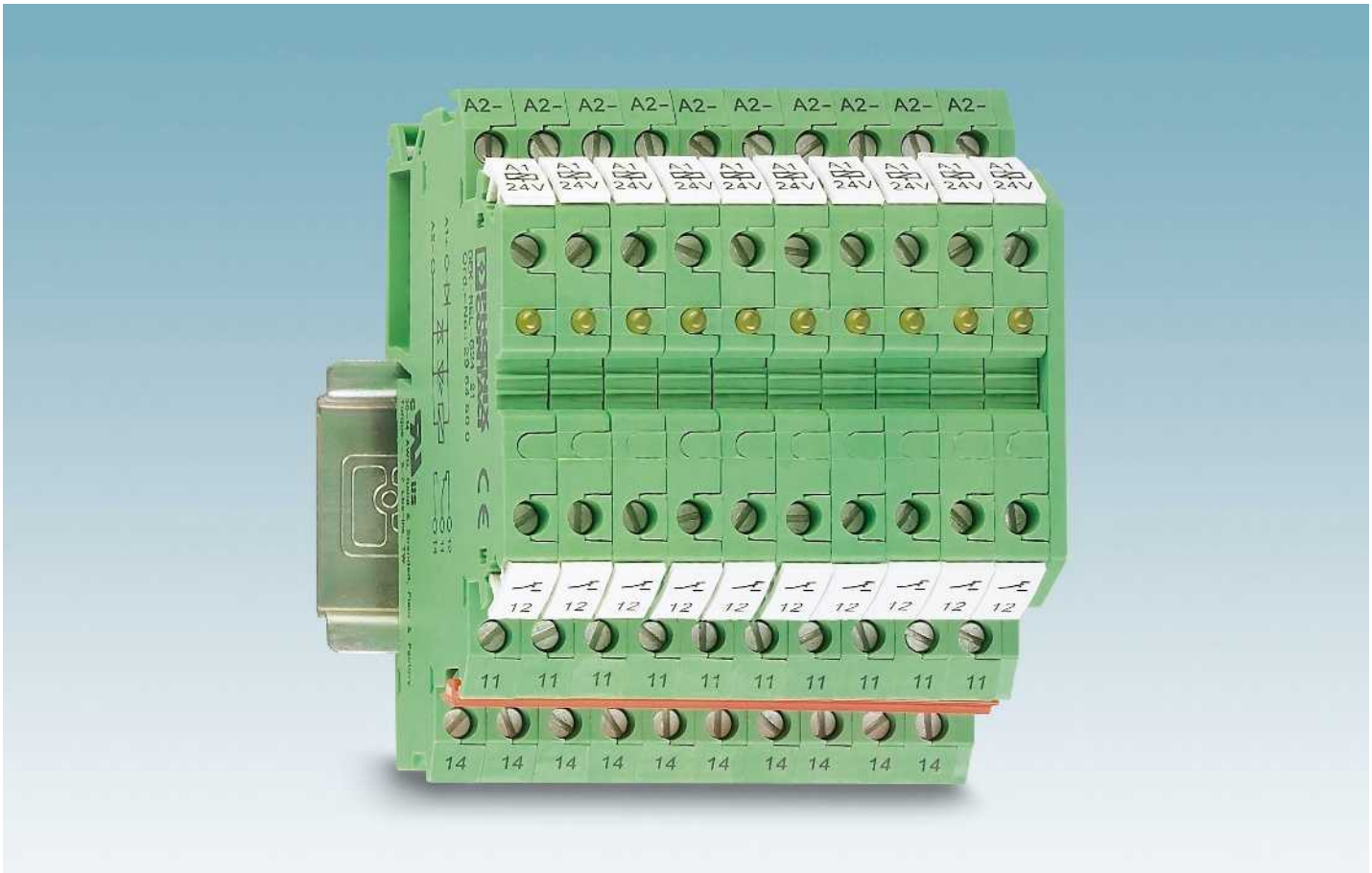
Online values:
– Representation of the program running on the hardware in LOGIC+ with online values
– Overwriting of values from LOGIC+

### Example programs

Numerous application examples make it easy to get started with LOGIC+. These include:

– Underground garage ventilation
– Conveyor belt
– Pumping plant
– Two-way control
– Tips for creating shift registers or surge relays

## Relay modules in terminal block design - DEK series




The DEK interface terminal blocks from Phoenix Contact 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 capacity 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 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 DEK-REL... relay terminal block and the DEK-OV... solid-state relay terminal block.

The DEK-OV... wear-free power solid-state relay terminal block 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.

EB-DIK colored insertion bridges for the supply and ground signals make it possible to design the circuit simply and effectively.

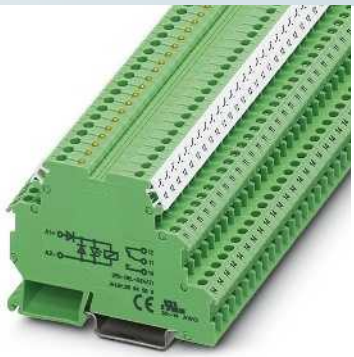
Integrated protective circuits such as freewheeling diodes, polarity reversal protection diodes, and surge protection elements protect the coupling modules and ensure optimum availability of the system.

## DEK-REL-... relay terminal block

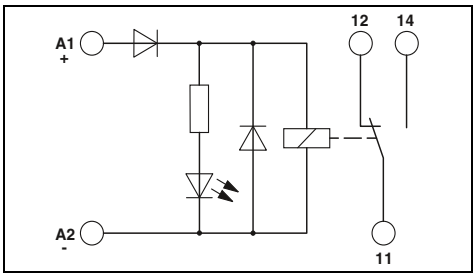
The Phoenix relay terminal block with PDT contact offers the following advantages:

- Width of just 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
- Minimal wiring effort 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 indicating the switching status

| Notes: |
|---|
| Type of housing:<br>Polyamide PA non-reinforced, color: green. |
| Marking systems and mounting material<br>See Catalog 5 |
| For the protection of relay coils and contacts, inductive loads must be dampened with an efficient protection circuit. |
| For other EB...DIK... insertion bridges refer to page 467 |



**For medium to large loads**
**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, freewheeling diode |
| **Output data** | | |
| Contact type | | 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 |
| EMC note | | Class A product, see page 625 |

### 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 pos. | 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 |

## Relay modules in terminal block design - DEK series

### DEK-REL-24/1/SEN input interface and DEK-REL-24/1/AKT output interface

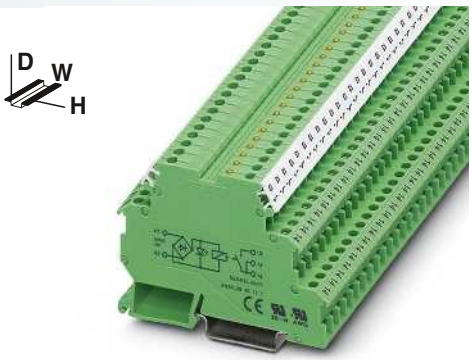
In addition to the familiar advantages of the DEK-REL... electronic terminal blocks, such as:
- 2-layer contact with hard gold-plating for universal applications from 1 mA to 5 A continuous current
- 2 $kV_{rms}$ electrical isolation of input and output
- Integrated input circuit

With this terminal block, "ALL" connections for a sensor or actuator are provided over a width of just 6.2 mm!

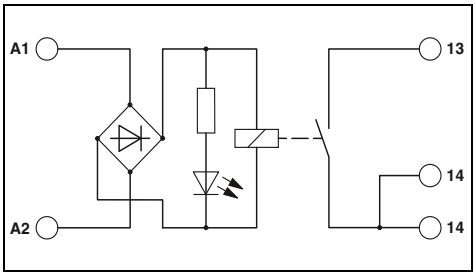
This means that 16 outputs take up a total overall width of just 105.4 mm (including the power terminal).

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:<br>Polyamide PA non-reinforced, color: green. |
| Marking systems and mounting material<br>See Catalog 5 |
| For the protection of relay coils and contacts, inductive loads must be dampened with an efficient protection circuit. |
| For other EB...DIK... insertion bridges refer to page 467 |




**for small to medium loads**
**1 N/O contact (1)**




### Technical data

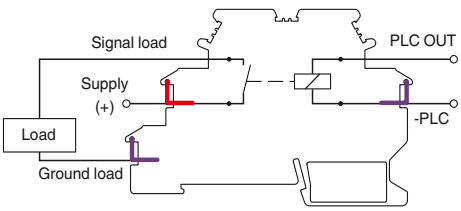
| | | | |
|---|---|---|---|
| Input data | | ① | ② |
| Permissible range (with reference to $U_N$) | | 0.9 - 1.1 | 0.8 - 1.1 |
| Typ. input current at $U_N$ | [mA] | 23 | 6.5 |
| Response/release time at $U_N$ | [ms] | 8 / 15 | 5 / 15 |
| Input protection: | | Yellow LED, bridge rectifier | |
| Output data | | | |
| Contact type | | 1 N/O contact (double contact) | |
| Contact material | | AgNi, 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 | |
| EMC note | | Class A product, see page 625 | |

### Ordering data

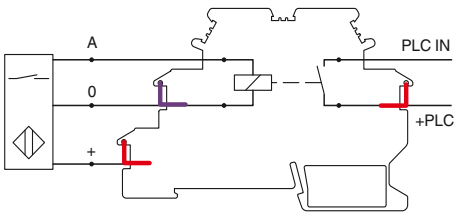
| Description | | Input voltage $U_N$ | Type | Order No. | Pcs. / Pkt. |
|---|---|---|---|---|---|
| **Relay terminal block with miniature relay** | | | | | |
| | ① | 5 V AC/DC | **DEK-REL- 5/I/1** | **2941183** | 10 |
| | ② | 24 V AC/DC | **DEK-REL- 24/I/1** | **2940171** | 10 |

### Accessories

| | | | | | |
|---|---|---|---|---|---|
| **Terminal block**, with three through contacts, for mounting on NS 35...<br>For busbar feeding | | | | | |
| **Cover** | | | | | |
| | | | **D-DEK 1,5 GN** | **2716949** | 10 |
| **Insertion bridge,** for middle and lower levels | No. of pos. | 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 |

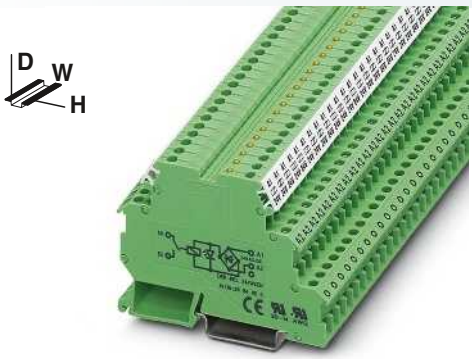



**Pin configuration, DEK-REL-...AKT**

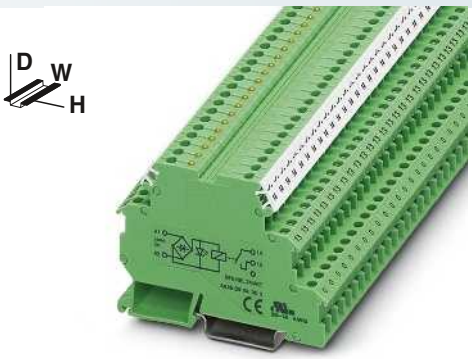



**Pin configuration DEK-REL-...SEN**

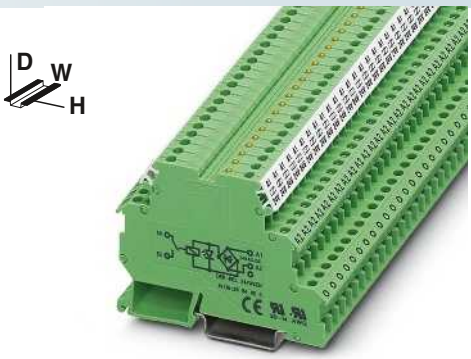
## Relay modules in terminal block design - DEK series



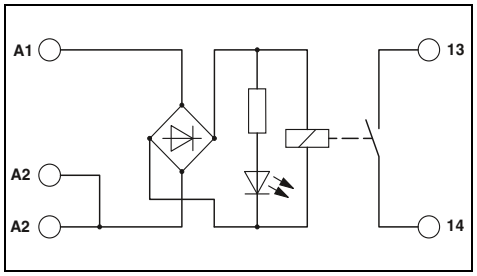
**for small to medium loads**
**1 N/O contact (1)**

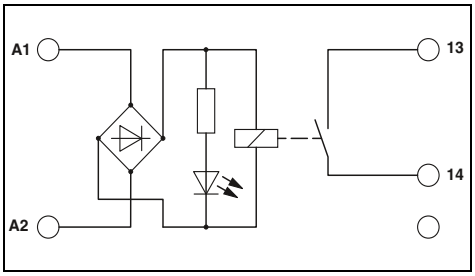


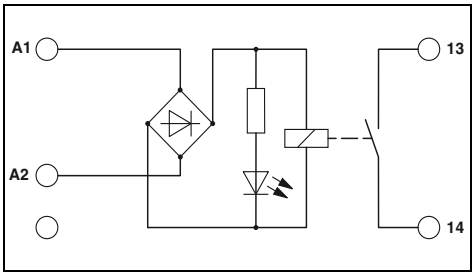
**for small to medium loads**
**1 N/O contact (1)**



**for small to medium loads**
**1 N/O contact (1)**




### Technical data

| ① | ② |
|---|---|
| 0.9 - | 0.8 - |
| 1.1 | 1.1 |
| 23 | 6.5 |
| 8 / 15 | 5 / 15 |
| Yellow LED, bridge rectifier | |
| | |
| 1 N/O contact (double contact) | |
| AgNi, 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 | |
| Class A product, see page 625 | |

### 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

| ② |
|---|
| 0.8 - |
| 1.1 |
| 6.5 |
| 5 / 15 |
| Yellow LED, bridge rectifier |
| |
| 1 N/O contact |
| AgNi, 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 |
| Class A product, see page 625 |

### 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

| ② |
|---|
| 0.8 - |
| 1.1 |
| 6.5 |
| 5 / 15 |
| Yellow LED, bridge rectifier |
| |
| 1 N/O contact |
| AgNi, 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 |
| Class A product, see page 625 |

### Ordering data

| Type | | Order No. | Pcs. / Pkt. |
|---|---|---|---|
| **DEK-REL- 24/1/SEN** | | **2964050** | 10 |

### Accessories

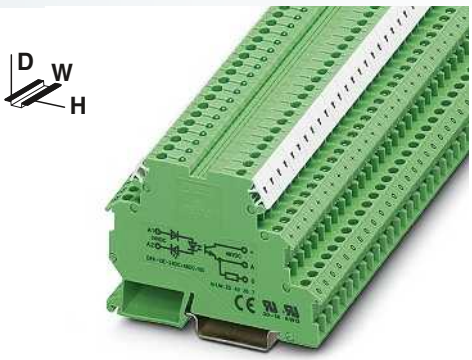
| | | | |
|---|---|---|---|
| **DIKD 1,5** | | **2715979** | 50 |
| **D-DEK 1,5 GN** | | **2716949** | 10 |
| **EB 80- DIK BU** | 26 A | **2715940** | 1 |
| **EB 80- DIK RD** | 26 A | **2715953** | 1 |
| **EB 80- DIK WH** | 26 A | **2715788** | 1 |

## DEKOE... and DEK-OV... solid-state relay terminal blocks

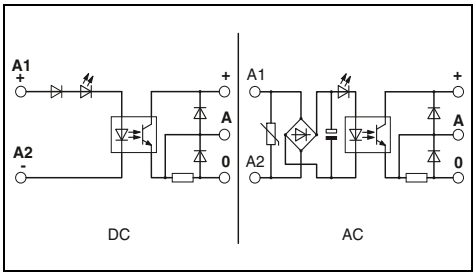
Phoenix Contact DEK-OE and DEK-OV interface terminal blocks are only 6.2 mm wide but still provide a complete input or output interface with:

- Electrical isolation between input and output at up to 2.5 $kV_{rms}$
- Integrated input circuit
- Status display
- EB-DIK insertion bridges
- Marking 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 protection circuit
- Zero voltage switch at AC output
- Actuator version available

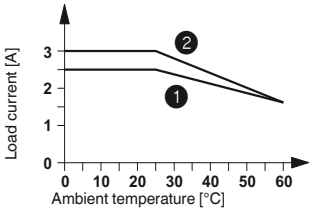
| Notes: |
|---|
| Type of housing:<br>Polyamide PA non-reinforced, color: green. |
| Marking systems and mounting material<br>See Catalog 5 |
| For the protection of input and output, inductive loads must be dampened with an effective protection circuit. |
| For other EB...DIK... insertion bridges refer to page 467 |




**with DC voltage output max. = 100 mA**

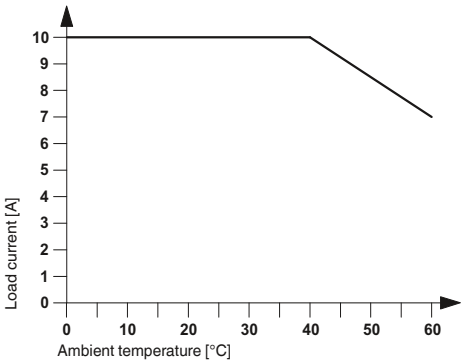



**Derating curve for DEK-OV...24DC/3 and DEK-OV-24DC/24DC/3/AKT**

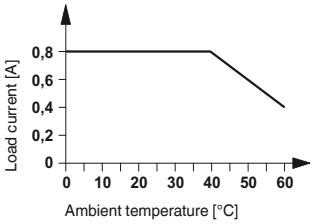



❶ Horizontal mounting
❷ Vertical mounting

**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, freewheeling 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 | | | | | |
| EMC note | | Class A product, see page 625 | | | | | |

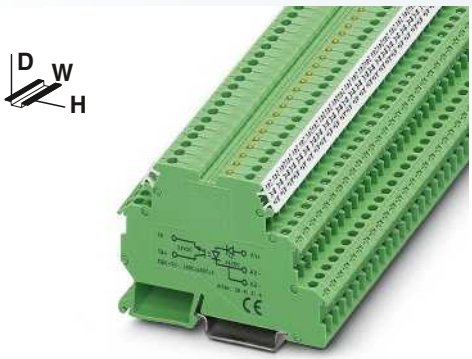
### Ordering data

| Description | | Input voltage $U_N$ | Type | Order No. | Pcs. / Pkt. |
|---|---|---|---|---|---|
| **Solid-state input relay** | | | | | |
| | 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 relay** | | | | | |
| | ① | 5 V DC | | | |
| | ② | 12 V DC | | | |
| | ③ | 24 V DC | | | |
| Actuator principle | ⑦ | 24 V DC | | | |

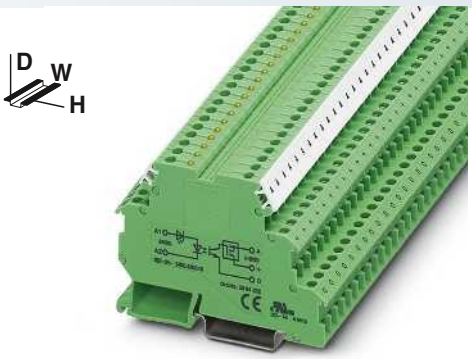
### Accessories

| **Insertion bridge,** for middle and lower levels | No. of pos. | 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 |

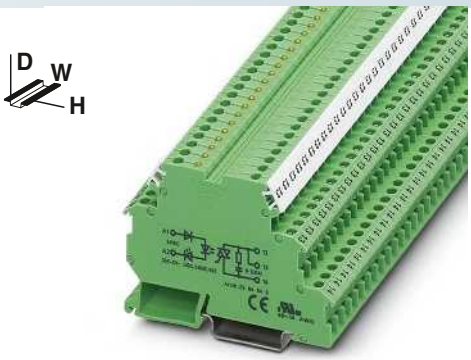
## Relay modules in terminal block design - DEK series



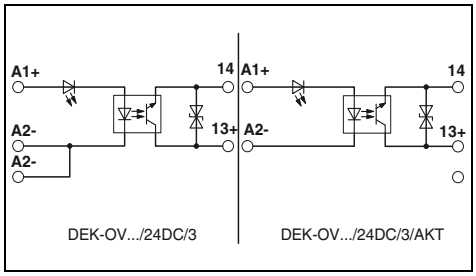
**with DC voltage output**
**max. = 3 A**

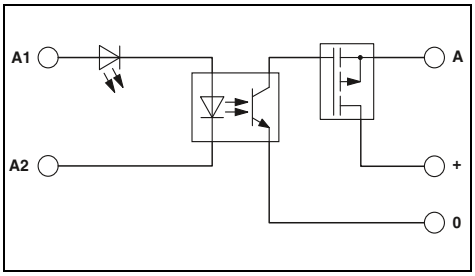


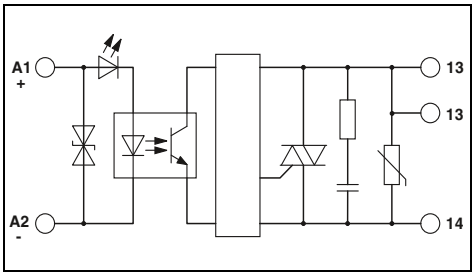
**with DC voltage output**
**max. = 10 A**



**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
Class A product, see page 625

### 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
Class A product, see page 625

### 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

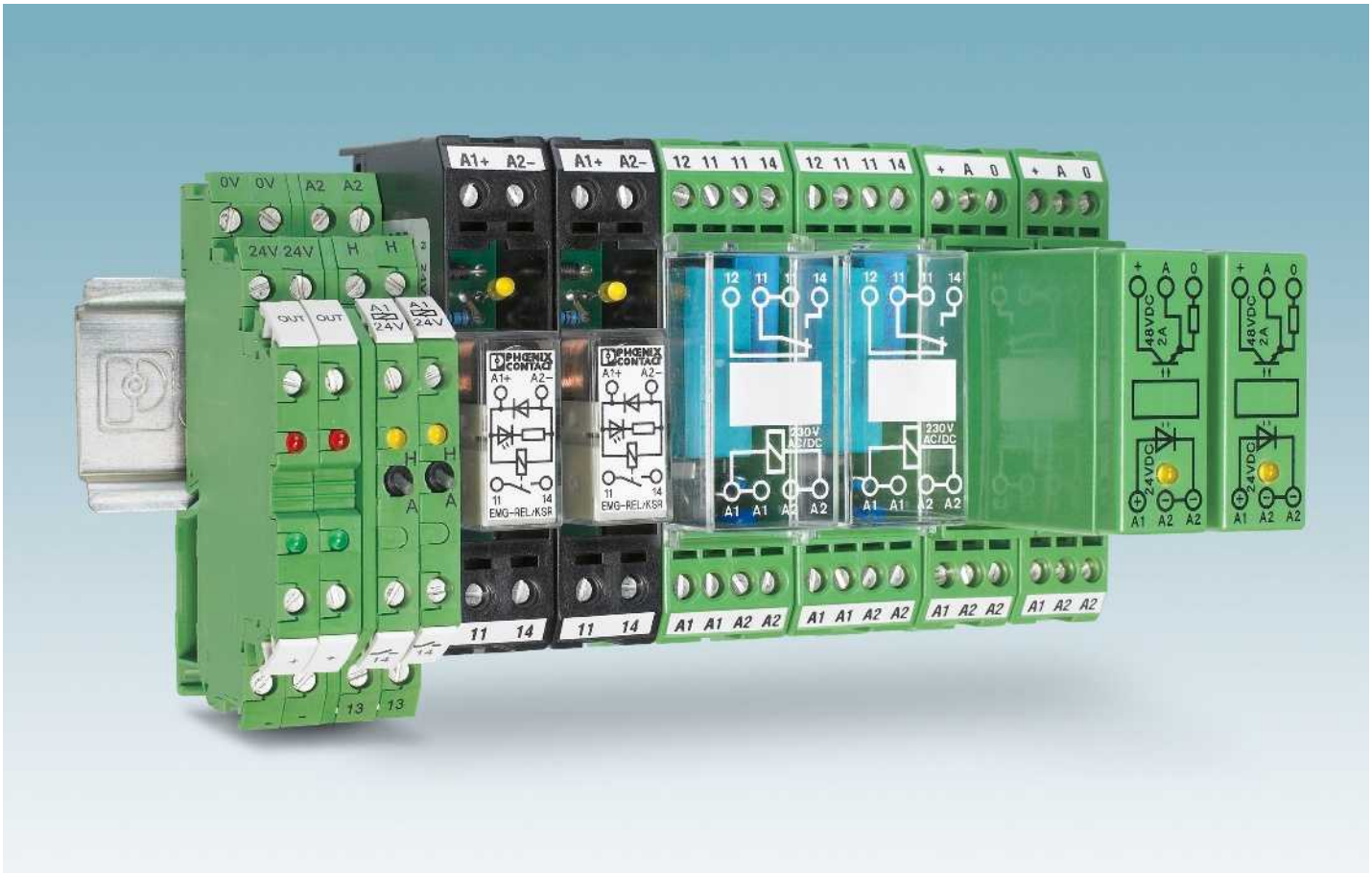
2.5 kV (50 Hz, 1 min.)
-20 °C ... 60 °C
IEC 60664, EN 50178, IEC 62103
2 / III
0.2 - 4 mm² / 0.2 - 2.5 mm² / 24 - 12
6.2 mm / 80 mm / 56 mm

### 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 |




**Switch/relay terminal block DEK-REL-24/1/S**

The "Manual", "0", and "Automatic" functions are provided in a narrow 6.2 mm 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 loads 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.

**Plug-in solid-state power relay 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.

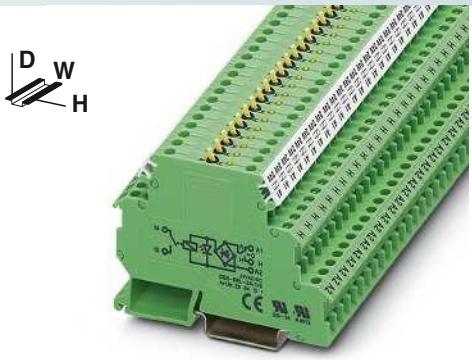
## Relay module with manual switch

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

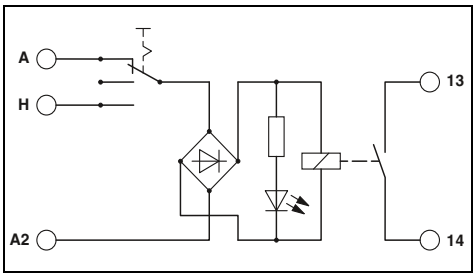
The advantages:

- 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:<br>Polyamide PA non-reinforced, color: green. |
| Marking systems and mounting material<br>See Catalog 5 |
| For the protection of input and output, inductive loads must be dampened with an effective protection 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 | | 1 N/O contact |
| Contact material | | AgNi, 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 |
| EMC note | | Class A product, see page 625 |

### 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 pos. | 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 |

## 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:

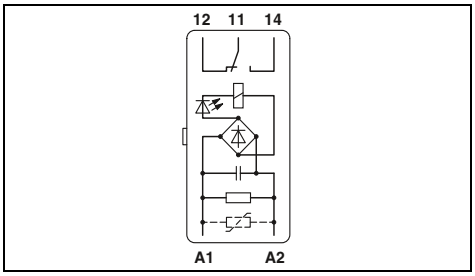
– Applications with long control lines
– Use of AC output boards, resulting in residual AC currents

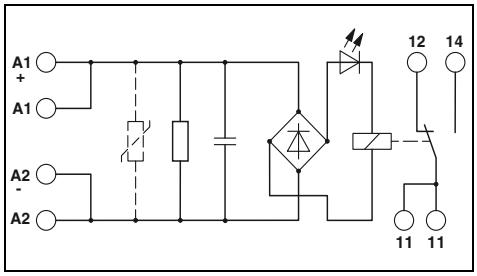
**Notes:**

Load current diagrams, see page 427

1 PDT, plug-in relay

1 PDT, soldered-in relay




### Technical data

| | | ① | ② | ③ |
|---|---|---|---|---|
| **Input data** | | | | |
| 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 | | 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

| | | ③ | |
|---|---|---|---|
| **Input data** | | | |
| 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, 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 | **ST-REL3-KG 24/21/SO46** | **2826091** | 10 |
| | ② | 120 V AC | **ST-REL3-KG120/21/SO46** | **2833026** | 10 |
| | ③ | 230 V AC | **ST-REL3-KG230/21/SO46** | **2832027** | 10 |
| **Relay module with multi-layer contact relay** | | | | | |
| | ① | 24 V AC | **ST-REL3-KG 24/21/AU/SO46** | **2826981** | 10 |
| | ② | 120 V AC | **ST-REL3-KG120/21/AU/SO46** | **2829797** | 10 |
| | ③ | 230 V AC | **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 |

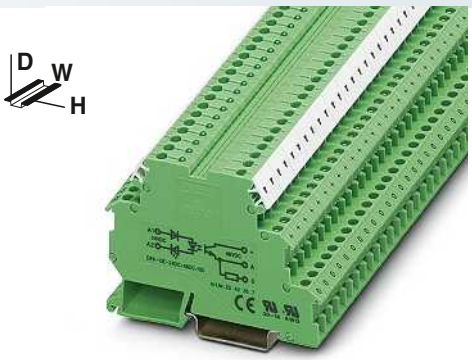
### Accessories

| | | |
|---|---|---|
| **Basic terminal block**, complete with end cover | **URELG 3** | **2820136** | 10 |
| **Equipment marker** | | |

### Accessories

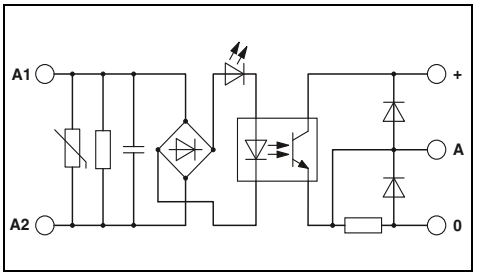
| | | |
|---|---|---|
| **EMG-GKS 12** | **2947035** | 50 |

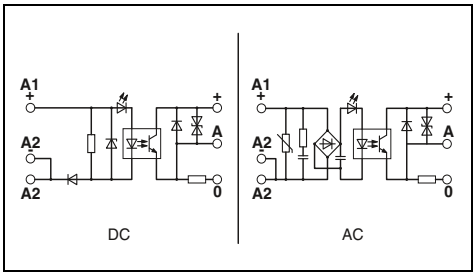
| Notes: |
|---|
| Type of housing:<br>**ST-REL:** Polyamide non-reinforced PA, color: bottom part gray, hood green<br>**EMG:** Polyamide fiber reinforced PA-F, color: green.<br>**DEK:** Polyamide non-reinforced PA, color: green. |
| Marking systems and mounting material<br>See Catalog 5 |
| For derating curve, refer to page 425 |




**Solid-state input relay**
**100 mA, maximum**

**Solid-state power relay**
**Max. 2 A**




| | | Technical data | Technical data |
|---|---|---|---|
| Input data | | ② | ① |
| Permissible range (with reference to $U_N$) | | 0.9 -<br>1.1 | 0.8 -<br>1.2 |
| Switching level | 1 signal ("H") [V DC] ≥<br>0 signal ("L") [V DC] ≤ | 207<br>92 | 16.8<br>16 |
| Typ. input current at $U_N$ | [mA] | 2.5 | 8 |
| Typ. switch-on time at $U_N$ | [ms] | 4.4 | 0.02 |
| Typ. shutdown time at $U_N$ | [ms] | 14 | 0.2 |
| Transmission frequency $f_{limit}$ | [Hz] | 5 | 300 |
| Input circuit AC | | Yellow LED, surge protection, RC element | |
| 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-conductor, ground-referenced | 3-conductor, ground-referenced |
| Output protection | | Protection against polarity reversal, freewheeling | 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 | - / aligned without spacing: horizontal/not aligned: 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 |
| EMC note | | | Class A product, see page 625 |

| Description | | Input voltage $U_N$ | Ordering data<br>Type | Order No. | Pcs. / Pkt. | Ordering data<br>Type | Order No. | Pcs. / Pkt. |
|---|---|---|---|---|---|---|---|---|
| **Solid-state power relay** | | | | | | | | |
| | 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 | | | |
| | | | **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 EMG 17-REL...2E/SO38 model, 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:
- EMG modular DIN-rail-mountable housing with an overall width of 17.5 mm
- Convenient ST-REL plug-in housing from the Phoenix ST series for mounting on URELG or UDK-RELG basic terminal blocks

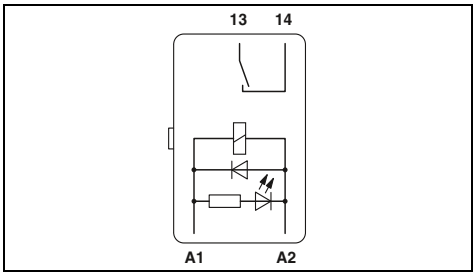
Further features are:
- Snap-on mounting on common EN DIN rails
- Easy maintenance
- Clear marking of terminal blocks using Phoenix Contact marking material

**Notes:**

Type of housing:
Polycarbonate fiber reinforced PC-F, color: green or black.

Marking systems and mounting material
See Catalog 5

**medium to large loads**
**1 N/O contact (1)**




### Technical data

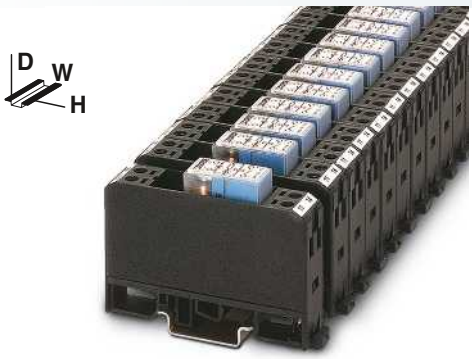
| | | |
|---|---|---|
| **Input data** | | ① |
| Permissible range (with reference to $U_N$) | | 0.85 - 1.1 |
| Typ. input current at $U_N$ | [mA] | 28 |
| Response/release time at $U_N$ | [ms] | 13 / 15 |
| Input protection: | | Yellow LED, freewheeling diode |
| **Output data** | | |
| Contact type | | 1 N/O contact with lead contact |
| Contact material | | AgCdO |
| 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 without spacing, vertical with spacing |
| Connection data solid / stranded / AWG | | - / - / - |
| Dimensions | W / H / D | 20.8 mm / 42.5 mm / 112 mm |

### Ordering data

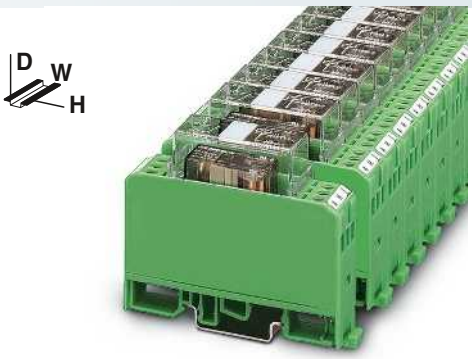
| Description | Input voltage $U_N$ | Type | Order No. | Pcs. / Pkt. |
|---|---|---|---|---|
| **Relay module with power contact relay** + wolfram lead contact ① | 24 V DC | **ST-REL3-KG 24/ 1/SO38** | **2829564** | 10 |
| **Relay module with power contact relay**, with two inputs for manual, automatic ① | 24 V DC | | | |

### Accessories

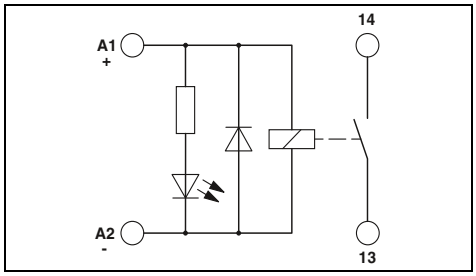
| | | | |
|---|---|---|---|
| **Basic terminal block**, complete with end cover | | **URELG 3** | **2820136** | 10 |
| **Equipment marker** | | | | |

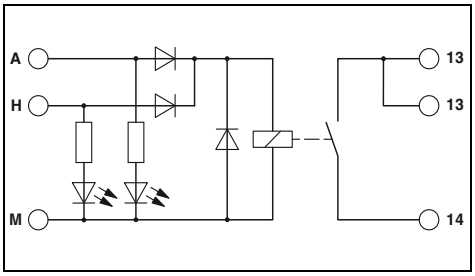



**medium to large loads**
**1 N/O contact (1)**




**medium to large loads**
**1 N/O contact (1)**




## Technical data

| | |
|---|---|
| ① | ① |
| 0.85 - | 0.9 - |
| 1.1 | 1.1 |
| 28 | 23 |
| 13 / | 9 / 10 |
| 15 | |
| Yellow LED, freewheeling diode | Automatic: yellow LED, manual: red LED, freewheeling diode, protection against polarity reversal |
| | |
| 1 N/O contact with lead contact | Single contact, 1 N/O contact |
| AgCdO | 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 $mm^2$ / 0.2 - 2.5 $mm^2$ / 24 - 12 | 0.2 - 4 $mm^2$ / 0.2 - 2.5 $mm^2$ / 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 |

## Ordering data

| Type | Order No. | Pcs. / Pkt. |
|---|---|---|
| **EMG 17-REL/KSR-G 24/2E/SO38** | **2941646** | 10 |

## Accessories

| | | |
|---|---|---|
| **EMG-GKS 12** | **2947035** | 50 |

## Accessories

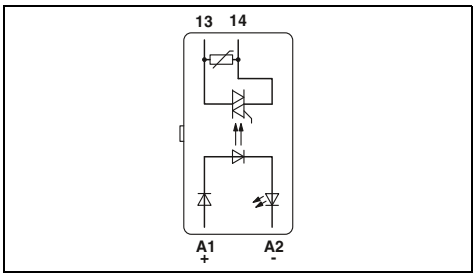
| | | |
|---|---|---|
| **EMG-GKS 12** | **2947035** | 50 |

## Plug-in solid-state power relays ST-OV 3

The plug-in 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)
– Plug-in

| 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 |

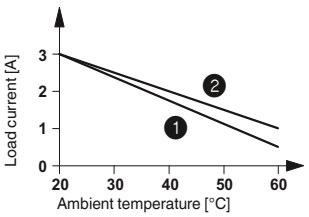
### Ordering data

| Description | | Input voltage $U_N$ | Type | Order No. | Pcs. / Pkt. |
|---|---|---|---|---|---|
| **Solid-state power relay** | | | | | |
| | 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

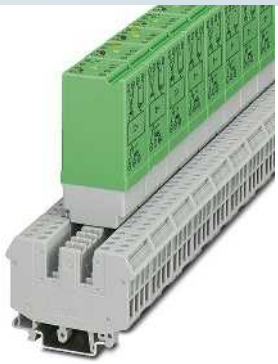
## Power protection circuit solid-state relay with signal logic ST-OV 4-24DC/24DC/...-PRO

The ST-OV 4-...PRO provides protection and monitoring functions that are otherwise only known from thermomagnetic protection elements.

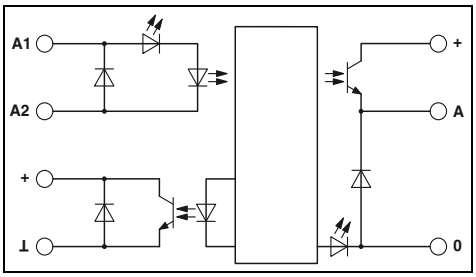
The PROtect modules have the following features:

- 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 detection and indication of a line break on the load side
- Feedback in the event of an error

| Notes: |
|---|
| Type of housing:<br>Polyamide PA non-reinforced, color: bottom part gray, hood green |
| Marking systems and mounting material<br>See Catalog 5 |
| For load current diagram, see page 427 |
| Derating curve, time/current characteristic curves, and state diagram, see page 427 |



**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 shutdown | | 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-conductor, 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, freewheeling diode | |
| Output circuit | | 3-conductor, 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 |

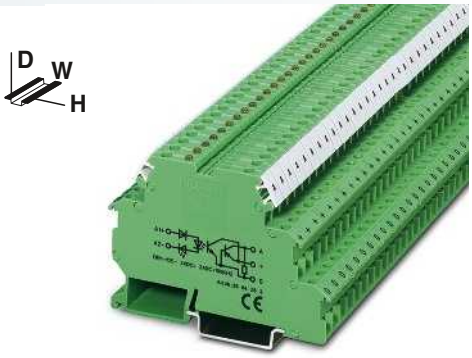
### Accessories

| | | | |
|---|---|---|---|
| **Basic terminal block**, complete with end cover | **UDK-RELG 4** | **2777056** | 10 |

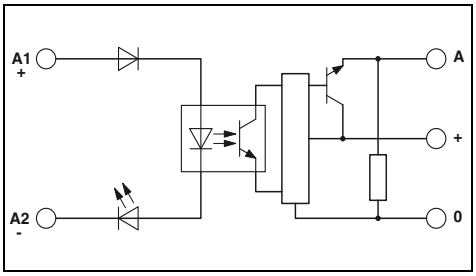
## 100 kHz input solid-state relay DEK-OE

A solid-state relay for the reliable detection of short pulses
- Cut-off 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:<br>Polyamide PA non-reinforced, color: green. |
| Marking systems and mounting material<br>See Catalog 5 |




**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. shutdown 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-conductor, 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 | |
| EMC note | | Class A product, see page 625 | |

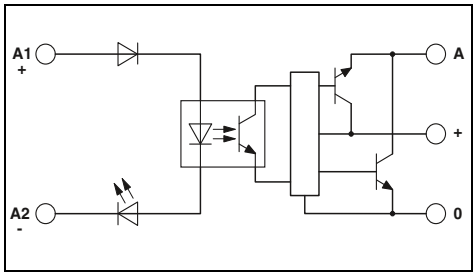
### Ordering data

| Description | | Input voltage $U_N$ | Type | Order No. | Pcs. / Pkt. |
|---|---|---|---|---|---|
| **Solid-state input relay** | | | | | |
| | 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**

EAC




## 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-conductor push-pull, ground referenced
Surge protection

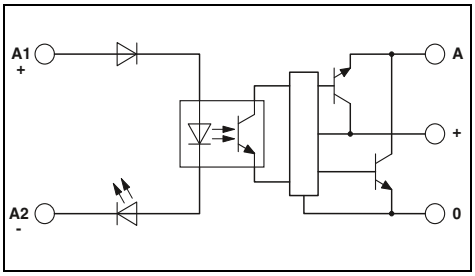
2.5 kV AC
-20 °C ... 60 °C
IEC 60664, EN 50178, IEC 62103
2 / II

0.2 - 4 mm² / 0.2 - 2.5 mm² / 24 - 12
6.2 mm / 80 mm / 56 mm
Class A product, see page 625

## Ordering data

| Type | Order No. | Pcs. / Pkt. |
|---|---|---|
| **DEK-OE- 5DC/ 5DC/100KHZ-G** | **2964542** | 10 |
| **DEK-OE- 24DC/ 5DC/100KHZ-G** | **2964364** | 10 |

EAC




## 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-conductor 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
Class A product, see page 625

## Ordering data

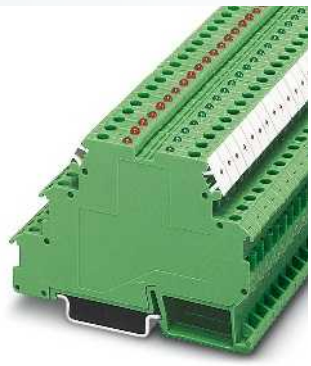
| Type | Order No. | Pcs. / Pkt. |
|---|---|---|
| **DEK-OE- 5DC/ 24DC/100KHZ-G** | **2964555** | 10 |
| **DEK-OE- 24DC/ 24DC/100KHZ-G** | **2964348** | 10 |

## Electronic sensor terminal block for NAMUR proximity sensors

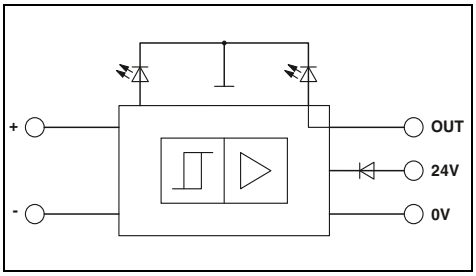
The EIK 1-SVN 24-P electronic sensor terminal block converts the changeable resistance of a NAMUR sensor unit into a digital signal that can be read by all PLCs.

- Monitoring of initiator side for short-circuit or open circuit
- 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:<br>Polyamide PA non-reinforced, color: green. |
| Marking systems and mounting material<br>See Catalog 5 |



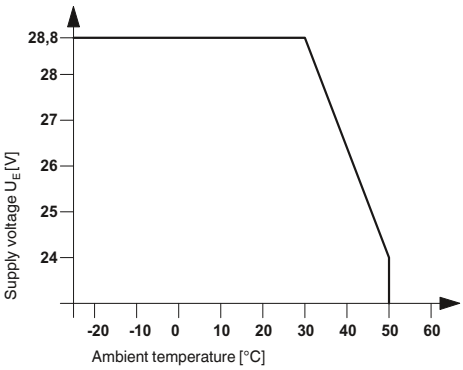
**For inductive proximity sensors acc. to NAMUR**




### 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** | |
| No-load voltage | 8.2 V DC ±10 % |
| Switching points in accordance with EN 60947-5-6: | ≥ 2.1 mA (in conductive state)<br>≤ 1.2 mA (in blocking state)<br>6.3 mA ... 10 mA (in the event of a short-circuit)<br>0 mA ... 0.35 mA (in the event of an open circuit) |
| Switching hysteresis | approx. 0.2 mA |
| Internal resistance | approx. 1 kΩ |
| Output protection | visual short-circuit and open circuit check with LED (red),<br>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)<br>$U_{VN}$ - $U_R$; in blocking state |
| Output protection | 36 V Zener diode as freewheeling 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 |
| EMC note | Class A product, see page 625 |

**Derating curve for EIK 1-SVN 24 P**



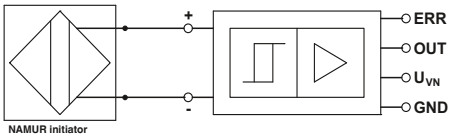

### Ordering data

| 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 |

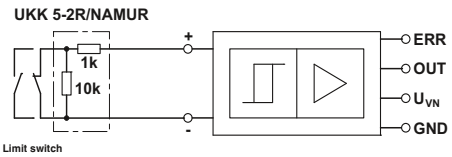
### Accessories

| | | | |
|---|---|---|---|
| **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...**<br>**Ordering data at DEK-REL...** | | |

**Application 1**



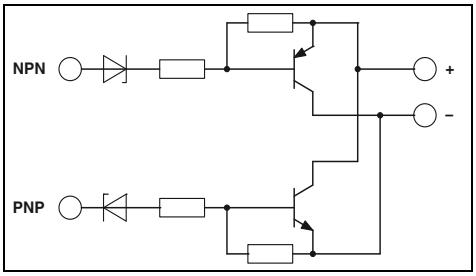

**Application 2**



## 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:<br>Polyamide PA non-reinforced, color: green. |
| Marking systems and mounting material<br>See Catalog 5 |




### Technical data

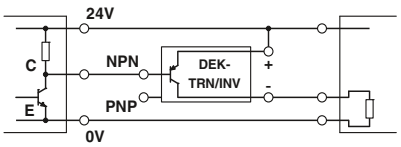
| | | |
|---|---|---|
| Supply voltage | | 20 V DC ... 30 V DC ($U_V$) |
| Continuous current | | 200 mA |
| Residual voltage drop | | < 1 V |
| Leakage current | | < 1 mA |
| Max. transmission frequency | | 15 kHz |
| NPN input/PNP output | | |
| Switch-on threshold | | < 5 V (at $U_V$ = 24 V; < ($U_V$ - 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<br>Basic insulation |
| Pollution degree / Surge voltage category | | 2 / II |
| Screw connection solid / stranded / AWG | | 0.2 - 4 $mm^2$ / 0.2 - 2.5 $mm^2$ / 24 - 12 |
| Dimensions | W / H / D | 6.2 mm / 80 mm / 56 mm |

### Ordering data

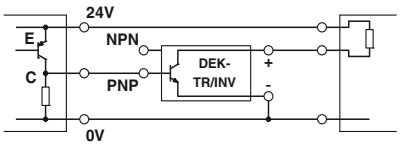
| Description | Type | Order No. | Pcs. / Pkt. |
|---|---|---|---|
| **Inverter module** | **DEK-TR/INV** | **2964319** | 10 |

**Connection examples:**

**NPN output** **Load**




**PNP output** **Load**



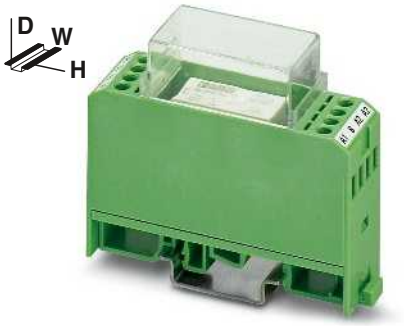
## Hybrid relay modules

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.

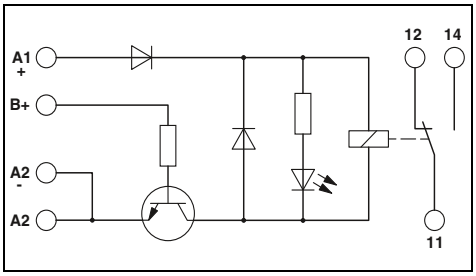
The advantages:

- 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:<br>Polycarbonate fiber reinforced PC-F, color: green. |
| Marking systems and mounting material<br>See Catalog 5 |
| For the protection of relay coils and contacts, inductive loads must be dampened with an efficient protection circuit. |




**Positive switching hybrid relay**




### Technical data

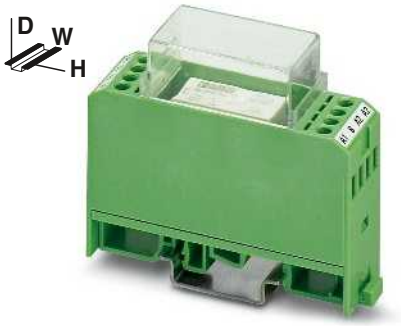
| | | ① | ② | ③ |
|---|---|---|---|---|
| **Input data** | | | | |
| Relay supply voltage $U_N$ ± 10 % | [V DC] | 24 | 24 | 24 |
| Min. control voltage | [V DC] | 2.7 | 5 | 15 |
| Max. control voltage | [V DC] | 5.25 | 13.2 | 35 |
| Min. control current | [mA] | 2.6 | 0.5 | 0.5 |
| Max. control current | [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, freewheeling 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 | | |
| EMC note | | Class A product, see page 625 | | |

### Ordering data

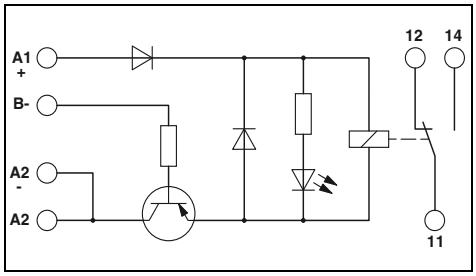
| Description | | Nominal control voltage | Type | Order No. | Pcs. / Pkt. |
|---|---|---|---|---|---|
| **Relay module with miniature power contact relay** with integrated NPN transistor control, for low control currents | | | | | |
| | ① | 5 V DC | **EMG 22-REL/KSR-G 24/TRN 5** | **2949787** | 10 |
| | 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, freewheeling 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
Class A product, see page 625

## 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 |

X.12
Y.182

# System cabling for controllers

Wiring I/O modules with individual wires is an extremely time-consuming process. Wiring errors and tedious troubleshooting cannot be ruled out.

VARIOFACE system components reduce assembly costs by using plug-in components to carry out wiring quickly, clearly, and without errors.

In the case of **controller-specific system cabling**, front adapters, system cables, and modules are specially matched to each other. Individual solutions exist for the following controllers:

- **ABB**
- **Allen Bradley**
- **Emerson**
- **Honeywell**
- **GE Fanuc**
- **Phoenix Contact**
- **Mitsubishi Electric**
- **OMRON**
- **Schneider Electric**
- **Siemens**
- **Yokogawa**

If automation components with high-pos. connectors such as D-SUB are in the control cabinet, **universal modules** and cables are suitable for signal connection. The 1:1 connection is characteristic for these universal all-purpose modules. The modules allow orderly connection of field signals to screw, spring-cage or push-in technology.

**Universal cables** connect the control and signal level quickly and without errors.

A wide variety of **potential distributors** are available for splitting the control and operating voltage. The different potential levels and the connection terminal blocks make flexible use possible.

Individual application requirements can be realized with customer-specific products (see page 488).


**Product range overview**

Introduction 482

Product overview 484

**Customer-specific products** 488

**Controller-specific system cabling**

For ABB S800 I/O 490

For Allen Bradley, ControlLogix, SLC 500, and PlantScape 492

For Emerson DeltaV 498

For GE Fanuc RX3i and Series 90-30 502

For Honeywell C300 Series CI/O and PlantScape 504

For Mitsubishi A1S and Q, Melsec L, Honeywell ML 200 506

For Omron CJ1, CS1, and C200H 508

For Phoenix Contact Axioline and Inline 509

For Schneider Electric MODICON® 511

For Siemens SIMATIC® S7-300 514

For Siemens SIMATIC® S7-1500 524

For Siemens SIMATIC® S7-400 526

For Siemens SIMATIC® S5-S7 conversion 527

For Yokogawa Centum VP, ProSafe-RS 534

Termination Carriers for Yokogawa Centum VP and ProSafe-RS 540

Passive modules 542

Active modules 556

V8 adapters for PLC-INTERFACE 568

System and splitting cables 575

**Universal modules**

With flat-ribbon cable connectors 576

With D-SUB connectors 584

With high-density D-SUB connectors 591

With DIN strips 592

With ELCO connectors 594

With RJ45 connectors 598

With COMBICON connection 599

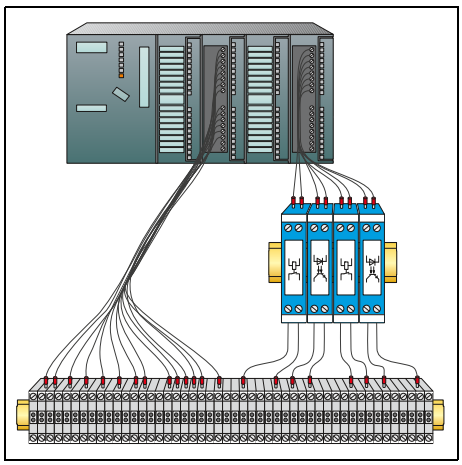
**Universal cables**

With flat-ribbon cable connectors 600

With D-SUB connectors 610

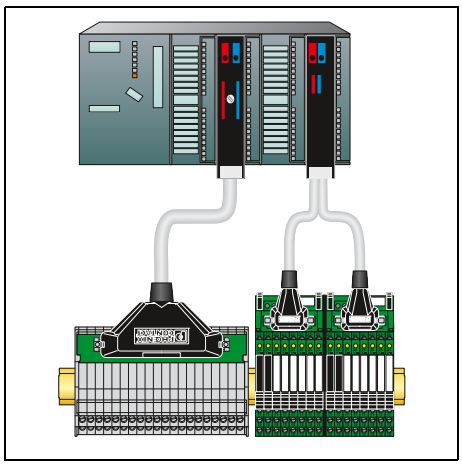
With ELCO connectors 616

**Potential distributors** 618



**Wiring with single wires**

– Time-consuming
– Confusing wiring
– Risk of mixing wires
– Time-consuming troubleshooting



**Wiring with the controller-specific system cabling:**

– Fast, fault-free wiring
– Plug and Play solution
– Orderly structure
– Considerable time savings

The matching components are selected with the help of the "system cabling for controllers" online configurator:
– Front adapter
– System cables
– Module

For the online configurator, use the web code:

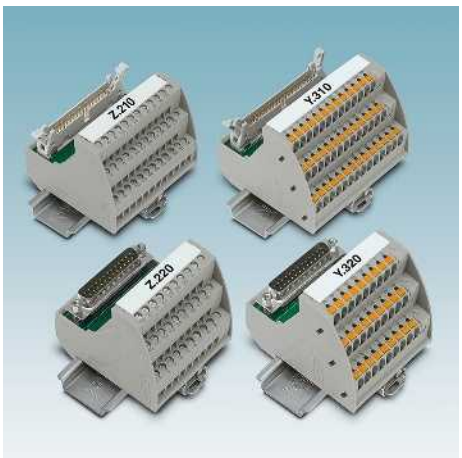
**Your web code: #0007**

Simply enter "#0007" into the search field on our website.

**Front adapter**
– Tailored to controller-specific I/O modules
– Plug-in components
– Connection via system cables

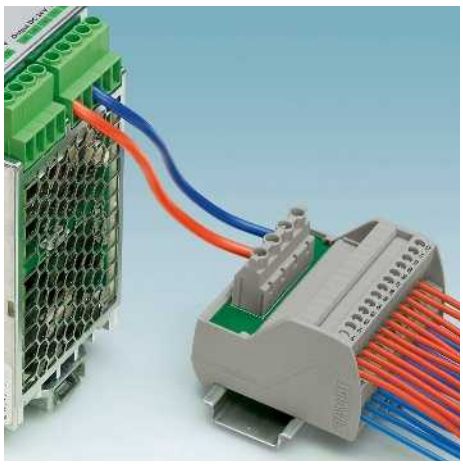
**8 and 32-channel modules**
– Passive modules
– Relay modules
– Controller-specific layout
– Screw or push-in connection technology

**PLC-V8 adapter**
– Connection of 8 channels via the "PLC series"
– Feasible functions: relay, solid-state relay or feed-through
– Individual function selection per channel
– Screw, spring-cage or push-in connection technology




**Universal modules**
– Connector: IDC/FLK, D-SUB, ELCO or DIN
– 1:1 connection
– Screw, spring-cage or push-in connection technology
– Optional status indicator

**Universal cables**
– With IDC/FLK connector
– With D-SUB connector
– With ELCO connector
– With open end as an option



**Potential distributor**
– Up to 30 A/250 V
– Two, three or six potential levels
– Screw or push-in connection technology

## Controller-specific system cabling

| System component | Version | Controller | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | ABB | Allen Bradley | | Emerson | GE-FANUC | | Honeywell | | Mitsubishi |
| | | S800 I/O | Control Logix | SLC 500 | DeltaV | RX3i | 90-30 | C300 Series CI/O ML 200 | PlantScape | MELSEC A, A1S, Q, L |
| | | Page | Page | Page | Page | Page | Page | Page | Page | Page |
| Front adapter | | not required | 492 | 494 | not required | 502 | 503 | 504 | 492 | not required |
| System cables | Standard | 610 | 574 | 574 | 606 | 574 | 574 | 610 | 574 | |
| | Controller-specific | 491 | | 496 | 498 | | | 507 | | 506 |
| Interface modules | Passive Standard | 542 | 542 | 542 | 542 | 542 | 542 | 505 | 542 | 542 |
| | Passive Controller-specific | 490 | 545 | 495 | 499 | | | | | |
| | Active Standard | 556 | 556 | 556 | 556 | 556 | 556 | 556 | 556 | 556 |
| | V8 adapter/ feed-through terminal block | 568 | 568 | 568 | 568 | 568 | 568 | 568 | 568 | 568 |
| | Relay/ optocoupler | 398 | 398 | 398 | 398 | 398 | 398 | 398 | 398 | 398 |
| | MINI Analog system adapter | | | | | | | | | |
| | MINI Analog | | | | | | | | | |

| | OMRON CJ1 | Phoenix Contact | Schneider | | Siemens | | | | Yokogawa | |
|---|---|---|---|---|---|---|---|---|---|---|
| | CS1, CQM1, C200H | Axioline Inline | TSX Qantum | M340 | S7 300 | S7 1500 | S7 400 | Conversion S5 to S7 | Centum VP | ProSafe-RS |
| | Page | Page | Page | Page | Page | Page | Page | Page | Page | Page |
| | not required | 510 | 511 | 512 | 516 | not required | 526 | 527 | not required | not required |
| | | 574 | 574 | 574 | 574 | | 574 | | | |
| | 508 | | | 513 | 521 | 524 | | | 534 | 534 |
| | 542 | 542 | 542 | 542 | 542 | 542 | 542 | | | |
| | | | 545 | | 544 | | 544 | | 536 | 538 |
| | 556 | 556 | 556 | 556 | 556 | 556 | 556 | | | |
| | 568 | 568 | 568 | 568 | 568 | 568 | 568 | | 568 | |
| | 398 | 398 | 398 | 398 | 398 | 398 | 398 | | 398 | |
| | | | | | 122 | | | | 122 | |
| | | | | | 120 | | | | 120 | |

## Universal modules and cables

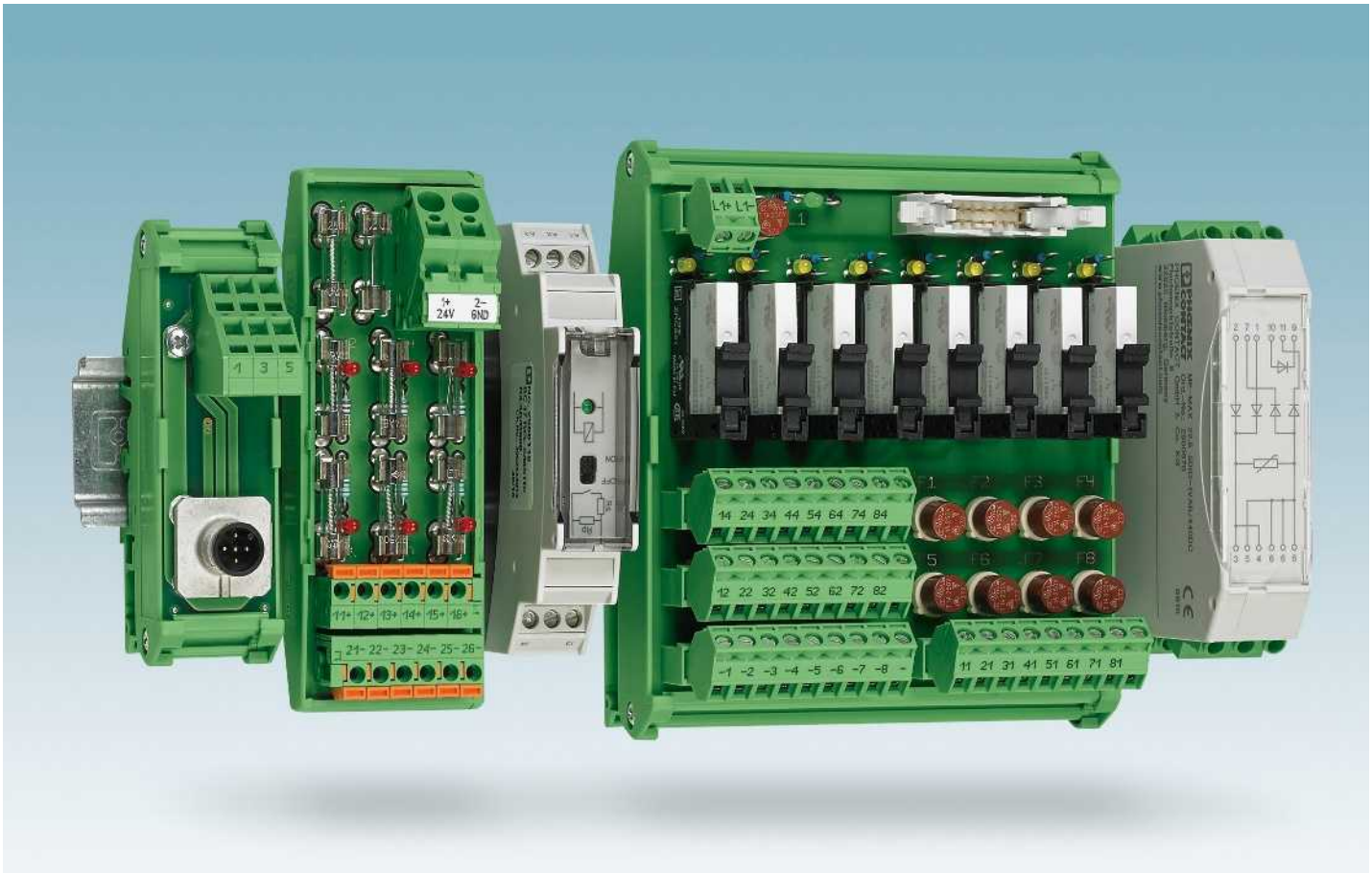
| Device series | | Passive modules (connection technology) | | | | |
|---|---|---|---|---|---|---|
| | | Flat-ribbon cable strip | D-SUB strip | DIN strip | ELCO strip | Potential distributor |
| | | | | | | |
| | | Page | Page | Page | Page | Page |
| VIP Line | | 576 | 584<br>591 | | | 618 |
| Standard Line | | | | 592 | 596 | |
| Slim Line | | 580 | 588 | | | |
| Feed-through modules | | 582 | 589 | | | |
| Cables | | 600 | 610 | | | |

**COMBICON**

Page

599

599



## From the enquiry to the product

We develop your product from the idea to series production.

### Concept phase

- Realization test according to your specifications
- Personal consultation
- Tendering including draft drawing

### Realization phase

- Development according to product creation process
- Circuit diagram and PCB layout
- Component selection
- Creation of functional samples
- Creation of prototypes
- Tests in every phase of development
- EC conformance
- Preparation and implementation of approval procedures
- Environmental tests according to standards
- Documentation

### Series phase

- Production according to IPC-A-610 Class 2
- 100% end test with automated test systems
- Lifecycle management

## Directives and standards

- Low-voltage directive
- EMC directive
- IEC 60664-1
  Insulation coordination for electrical equipment within low-voltage systems
- EN 50178
  Electronic equipment for use in power installations
- EN 61000-6
  Electromagnetic compatibility
- IPC A-600
  Acceptance criteria for PCBs
- IPC-A-610
  Acceptance criteria for electronic modules

## Components used

We use connection technology and housings from the comprehensive Phoenix Contact portfolio.

Here you will find all common market technologies:

- Screw and spring-cage connection
- Push-in spring connection
- Knife disconnection
- Modular component housing
- Building installation housings
- Profile module carriers

Furthermore, we use components, connectors, cables as well as PCBs from qualified and certified suppliers.

## Product range

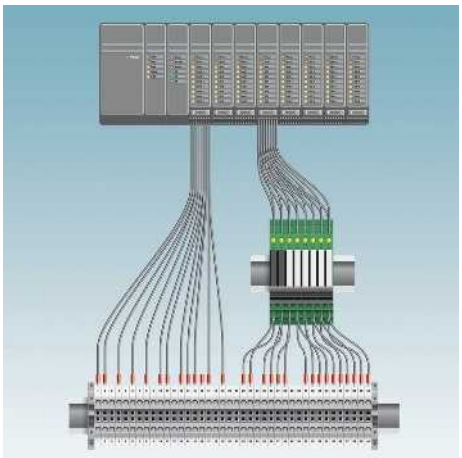
We create versions from catalog production for you or new products according to your specifications from the following portfolio:

- Function modules such as diode gates
- Relay and optocoupler modules
- 1:1 installation modules (connector on terminal block)
- Potential distributors
- System cables with high-pos. connectors
- System adapters for controllers and control systems
- Transfer modules for use between controller and field level
- Output modules with electrical isolation
- Module carriers for system cabling of signal conditioners or safe coupling relays

## Your direct line to us

Do you have a specific question? Talk to us about it.

**Simplification of installation**
Objectives
– Reduce assembly costs
– Minimize installation time
– Optimize space in the control cabinet
Implementation
– Analysis of the application
– Draft of concept
Result
– Tailor-made solution from system components (standard and customer-specific)
– Fault-free wiring



**Retrofitting systems**
Task
– Extension
– Retrofitting
Objectives
– System availability
– Fulfillment of statutory specifications
Solution
– Use adaptation solutions and high-pos. system cables
Result
– Minimum downtimes

**Pre-assembled system cables**
With high-position connectors
– D-SUB strips
– IDC/FLK pin strips (2.54 mm)
– Pre-assembled at one or both ends
Cables
– Shielded, unshielded, halogen-free
– 0.14 mm²/26 AWG and 0.25 mm²/24 AWG
Quality
– Continuity and dielectric test
Other versions available on request.

**Installation modules**
– 1:1 marshalling terminal block to high-pos. connector (D-SUB, HE10, ELCO...)
– Passive transfer modules with system connection
– Potential distributors
– Fuse modules
– Diode modules
– Other modules on request

**Relay and optocoupler modules**
– With electromechanical relays
– With solid-state relays
– Multi-channel
– With system connection
– N/O contact or PDT contact
– LED status display
– Freewheeling diode
– Protection against polarity reversal
– Redundant power supply

**Termination Carrier module carrier**
The compact Termination Carrier connects
– Signal conditioners
– Signal conditioners for Ex i circuits
– Signal conditioners for SIL applications
– Safe coupling relays
easily with the automation system via system cables.
The advantages are clear:
– Quick startup
– Fault minimization

## 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 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 via assembled D-SUB cables (see page 610).

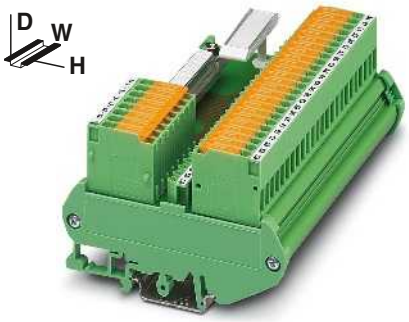
In addition to screw connection with knife disconnection for every channel and ABB S800-specific marking, the modules have the following features:

– Eight negative terminal blocks with knife disconnection (TU810)
– Eight positive terminal blocks with knife disconnection (TU810/P)
– For each channel, there is a positive and negative terminal block with knife disconnection (TU830)

Passive interface modules can also be used for signal transmission (e.g., VIP-3/SC/D25SUB/F, 2315188), see page 585.

### Web code for the online configurator

**Your web code: #0007**




**Interface module with knife disconnect terminal blocks**

**Connectable I/O modules**

| Card type | FLKM-D25SUB... | | |
|---|---|---|---|
| | ...TU810 | ...TU810/P | ...TU830 |
| **Digital input** | | DI 810 | DI 810 |
| | | DI 811 | DI 811 |
| | DI 814 | | DI 814 |
| | | DI 818 | DI 818 |
| | | DI 830 | DI 830 |
| | | DI 831 | DI 831 |
| | | DI 840 | DI 840 |
| | | DI 885 | DI 885 |
| **Digital output** | DO 810 | | DO 810 |
| | | DO 814 | DO 814 |
| | DO 818 | | DO 818 |
| | DO 840 | | DO 840 |
| **Analog input** | AI 810 | AI 810 | AI 810 |
| | AI 815 | AI 815 | AI 815 |
| | AI 820 | | AI 820 |
| | AI 830 | | AI 830 |
| | AI 835 | | AI 835 |
| | AI 845 | AI 845 | AI 845 |
| **Analog output** | AO 810 | | AO 810 |
| | AO 815 | | AO 815 |
| | AO 820 | | AO 820 |
| | AO 845 | | AO 845 |
| **Other** | DP 820 | | DP 820 |

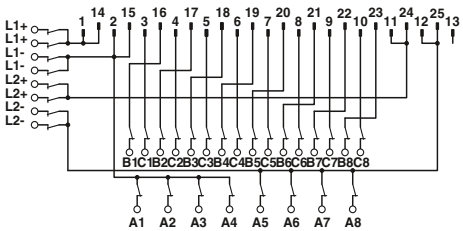
**Explanation:**
- Flat-ribbon cable strip
- Connection to I/O card
- Screw terminal blocks for separate supply

### Technical data

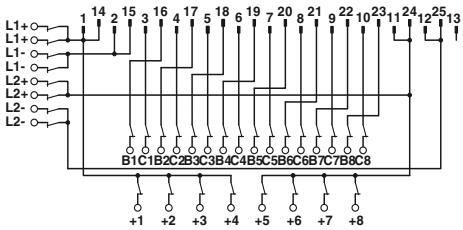
| | | |
|---|---|---|
| Max. perm. operating voltage | | < 50 V AC / 60 V DC |
| Max. perm. current (per branch) | | 2 A |
| Max total current (voltage supply) | | 4 A (8 A L1-/L2-) |
| Ambient temperature (operation) | | -20 °C ... 50 °C |
| Mounting position | | any |
| Standards/regulations | | DIN EN 50178, IEC 60664, IEC 62103 |
| Connection method | Field level | Screw connection with disconnect knife |
| | Controller level | D-SUB socket strip |
| Connection data solid / stranded / AWG | | 0.2 ... 4 mm² / 0.2 ... 2.5 mm² / 24 - 12 |
| Dimensions | H / D | 90 mm / 61 mm |

### Ordering data

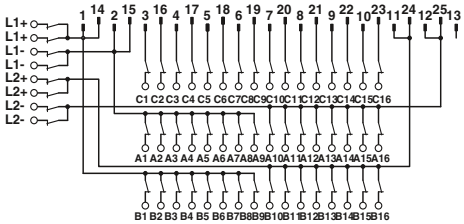
| Description | No. of pos. | Module width W | Type | Order No. | Pcs. / Pkt. |
|---|---|---|---|---|---|
| **VARIOFACE module,** with knife disconnect terminal blocks in ABB-specific marking: | | | | | |
| - with 8 negative terminal blocks | 25 | 126.5 mm | **FLKM-D25 SUB/B/KDS3-MT/TU810** | **2304513** | 1 |
| - with 8 positive terminal blocks | 25 | 126.5 mm | **FLKM-D25 SUB/B/KDS3-MT/TU810/P** | **2304539** | 1 |
| - each with 16 positive and negative terminal blocks | 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**

## ABB S800 I/O
## System cable

The ABB S800 I/O system offers the possibility of realizing the process wiring with D-SUB connectors. ABB TU 812 Compact MTU are available for this purpose.

The CABLE-D25SUB/B/2X14/.../TU812 system cables convert digital signals from a D-SUB socket strip to two flat-ribbon cable connectors. Therefore, all 8-channel interface modules of the system cabling can be connected to S800 I/O modules. Two interface modules are used per module.

System cable

### Technical data

| | |
|---|---|
| Max. perm. operating voltage | < 50 V AC / 60 V DC |
| Max. perm. current carrying capacity 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-position | 6.3 mm |

### Ordering data

| Description | No. of pos. | Cable length | Type | Order No. | Pcs. / Pkt. |
|---|---|---|---|---|---|
| **VARIOFACE system cable**, for S800 I/O, with a 25-pos. D-SUB socket strip and two 14-pos. 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-pos. D-SUB socket strip and two 14-pos. 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 1st connector | FLK 14 2nd 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 of this type

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. A 50-pos. system cable can connect a maximum of 32 channels to the field level.

Tailor-made VARIOFACE termination boards round off this system concept.

### Web code for the online configurator

**Your web code: #0007**

**Notes:**

Front adapters can also be used without cover.

**32-channel front adapter with 50-pos. FLK strip**

### Technical data

| | |
|---|---|
| Max. perm. operating voltage | < 50 V AC / 60 V DC |
| Max. permissible current | 1 A (per path)<br>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 | DIN EN 50178 / IEC 60664 / IEC 62103 |

### Ordering data

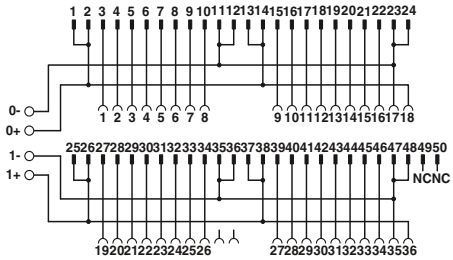
| Description | No. of pos. | Type | Order No. | Pcs. / Pkt. |
|---|---|---|---|---|
| **VARIOFACE front adapter,** for ControlLogix: | | | | |
| - A maximum of 1 x 32 channels can be connected | 50 | **FLKM 50-PA-AB/1756/EXTC** | **2302735** | 1 |
| - IB 32 input board | 50 | **FLKM 50-PA-AB/1756/IN/EXTC** | **2302748** | 1 |

**Front adapters for I/O modules of Allen Bradley ControlLogix and Honeywell PlantScape automation devices**

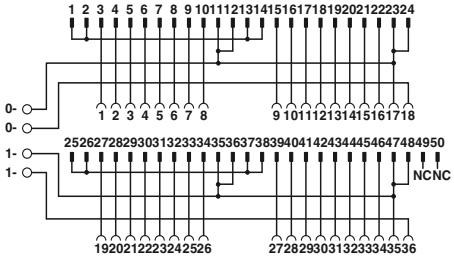
| Card type | FLKM 50-PA-AB/1756/EXTC |
|---|---|
| **Digital input** | 1756-IA 16 I* or TC-TDK 161*<br>1756-IB 16 D* or TC-TDX 161*<br>1756-IB 16 I* or TC-TDJ 161*<br>1756-IH 16 I* |
| **Digital output** | 1756-OB 32 or TC-ODD 321 |
| **Analog input** | 1756-IF 8*<br>1756-IF 16 I* or TC-IAH 161*<br>1756-IF 8H* or TC-HAI 081* |
| **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
VIP-2/PT/FLK50/AB-1756, Order No.: 2904286
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 of this type

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-pos. system cables are used to connect up to 2 x 8 channels to the field level.

Tailor-made VARIOFACE termination boards round off this system concept.

### Web code for the online configurator

**Your web code: #0007**

**Notes:**
Front adapters can also be used without cover.

**16-channel front adapter with two 14-pos. FLK strips**

### Technical data

| | |
|---|---|
| Max. perm. operating voltage | < 50 V AC / 60 V DC |
| Max. permissible current | 1 A (per path)<br>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 | DIN EN 50178 / IEC 60664 / IEC 62103 |

### Ordering data

| Description | No. of pos. | Type | Order No. | Pcs. / Pkt. |
|---|---|---|---|---|
| **VARIOFACE front adapter,** 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 |

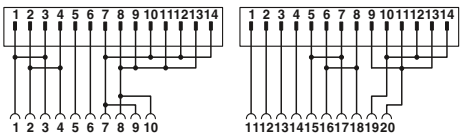
**Front adapters for I/O modules of Allen Bradley ControlLogix and Honeywell PlantScape automation devices**

| 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**<br>1756-IF 6 I** or TC-IAH 061**<br>1756-IR 6 I** or TC-IXR 061**<br>1756-IT 6 I** or TC-IXL 061** |
| **Analog output** | 1756-OF 4 I**<br>1756-OF 6 CI** or TC-OAH 061**<br>1756-OF 6 VI** or TC-OAV 061**<br>1756-OF 8** or TC-OAV 081**<br>1756-OF 8 H** |
| **Switch** | 1756-PLS** |

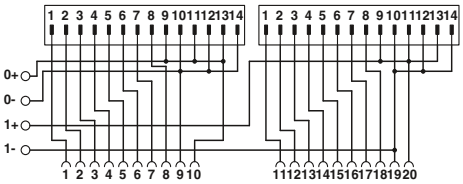
| Card type | FLKM 14-PA-AB/1756/IN/EXTC |
|---|---|
| **Digital input** | 1756-IN 16**<br>1756-IA 16 or TC-IDA 161**<br>1756-IB 16<br>1756-IC 16** |

| Card type | FLKM 14-PA-AB/1756/IF6I/EXTC |
|---|---|
| **Analog input** | IF6I** |

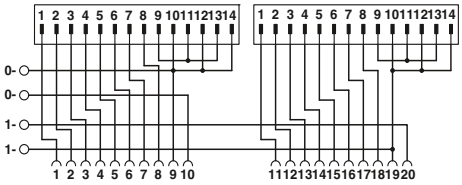
** Only in conjunction with
VIP-2/SC/2FLK14/AB-1756, Order No.: 2322333
VIP-2/PT/2FLK14/AB-1756, Order No.: 2904288
There must be no voltage supply on the front adapter. Risk of short circuit!




**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 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-pos. system cables. Tailor-made VARIOFACE termination boards with a variety of functions and connection options round off this system concept.
– With the FLKM50-PA-SLC500 OUT/2A front adapters, the FLKM 50/16/SLC500 termination board and 50-position system cables, the VARIOFACE system cabling can also be coupled to the OA16 and OW16 power output cards.

### Web code for the online configurator

**Your web code: #0007**

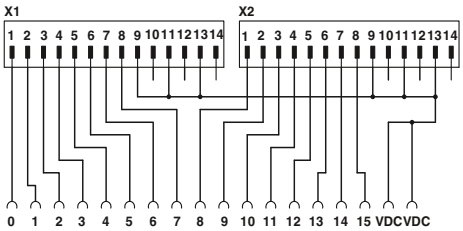
**Front adapter for SLC 500 1746, 2 x 8 channels can be connected**

### Technical data

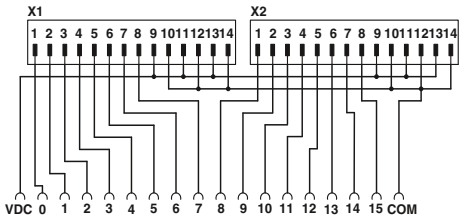
| | FLKM 14-PA... | FLKM 50-PA... |
|---|---|---|
| Max. perm. operating voltage | < 50 V AC / 60 V DC | < 50 V AC / 60 V DC |
| Max. permissible current | 1 A (per path) | 2 A (per path) |
| Max. perm. total current | 2 A (per byte, for supply via connector) | 7 A (per byte, for supply via connector) |
| 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

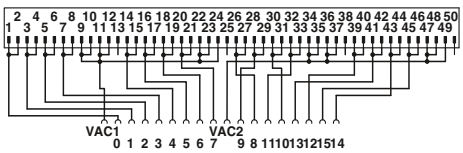
| Description | No. of pos. | Type | Order No. | Pcs. / Pkt. |
|---|---|---|---|---|
| **VARIOFACE front adapter**, 2 x 8 channels can be connected for Allen Bradley SLC 500 for: | | | | |
| - 1746 OB16, OV16, OG16 and IG16 | 14 | **FLKM 14-PA-SLC500/OUT** | **2293459** | 1 |
| - 1746 IA16, IB16, ITB16 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 |



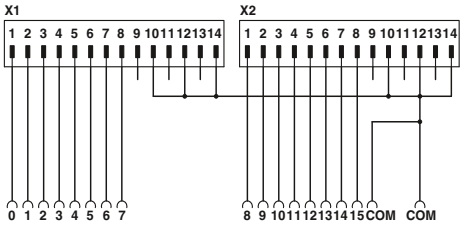

**Connection scheme FLKM 14-PA-SLC500/IN/M**




**Connection scheme FLKM 14-PA-SLC500/OUT**




**Connection scheme FLKM 50-PA-SLC500/OUT/2A**




**Connection scheme FLKM 14-PA-SLC500/IN**

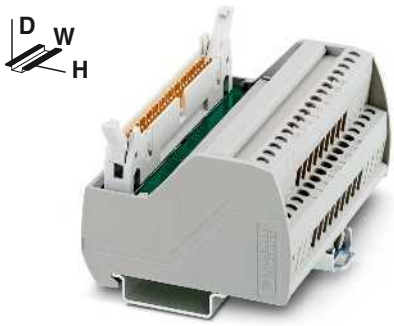
**Explanation:**
- Flat-ribbon cable strip
- Connection to I/O card
- Screw terminal blocks for separate supply

## VIP termination board for Allen Bradley SLC 500, 2 A output cards

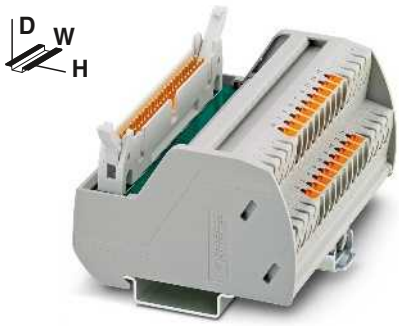
The VIP-2/.../FLK50/16/SLC500 VARIOFACE Professional (VIP) module has been designed specifically for OA16 and OW16 output modules. When used in conjunction with the FLKM 50-PA-SLC500/OUT/2A front adapter, currents up to 2 A per channel can be transferred with the system cabling.

**Notes:**

For marking systems (e.g., “ZB 22:UNBEDRUCKT”; Order No. 0811862) and mounting material, see Catalog 5.




**VARIOFACE termination board for 16 channels with screw connection**



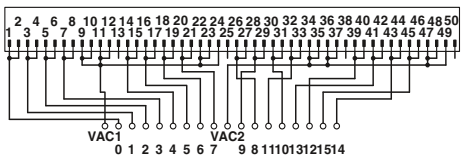

**VARIOFACE termination board for 16 channels with push-in connection**

### Technical data

| | | | |
|---|---|---|---|
| Max. perm. operating voltage | | 120 V AC/DC | 120 V AC/DC |
| Max. perm. current (per branch) | | 1 A | 1 A |
| Max total current (voltage supply) | | 2 A (per channel) | 2 A (per channel) |
| Ambient temperature (operation) | | -20 °C ... 50 °C | -20 °C ... 50 °C |
| Mounting position | | any | any |
| Standards/regulations | | IEC 60664, DIN EN 50178, IEC 62103 | EN 50178 |
| Connection method | Field level | Screw connection | Push-in connection |
| | Controller level | IDC/FLK pin strip (2.54 mm) | IDC/FLK pin strip (2.54 mm) |
| Connection data solid / stranded / AWG | | 0.2 ... 4 mm² / 0.2 ... 2.5 mm² / 24 - 12 | 0.14 ... 2.5 mm² / 0.14 ... 2.5 mm² / 26 - 14 |
| Dimensions | H / D | 65.5 mm / 56 mm | 72.1 mm / 56 mm |

### Ordering data

| Description | No. of pos. | 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 | | | | | |
| - with screw connection | 50 | 90.8 mm | **VIP-2/SC/FLK50/16/SLC500** | **2322320** | 1 |
| - with push-in connection | 50 | 92.7 mm | **VIP-2/PT/FLK50/16/SLC500** | **2904287** | 1 |




**Connection scheme VIP-2/.../FLK50/16/SLC500**

## Allen Bradley SLC 500
## System cable for 32 channels

The 32-channel I/O cards of the SLC 500 are connected using 40-pos. 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

### Web code for the online configurator

**Your web code: #0007**

**System cable for 32-channel I/O cards of the SLC 500 (OB32, OV32, IB32, IV32)**

EAC

### Technical data

| | |
|---|---|
| Max. perm. operating voltage | < 50 V AC / 60 V DC |
| Max. perm. current carrying capacity 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-position | |

### Ordering data

| Description | No. of pos. | Cable length | Type | Order No. | Pcs. / Pkt. |
|---|---|---|---|---|---|
| **Assembled round cable,** with two 40-pos. socket strips in fixed lengths (50 cm increments) for connection to 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 |
| **Assembled round cable**, for connection to Allen-Bradley SLC500, OB32 and IB32, with one 40-position socket strip and four 14-position socket strips, 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)**

EAC

## 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. In addition to the 10, 16, and 20-pos. system cables of system cabling (see page 574), the following system-specific cables are available:

- **FLK 16/14/DV-OUT/...**, for digital modules with 16-pos. MTB for connection to 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 modules with 40-pos. MTB for connection to PLC-INTERFACE
- **FLK 16/24/DV-AI/EZ-DR/...**, for analog modules 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 to 32-channel VARIOFACE interface modules

System cable for DeltaV

EAC

### Technical data

| | | |
|---|---|---|
| Max. perm. operating voltage | | < 50 V AC / 60 V DC |
| Max. perm. current carrying capacity 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-position | 6.8 mm |
| | 20-position | 7.6 mm |
| | 24-position | 6.5 mm |
| | 20-position | 10.3 mm |

### Ordering data

| Description | No. of pos. | Cable length | Type | Order No. | Pcs. / Pkt. |
|---|---|---|---|---|---|
| **System cable**, for 16-pos. "mass termination blocks" with a 16-pos. and a 14-pos. flat-ribbon cable connector for connection to 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-pos. and a 14-pos. flat-ribbon cable connector for connection to 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-pos. and two 14-pos. flat-ribbon cable connectors for connection to 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-pos. and a 16-pos. flat-ribbon cable connector for connection to 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-pos. and one 50-pos. flat-ribbon cable connectors for connection to 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

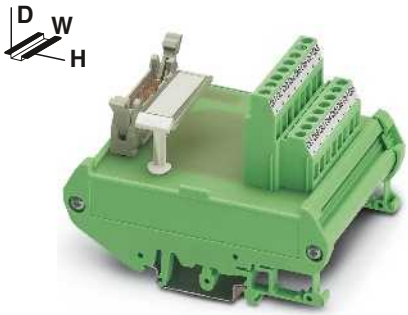
These system-specific interface modules for DeltaV modules are used in combination with the respective system cables. The controller board is connected to 8-channel modules through "mass termination blocks" with flat-ribbon cable connection.

### 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, IEC60127-2/3 per channel

### FLKM 16/DI/SI/LA/DV
– 1:1 connection
– Fuse 5 x 20, 50 mA T, IEC60127-2/3 per channel
– LED status indicator per signal path



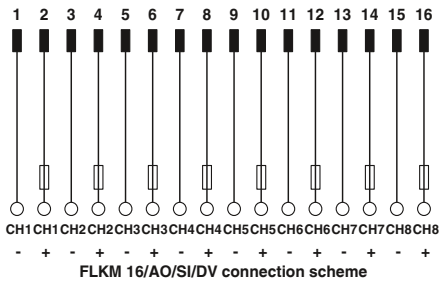

**Interface module for 8 channels**

### Technical data

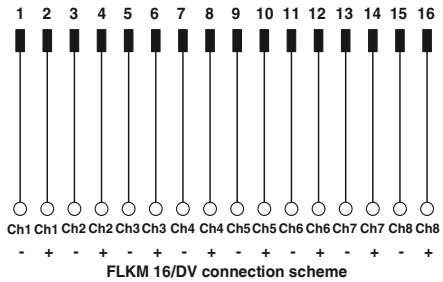
| | | FLKM 16/.../DV | FLKM 16/.../SI/.../DV |
|---|---|---|---|
| Max. perm. operating voltage | | < 50 V AC / 60 V DC | < 50 V AC / 60 V DC |
| Max. perm. current (per branch) | | 1 A (per signal path) | 50 mA (in delivered state, with one 50 mA fuse, max. 1 A permitted) |
| Ambient temperature (operation) | | -20 °C ... 50 °C | -20 °C ... 50 °C |
| Mounting position | | any | any |
| Standards/regulations | | DIN EN 50178, IEC 60664, IEC 62103 | |
| Connection method | Field level | Screw connection | Screw connection |
| | Controller level | IDC/FLK pin strip (2.54 mm) | IDC/FLK pin strip (2.54 mm) |
| 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

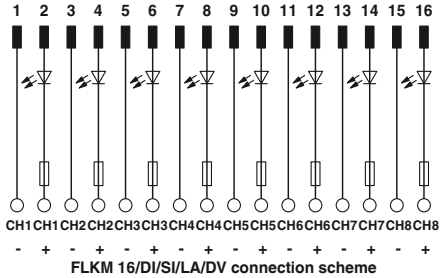
| Description | No. of pos. | Module width W | Type | Order No. | Pcs. / Pkt. |
|---|---|---|---|---|---|
| **Interface module,** with 1:1 connection | 16 | 45 mm | **FLKM 16/DV** | **2304432** | 1 |
| **Interface module,** with 1:1 connection and separate potential terminal blocks per channel | 16 | 57 mm | **FLKM 16/AI/DV** | **2304429** | 1 |
| **Interface module**, with fuses per channel | 16 | 90 mm | **FLKM 16/AO/SI/DV** | **2304445** | 1 |
| **Transfer module**, with LED and fuses per channel, max. permitted operating voltage 30 V DC | 16 | 90 mm | **FLKM 16/DI/SI/LA/DV** | **2304458** | 1 |



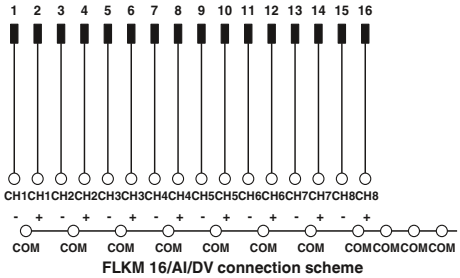

**FLKM 16/AO/SI/DV connection scheme**




**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

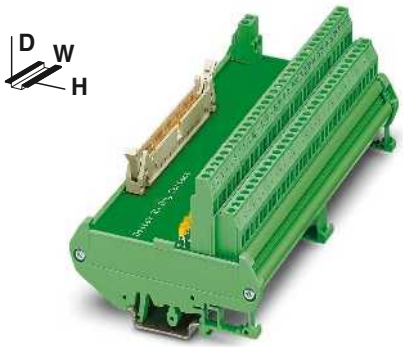
These system-specific interface modules for DeltaV modules are used in combination with the FLK 50/2FLK20/EZ-DR/.../DV system cables. The controller board is connected to 32-channel modules through 40-pos. “mass termination blocks” with flat-ribbon cable connection.

### FLKM 50/32M/DV

- Can be used for 32-channel input and output cards
- Two-conductor 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-conductor connection with a separate negative terminal per channel (Dry Contact)




**Interface module with two-conductor connection technology for DeltaV**

**Technical data**

| | | FLKM 50/32M/DV | FLKM 50/32M/IN/LA/DV |
|---|---|---|---|
| Max. perm. operating voltage | | < 50 V AC / 60 V DC | 30 V 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, IEC 60664, IEC 62103 | |
| Connection method | Field level | Screw connection | Screw connection |
| | Controller level | IDC/FLK pin strip (2.54 mm) | IDC/FLK pin strip (2.54 mm) |
| 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**

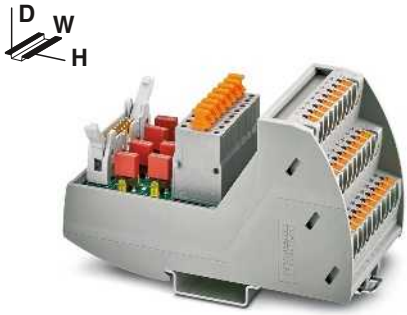
| Description | No. of pos. | Module width W | Type | Order No. | Pcs. / Pkt. |
|---|---|---|---|---|---|
| **VARIOFACE interface modules**, for 32-channel I/O modules: | | | | | |
| - Input/output | 50 | 169 mm | **FLKM 50/32M/DV** | **2304869** | 1 |
| - Input with LED per signal | 50 | 169 mm | **FLKM 50/32M/IN/LA/DV** | **2304856** | 1 |

## Emerson DeltaV VIP controller board with fuses for 8 channels

System-specific interface module for use in combination with the respective system cables. The controller board is connected to 8-channel modules through 16-position “mass termination blocks” with flat ribbon cable connection.

Features:

- Fuse per channel
- Separate equipotential terminals per channel
- Knife disconnection for each channel
- Push-in connection




**Interface module with fuses for 16-pos. mass terminal block**

**Technical data**

| | | |
|---|---|---|
| Max. perm. operating voltage | | 24 V DC |
| Max. perm. current (per branch) | | 63 mA (in as supplied state, with one 63 mA fuse) |
| Ambient temperature (operation) | | -20 °C ... 60 °C |
| Mounting position | | any |
| Standards/regulations | | DIN EN 50178 |
| Connection method | Field level | Push-in connection |
| | Controller level | IDC/FLK pin strip (2.54 mm) |
| Connection data solid / stranded / AWG | | 0.14 ... 2.5 mm² / 0.14 ... 2.5 mm² / 26 - 14 |
| Dimensions | H / D | 109.8 mm / 63 mm |

**Ordering data**

| Description | No. of pos. | Module width W | Type | Order No. | Pcs. / Pkt. |
|---|---|---|---|---|---|
| **Interface module** for 16-pos. mass termination block | | | | | |
| | 16 | 57.1 mm | **VIP-PT/FLK16/DS/FU/LED/AN/DV** | **2903599** | 1 |

## Emerson DeltaV Controller boards with fuses for 8 channels

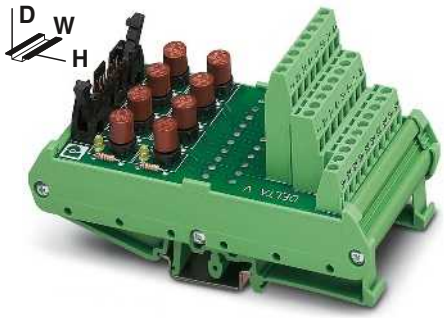
These system-specific interface modules for DeltaV modules are used in combination with the respective system cables. The controller board is connected to 8-channel modules through 16-pos. or 24-pos. "mass termination blocks" with flat-ribbon cable connection.

### 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



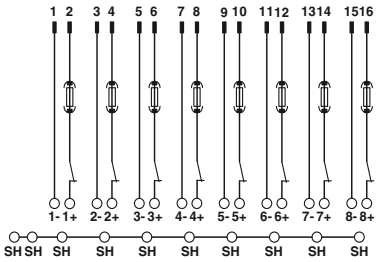

**Interface module with fuses for 16-pos. and 24-pos. "mass termination blocks"**

### Technical data

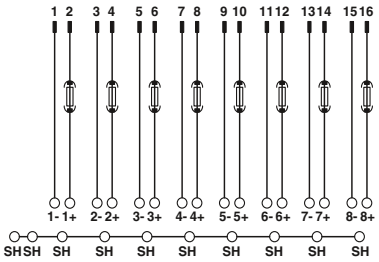
| | | |
|---|---|---|
| Max. perm. operating voltage | | 24 V DC |
| Max. perm. current (per branch) | | 50 mA (in as-supplied state, with one 50 mAF fuse, max. 1 A permitted) |
| Ambient temperature (operation) | | -20 °C ... 50 °C |
| Mounting position | | any |
| Standards/regulations | | IEC 60664, DIN EN 50178, IEC 62103 |
| Connection method | Field level | Screw connection |
| | Controller level | IDC/FLK pin strip (2.54 mm) |
| 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

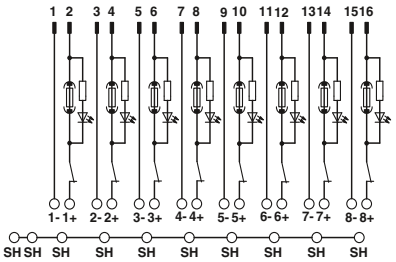
| Description | No. of pos. | Module width W | Type | Order No. | Pcs. / Pkt. |
|---|---|---|---|---|---|
| **Interface modules** for 16-pos. and 24-pos. "mass termination blocks" with: | | | | | |
| - Fuses | 16 | 61 mm | **UM-DELTA V/D/SI** | **5603255** | 1 |
| - Fuses and knife disconnect terminal blocks | 16 | 61 mm | **UM-DELTAV/D/SI/BFI/TP** | **5603257** | 1 |
| - Fuses and fuse failure display | 16 | 61 mm | **UM-DELTAV/A/SI** | **5603256** | 1 |
| - Fuses, fuse failure display and knife disconnect terminal blocks | 16 | 61 mm | **UM-DELTAV/A/SI/BFI/TP** | **5603258** | 1 |



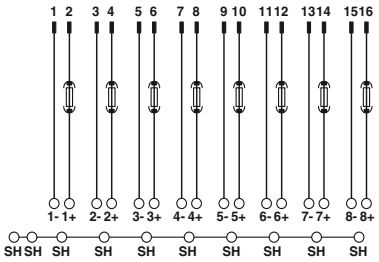
**Connection scheme UM-DELTAV/A/SI**



**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-position system cable
- Can be plugged onto I/O modules
- Connection via suitable VARIOFACE termination boards

### Web code for the online configurator

**Your web code: #0007**

**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)<br>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 | DIN EN 50178 / IEC 60664 / IEC 62103 |

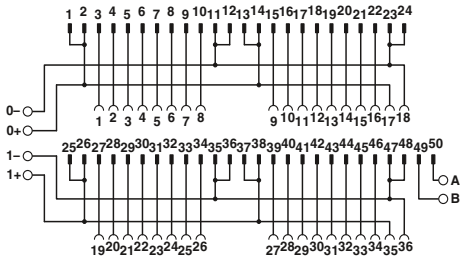
### Ordering data

| Description | No. of pos. | 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 |

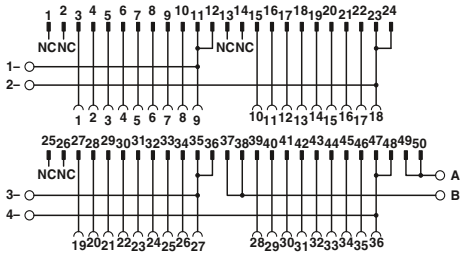
**Front adapter for I/O modules of RX3i series**

| **Card type** | **FLKM 50-PA/GE/TKFC/RXI** |
|---|---|
| **Digital output** | IC 694 MDL 754 |

| **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**

**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-pos. system cables.

Tailor-made VARIOFACE termination boards with a variety of functions and connection options round off this system concept.

### Web code for the online configurator

**Your web code: #0007**

**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)<br>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 |

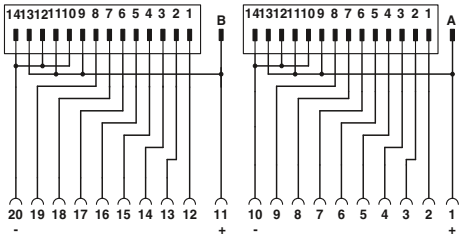
### Ordering data

| Description | No. of pos. | Type | Order No. | Pcs. / Pkt. |
|---|---|---|---|---|
| **VARIOFACE front adapter**, for Series 90-30, max. 2 x 8 channels can be connected, digital output | 14 | **FLKM 14-PA/GE/DO** | **2290009** | 2 |
| **VARIOFACE front adapter**, for Series 90-30, max. 2 x 8 channels can be connected, digital input | 14 | **FLKM 14-PA/GE/DI** | **2290038** | 5 |

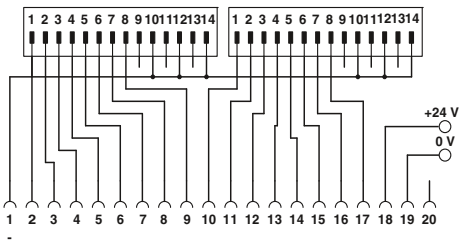
**Front adapter for Series 90-30 I/O modules**

| Card type | FLKM 14-PA/GE/DO |
|---|---|
| **Digital output** | IC 693 MDL 732<br>IC 693 MDL 733*<br>IC 693 MDL 740<br>IC 693 MDL 741*<br>IC 693 MDL 742 |
| **Analog** | IC 693 ALG 220*<br>IC 693 ALG 221*<br>IC 693 ALG 222*<br>IC 693 ALG 223*<br>IC 693 ALG 390*<br>IC 693 ALG 391*<br>IC 693 ALG 392*<br>IC 693 ALG 442* |

| Card type | FLKM 14-PA/GE/DI |
|---|---|
| **Digital input** | IC 693 MDL 241<br>IC 693 MDL 634<br>IC 693 MDL 645<br>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 jumpers (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

## Honeywell C300, Series CI/O Front adapters

The front adapters mean that pre-assembled system cables can be directly connected to I/O modules.

### FLKM-PA-D37/HW/DIO/C300
- Front adapter with D-SUB connector
- Connection of a maximum of 16 digital channels
- Specifically for digital I/O cards

### FLKM-PA-D37/HW/AN/C300
- Front adapter with D-SUB connector
- Connection of analog modules

### FLKM-PA-2D15/HW/.../C300
- Front adapter with two 15-pos. D-SUB connectors
- Connection of a maximum of 2 x 8 digital inputs/outputs per adapter
- Specifically for connecting PLC-V8/D15.../OUT or PLC-V8/D15.../IN

### Web code for the online configurator

**Your web code: #0007**

**Notes:**

Matching system cable fitted with D-SUB socket strip at both ends, see page 611

**Honeywell C300 front adapter**

### Technical data

| | |
|---|---|
| Max. perm. operating voltage | 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 pos. | Type | Order No. | Pcs. / Pkt. |
|---|---|---|---|---|
| **VARIOFACE front adapter** for Series CI/O, with one D-SUB pin strip | | | | |
| - For digital I/O modules | 37 | **FLKM-PA-D37/HW/DIO/C300** | **2901423** | 1 |
| - For analog I/O modules | 37 | **FLKM-PA-D37/HW/AN/C300** | **2900622** | 1 |
| **VARIOFACE front adapter** for Series CI/O, with two D-SUB pin strips | | | | |
| - For digital output modules | 15 | **FLKM-PA-2D15/HW/DO/C300** | **2900924** | 1 |
| - For digital input modules | 15 | **FLKM-PA-2D15/HW/DI/C300** | **2901879** | 1 |

**Front adapter for I/O modules of Series C300, Series CI/O**

| Card type | FLKM-PA-D37/HW/DIO/C300 |
|---|---|
| **Digital input** | TDIL 11*<br>TDIL 01* |
| **Digital output** | TDOB 11*<br>TDOB 01* |

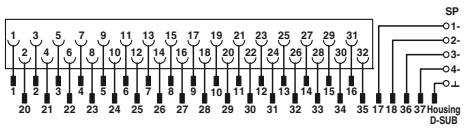
| Card type | FLKM-PA-D37/HW/AN/C300 |
|---|---|
| **Analog input** | TAIX 01**<br>TAIX 11** |
| **Analog output** | TAOX 01**<br>TAOX 11** |

| Card type | FLKM-PA-2D15/HW/DO/C300 |
|---|---|
| **Digital output** | TDOB 01*<br>TDOB 11* |

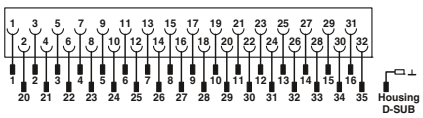
| Card type | FLKM-PA-2D15/HW/DI/C300 |
|---|---|
| **Digital input** | TDIL 01*<br>TDIL 11* |

* Two front adapters are required for each module.

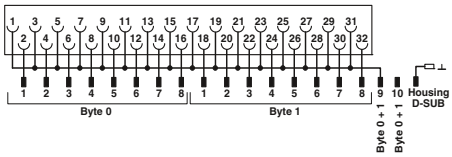
** For three-conductor operation (channels 13 - 16) of input modules: only in conjunction with VIP-3/SC/D37SUB/M/HW/C300, Order No. 2900675.



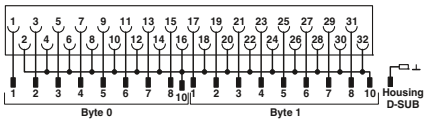

**Connection scheme: FLKM-PA-D37/HW/AN/C300**




**Connection scheme: FLKM-PA-D37/HW/DIO/C300**




**FLKM-PA-2D15/HW/DI/C300 connection scheme**




**Connection scheme: FLKM-PA-2D15/HW/DO/C300**

**Explanation:**
- Connector
- Connection to I/O card
- Screw terminal blocks for separate supply

## Honeywell C300, Series CI/O Interface modules

These VARIOFACE modules are used in combination with 37-pos. D-SUB cables and the relevant front adapters. The three module versions are available with screw or push-in connection technology.

### VIP-2/.../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/.../D37SUB/M/SO

- In conjunction with FLKM-PA-D37/HW/C300 front adapter
- System-specific marking
- Field connection via double-level terminal blocks

### VIP-3/.../D37SUB/M/HW/C300

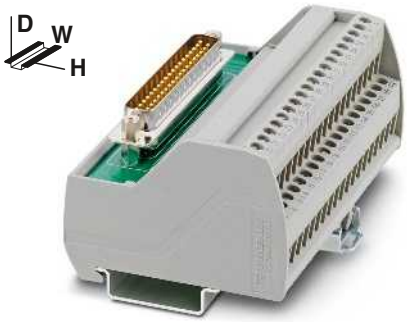
- In conjunction with FLKM-PA-D37/HW/AN/C300 front adapter
- System-specific marking
- For TAIX01, TAIX11 analog input modules
- Field connection via three-level terminal blocks

### Web code for the online configurator

**Your web code: #0007**

**Notes:**

For marking systems (e.g., "ZB 22:UNBEDRUCKT"; Order No. 0811862) and mounting material, see Catalog 5.



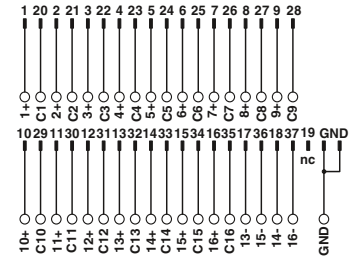

**37-pos. with screw or push-in connection**

### Technical data

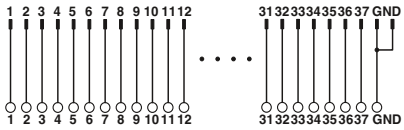
| | | |
|---|---|---|
| | VIP-2/... | VIP-3/...C300 |
| Max. perm. operating voltage | 125 V AC/DC | 125 V AC/DC |
| Max. perm. current (per branch) | 2 A | 2 A |
| Ambient temperature (operation) | -20 °C ... 50 °C | -20 °C ... 50 °C |
| Mounting position | any | any |
| Standards/regulations | DIN EN 50178 | |
| Connection method | D-SUB pin strip | D-SUB pin strip |
| Dimensions | 72.1 mm / 46.6 mm | 75.8 mm / 63 mm |
| Screw connection solid / stranded / AWG | 0.2 ... 4 mm² / 0.2 ... 2.5 mm² / 24 - 12 | |
| Push-in connection solid / stranded / AWG | 0.14 ... 4 mm² / 0.14 ... 2.5 mm² / 26 - 14 | |
| D-SUB connection | H / D | |

### Ordering data

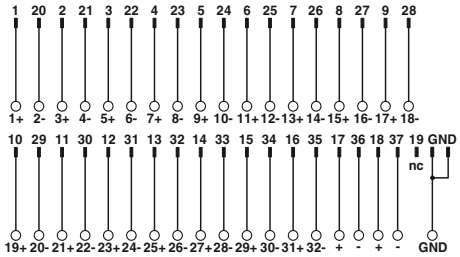
| Description | No. of pos. | Module width W | Type | Order No. | Pcs. / Pkt. |
|---|---|---|---|---|---|
| **VARIOFACE front module**, with D-SUB pin strip and universal marking, | | | | | |
| - with screw connection | 37 | 101 mm | **VIP-2/SC/D37SUB/M** | **2900676** | 1 |
| - with push-in connection | 37 | 102.8 mm | **VIP-2/PT/D37SUB/M** | **2904277** | 1 |
| **VARIOFACE front module**, with D-SUB pin strip and system specific marking, | | | | | |
| - with screw connection | 37 | 101 mm | **VIP-2/SC/D37SUB/M/SO** | **2900786** | 1 |
| - with push-in connection | 37 | 102.8 mm | **VIP-2/PT/D37SUB/M/SO** | **2904278** | 1 |
| **VARIOFACE front module**, with D-SUB pin strip for analog input modules, | | | | | |
| - with screw connection | 37 | 88 mm | **VIP-3/SC/D37SUB/M/HW/C300** | **2900675** | 1 |
| - with push-in connection | 37 | 87.6 mm | **VIP-3/PT/D37SUB/M/HW/C300** | **2904276** | 1 |




**Connection scheme VIP-3/SC/D37SUB/M/HW/C300**




**Connection scheme VIP-2/SC/D37SUB/M**




**Connection scheme VIP-2/SC/D37SUB/M/SO**

## Mitsubishi Electric MELSEC A, A1S, and Q System cable

For 32/64-channel I/O cards with 37-pos. D-SUB connectors. System cables are available for connecting 1 x 32 channels or 4 x 8 channels.

### Web code for the online configurator

**Your web code: #0007**

**System cable, D-SUB socket strip on FLK, number of positions: 37 on 50**

**Splitting cable, D-SUB socket strip on FLK, number of positions: 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 capacity 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-position | 10.5 mm | 6.3 mm |

| Description | No. of pos. | Cable length | Ordering data: Type | Order No. | Pcs. / Pkt. | Ordering data: Type | Order No. | Pcs. / Pkt. |
|---|---|---|---|---|---|---|---|---|
| **Round cable for output module** 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**, as above, 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 for input module** MELSEC Q X81, MELSEC A1S X81, and MELSEC A AX82, 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**, as above, 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

## Mitsubishi Electric
## MELSEC L/Q and Honeywell ML 200
## System cables

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

### Web code for the online configurator

**Your web code: #0007**

**Fujitsu FCN connector on flat-ribbon cable, number of positions: 40 on 50**

**Fujitsu FCN connector on flat-ribbon cable, number of positions: 40 on 4 x 14**

EAC

EAC

| | Technical data | Technical data |
|---|---|---|
| Max. perm. operating voltage | < 50 V AC / 60 V DC | < 50 V AC / 60 V DC |
| Max. perm. current carrying capacity 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 |

| Description | No. of pos. | Cable length | Ordering data: Type | Order No. | Pcs. / Pkt. | Ordering data: Type | Order No. | Pcs. / Pkt. |
|---|---|---|---|---|---|---|---|---|
| **Round cable** in variable lengths for<br>**Mitsubishi Melsec L**<br>LX41C4, LX42C4 (common positive connection to B01, B02)<br>LY41NT1P, LY42NT1P, LY41PT1P, LY42PT1P<br>**Mitsubishi Melsec Q**<br>QX41, QX41-S1, QX42, QX42-S1<br>QX71 and QX72 (common positive connection to B01, B02)<br>QY41P, QY42P, QY71, QH42P<br>**Honeywell ML 200**<br>2MLQ-TR4A, 2MLQ-TR8A, 2MLQ-TR4B, 2MLQ-TR8B | | | | | | | | |
| | 40 | 0.5 m | **CABLE-FCN40/1X50/ 0,5M/IM/MEL** | **2903468** | 1 | | | |
| | 40 | 1 m | **CABLE-FCN40/1X50/ 1,0M/IM/MEL** | **2903469** | 1 | | | |
| | 40 | 2 m | **CABLE-FCN40/1X50/ 2,0M/IM/MEL** | **2903470** | 1 | | | |
| | 40 | 3 m | **CABLE-FCN40/1X50/ 3,0M/IM/MEL** | **2903471** | 1 | | | |
| | 40 | 4 m | **CABLE-FCN40/1X50/ 4,0M/IM/MEL** | **2903472** | 1 | | | |
| | 40 | 6 m | **CABLE-FCN40/1X50/ 6,0M/IM/MEL** | **2903473** | 1 | | | |
| | 40 | 8 m | **CABLE-FCN40/1X50/ 8,0M/IM/MEL** | **2903474** | 1 | | | |
| | 40 | 10 m | **CABLE-FCN40/1X50/10,0M/IM/MEL** | **2903475** | 1 | | | |
| **Round cable** in variable lengths for<br>**Mitsubishi Melsec L**<br>LX41C4 and LX42C4 (common negative connection to B01, B02)<br>**Mitsubishi Melsec Q**<br>QX71 and QX72 (common negative connection to B01, B02)<br>QX82, QX82-S1<br>**Honeywell ML 200**<br>2MLI-D24A, 2MLI-D28B, 2MLF-SOEA<br>(common negative connection to B01, B02) | | | | | | | | |
| | 40 | 0.5 m | **CABLE-FCN40/1X50/ 0,5M/IP/MEL** | **2903476** | 1 | | | |
| | 40 | 1 m | **CABLE-FCN40/1X50/ 1,0M/IP/MEL** | **2903477** | 1 | | | |
| | 40 | 2 m | **CABLE-FCN40/1X50/ 2,0M/IP/MEL** | **2903478** | 1 | | | |
| | 40 | 3 m | **CABLE-FCN40/1X50/ 3,0M/IP/MEL** | **2903479** | 1 | | | |
| | 40 | 4 m | **CABLE-FCN40/1X50/ 4,0M/IP/MEL** | **2903480** | 1 | | | |
| | 40 | 6 m | **CABLE-FCN40/1X50/ 6,0M/IP/MEL** | **2903481** | 1 | | | |
| | 40 | 8 m | **CABLE-FCN40/1X50/ 8,0M/IP/MEL** | **2903482** | 1 | | | |
| | 40 | 10 m | **CABLE-FCN40/1X50/10,0M/IP/MEL** | **2903483** | 1 | | | |
| **Round cable** in variable lengths for<br>**Mitsubishi Melsec L**<br>LX41C4 and LX42C4 (common positive connection to B01, B02)<br>LY41NT1P, LY42NT1P, LY41PT1P, LY42PT1P<br>**Mitsubishi Melsec Q**<br>QX41, QX41-S1, QX42, QX42-S1<br>QY41P (24 V), QY42P (24 V), QH42P (24 V)<br>**Honeywell ML 200**<br>2MLQ-TR4A, 2MLQ-TR8A, 2MLQ-TR4B, 2MLQ-TR8B | | | | | | | | |
| | 40 | 0.5 m | | | | **CABLE-FCN40/4X14/ 0,5M/IM/MEL** | **2903502** | 1 |
| | 40 | 1 m | | | | **CABLE-FCN40/4X14/ 1,0M/IM/MEL** | **2903503** | 1 |
| | 40 | 2 m | | | | **CABLE-FCN40/4X14/ 2,0M/IM/MEL** | **2903504** | 1 |
| | 40 | 3 m | | | | **CABLE-FCN40/4X14/ 3,0M/IM/MEL** | **2903505** | 1 |
| | 40 | 4 m | | | | **CABLE-FCN40/4X14/ 4,0M/IM/MEL** | **2903506** | 1 |
| | 40 | 6 m | | | | **CABLE-FCN40/4X14/ 6,0M/IM/MEL** | **2903507** | 1 |
| | 40 | 8 m | | | | **CABLE-FCN40/4X14/ 8,0M/IM/MEL** | **2903508** | 1 |
| | 40 | 10 m | | | | **CABLE-FCN40/4X14/10,0M/IM/MEL** | **2903509** | 1 |

## 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

**Fujitsu FCN connector on flat-ribbon cable, number of positions: 40 on 50**

**Fujitsu FCN connector on flat-ribbon cable, number of positions: 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 capacity 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 |

| Description | No. of pos. | 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,** as above, 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,** as above, 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,** as above, 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,** as above, 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

## Phoenix Contact Axioline realtime I/O System cables

These cables have been specifically developed for connecting VARIOFACE termination boards to the Axioline realtime I/O system. The push-in technology on the I/O system ensures rapid connection.

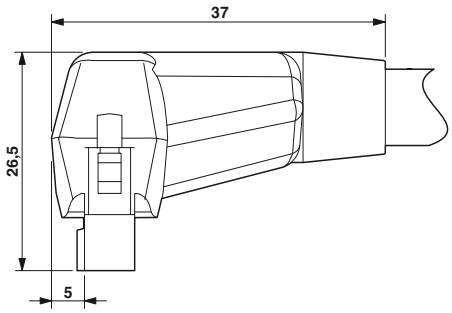
The cables have the following features:

– 1:1 connection
– 14-pos. connector, molded
– 8 pre-assembled open ends, for connection to the Axioline realtime I/O system
– Transmission of groups of 8 channels
– Marking field on connector

Tailor-made VARIOFACE termination boards round off this system concept.

**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



System cable for 8 channels

### Technical data

| | | |
|---|---|---|
| Max. perm. operating voltage | | < 50 V AC / 60 V DC |
| Max. perm. current carrying capacity 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 - / 0.14 mm² |
| Conductor structure: stranded wires / material | | 7 / Cu tin-plated |
| Outside diameter | 14-position | 6.4 mm |

### Ordering data

| Description | No. of pos. | 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

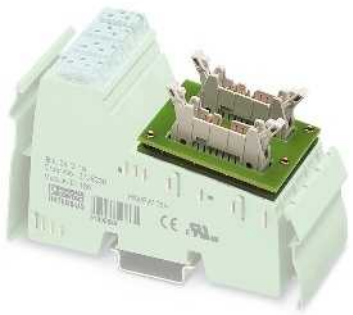
The front adapters are used to connect pre-assembled system cables directly to Inline. Front adapters are simply plugged into the relevant Inline modules. Three connection options are available:

– Transfer of 8 channels via a 14-pos. system cable
– Transmission of 2 x 8 channels over two 14-position system cables
– Transmission of 4 x 8 channels over four 14-position system cables

Tailor-made VARIOFACE termination boards round off this system concept.

### Web code for the online configurator

**Your web code: #0007**



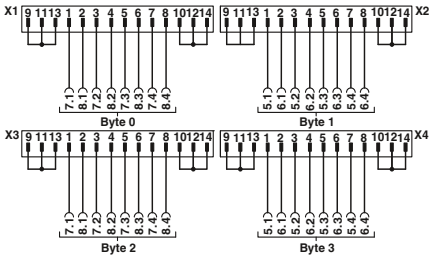
**Front adapter for Inline**

### Technical data

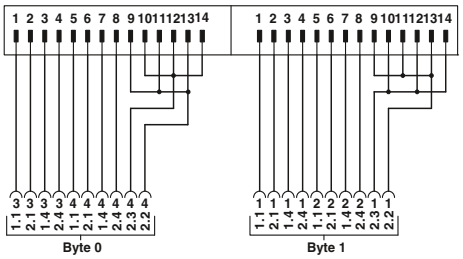
| | |
|---|---|
| Max. perm. operating voltage | 60 V DC |
| Max. permissible current | 1 A (per path) |
| Ambient temperature (operation) | -20 °C ... 50 °C |
| Ambient temperature (storage/transport) | -20 °C ... 70 °C |
| Mounting position | any |
| Standards/regulations | IEC 60664 / DIN EN 50178 / IEC 62103 |

### Ordering data

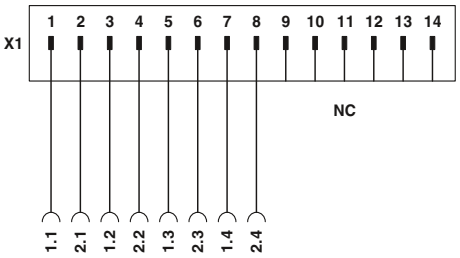
| Description | No. of pos. | Type | Order No. | Pcs. / Pkt. |
|---|---|---|---|---|
| **VARIOFACE front adapter,** for 8-channel Inline modules | | | | |
| Input: IB IL 24 D I8/HD-PAC<br>Output: IB IL 24 DO 8/HD-PAC | | **FLKM 14-PA-INLINE/DIO8** | **2900889** | 1 |
| **VARIOFACE front adapter**, for 16-channel Inline modules | | | | |
| Input: IB IL 24 DI 16-PAC | | **FLKM 14-PA-INLINE/IN16** | **2302751** | 1 |
| Output: IB IL 24 DO 16-PAC | | **FLKM 14-PA-INLINE/OUT16** | **2302764** | 1 |
| **VARIOFACE front adapter**, for 32-channel Inline modules | | | | |
| Input: IB IL 24 DI 32/HD-PAC and IB IL 24 DI 32/HD-NPN-PAC<br>Output: IB IL 24 DO 32/HD-PAC | | **FLKM 14-PA-INLINE/32** | **2302777** | 1 |



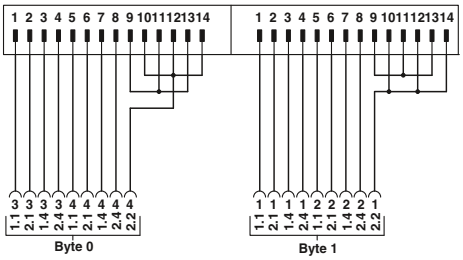

**Connection scheme: FLKM 14-PA-INLINE/32**




**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 adapters

The front adapters mean that pre-assembled system cables can be directly connected to I/O modules. There are two connection options available:

– Transfer of max. 32 channels over one 50-position system cable
– Transmission of 4 x 8 channels over four 14-position system cables

Tailor-made VARIOFACE termination boards with a variety of functions and connection options round off this system concept.

**Front adapter for MODICON TSX Quantum**

### Web code for the online configurator

**Your web code: #0007**

### Technical data

| | |
|---|---|
| Max. perm. operating voltage | < 50 V AC / 60 V DC |
| Max. permissible current | 1 A (per path)<br>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 pos. | 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 |

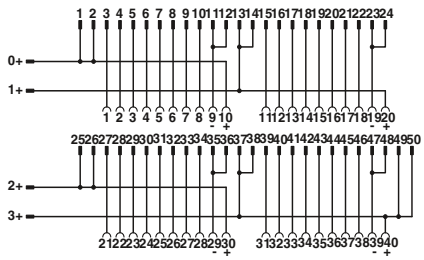
**Front adapter for I/O modules of MODICON® TSX Quantum automation devices**

| Card type | FLKM 50-PA-MODI-TSX/Q |
|---|---|
| **Digital input** | DDI 353<br>DDI 841*<br>DDI 853<br>DAI 340*<br>DAI 353**<br>DAI 440*<br>DAI 453** |
| **Digital output** | DDO 353 |
| **Digital input/output** | DDM 390* |
| **Analog input** | ACI 030*<br>ACI 040*<br>ATI 030*<br>ARI 030*<br>AVI 030* |
| **Analog output** | ACO 020*<br>ACO 130*<br>AVO 020* |
| **Analog input/output** | AMM 090* |
| **Counter** | ECH 105*<br>EHC 202* |

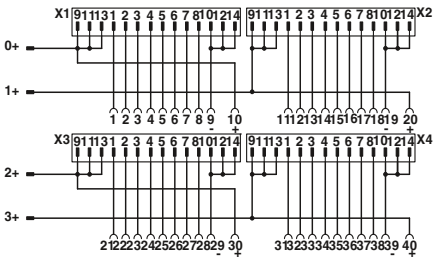
* Only in conjunction with VIP-2/SC/FLK50/MODI-TSX/Q, Order No. 2322304.
** Only in conjunction with Passive interface modules without LED.

| Card type | FLKM 50/4-FLK14/PA-MODI- |
|---|---|
| **Digital input** | DDI 353<br>DDI 853<br>DAI 353**<br>DAI 453** |
| **Digital output** | DDO 353 |

** Only in conjunction with Passive interface modules 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 Front adapter

Pre-assembled system cables are connected directly to the 16-channel I/O modules using the front adapter.
The adapters connect 2 x 8 channels of the controller via two 14-pos. system cables. Tailor-made VARIOFACE termination boards with a variety of functions and connection options are available for connection to field level and round off this system concept.

### Web code for the online configurator

**Your web code: #0007**

### Technical data

| | |
|---|---|
| Max. perm. operating voltage | < 50 V AC / 60 V DC |
| Max. permissible current | 1 A (per path) |
| Max. perm. total current | 3 A (per system cable when supplying from the module side)<br>10 A (when supplying via the front adapter) |
| Ambient temperature (operation) | -20 °C ... 60 °C |
| Ambient temperature (storage/transport) | -20 °C ... 60 °C |
| Mounting position | any |
| Standards/regulations | IEC 60664 / DIN EN 50178 / IEC 62103 |

### Ordering data

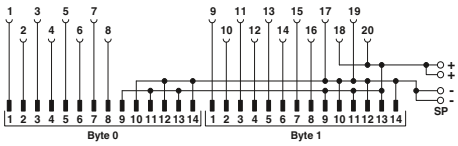
| Description | No. of pos. | Type | Order No. | Pcs. / Pkt. |
|---|---|---|---|---|
| **VARIOFACE front adapter**, for MODICON® M340 with two FLK pin strips | 14 | **FLKM 14-PA-MODI/M340** | **2903208** | 1 |

**Front adapter for MODICON C340 series I/O modules**

| Card type | FLKM 14-PA-MODI/M340 |
|---|---|
| **Digital input** | BMX DDI1602<br>BMX DDI1603<br>BMX DAI1602<br>BMX DAI1603 |
| **Digital output** | BMX DDO1602<br>BMX DDO1612 |

**Assignment table**

| Contacts of front adapter/ controller | Connector (Byte 0) | Connector (Byte 1) |
|---|---|---|
| 1 | 1 | |
| 2 | 2 | |
| 3 | 3 | |
| 4 | 4 | |
| 5 | 5 | |
| 6 | 6 | |
| 7 | 7 | |
| 8 | 8 | |
| 9 | | 1 |
| 10 | | 2 |
| 11 | | 3 |
| 12 | | 4 |
| 13 | | 5 |
| 14 | | 6 |
| 15 | | 7 |
| 16 | | 8 |
| 17 | 10, 12, 14 (-) | 10, 12, 14 (-) |
| 18 | 9, 11, 13 (+) | 9, 11, 13 (+) |
| 19 | 10, 12, 14 (-) | 10, 12, 14 (-) |
| 20 | 9, 11, 13 (+) | 9, 11, 13 (+) |




**Connection scheme FLKM 14-PA-MODI/M340**

## 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

**Web code for the online configurator**

**Your web code: #0007**

**Fujitsu FCN connector on flat-ribbon cable, number of positions: 40 on 50**

**Fujitsu FCN connector on flat-ribbon cable, number of positions: 40 on 4 x 14**

EAC

EAC

| Technical data | | Technical data | |
|---|---|---|---|
| Max. perm. operating voltage | < 50 V AC / 60 V DC | < 50 V AC / 60 V DC | |
| Max. perm. current carrying capacity 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 | |

| Description | No. of pos. | 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 |
| | 40 | 15 m | **CABLE-FCN40/1X50/15,0M/M340** | **2903748** | 1 | **CABLE-FCN40/4X14/15,0M/M340** | **2903749** | 1 |

## VIP - power cabling
## Universal front adapters for SIMATIC® S7-300

**Four connection options are available:**

- Connection of 40-pos. modules via four cables, each with a 10-pos. COMBI connector
- Connection of 20-pos. modules via two cables, each with a 10-pos. COMBI connector
- Connection of 40-pos. modules via 40 individual wires in rope structure (not assembled)
- Connection of 20-pos. modules via 20 individual wires in rope structure (not assembled)

**The front adapters have the following features:**

- Can be screwed on/snapped in with the I/O module
- Suitable for all common S7-300 modules, up to max. 250 V AC/DC, 6 A
- Universal 1:1 connection
- Numerically marked wires/connectors

**Combination example:**

A front adapter with punched-on 10-pos. COMBI connectors can be combined with the following modular terminal blocks for field connection:

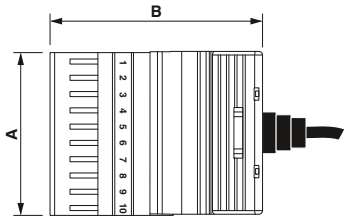
Overall width of 52 mm per connector:

- 3045017 UT 2,5/1P
- 3210033 PT 2,5/1P
- 3040012 ST 2,5/1P
- 3040766 ST 2,5-TWIN-MT/1P

Reduced overall width of 35 mm per connector:

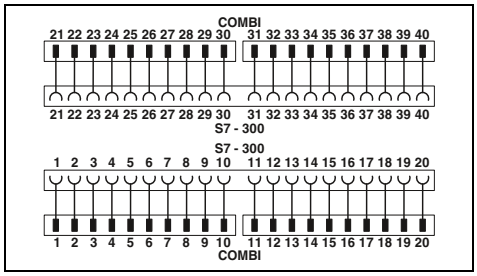
- 3208582 PT 1,5/S/1P
- 3212439 PTTB 1,5/S/2P

You can find further versions, accessories, and combination options in Catalog 3 "Terminal blocks" in the "Plug-in COMBI connection solutions" section or online at phoenixcontact.net/products.




| | A | B |
|---|---|---|
| ...4X10COMBI... | 52 | 70 |
| ...2X10COMBI... | | |
| ...4X10 PT... | 35 | 62 |
| ...2X10 PT... | | |

**Front adapter with punched-on connectors for 40 plug-in modular terminal blocks**




### Technical data

| | | |
|---|---|---|
| Max. perm. operating voltage | | ≤ 250 V AC/DC |
| Max. perm. current carrying capacity per path | | 6 A (per single wire at 40°C)<br>4 A (per single wire at 60°C) |
| Max. perm. total current | | 20 A (per cable at 40 °C)<br>16 A (per cable at 60°C) |
| Max. conductor resistance | | 39 Ω/km |
| Conductor cross section | | AWG 21 / 0.5 mm² |
| Conductor structure: stranded wires / material | | 16 / Cu uninsulated |
| Outside diameter | | 9 mm |
| Ambient temperature range | | -20 °C ... 60 °C |
| Standards/regulations | | DIN EN 50178, IEC 60664, IEC 62103 |
| Connection method | Front adapter | Can be plugged onto 40-pos. I/O modules |
| | System cable | COMBICON connectors |

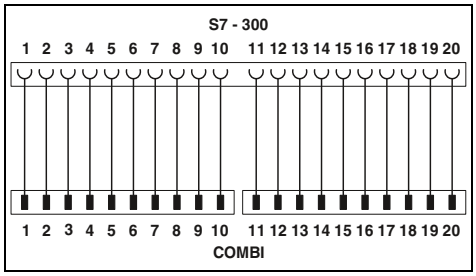
### Ordering data

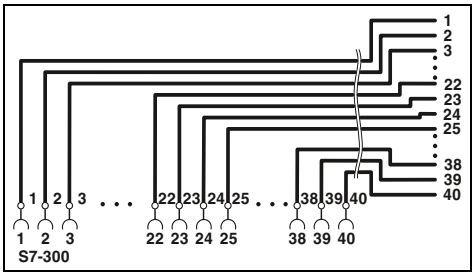
| Description | Cable length | Type | Order No. | Pcs. / Pkt. |
|---|---|---|---|---|
| **VIP - power adapter,** for universal connection of the SIMATIC S7-300, with an overall width of 52 mm per connector | | | | |
| | 0.5 m | **VIP-PA-PWR/4X10COMBI/ 0,5M/S7** | **2904702** | 1 |
| | 1 m | **VIP-PA-PWR/4X10COMBI/ 1,0M/S7** | **2904703** | 1 |
| | 1.5 m | **VIP-PA-PWR/4X10COMBI/ 1,5M/S7** | **2904704** | 1 |
| | 2 m | **VIP-PA-PWR/4X10COMBI/ 2,0M/S7** | **2904705** | 1 |
| | 2.5 m | **VIP-PA-PWR/4X10COMBI/ 2,5M/S7** | **2904706** | 1 |
| | 3 m | **VIP-PA-PWR/4X10COMBI/ 3,0M/S7** | **2904707** | 1 |
| | 4 m | **VIP-PA-PWR/4X10COMBI/ 4,0M/S7** | **2904708** | 1 |
| | 5 m | **VIP-PA-PWR/4X10COMBI/ 5,0M/S7** | **2904709** | 1 |
| | 6 m | **VIP-PA-PWR/4X10COMBI/ 6,0M/S7** | **2904710** | 1 |
| | 8 m | **VIP-PA-PWR/4X10COMBI/ 8,0M/S7** | **2904711** | 1 |
| | 10 m | **VIP-PA-PWR/4X10COMBI/10,0M/S7** | **2904712** | 1 |
| **VIP - power adapter,** for universal connection of the SIMATIC S7-300, with reduced overall width of 35 mm per connector | | | | |
| | 0.5 m | **VIP-PA-PWR/4X10 PT/ 0,5M/S7** | **2905516** | 1 |
| | 1 m | **VIP-PA-PWR/4X10 PT/ 1,0M/S7** | **2905517** | 1 |
| | 1.5 m | **VIP-PA-PWR/4X10 PT/ 1,5M/S7** | **2905518** | 1 |
| | 2 m | **VIP-PA-PWR/4X10 PT/ 2,0M/S7** | **2905519** | 1 |
| | 2.5 m | **VIP-PA-PWR/4X10 PT/ 2,5M/S7** | **2905520** | 1 |
| | 3 m | **VIP-PA-PWR/4X10 PT/ 3,0M/S7** | **2905521** | 1 |
| | 4 m | **VIP-PA-PWR/4X10 PT/ 4,0M/S7** | **2905522** | 1 |
| | 5 m | **VIP-PA-PWR/4X10 PT/ 5,0M/S7** | **2905523** | 1 |
| | 6 m | **VIP-PA-PWR/4X10 PT/ 6,0M/S7** | **2905524** | 1 |
| | 8 m | **VIP-PA-PWR/4X10 PT/ 8,0M/S7** | **2905525** | 1 |
| | 10 m | **VIP-PA-PWR/4X10 PT/10,0M/S7** | **2905526** | 1 |

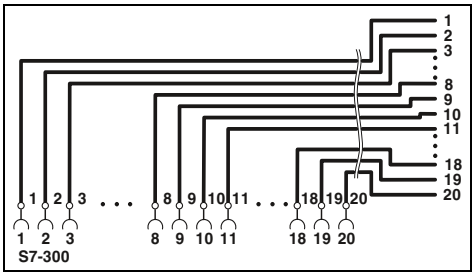
**Front adapter with punched-on connectors for 20 plug-in modular terminal blocks**

**Front adapter with 40 open cable ends**

**Front adapter with 20 open cable ends**




## Technical data

≤ 250 V AC/DC
6 A (per single wire at 40°C)
4 A (per single wire at 60°C)
20 A (per cable at 40 °C)
16 A (per cable at 60°C)
39 Ω/km
AWG 21 / 0.5 mm²
16 / Cu uninsulated
9 mm
-20 °C ... 60 °C
DIN EN 50178, IEC 60664, IEC 62103
Can be plugged onto 20-pos. I/O modules
COMBICON connectors

## Ordering data

| Type | Order No. | Pcs. / Pkt. |
|---|---|---|
| VIP-PA-PWR/2X10COMBI/ 0,5M/S7 | 2904713 | 1 |
| VIP-PA-PWR/2X10COMBI/ 1,0M/S7 | 2904714 | 1 |
| VIP-PA-PWR/2X10COMBI/ 1,5M/S7 | 2904715 | 1 |
| VIP-PA-PWR/2X10COMBI/ 2,0M/S7 | 2904716 | 1 |
| VIP-PA-PWR/2X10COMBI/ 2,5M/S7 | 2904717 | 1 |
| VIP-PA-PWR/2X10COMBI/ 3,0M/S7 | 2904718 | 1 |
| VIP-PA-PWR/2X10COMBI/ 4,0M/S7 | 2904719 | 1 |
| VIP-PA-PWR/2X10COMBI/ 5,0M/S7 | 2904720 | 1 |
| VIP-PA-PWR/2X10COMBI/ 6,0M/S7 | 2904721 | 1 |
| VIP-PA-PWR/2X10COMBI/ 8,0M/S7 | 2904722 | 1 |
| VIP-PA-PWR/2X10COMBI/10,0M/S7 | 2904723 | 1 |
| VIP-PA-PWR/2X10 PT/ 0,5M/S7 | 2905528 | 1 |
| VIP-PA-PWR/2X10 PT/ 1,0M/S7 | 2905529 | 1 |
| VIP-PA-PWR/2X10 PT/ 1,5M/S7 | 2905531 | 1 |
| VIP-PA-PWR/2X10 PT/ 2,0M/S7 | 2905532 | 1 |
| VIP-PA-PWR/2X10 PT/ 2,5M/S7 | 2905533 | 1 |
| VIP-PA-PWR/2X10 PT/ 3,0M/S7 | 2905534 | 1 |
| VIP-PA-PWR/2X10 PT/ 4,0M/S7 | 2905535 | 1 |
| VIP-PA-PWR/2X10 PT/ 5,0M/S7 | 2905536 | 1 |
| VIP-PA-PWR/2X10 PT/ 6,0M/S7 | 2905537 | 1 |
| VIP-PA-PWR/2X10 PT/ 8,0M/S7 | 2905538 | 1 |
| VIP-PA-PWR/2X10 PT/10,0M/S7 | 2905539 | 1 |

## Technical data

≤ 250 V AC/DC
6 A (per single wire at 40°C)
4 A (per single wire at 60°C)
20 A (per cable at 40 °C)
16 A (per cable at 60°C)
39 Ω/km
AWG 21 / 0.5 mm²
16 / Cu uninsulated
13 mm
-20 °C ... 60 °C
DIN EN 50178, IEC 60664, IEC 62103
Can be plugged onto 40-pos. I/O modules
Open cable end

## Ordering data

| Type | Order No. | Pcs. / Pkt. |
|---|---|---|
| VIP-PA-PWR/40XOE/ 1,0M/S7 | 2904731 | 1 |
| VIP-PA-PWR/40XOE/ 2,0M/S7 | 2904732 | 1 |
| VIP-PA-PWR/40XOE/ 3,0M/S7 | 2904733 | 1 |
| VIP-PA-PWR/40XOE/ 4,0M/S7 | 2904734 | 1 |
| VIP-PA-PWR/40XOE/ 6,0M/S7 | 2904735 | 1 |
| VIP-PA-PWR/40XOE/ 8,0M/S7 | 2904736 | 1 |
| VIP-PA-PWR/40XOE/10,0M/S7 | 2904737 | 1 |

## Technical data

≤ 250 V AC/DC
6 A (per single wire at 40°C)
4 A (per single wire at 60°C)
20 A (per cable at 40 °C)
16 A (per cable at 60°C)
39 Ω/km
AWG 21 / 0.5 mm²
16 / Cu uninsulated
9 mm
-20 °C ... 60 °C
DIN EN 50178, IEC 60664, IEC 62103
Can be plugged onto 20-pos. I/O modules
Open cable end

## Ordering data

| Type | Order No. | Pcs. / Pkt. |
|---|---|---|
| VIP-PA-PWR/20XOE/ 1,0M/S7 | 2904724 | 1 |
| VIP-PA-PWR/20XOE/ 2,0M/S7 | 2904725 | 1 |
| VIP-PA-PWR/20XOE/ 3,0M/S7 | 2904726 | 1 |
| VIP-PA-PWR/20XOE/ 4,0M/S7 | 2904727 | 1 |
| VIP-PA-PWR/20XOE/ 6,0M/S7 | 2904728 | 1 |
| VIP-PA-PWR/20XOE/ 8,0M/S7 | 2904729 | 1 |
| VIP-PA-PWR/20XOE/10,0M/S7 | 2904730 | 1 |

## VIP – VARIOFACE Professional front adapters for SIMATIC S7-300

### Three connection options are available:

– Transfer of max. 32 channels via two 50-pos. system cables (32-channel cards or this type)
– Transfer of 4 x 8 channels via two 14-pos. system cables (32-channel cards or this type)
– Transfer of 2 x 8 channels via two 14-pos. system cables (16-channel cards or this 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-pos. system cable (32-channel cards), 12.75 m in length:

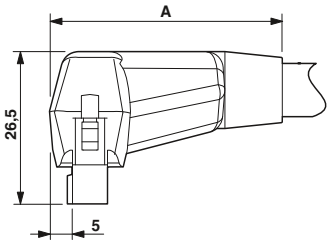
**1 pcs. 2900885/12,75**

### Web code for the online configurator

**Your web code: #0007**

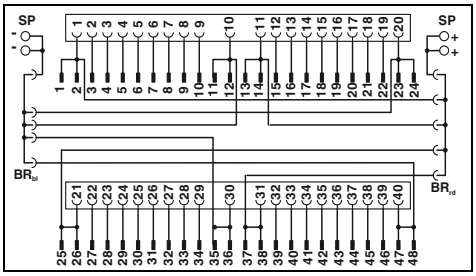
**Notes:**

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




| | A |
|---|---|
| ...FLK14... | 37 |
| ...FLK50... | 42 |

**Front adapter with system cable 1 x 32 channels can be connected**




### Technical data

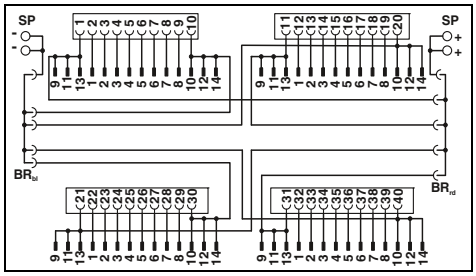
| | | |
|---|---|---|
| Max. perm. operating voltage | | < 50 V AC / 60 V DC |
| Max. perm. current carrying capacity per path | | 1 A (per path) |
| Max. perm. current (separate power supply) | | 8 A |
| Max. conductor resistance | | 0.16 Ω/m |
| Conductor cross section | | AWG 26 / 0.14 mm² |
| Conductor 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 connector in acc. with IEC 60603-13 |
| Connection data solid / stranded / AWG | | 0.2 ... 2.5 mm² / 0.2 ... 2.5 mm² / 24 - 14 |

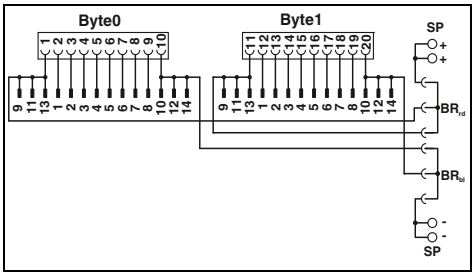
### Ordering data

| 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

0.16 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 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

0.16 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 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 adapters 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*<br>6ES7 331-7PF11-0AB0*<br>6ES7 331-7NF00-0AB0*<br>6ES7 331-7NF10-0AB0*<br>6ES7 331-1KF01-0AB0* |
| Analog output | 6ES7 332-5HF00-0AB0* |
| CPU | 312C, 313C, 314C, 313C-2PtP<br>313C-2DP, 314C-2DP |
| Other modules | 6ES7 350-2AH01-0AE0*<br>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<br>313C-2DP, 314C-2DP |

* Only in conjunction with
VIP-2/SC/FLK50 (1-40)/S7, Order No.:2315243,
VIP-2/PT/FLK50 (1-40)/S7, Order No.: 2903804,
FLKM 50/KDS3-MT/PPA/S7-300, Order No.: 2304490.
All bridges (BR) at the adapter must be removed!

**Front adapters for 16-channel cards of SIMATIC® S7-300**

| Card type | VIP-PA-FLK14/...M/S7 |
|---|---|
| Digital input | 6ES7 321-1BH02-0AA0<br>6ES7 321-1BH10-0AA0<br>6ES7 321-1BH50-0AA0*<br>6ES7 321-7BH01-0AB0* |
| Digital output | 6ES7 322-1BH01-0AA0<br>6ES7 322-1BH10-0AA0<br>6ES7 322-8BF00-0AB0* |
| Digital input/output | 6ES7 323-1BH01-0AA0 |
| Analog input | 6ES7 331-7KF02-0AB0*<br>6ES7 331-7HF01-0AB0*<br>6ES7 331-7KB02-0AB0*<br>6ES7 331-7TF01-0AB0* |
| Analog output | 6ES7 332-5HD01-0AB0*<br>6ES7 332-5HB01-0AB0*<br>6ES7 332-7ND02-0AB0* |
| Analog input/output | 6ES7 334-0CE01-0AA0*<br>6ES7 334-0KE00-0AB0*<br>6ES7 335-7HG01-0AB0* |
| Other modules | 6ES7 338-4BC01-0AB0*<br>6ES7 350-1AH03-0AE0*<br>6ES7 351-1AH01-0AE0*<br>6ES7 352-1AH02-0AE0*<br>6ES7 353-1AH01-0AE0*<br>6ES7 354-1AH01-0AE0*<br>6ES7 355-0VH10-0AE0*<br>6ES7 355-1VH10-0AE0* |

* Only in conjunction with
VIP-2/SC/2FLK14 (1-20)/S7, Order No.: 2315230
VIP-2/PT/2FLK14 (1-20)/S7, Order No.: 2903802
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
$BR_{bl}$: blue jumper
$BR_{rd}$: red jumper

## Siemens SIMATIC® S7-300 Front adapter

### I/O modules with 32 channels or with this design

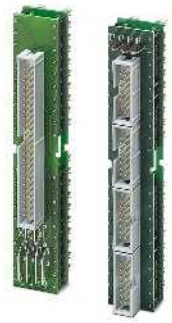
There are two connection options available:

– Transfer of max. 32 channels over one 50-position system cable
– Transmission of 4 x 8 channels over four 14-position system cables

Tailor-made VARIOFACE termination boards with a variety of functions and connection options round off this system concept.

### Web code for the online configurator

**Your web code: #0007**



**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)<br>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)<br>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 | IDC/FLK pin strip (2.54 mm) |

### Ordering data

| Description | No. of pos. | Type | Order No. | Pcs. / Pkt. |
|---|---|---|---|---|
| **VARIOFACE front adapter,** 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 adapters for 32-channel cards of SIMATIC® S7-300**

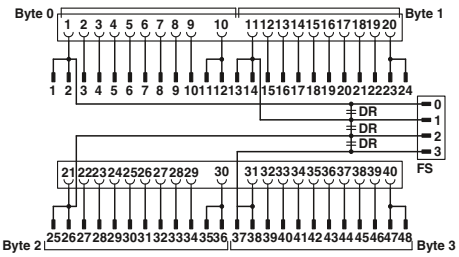
| Card type | FLKM 50-PA-S300 |
|---|---|
| **Digital input** | 6ES7 321-1BL00-0AA0 |
| **Digital output** | 6ES7 322-1BL00-0AA0 |
| **Digital input/output** | 6ES7 323-1BL00-0AA0 |
| **Analog input** | 6ES7 331-7PF01-0AB0*<br>6ES7 331-7PF11-0AB0*<br>6ES7 331-7NF00-0AB0*<br>6ES7 331-7NF10-0AB0*<br>6ES7 331-1KF01-0AB0* |
| **Analog output** | 6ES7 332-5HF00-0AB0* |
| **CPU** | 312C, 313C, 314C, 313C-2PtP<br>313C-2DP, 314C-2DP |
| **Other modules** | 6ES7 350-2AH01-0AE0*<br>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<br>313C-2DP, 314C-2DP |

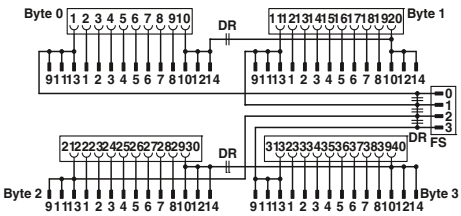
* Only in conjunction with
VIP-2/SC/FLK50(1-40)/S7, Order No.: 2315243,
VIP-2/PT/FLK50(1-40)/S7, Order No.: 2903804,
FLKM 50/KDS3-MT/PPA/S7-300, Order No.: 2304490.
All wire jumpers (DR) on the adapter must be disconnected!
There must be no voltage supply at the front adapter (flowing via the slip-on connections)!

**Note:**
The front adapters are non-isolated on delivery.
Removal of the wire jumpers 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-position system cables.
Tailor-made VARIOFACE termination boards with a variety of functions and connection options round off this system concept.

### Web code for the online configurator

**Your web code: #0007**

**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)<br>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)<br>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 | IDC/FLK pin strip (2.54 mm) |

### Ordering data

| Description | No. of pos. | Type | Order No. | Pcs. / Pkt. |
|---|---|---|---|---|
| **VARIOFACE front adapter,** for SIMATIC® S7-300 | | | | |
| - 2 x 8 channels can be connected | 14 | **FLKM 14-PA-S300** | **2299770** | 1 |

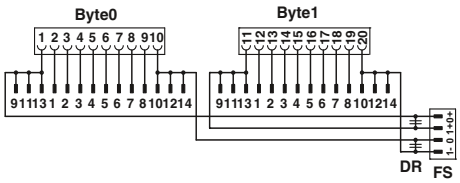
**Front adapters for 16-channel cards of SIMATIC® S7-300**

| Card type | FLKM 14-PA-S300 |
|---|---|
| **Digital input** | 6ES7 321-1BH02-0AA0<br>6ES7 321-1BH10-0AA0<br>6ES7 321-1BH50-0AA0*<br>6ES7 321-7BH01-0AB0* |
| **Digital output** | 6ES7 322-1BH01-0AA0<br>6ES7 322-1BH10-0AA0<br>6ES7 322-8BF00-0AB0* |
| **Digital input/output** | 6ES7 323-1BH01-0AA0 |
| **Analog input** | 6ES7 331-7KF02-0AB0*<br>6ES7 331-7HF01-0AB0*<br>6ES7 331-7KB02-0AB0*<br>6ES7 331-7TF01-0AB0* |
| **Analog output** | 6ES7 332-5HD01-0AB0*<br>6ES7 332-5HB01-0AB0*<br>6ES7 332-7ND02-0AB0* |
| **Analog input/output** | 6ES7 334-0CE01-0AA0*<br>6ES7 334-0KE00-0AB0*<br>6ES7 335-7HG01-0AB0* |
| **Other modules** | 6ES7 338-4BC01-0AB0*<br>6ES7 350-1AH03-0AE0*<br>6ES7 351-1AH01-0AE0*<br>6ES7 352-1AH02-0AE0*<br>6ES7 353-1AH01-0AE0*<br>6ES7 354-1AH01-0AE0*<br>6ES7 355-0VH10-0AE0*<br>6ES7 355-1VH10-0AE0* |

* Only in conjunction with
VIP-2/SC/2FLK14 (1-20)/S7, Order No.: 2315230
VIP-2/PT/2FLK14 (1-20)/S7, Order No.: 2903802
FLKM-2FLK14/KDS 3-MT/PPA/S7, Order No.: 2295062
All wire jumpers (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 wire jumpers 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**

## Siemens SIMATIC® S7-300
## Front adapter for failsafe modules

The front adapters are coupled using 50-pos. 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 | < 50 V AC / 60 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 | IEC 60664 / DIN EN 50178 / IEC 62103 |
| Connection method | Flat-ribbon cable connector in acc. with IEC 60603-13 |

### Ordering data

| Description | No. of pos. | Type | Order No. | Pcs. / Pkt. |
|---|---|---|---|---|
| **VARIOFACE front adapter** for failsafe I/O cards | | | | |
| 6ES7 326-1BK02-0AB0<br>6ES7 326-1RF00-0AB0<br>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**

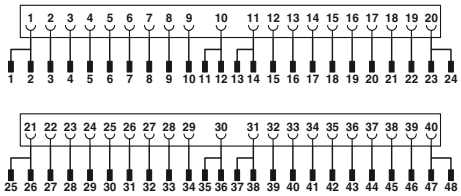
| Card type | FLKM 50-PA-S300/SO167 |
|---|---|
| Digital input | 6ES7 326-1BK02-0AB0*<br>6ES7 326-1RF00-0AB0*[1]) |
| Analog input | 6ES7 336-1HE00-0AB0* |

| Card type | FLKM 50-PA/DO326/S7-S300 |
|---|---|
| Digital output | 6ES7 326-2BF01-0AB0**<br>6ES7 326-2BF10-0AB0** |

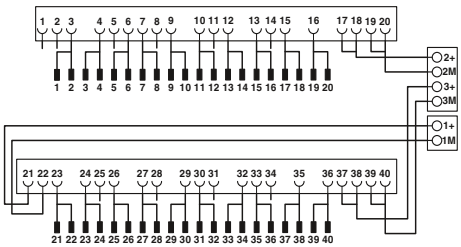
* Only in conjunction with
VIP-2/SC/FLK50 (1-40)/S7, Order No.: 2315243,
VIP-2/PT/FLK50 (1-40)/S7, Order No.: 2903804,
FLKM 50/KDS3-MT/PPA/S7-300, Order No.: 2304490.

** Only in conjunction with
FLKM 50/DO326/S7-300, Order No. 2321965.

[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-pos. connector on 50-pos. flat-ribbon cable strip

### CABLE-FCN40/4X14/...
- Signal transmission of 4x8 channels
- Splitting cable: 40-pos. connector on four 14-pos. flat-ribbon cable strips

System cable

Splitting cable

EAC

EAC

| | Technical data | Technical data |
|---|---|---|
| Max. perm. operating voltage | < 50 V AC / 60 V DC | < 50 V AC / 60 V DC |
| Max. perm. current carrying capacity 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 |

| Description | No. of pos. | 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 is used exclusively to couple the MINI MCR-SL-V8-FLK 16 A adapter. Changed standard analog signals can be transmitted with the help of these components.

Suitable isolators can be found from page 92.

For suitable 16-pos. system cable (FLK 16/EZ-DR/...), refer to page 606.

**Front adapter for SIMATIC® S7-300, 20-pos. analog I/O cards**

### Technical data

| | |
|---|---|
| | FLKM 16-PA-S300/MINI-MCR |
| Max. perm. operating voltage | < 50 V AC / 60 V DC |
| Max. permissible current | 50 mA (per path)<br>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 | IEC 60664 / DIN EN 50178 / IEC 62103 |

### Ordering data

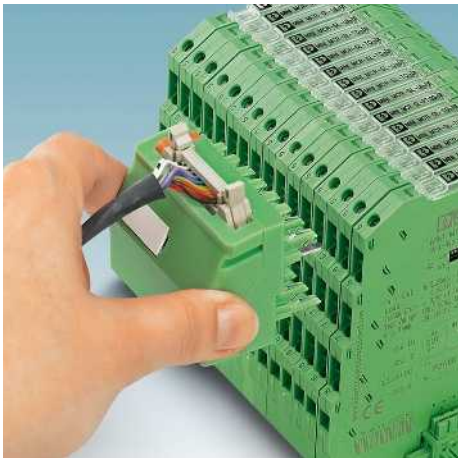
| Description | No. of pos. | Type | Order No. | Pcs. / Pkt. |
|---|---|---|---|---|
| **VARIOFACE front adapter**, for SIMATIC® S7-300, only in connection with MINI MCR-SL-V8-FLK 16-A | 16 | **FLKM 16-PA-S300/MINI-MCR** | **2314749** | 1 |

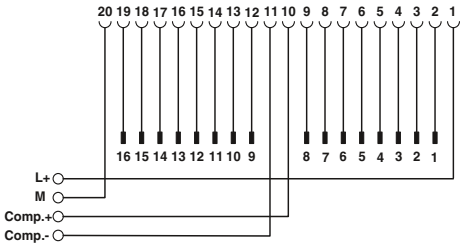
### Accessories

| | | | |
|---|---|---|---|
| **Assembled round cable**, with two 16-pos. 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<br>6ES7 331-7KB02-0AB0<br>6ES7 331-7KB81-0AB0<br>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

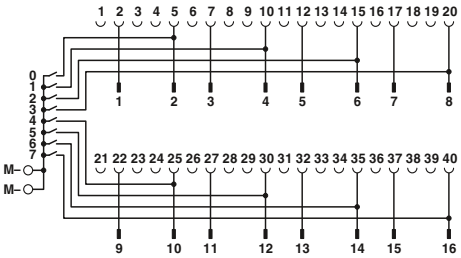
The FLKM 16-PA-331-1KF/I/MINI-MCR front adapter helps in system cabling in conjunction with the MINI Analog system adapter and a 16-pos. system cable FLK 16/EZ-DR/.../KONFEK, refer to page 606.

Instead of the conventional front connector, screw terminal blocks are used to snap this component onto 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



Connection scheme FLKM 16-PA-331-1KF/I/MINI-MCR

Front adapter for SIMATIC® S7-300, 6ES7 331-1KF02-0AB0 analog I/O card

### Technical data

| | |
|---|---|
| Max. perm. operating voltage | < 50 V AC / 60 V DC |
| Max. permissible current | 50 mA (per path) |
| Ambient temperature (operation) | -20 °C ... 60 °C |
| Ambient temperature (storage/transport) | -20 °C ... 70 °C |
| Standards/regulations | IEC 60664 / DIN EN 50178 / IEC 62103 |

### Ordering data

| Description | No. of pos. | 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 |

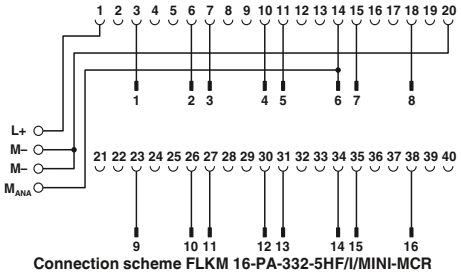
## Siemens SIMATIC® S7-300 Front adapter for MINI Analog system cabling

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-pos. system cable FLK 16/EZ-DR/.../KONFEK, refer to page 606.

Instead of the conventional front connector, screw terminal blocks are used to snap this component onto 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



Connection scheme FLKM 16-PA-332-5HF/I/MINI-MCR

Front adapter for SIMATIC® S7-300, 6ES7 332-5HF00-0AB0 analog I/O card

### Technical data

| | |
|---|---|
| Max. perm. operating voltage | < 50 V AC / 60 V DC |
| Max. permissible current | 50 mA (per path)<br>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 | IEC 60664 / DIN EN 50178 / IEC 62103 |

### Ordering data

| Description | No. of pos. | 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® S7-1500 System cables for front connectors from the "TOP connect" series

These system cables are connected directly to Siemens "SIMATIC TOP connect" front connectors. A VARIOFACE front adapter is not required. The cables can be used to connect existing 8-channel Phoenix Contact interface modules.

– For passive signal transmission, e.g., VIP-2/SC/FLK14/PLC; Order No. 2315214, see page 542.
– For relay or solid-state relay connection via V8 adapters, e.g., PLC-V8/FLK14/OUT; Order No. 2295554, see page 451.

The system cables are available in the following versions:

– Unshielded
– Shielded
– Halogen-free

The following SIMATIC® S7-1500 cards can be coupled:

### Digital input:

– 6ES7 521-1BH00-0AB0
– 6ES7 521-1BH50-0AA0
– 6ES7 521-1BL00-0AB0

### Digital output:

– 6ES7 522-1BH00-0AB0
– 6ES7 522-1BL00-0AB0

### Web code for the online configurator

**Your web code: #0007**

| Notes: |
|---|
| These system cables are connected directly to the Siemens S7-1500 6ES7 921-5AB20-0AA0 or 6ES7 921-5AH20-0AA0 front connector modules. |
| The Siemens adapters are not supplied by Phoenix Contact. |

### Technical data

| | |
|---|---|
| Max. perm. operating voltage | < 50 V AC / 60 V DC |
| Max. perm. current carrying capacity 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 |
| Number of positions, control side | 16 |
| Number of positions, module side | 14 |
| Conductor cross section | AWG 26 / 0.14 mm² |
| Conductor structure: stranded wires / material | 7 / Cu tin-plated |
| Outside diameter | 6.4 mm |

### Ordering data

| Description | Cable length | Type | Order No. | Pcs. / Pkt. |
|---|---|---|---|---|
| **Unshielded round cables**, with one 16-pos. and one 14-pos. socket strip in fixed lengths for transmitting 8 channels | | | | |
| | 0.5 m | **FLK 14/16/EZ-DR/ 50/S7** | **2293815** | 5 |
| | 1 m | **FLK 14/16/EZ-DR/ 100/S7** | **2293828** | 1 |
| | 1.5 m | **FLK 14/16/EZ-DR/ 150/S7** | **2293831** | 1 |
| | 2 m | **FLK 14/16/EZ-DR/ 200/S7** | **2293844** | 1 |
| | 2.5 m | **FLK 14/16/EZ-DR/ 250/S7** | **2293857** | 1 |
| | 3 m | **FLK 14/16/EZ-DR/ 300/S7** | **2293860** | 1 |
| | 4 m | **FLK 14/16/EZ-DR/ 400/S7** | **2293886** | 1 |
| | 5 m | **FLK 14/16/EZ-DR/ 500/S7** | **2293899** | 1 |
| | 6 m | **FLK 14/16/EZ-DR/ 600/S7** | **2293909** | 1 |
| | 7 m | **FLK 14/16/EZ-DR/ 700/S7** | **2293912** | 1 |
| | 8 m | **FLK 14/16/EZ-DR/ 800/S7** | **2293925** | 1 |
| | 9 m | **FLK 14/16/EZ-DR/ 900/S7** | **2293938** | 1 |
| | 10 m | **FLK 14/16/EZ-DR/1000/S7** | **2293941** | 1 |
| **Unshielded round cables,** as above, but in variable lengths of type **"FLK EZ-DR/14U/C52/..."** | | **FLK EZ-DR.../.../...** | **2295059** | 1 |
| **Shielded round cables,** with one 16-pos. and one 14-pos. socket strip, for transmitting 8 channels in variable lengths of type **"FLK EZ-DR-S/14S/C52/..."** | | **FLK EZ-DR-S.../.../...** | **2295046** | 1 |
| **Unshielded halogen-free round cables**, with one 16-pos. and one 14-pos. socket strip, for transmitting 8 channels in variable lengths | | | | |

**Halogen-free**
**(cable only)**

EAC

## 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

16
14
AWG 26 / 0.14 mm²
7 / Cu tin-plated
6.4 mm

## Ordering data

| Type | Order No. | Pcs. / Pkt. |
|---|---|---|
| FLK 14/16/EZ-DR/HF/ 50/S7 | 2296919 | 1 |
| FLK 14/16/EZ-DR/HF/ 100/S7 | 2296922 | 1 |
| FLK 14/16/EZ-DR/HF/ 150/S7 | 2296935 | 1 |
| FLK 14/16/EZ-DR/HF/ 200/S7 | 2296948 | 1 |
| FLK 14/16/EZ-DR/HF/ 250/S7 | 2296951 | 1 |
| FLK 14/16/EZ-DR/HF/ 300/S7 | 2296964 | 1 |
| FLK 14/16/EZ-DR/HF/ 400/S7 | 2904525 | 1 |
| FLK 14/16/EZ-DR/HF/ 500/S7 | 2304704 | 1 |
| FLK 14/16/EZ-DR/HF/ 600/S7 | 2904526 | 1 |
| FLK 14/16/EZ-DR/HF/ 800/S7 | 2904527 | 1 |
| FLK 14/16/EZ-DR/HF/1000/S7 | 2904528 | 1 |
| FLK 14-16-EZ-DR-HF-S7/... | 2295693 | 1 |

**Pin assignment and color code:**
- FLK 14/16/EZ-DR/.../S7
- FLK 14/16/EZ-DR/HF/.../S7

| 14-pos. socket strip PIN | 16-pos. socket strip PIN | Wire color |
|---|---|---|
| 1 | 16 | Black |
| 2 | 14 | Brown |
| 3 | 12 | Red |
| 4 | 10 | Orange |
| 5 | 8 | Yellow |
| 6 | 6 | Green |
| 7 | 4 | Blue |
| 8 | 2 | Violet |
| 9 | 9 | Gray |
| 10 | 1 | White |
| 11 | 11 | White-black |
| 12 | 3 | White-brown |
| 13 | 13 | White-red |
| 14 | 5 | White-orange |
| Not used | 7 | - |
| Not used | 15 | - |

**Ordering example for unshielded round cable:**
Unshielded round cable, assembled with
one 14-pos. and one 16-pos. socket strip, 12.70 m long
Type: FLK EZ-DR /14U/C52/...

| Quantity | Order No. | | Length [m] [1]) |
|---|---|---|---|
| 1 | 2295059/14U/C52 | / | 12.70 |

[1]) Min. 0.20 m

14U ≙ 14-pos. unshielded cable
C52 ≙ S7-1500 assembly with 14-pos. socket strip at one end and 16-pos. socket strip at the other

**Ordering example for shielded round cable:**
Unshielded round cable, assembled with
one 14-pos. and one 16-pos. socket strip, 13.20 m long
Type: FLK EZ-DR-S /14S/C52/...

| Quantity | Order No. | | Length [m] [1]) |
|---|---|---|---|
| 1 | 2295046/14S/C52 | / | 13.20 |

[1]) Min. 0.20 m

14S ≙ 14-pos. shielded cable
C52 ≙ S7-1500 assembly with 14-pos. socket strip at one end and 16-pos. socket strip at the other

**Ordering example for halogen-free round cable:**
Halogen-free round cable, assembled with
one 14-pos. and one 16-pos. socket strip, 15.50 m long
Type: FLK 14-16-EZ-DR-HF-S7/...

| Quantity | Order No. | | Length [m] [1]) |
|---|---|---|---|
| 1 | 2295693 | / | 15.50 |

[1]) Min. 0.20 m

## 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-position system cable.

### FLKM 50/4-FLK14/PA-S400

– Transmission of max. 32 digital channels via one 14-position system cable.

Tailor-made VARIOFACE termination boards with a variety of functions and connection options round off this system concept.

### FLKM 50-PA-S400 (3-48)

– Analog channels are connected via a 50-position system cable.

The 1:1 connection of the adapter means that corresponding 1:1 interface modules are connected here

### Web code for the online configurator

**Your web code: #0007**

**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)<br>8 A (per connection, supply via separate power supply) |
| Max. perm. total current | 2 A (per byte, for supply via connector)<br>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 pos. | 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 devices SIMATIC® S7-400**

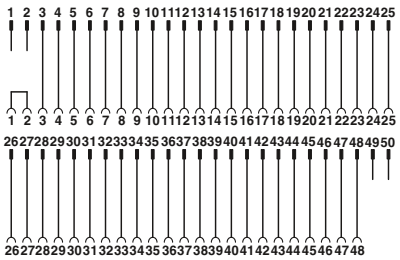
| Card type | FLKM 50-PA-S400 |
|---|---|
| Digital input | 6ES7 421-1BL01-0AA0<br>6ES7 421-7BH01-0AB0*<br>6ES7 421-7DH00-0AB0* |
| Digital output | 6ES7 422-1BL00-0AA0<br>6ES7 422-7BL00-0AB0 |

| Card type | FLKM 50/4-FLK14/PA-S400 |
|---|---|
| Digital input | 6ES7 421-1BL01-0AA0 |
| Digital output | 6ES7 422-1BL00-0AA0<br>6ES7 422-7BL00-0AB0 |

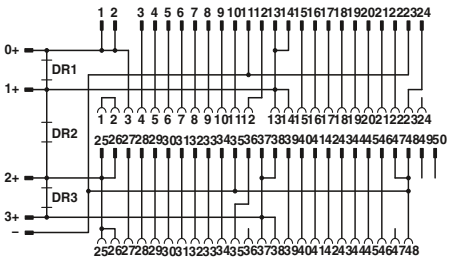
| Card type | FLKM 50-PA-S400 (3-48) |
|---|---|
| Analog input | 6ES7 431-0HH00-0AB0**<br>6ES7 431-1KF00-0AB0**<br>6ES7 431-1KF10-0AB0**<br>6ES7 431-1KF20-0AB0**<br>6ES7 431-7KF00-0AB0**<br>6ES7 431-7KF10-0AB0**<br>6ES7 431-7QH00-0AB0** |
| Analog output | 6ES7 432-1HF00-0AB0** |

* Only in conjunction with
VIP-2/SC/FLK50/S7/A-S400, Order No.: 2322359
VIP-2/PT/FLK50/S7/A-S400, Order No.: 2904289
all DR wire jumpers on the adapter must be disconnected.

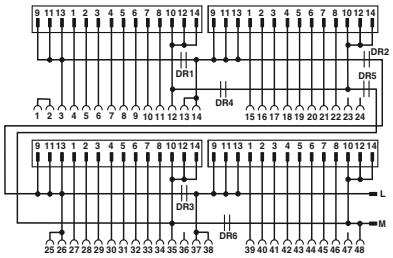
** Only in conjunction with
VIP-3/SC/FLK50, Order No.: 2315081
VIP-3/PT/FLK50, Order No.: 2903794
FLKM 50/KDS 3-MT/PPA/AN/PLC, Order No.: 2291587



**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 plug wired with individual conductors directly with the SIMATIC® S7-400 basic card.

The SIMATIC® S5 plug is plugged directly onto an S7-400-I/O card with the help of an FFLKM 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.

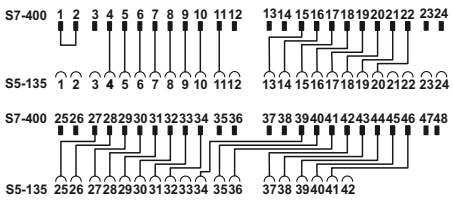
**Adapter for Siemens SIMATIC® S5-135/S7-400**

### Technical data

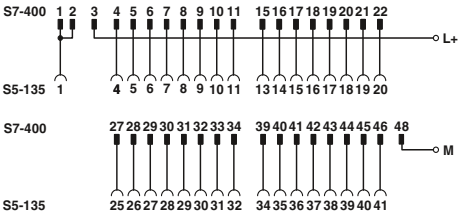
| | ① | ② | ③ | ④ |
|---|---|---|---|---|
| Max. perm. operating voltage | 60 V DC | 60 V DC | 60 V DC | 60 V DC |
| Max. permissible current | 4 A (per path) | 2 A (per path) | 4 A (per path) | 4 A (per path) |
| Ambient temperature (operation) | -20 °C ... 50 °C | -20 °C ... 50 °C | -20 °C ... 50 °C | -20 °C ... 50 °C |
| Mounting position | any | any | any | any |
| Standards/regulations | IEC 60664 / DIN EN 50178 / IEC 62103 | | | |

### Ordering data

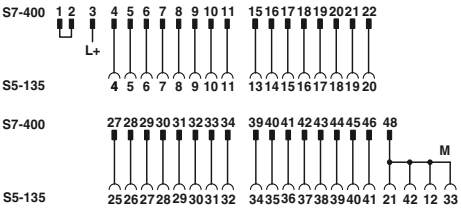
| Description | No. of pos. | Type | Order No. | Pcs. / Pkt. |
|---|---|---|---|---|
| **Digital IN 24 V from S5-135/155 to S7-400** | | | | |
| 6ES5 420-4UA14 to 6ES7 421-1BL01-0AA0 | ① | **FLKM S135/S400/SO120** | **2301723** | 1 |
| 6ES5 430-4UA14 to 6ES7 421-1BL01-0AA0 | ② | **FLKM S135/S400/SO121** | **2301736** | 1 |
| 6ES5 431-4UA12 to 6ES7 421-7DH00-0AB0 | ③ | **FLKM S135-431-4UA/S400** | **2314846** | 1 |
| 6ES5 432-4UA12 to 6ES7 421-1BL01-0AA0 | ④ | **FLKM S135/S400/SO122** | **2301749** | 1 |



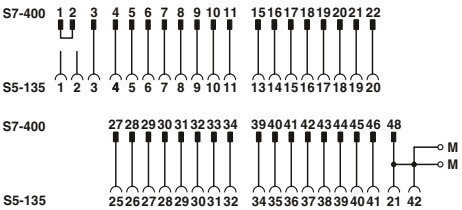

**FLKM S135-431-UA/S400 connection scheme**




**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 plug wired with individual conductors directly with the SIMATIC® S7-400 basic card.

The SIMATIC® S5 plug is plugged directly onto an S7-400-I/O card with the help of an FFLKM 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.

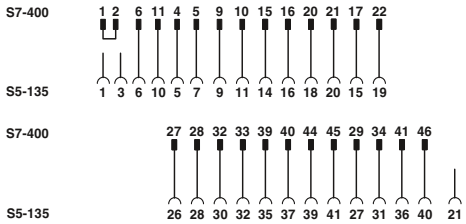
**Front adapter for SIMATIC S5-135 S7 400**

### Technical data

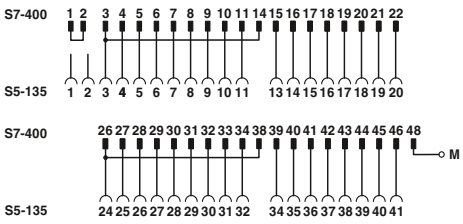
| | ① | ② | ③ |
|---|---|---|---|
| Max. perm. operating voltage | 60 V DC | 60 V DC | 60 V DC |
| Max. permissible current | 4 A (per path) | 4 A (per path) | 4 A (per path) |
| Ambient temperature (operation) | -20 °C ... 50 °C | -20 °C ... 50 °C | -20 °C ... 50 °C |
| Mounting position | any | any | any |
| Standards/regulations | IEC 60664 / DIN EN 50178 / IEC 62103 | | |

### Ordering data

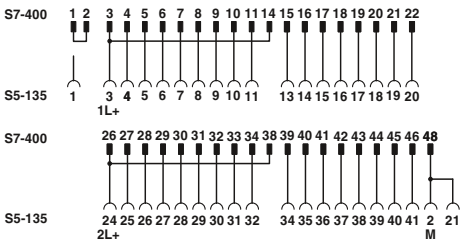
| Description | No. of pos. | Type | Order No. | Pcs. / Pkt. |
|---|---|---|---|---|
| **Digital OUT 24 V from S5-135/155 to S7-400** | | | | |
| 6ES5 441-4UA12 to 6ES7 422-1BL00-0AA0 | ① | **FLKM S135/S400/SO125** | **2301778** | 1 |
| 6ES5 451-4UA14 to 6ES7 422-1BL00-0AA0 | ② | **FLKM S135/S400/SO126** | **2301781** | 1 |
| **Digital OUT 24 V DC / 2 A from S5-135/155 to S7-400** | | | | |
| 6ES5 453-4UA12 to 6ES7 422-1HH00-0AA0 | ③ | **FLKM S135/S400/SO127** | **2301794** | 1 |




**Connection scheme: FLKM S135/S400/SO127**




**Connection scheme: FLKM S135/S400/SO125**




**Connection scheme: FLKM S135/S400/SO126**

## Siemens SIMATIC® S7-400 Adapter for conversion from S5-135/155 to S7-400

The FLKM S135/... adapters connect a SIMATIC® S5 plug wired with individual conductors directly with the SIMATIC® S7-400 basic card.

The SIMATIC® S5 plug is plugged directly onto an S7-400-I/O card with the help of an FFLKM 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.

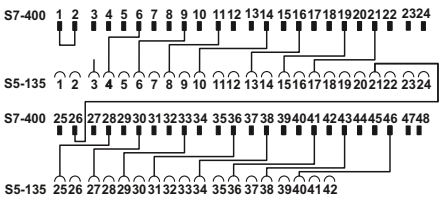
**Adapter for Siemens SIMATIC® S5-135/S7-400**

### Technical data

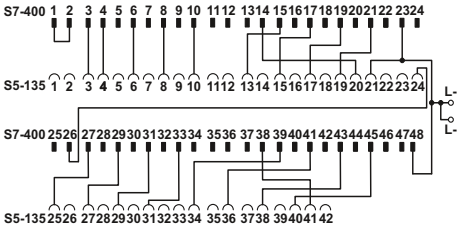
| | ① | ② | ③ |
|---|---|---|---|
| Max. perm. operating voltage | 60 V DC | 60 V DC | 60 V DC |
| Max. permissible current | 4 A (per path) | 4 A (per path) | 4 A (per path) |
| Ambient temperature (operation) | -20 °C ... 50 °C | -20 °C ... 50 °C | -20 °C ... 50 °C |
| Mounting position | any | any | any |
| Standards/regulations | IEC 60664 / DIN EN 50178 / IEC 62103 | | |

### Ordering data

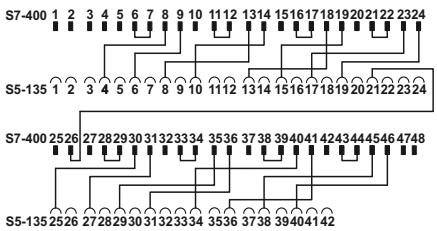
| Description | No. of pos. | Type | Order No. | Pcs. / Pkt. |
|---|---|---|---|---|
| **Digital OUT 24 V DC / 2 A from S5-135/155 to S7-400** | | | | |
| 6ES5 454-4UA14 to 6ES7 422-1BH11-0AA0 | ① | **FLKM S135-454-4UA/S400** | **2314859** | 1 |
| **Analog IN (only current measurement) from S5-135/155 to S7-400** | | | | |
| 6ES5 460-4UA13 to 6ES7 431-1KF00-0AB0 | ② | **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 | ③ | **FLKM S135-460-4UA/U/S400** | **2314862** | 1 |




**Connection scheme: FLKM S135-460-4UA/U/S400**




**FLKM S135-454-4UA/S400 connection scheme**




**FLKM S135-460-4UA/I/S400 connection scheme**

## Siemens SIMATIC® S7-400 Adapter for conversion from S5-135/155 to S7-400

The FLKM S135/... adapters connect a SIMATIC® S5 plug wired with individual conductors directly with the SIMATIC® S7-400 basic card.

The SIMATIC® S5 plug is plugged directly onto an S7-400-I/O card with the help of an FFLKM 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.

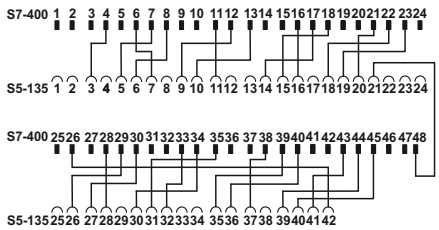
**Adapter for Siemens SIMATIC® S5-135/S7-400**

### Technical data

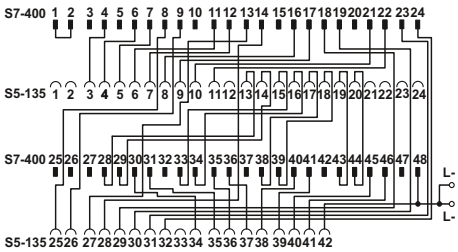
| | ① | ② | ③ | ④ |
|---|---|---|---|---|
| Max. perm. operating voltage | 60 V DC | 60 V DC | 60 V DC | 60 V DC |
| Max. permissible current | 2 A (per path) | 4 A (per path) | 4 A (per path) | 4 A (per path) |
| Ambient temperature (operation) | -20 °C ... 50 °C | -20 °C ... 50 °C | -20 °C ... 50 °C | -20 °C ... 50 °C |
| Mounting position | any | any | any | any |
| Standards/regulations | IEC 60664 / DIN EN 50178 / IEC 62103 | | | |

### Ordering data

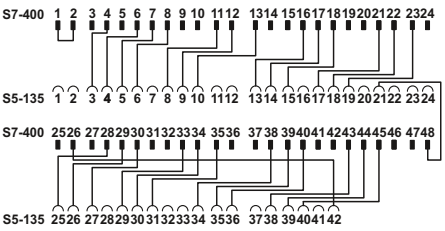
| Description | No. of pos. | Type | Order No. | Pcs. / Pkt. |
|---|---|---|---|---|
| **Analog IN (only Pt 100) from S5-135/155 to S7-400** | | | | |
| 6ES5 465-4UA13 to 6ES7 431-7KF10-0AB0 | ① | **FLKM S135-465-4UA/T/S400** | **2314875** | 1 |
| **Analog IN (only current and voltage measurement) from S5-135/155 to S7-400**<br>6ES5 465-4UA13 to 6ES7 431-0HH00-0AB0<br>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<br>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<br>6ES5 470-4UB13 to 6ES7 432-1HF00-0AB0<br>6ES5 470-4UC13 to 6ES7 432-1HF00-0AB0 | ④ | **FLKM S135-470-4UC/U/S400** | **2314891** | 1 |



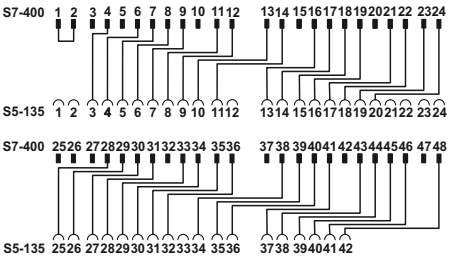

**Connection scheme FLKM S135-470-4UC/I/S400**




**FLKM S135-465-4UA/T/S400 connection scheme**




**Connection scheme FLKM S135-470-4UC/U/S400**




**FLKM S135-465-4UA/UI/S400 connection scheme**

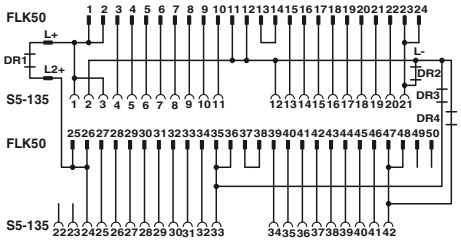
## Siemens SIMATIC® S7-300 Adapter for conversion from S5-135/155 to S7-300

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-pos. strip. A 50-pos. 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.

**Notes:**

Due to the geometry, it is not possible to couple any molded FLK connectors (e.g., VIP-PA...S7).




FLKM S135/S7/FLK50/PLC connection scheme

Converter for Siemens SIMATIC® S5-135 to 50-pos. FLK strip.

### Technical data

| | |
|---|---|
| Max. perm. operating voltage | 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 |

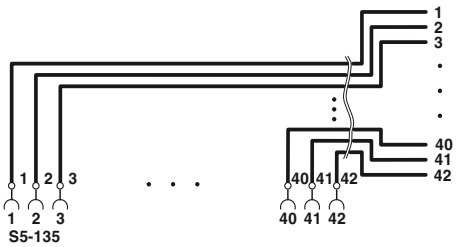
### Ordering data

| Description | Type | Order No. | Pcs. / Pkt. |
|---|---|---|---|
| **Digital IN or OUT 24 V DC from S5-135 to S7-300**<br>**IN**<br>6ES5 420-4UA14 to 6ES7 321-1BL00-0AA0<br>6ES5 430-4UA14 to 6ES7 321-1BL00-0AA0<br>**OUT**<br>6ES5 441-4UA14 to 6ES7 322-1BL00-0AA0<br>6ES5 451-4UA14 to 6ES7 322-1BL00-0AA0 | **FLKM S135/S7/FLK50/PLC** | **2314736** | 1 |

## Startup adapters for extending the existing S5-135/155 field wiring

All signals of the existing S5-135 wiring are extended by 3 or 5 meters with the help of the universal startup adapters. The open cable end can be connected to various controllers such as S7-400 or S7-300. Thus, 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 | IEC 60664 / DIN EN 50178 / IEC 62103 |

### 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 plug wired with individual conductors directly with the SIMATIC® S7-400 basic card.

The SIMATIC® S5 plug is plugged directly onto an S7-400-I/O card with the help of an FFLKM 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 other slot. The LEDs of the S7-400 module are hidden by the S5-115 adapter.

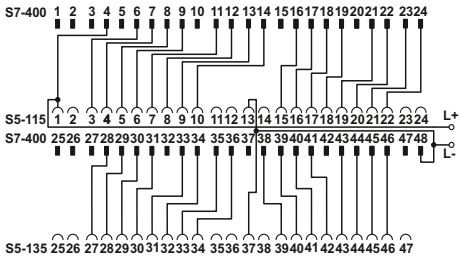
**Adapter for Siemens SIMATIC® S5-115/S7-400**

### Technical data

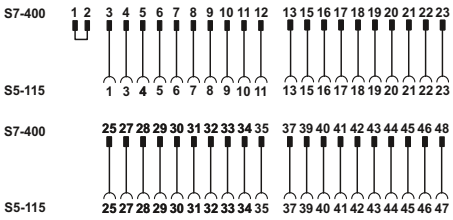
| | |
|---|---|
| Max. perm. operating voltage | 60 V DC |
| Max. permissible current | 4 A (per path)<br>4 A (per connection, supply via separate power supply) |
| Ambient temperature (operation) | -20 °C ... 50 °C |
| Ambient temperature (storage/transport) | -20 °C ... 70 °C |
| Mounting position | any |
| Standards/regulations | IEC 60664 / DIN EN 50178 / IEC 62103 |

### Ordering data

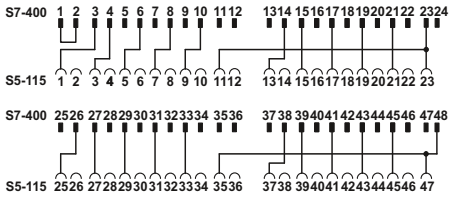
| Description | Type | Order No. | Pcs. / Pkt. |
|---|---|---|---|
| **Digital IN or OUT 24 V DC from S5-115 to S7-400**<br>**IN**<br>6ES5 420-7LA11 to 6ES7 421-1BL01-0AA0<br>6ES5 430-7LA11 to 6ES7 421-1BL01-0AA0<br>**OUT**<br>6ES5 441-7LA11 to 6ES7 422-1BL00-0AA0<br>6ES5 451-7LA11 to 6ES7 422-1BL00-0AA0 | **FLKM S115/S400/SO155** | **2307248** | 1 |
| **Digital OUT 24 V DC from S5-115 to S7-400**<br>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**<br>6ES5 465-7LA13 to 6ES7 431-0HH00-0AB0<br>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**

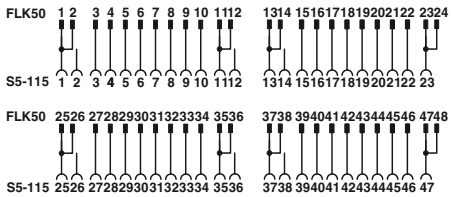
## Siemens SIMATIC® S7-300 Adapter for conversion from S5-115 to S7-300

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-pos. strip. A 50-pos. 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.

**Notes:**

Due to the geometry, it is not possible to couple any molded FLK connectors (e.g., VIP-PA...S7).




**Connection scheme: FLKM S115/S7/FLK50/PLC/SO137**

**Converter for Siemens SIMATIC® S5-115 to 50-pos. FLK strip.**

### Technical data

| | |
|---|---|
| Max. perm. operating voltage | 60 V 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 | IEC 60664 / 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**<br><br>**IN**<br>6ES5 420-7LA11 to 6ES7 321-1BL00-0AA0<br>6ES5 430-7LA11 to 6ES7 321-1BL00-0AA0<br>**OUT**<br>6ES5 441-7LA11 to 6ES7 322-1BL00-0AA0<br>6ES5 451-7LA11 to 6ES7 322-1BL00-0AA0 | **FLKM S115/S7/FLK50/PLC/SO137** | **2306294** | 1 |

## Startup adapters for extending the existing S5-115 field wiring

All signals of the existing S5-115 wiring are extended by 3 or 5 meters with the help of the universal startup adapters. The open cable end can be connected to various controllers such as S7-400 or S7-300. Thus, 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 | DIN EN 50178 / IEC 60664 / IEC 62103 |

### 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 VP and ProSafe-RS System cables

These shielded system cables for digital (50-pos.) and analog (40-pos.) I/O modules are connected directly to the modules. An intermediate adapter is not required.

Features:
- Molded connector
- Can be screwed
- Lateral cable outlet of the I/O module
- KS/AKB-compatible connectors on the module side

Shielded

shielded and halogen-free

| | | Technical data | Technical data |
|---|---|---|---|
| Max. perm. operating voltage | | 30 V DC | 30 V DC |
| Max. perm. current carrying capacity per path | | 500 mA | 500 mA |
| 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 | | | |
| | 50-position | 11 mm | 11 mm |
| | 40-position | 11 mm | 11 mm |

| Description | No. of pos. | Cable length | Ordering data: Type | Order No. | Pcs. / Pkt. | Ordering data: Type | Order No. | Pcs. / Pkt. |
|---|---|---|---|---|---|---|---|---|
| **50-pos. YUC cables,** for digital I/O modules | | | | | | | | |
| | 50 | 1 m | **FLK 50-PA/EZ-DR/KS/ 100/YUC** | **2900991** | 1 | **FLK 50-PA/EZ-DR/HF/KS/ 100/YUC** | **2904739** | 1 |
| | 50 | 2 m | **FLK 50-PA/EZ-DR/KS/ 200/YUC** | **2314299** | 1 | **FLK 50-PA/EZ-DR/HF/KS/ 200/YUC** | **2904740** | 1 |
| | 50 | 3 m | **FLK 50-PA/EZ-DR/KS/ 300/YUC** | **2314309** | 1 | **FLK 50-PA/EZ-DR/HF/KS/ 300/YUC** | **2904741** | 1 |
| | 50 | 4 m | **FLK 50-PA/EZ-DR/KS/ 400/YUC** | **2314312** | 1 | **FLK 50-PA/EZ-DR/HF/KS/ 400/YUC** | **2904742** | 1 |
| | 50 | 5 m | **FLK 50-PA/EZ-DR/KS/ 500/YUC** | **2321499** | 1 | **FLK 50-PA/EZ-DR/HF/KS/ 500/YUC** | **2904636** | 1 |
| | 50 | 6 m | **FLK 50-PA/EZ-DR/KS/ 600/YUC** | **2314927** | 1 | **FLK 50-PA/EZ-DR/HF/KS/ 600/YUC** | **2904743** | 1 |
| | 50 | 7 m | **FLK 50-PA/EZ-DR/KS/ 700/YUC** | **2321509** | 1 | **FLK 50-PA/EZ-DR/HF/KS/ 700/YUC** | **2904744** | 1 |
| | 50 | 8 m | **FLK 50-PA/EZ-DR/KS/ 800/YUC** | **2314930** | 1 | **FLK 50-PA/EZ-DR/HF/KS/ 800/YUC** | **2904745** | 1 |
| | 50 | 9 m | **FLK 50-PA/EZ-DR/KS/ 900/YUC** | **2321512** | 1 | **FLK 50-PA/EZ-DR/HF/KS/ 900/YUC** | **2904746** | 1 |
| | 50 | 10 m | **FLK 50-PA/EZ-DR/KS/1000/YUC** | **2314325** | 1 | **FLK 50-PA/EZ-DR/HF/KS/1000/YUC** | **2904637** | 1 |
| | 50 | 15 m | **FLK 50-PA/EZ-DR/KS/1500/YUC** | **2314338** | 1 | **FLK 50-PA/EZ-DR/HF/KS/1500/YUC** | **2904638** | 1 |
| | 50 | 20 m | **FLK 50-PA/EZ-DR/KS/2000/YUC** | **2314503** | 1 | **FLK 50-PA/EZ-DR/HF/KS/2000/YUC** | **2904487** | 1 |
| | 50 | 25 m | **FLK 50-PA/EZ-DR/KS/2500/YUC** | **2314516** | 1 | **FLK 50-PA/EZ-DR/HF/KS/2500/YUC** | **2904639** | 1 |
| | 50 | 30 m | **FLK 50-PA/EZ-DR/KS/3000/YUC** | **2314529** | 1 | **FLK 50-PA/EZ-DR/HF/KS/3000/YUC** | **2904640** | 1 |
| **40-pos. YUC cables,** for analog I/O modules | | | | | | | | |
| | 40 | 1 m | **FLK 40-PA/EZ-DR/KS/ 100/YUC** | **2322786** | 1 | **FLK 40-PA/EZ-DR/HF/KS/ 100/YUC** | **2904747** | 1 |
| | 40 | 2 m | **FLK 40-PA/EZ-DR/KS/ 200/YUC** | **2314341** | 1 | **FLK 40-PA/EZ-DR/HF/KS/ 200/YUC** | **2904748** | 1 |
| | 40 | 3 m | **FLK 40-PA/EZ-DR/KS/ 300/YUC** | **2314354** | 1 | **FLK 40-PA/EZ-DR/HF/KS/ 300/YUC** | **2904749** | 1 |
| | 40 | 4 m | **FLK 40-PA/EZ-DR/KS/ 400/YUC** | **2314367** | 1 | **FLK 40-PA/EZ-DR/HF/KS/ 400/YUC** | **2904750** | 1 |
| | 40 | 5 m | **FLK 40-PA/EZ-DR/KS/ 500/YUC** | **2321570** | 1 | **FLK 40-PA/EZ-DR/HF/KS/ 500/YUC** | **2904645** | 1 |
| | 40 | 6 m | **FLK 40-PA/EZ-DR/KS/ 600/YUC** | **2314943** | 1 | **FLK 40-PA/EZ-DR/HF/KS/ 600/YUC** | **2904751** | 1 |
| | 40 | 7 m | **FLK 40-PA/EZ-DR/KS/ 700/YUC** | **2321583** | 1 | **FLK 40-PA/EZ-DR/HF/KS/ 700/YUC** | **2904752** | 1 |
| | 40 | 8 m | **FLK 40-PA/EZ-DR/KS/ 800/YUC** | **2314956** | 1 | **FLK 40-PA/EZ-DR/HF/KS/ 800/YUC** | **2904753** | 1 |
| | 40 | 9 m | **FLK 40-PA/EZ-DR/KS/ 900/YUC** | **2321415** | 1 | **FLK 40-PA/EZ-DR/HF/KS/ 900/YUC** | **2904754** | 1 |
| | 40 | 10 m | **FLK 40-PA/EZ-DR/KS/1000/YUC** | **2314370** | 1 | **FLK 40-PA/EZ-DR/HF/KS/1000/YUC** | **2904646** | 1 |
| | 40 | 15 m | **FLK 40-PA/EZ-DR/KS/1500/YUC** | **2314383** | 1 | **FLK 40-PA/EZ-DR/HF/KS/1500/YUC** | **2904647** | 1 |
| | 40 | 20 m | **FLK 40-PA/EZ-DR/KS/2000/YUC** | **2314532** | 1 | **FLK 40-PA/EZ-DR/HF/KS/2000/YUC** | **2904488** | 1 |
| | 40 | 25 m | **FLK 40-PA/EZ-DR/KS/2500/YUC** | **2314545** | 1 | **FLK 40-PA/EZ-DR/HF/KS/2500/YUC** | **2904648** | 1 |
| | 40 | 30 m | **FLK 40-PA/EZ-DR/KS/3000/YUC** | **2314558** | 1 | **FLK 40-PA/EZ-DR/HF/KS/3000/YUC** | **2904649** | 1 |

## YOKOGAWA Centum VP System cables

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-pos. connectors on the module side for connection of four 8-channel VARIOFACE modules of the system cabling

Shielded

**Technical data**

| | |
|---|---|
| Max. perm. operating voltage | 30 V DC |
| Max. perm. current carrying capacity 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-position | 11 mm |

**Ordering data**

| Description | No. of pos. | 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 VP System cables 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 cost-effective Plug and Play solution.

The system cable is plugged directly into Yokogawa module. Two 16-pos. 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

Shielded

**Technical data**

| | |
|---|---|
| Max. perm. operating voltage | 30 V DC |
| Max. perm. current carrying capacity 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-position | 11 mm |

**Ordering data**

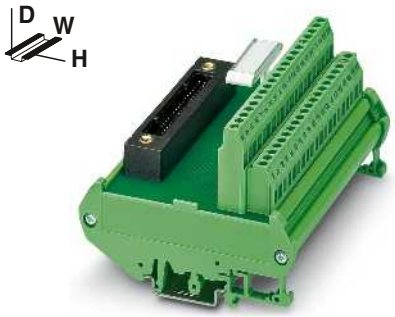
| Description | No. of pos. | Cable length | Type | Order No. | Pcs. / Pkt. |
|---|---|---|---|---|---|
| **System cable,** for analog I/O modules for coupling two 8-channel MINI Analog system adapters | | | | | |
| | 40 | 2 m | **CABLE-40/2FLK16/ 2,0M/YUC** | **2321334** | 1 |
| | 40 | 4 m | **CABLE-40/2FLK16/ 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 VP
## Interface modules

These modules are connected to the I/O modules via the YUC system cable (on page 534).

**FLKM-KS40/YCS:**
– For analog modules
– Universal interface module with 40 connection terminal blocks

For more cabling solutions for Yokogawa visit: phoenixcontact.com




Passive interface modules

### Technical data

| | | |
|---|---|---|
| Max. perm. operating voltage | | < 25 V AC / 30 V DC |
| Max. perm. current (per branch) | | 1 A |
| Ambient temperature (operation) | | -20 °C ... 50 °C |
| Mounting position | | any |
| Standards/regulations | | DIN EN 50178, IEC 60664, IEC 62103 |
| Connection method | Field level | Screw connection |
| | Controller 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

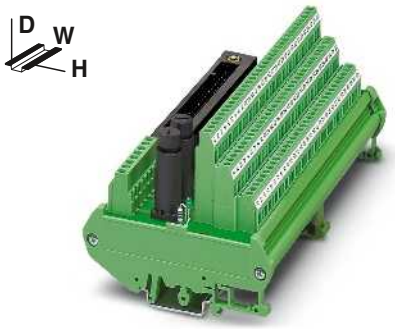
| Description | No. of pos. | Module width W | Type | Order No. | Pcs. / Pkt. |
|---|---|---|---|---|---|
| **Controller board,** for analog I/O modules | | | | | |
| | 40 | 112 mm | **FLKM-KS40/YCS** | **2314642** | 1 |

## YOKOGAWA Centum VP
## Interface modules

These modules are connected to the I/O modules via the YUC system cable (on page 534).

**FLKMS-KS50/32IM/YCS:**
– For digital modules ADV 151 and ADV 551
– Three-conductor connection (signal, plus, minus)
– Redundant voltage supply (fuse IEC 127-2, 5 x 20, 2 A)

For more cabling solutions for Yokogawa visit: phoenixcontact.com




Passive interface modules

### Technical data

| | | |
|---|---|---|
| Max. perm. operating voltage | | 30 V DC |
| Max. perm. current (per branch) | | 1 A |
| Ambient temperature (operation) | | -20 °C ... 50 °C |
| Mounting position | | any |
| Standards/regulations | | DIN EN 50178, IEC 60664, IEC 62103 |
| Connection method | Field level | Screw connection |
| | Controller 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 pos. | 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 VP
## Interface modules

These modules are connected to the analog I/O modules via the 40-pos. YUC system cable (on page 534).

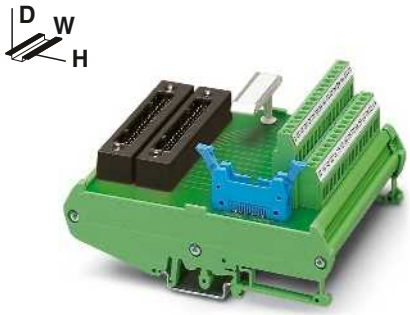
The modules are designed for redundant signal transmission (two connectors parallel). A separate connection to the HART multiplexer is possible.

### 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 4-wire mode)
– Transfer of 16 channels with separate positive and negative connections
– 16 plug-in 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 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 visit: phoenixcontact.com




Interface modules for analog I/O modules

### Technical data

| | | |
|---|---|---|
| Max. perm. operating voltage | | 30 V DC |
| Max. perm. current (per branch) | | 100 mA |
| Ambient temperature (operation) | | -20 °C ... 50 °C |
| Mounting position | | any |
| Standards/regulations | | DIN EN 50178, IEC 60664, IEC 62103 |
| Connection method | Field level | Screw connection |
| | Controller 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 pos. | 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 |

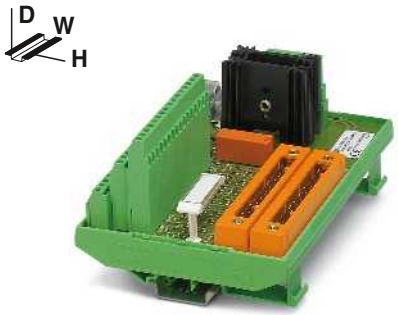
## Yokogawa ProSafe-RS Interface modules

new

These modules are connected to the I/O module via the 50-pos. YUC system cable (on page 534).
– For SDV144 digital module
– Redundant signal transmission (two parallel connectors)
– 16 channels

### UM-2KS50/16DI/RS/MKDS
– Screw connection
– Redundant voltage supply with signaling relay and fuse (IEC 127-2, 5 x 20, 3,15 AT)
– LED status display per channel

### UM-2KS50/DI16/RS/K-MT/SO241
– Screw connection with knife disconnection
– Redundant voltage supply with signaling relay and fuse (TR5, 2 AT)
– Plug-in fuses (TR5, 0,1 AT) and LED status indicator per channel




Passive interface modules

### Technical data

| | | |
|---|---|---|
| Max. perm. operating voltage | | 24 V DC ±5 % |
| Max. perm. current (per branch) | | 100 mA |
| Ambient temperature (operation) | | -20 °C ... 70 °C |
| Mounting position | | any |
| Standards/regulations | | DIN EN 50178 |
| Connection method | Field level | Screw connection |
| | Controller level | Yokogawa KS-compatible |
| Connection data solid / stranded / AWG | | 0.2 ... 2.5 mm² / 0.2 ... 1.5 mm² / 24 - 14 |
| Dimensions | H / D | 112 mm / 80 mm |

### Ordering data

| Description | No. of pos. | Module width W | Type | Order No. | Pcs. / Pkt. |
|---|---|---|---|---|---|
| **Interface module,** for I/O card: SDV144 | | | | | |
| - with LED status indicator | 50 | 162 mm | **UM-2KS50/16DI/RS/MKDS** | **2900173** | 1 |
| - with fuse and LED status indicator | 50 | 181 mm | **UM-2KS50/DI16/RS/K-MT/SO241** | **2319618** | 1 |

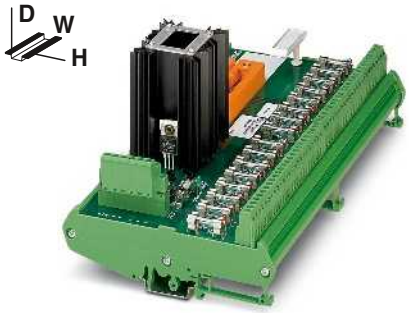
## Yokogawa ProSafe-RS Interface modules

new

These modules are connected to the I/O modules via the 40-pos. YUC system cable (on page 534).
– Redundant signal transmission (two parallel connectors)

### UM-2KS40/16AI/SI/RS/SO225
– For SAI143 analog module
– Screw connection
– Redundant voltage supply with signaling relay and fuse (IEC 127-2, 5 x 20, 10 AT)
– Plug-in fuses (IEC 127-2, 5 x 20, 1 AT) and LED status indicator per channel

### UM-2KS40/16AIO/RS/SO225
– For SAI143, SAV144, SAI533 analog modules
– Screw connection
– 16 analog inputs or 8 analog outputs




Passive interface modules

### Technical data

| | | |
|---|---|---|
| Max. perm. operating voltage | | 30 V DC |
| Max. perm. current (per branch) | | 1 A |
| Ambient temperature (operation) | | -20 °C ... 55 °C |
| Mounting position | | any |
| Standards/regulations | | DIN EN 50178 |
| Connection method | Field level | Screw connection |
| | Controller 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 / 96 mm |

### Ordering data

| Description | No. of pos. | Module width W | Type | Order No. | Pcs. / Pkt. |
|---|---|---|---|---|---|
| **Interface module**, for I/O card: SAI143 | | | | | |
| | 50 | 250 mm | **UM-2KS40/16AI/SI/RS/SO225** | **2319841** | 1 |
| **Interface module,** for I/O card: SAI143, SAV144, and SAI533 | | | | | |
| | 50 | 168 mm | **UM-2KS40/16AIO/RS/SO225** | **2319838** | 1 |

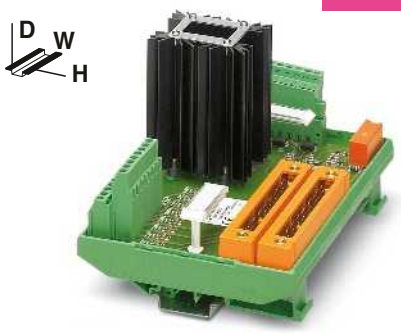
## Yokogawa ProSafe-RS Interface modules

new

These modules are connected to the I/O modules via the 50-pos. YUC system cable (on page 534).

### UM-2KS50/8DO/RS/MKDS

– For SDV531 and SDV531L digital modules
– Redundant signal transmission (two parallel connectors)
– Screw terminal blocks
– Redundant voltage supply with signaling relay and fuse (IEC 127-2, 5 x 20, 3,15 AT)
– LED status display per channel




Passive interface modules

**Technical data**

| | | |
|---|---|---|
| Max. perm. operating voltage | | 24 V DC ±5 % |
| Max. perm. current (per branch) | | 100 mA |
| Ambient temperature (operation) | | -20 °C ... 70 °C |
| Mounting position | | any |
| Standards/regulations | | DIN EN 50178 |
| Connection method | Field level | Screw connection |
| | Controller level | Yokogawa KS-compatible |
| Connection data solid / stranded / AWG | | 0.2 ... 2.5 mm² / 0.2 ... 1.5 mm² / 24 - 14 |
| Dimensions | H / D | 112 mm / 80 mm |

**Ordering data**

| Description | No. of pos. | Module width W | Type | Order No. | Pcs. / Pkt. |
|---|---|---|---|---|---|
| **Interface module**, for I/O card: SDV531 and SDV531L | | | | | |
| | 50 | 162 mm | **UM-2KS50/ 8DO/RS/MKDS** | **2900174** | 1 |

## Yokogawa ProSafe-RS Interface modules

new

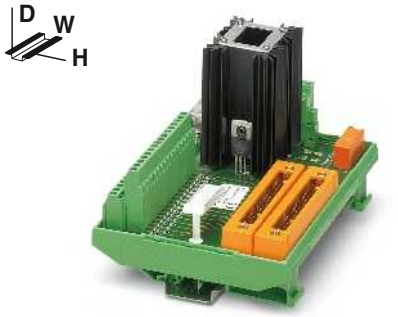
These modules are connected to the I/O modules via the 50-pos. YUC system cable (on page 534).
– Redundant signal transmission (two parallel connectors)
– Redundant voltage supply with signaling relay and fuse (IEC 127-2, 5 x 20, 6,3 AT)
– For SDV541 digital modules

### UM-2KS50/DO16/RS/K-MT/SO241

– Screw connection with knife disconnection
– Plug-in fuses (TR5, 0,2 AT) and LED status indicator per channel

### UM-2KS50/16DO/RS/MKDS

– Screw connection
– LED status display per channel




Passive interface modules

**Technical data**

| | | |
|---|---|---|
| Max. perm. operating voltage | | 24 V DC ±5 % |
| Max. perm. current (per branch) | | 100 mA |
| Ambient temperature (operation) | | -20 °C ... 70 °C |
| Mounting position | | any |
| Standards/regulations | | DIN EN 50178 |
| Connection method | Field level | Screw connection |
| | Controller level | Yokogawa KS-compatible |
| Connection data solid / stranded / AWG | | 0.2 ... 2.5 mm² / 0.2 ... 1.5 mm² / 24 - 14 |
| Dimensions | H / D | 112 mm / 80 mm |

**Ordering data**

| Description | No. of pos. | Module width W | Type | Order No. | Pcs. / Pkt. |
|---|---|---|---|---|---|
| **Interface module**, for I/O card: SDV541 | | | | | |
| - with LED status indicator | 50 | 162 mm | **UM-2KS50/16DO/RS/MKDS** | **2900175** | 1 |
| - with fuse and LED status indicator | 50 | 215 mm | **UM-2KS50/DO16/RS/K-MT/SO241** | **2319595** | 1 |

## Termination Carriers for Yokogawa Centum VP and ProSafe-RS

new

**Termination Carrier for Centum VP system, can be used with signal conditioners of the MINI Analog series**

The Termination Carriers are a compact solution for connecting signal conditioners and coupling relays to the Yokogawa Centum VP systems and ProSafe-RS.
– Mechanically decoupled PCB
– Redundant system connection
– Simple or redundant supply (diode decoupling, polarity reversal protection) and monitoring function. Implementation via separate DIN rail module or integrated switching on the PCB

### Termination Carrier for MINI Analog signal conditioners

**TC-2KS40-AI16-M-PRH-CS**
– For AAI141/AAI143 analog I/O modules

**TC-2KS40-AO16-M-PRH-CS**
– For AAI543 analog I/O module

### Termination Carrier for Ex i signal conditioners of the MACX Analog Ex series

**TC-2KS50-DI32-2EX-PR-CS**
– For ADV151/ADV161 digital I/O modules

**TC-2KS50-DO32-EX-PR-CS**
– For ADV551/ADV digital I/O modules

**TC-2KS40-AO16-EX-PR-CS**
– For AAI543 analog I/O module

**TC-2KS40-AI16-EX-PR-CS**
– For AAI141/AAI143 analog I/O modules

**TC-2KS50-DO16-EX-PR-RS**
– For SDV541 digital I/O module

**TC-2KS50-DI16-EX-PR-RS**
– For SDV144 digital I/O modules

**TC-2KS40-AI16-EX-PR-RS**
– For SAI143 analog I/O module

**TC-2KS40-AO8-EX-PR-RS**
– For SAI533 analog I/O module

### Termination Carrier for coupling relays from the PSR-ETP or PSR-FSP series

**TC-2KS50-DO16-F&G-AR-RS**
– For SDV541 digital I/O modules

**TC-2KS50-DO16-ESD-AR-RS**
– For SDV541 digital I/O modules

### Technical data

| | |
|---|---|
| General data | |
| Connection to the control system level | Yokogawa KS-compatible |
| Max. operating voltage | < 50 V DC (per signal/channel) |
| Max. permissible current | 23 mA (signal/channel) |
| Pollution degree / surge voltage category | 2 / II |
| Clearance and creepage distances | DIN EN 50178 (basic insulation) |
| Ambient temperature range | -20 °C ... 60 °C (please observe module specifications) |
| Shock | 15g, according to IEC 60068-2-27 |
| Vibration (operation) | 2g, according to IEC 60068-2-6 |
| Dimensions H / D | 170 / 160 mm |
| EMC note | |
| Power supply via power module | |
| Input voltage range | 19.2 V DC ... 30 V DC |
| Redundant supply | yes, decoupled from diodes |
| Polarization and surge protection | Yes |
| Fuse | 2x 2.5 A on PCB, slow-blow (replaceable) |
| Status indication | 2 x red LED (error)<br>2x green LEDs (PWR1 and PWR2) |
| Switching output | 1 N/C contact (alarm = open) |

### Ordering data

| Description | Module width W | Type | Order No. | Pcs. / Pkt. |
|---|---|---|---|---|
| **Termination Carrier** for 16 highly compact signal conditioners | | | | |
| - For AAI141 and AAI143 analog I/O modules | 148 mm | **TC-2KS40-AI16-M-PRH-CS** | **2905257** | 1 |
| - For AAI543 analog I/O modules | 148 mm | **TC-2KS40-AO16-M-PRH-CS** | **2905905** | 1 |
| **Termination Carrier** for 16/32 Ex i signal conditioners (SIL 2) | | | | |
| - For ADV151 and ADV161 digital I/O modules | 242 mm | | | |
| - For ADV551 and ADV561 digital I/O modules | 448 mm | | | |
| - For AAI543 analog I/O module | 242 mm | | | |
| - For AAI141 and AAI143 analog I/O modules | 242 mm | | | |
| **Termination Carrier** for 8/16 Ex i signal conditioners (SIL 2) | | | | |
| - For SDV144 digital I/O modules | 242 mm | | | |
| - For SDV541 digital I/O modules | 242 mm | | | |
| - For SAI143 analog I/O module | 242 mm | | | |
| - For SAI533 analog I/O module | 148 mm | | | |
| **Termination Carrier** for 16 PSR-FSP/PSR-ETP relays | | | | |
| - For SDV541 digital I/O modules (low-demand application) | 304 mm | | | |
| - For SDV541 digital I/O module (high-demand application) | 304 mm | | | |

### Accessories

| | | | |
|---|---|---|---|
| **MINI Analog power terminal** | **MINI MCR-SL-PTB-FM** | **2902958** | 1 |
| **MINI Analog fault signaling module** | **MINI MCR-SL-FM-RC-NC** | **2902961** | 1 |
| **Power and fault signaling module** | | | |
| **Cable set** with 24 V module supply, suitable for PSR-ETP/Order No.: 2986711 | | | |
| **Cable set** without use of confirmation contact, suitable for PSR-FSP/Order No.: 2981978 | | | |
| **Cable set** with use of confirmation contact, suitable for PSR-FSP/Order No.: 2986960 and 2986575 | | | |
| **Jumper plug** for occupying unused module slots, suitable for PSR-FSP/Order No.: 2986960 and 2986575 | | | |

new

**Termination Carrier for Centum VP System, can be used with Ex i signal conditioners of the MACX Analog Ex series**

### Technical data

Yokogawa KS-compatible
< 50 V DC (per signal/channel)
1 A (signal/channel)
2 / II
DIN EN 50178 (basic insulation)
-20 °C ... 60 °C (please observe module specifications)

15g, according to IEC 60068-2-27
2g, according to IEC 60068-2-6
170 / 160 mm

19.2 V DC ... 30 V DC
yes, decoupled from diodes
Yes
2x 2.5 A on PCB, slow-blow (replaceable)

1 x red LED (error)
2x green LEDs (PWR1 and PWR2)
1 N/C contact (alarm = open)

### Ordering data

| Type | Order No. | Pcs. / Pkt. |
|---|---|---|
| TC-2KS50-DI32-2EX-PR-CS | 2904676 | 1 |
| TC-2KS50-DO32-EX-PR-CS | 2905199 | 1 |
| TC-2KS40-AO16-EX-PR-CS | 2905201 | 1 |
| TC-2KS40-AI16-EX-PR-CS | 2905677 | 1 |

### Accessories

| | | |
|---|---|---|
| TC-MACX-MCR-PTB | 2904673 | 1 |

new

**Termination Carrier for ProSafe-RS system, can be used with Ex i signal conditioners of the MACX Analog Ex series**

### Technical data

Yokogawa KS-compatible
< 50 V DC (per signal/channel)
1 A (signal/channel)
2 / II
DIN EN 50178 (basic insulation)
-20 °C ... 60 °C (please observe module specifications)

15g, according to IEC 60068-2-27
2g, according to IEC 60068-2-6
170 / 160 mm

19.2 V DC ... 30 V DC
yes, decoupled from diodes
Yes
2x 2.5 A on PCB, slow-blow (replaceable)

1 x red LED (error)
2x green LEDs (PWR1 and PWR2)
1 N/C contact (alarm = open)

### Ordering data

| Type | Order No. | Pcs. / Pkt. |
|---|---|---|
| TC-2KS50-DI16-EX-PR-RS | 2905202 | 1 |
| TC-2KS50-DO16-EX-PR-RS | 2905678 | 1 |
| TC-2KS40-AI16-EX-PR-RS | 2905203 | 1 |
| TC-2KS40-AO8-EX-PR-RS | 2905204 | 1 |

### Accessories

| | | |
|---|---|---|
| TC-MACX-MCR-PTB | 2904673 | 1 |

new

**Termination Carrier for ProSafe-RS system, can be used with coupling relays from the PSR-ETP or PSR-FSP series**

### Technical data

Yokogawa KS-compatible
24 V DC (21.1 V ... 26.4 V)
1200 mA
2 / II
DIN EN 50178 (basic insulation)
-20 °C ... 60 °C

15g, according to IEC 60068-2-27
2g, according to IEC 60068-2-6
170 / 160 mm
Class A product, see page 625

21.1 V DC ... 26.4 V DC
yes, decoupled from diodes
Yes
2.5 A on PCB, slow-blow (replaceable)

2 x red LED (error)
2x green LEDs (PWR1 and PWR2)
1 N/C contact (alarm = open)

### Ordering data

| Type | Order No. | Pcs. / Pkt. |
|---|---|---|
| TC-2KS50-DO16-F&G-AR-RS | 2904112 | 1 |
| TC-2KS50-DO16-ESD-AR-RS | 2904113 | 1 |

### Accessories

| | | |
|---|---|---|
| TC-C-PSR3-SC-A100V+A20000 | 2903391 | 16 |
| TC-C-PSR3-SC-A10000A20000 | 2903389 | 16 |
| TC-C-PSR3-SC-A10000A23132 | 2903390 | 16 |
| TC-C-PTSM-50-00000000J1J1 | 2903388 | 8 |

## VIP termination boards for 8 channels

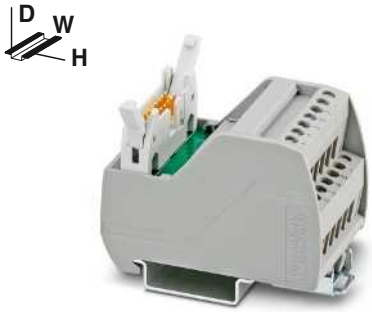
These VIP - VARIOFACE Professional modules are used in combination with 14-pos. system cables and the relevant front adapters.

### Features:

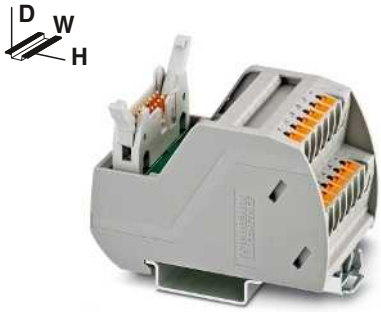
– Byte-by-byte marking
– For digital I/O modules
– With LED as an option

**Notes:**

For marking systems (e.g., “ZB 22:UNBEDRUCKT”; Order No. 0811862) and mounting material, see Catalog 5.




**Passive interface modules for input/output with screw connection**




**Passive interface modules for input/output with push-in connection**

### Technical data

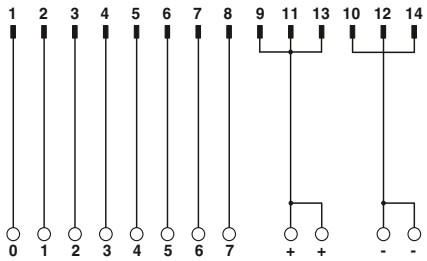
| | | VIP-2/.../FLK14/PLC | VIP-2/.../FLK14/LED/PLC |
|---|---|---|---|
| Max. perm. operating voltage | | 60 V AC/DC | 24 V DC |
| Max. perm. current (per branch) | | 1 A | 1 A |
| Max total current (voltage supply) | | 3 A | 3 A |
| Ambient temperature (operation) | | -20 °C ... 50 °C | -20 °C ... 50 °C |
| Mounting position | | any | any |
| Standards/regulations | | IEC 60664, DIN EN 50178, IEC 62103 | |
| Connection method | Field level | Screw connection | Screw connection |
| | Controller level | IDC/FLK pin strip (2.54 mm) | IDC/FLK pin strip (2.54 mm) |
| Connection data solid / stranded / AWG | | 0.2 ... 4 mm² / 0.2 ... 2.5 mm² / 24 - 12 | |
| Dimensions | H / D | 65.5 mm / 56 mm | |

### Technical data

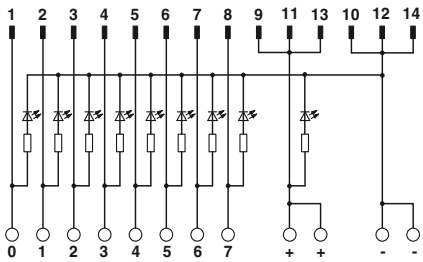
| | | VIP-2/.../FLK14/PLC | VIP-2/.../FLK14/LED/PLC |
|---|---|---|---|
| Max. perm. operating voltage | | 60 V AC/DC | 24 V DC |
| Max. perm. current (per branch) | | 1 A | 1 A |
| Max total current (voltage supply) | | 3 A | 3 A |
| Ambient temperature (operation) | | -20 °C ... 50 °C | -20 °C ... 50 °C |
| Mounting position | | any | any |
| Standards/regulations | | IEC 60664, DIN EN 50178, IEC 62103 | |
| Connection method | Field level | Push-in connection | Push-in connection |
| | Controller level | IDC/FLK pin strip (2.54 mm) | IDC/FLK pin strip (2.54 mm) |
| Connection data solid / stranded / AWG | | 0.14 ... 2.5 mm² / 0.14 ... 2.5 mm² / 26 - 14 | |
| Dimensions | H / D | 72.1 mm / 56 mm | |

### Ordering data

| Description | No. of pos. | Module width W | Type | Order No. | Pcs. / Pkt. |
|---|---|---|---|---|---|
| **VARIOFACE interface module,** for eight channels, | | | | | |
| - with screw connection | 14 | 39.8 mm | **VIP-2/SC/FLK14/PLC** | **2315214** | 1 |
| - with push-in connection | 14 | 41.9 mm | **VIP-2/PT/FLK14/PLC** | **2903801** | 1 |
| **VARIOFACE interface module**, for eight channels with light indicator, | | | | | |
| - with screw connection | 14 | 39.8 mm | **VIP-2/SC/FLK14/LED/PLC** | **2322249** | 1 |
| - with push-in connection | 14 | 41.9 mm | **VIP-2/PT/FLK14/LED/PLC** | **2904279** | 1 |




**VIP-2/SC/FLK14/PLC connection scheme**




**Connection scheme VIP-2/SC/FLK14/LED/PLC**

## VIP termination boards for 32 channels

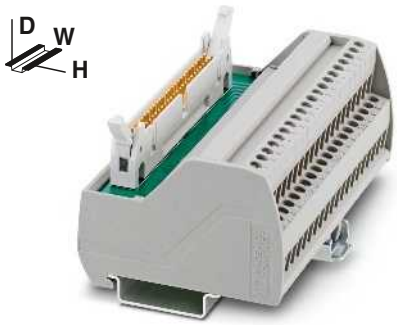
These VIP - VARIOFACE Professional modules are used in combination with 50-pos. system cables and the relevant front adapters.

### Features:

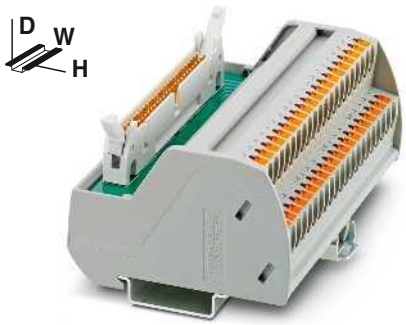
– Byte-by-byte marking
– For digital I/O modules
– With LED as an option

**Notes:**

For marking systems (e.g., “ZB 22:UNBEDRUCKT”; Order No. 0811862) and mounting material, see Catalog 5.




**Passive interface modules for input/output with screw connection**




**Passive interface modules for input/output with push-in connection**

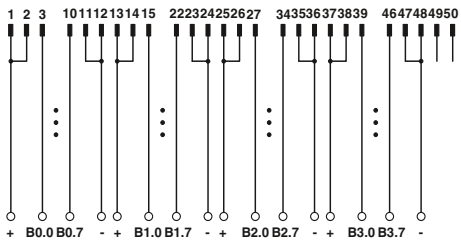
### Technical data

| | | VIP-2/.../FLK50/PLC | VIP-2/.../FLK50/LED/PLC |
|---|---|---|---|
| Max. perm. operating voltage | | 60 V AC/DC | 24 V DC |
| Max. perm. current (per branch) | | 1 A | 1 A |
| Max total current (voltage supply) | | 2 A (per byte) | 2 A (per byte) |
| 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 |
| | Controller level | IDC/FLK pin strip (2.54 mm) | IDC/FLK pin strip (2.54 mm) |
| Connection data solid / stranded / AWG | | 0.2 ... 4 mm² / 0.2 ... 2.5 mm² / 24 - 12 | |
| Dimensions | H / D | 65.5 mm / 56 mm | |

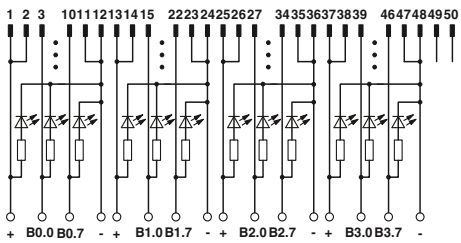
### Technical data

| | | VIP-2/.../FLK50/PLC | VIP-2/.../FLK50/LED/PLC |
|---|---|---|---|
| Max. perm. operating voltage | | 60 V AC/DC | 24 V DC |
| Max. perm. current (per branch) | | 1 A | 1 A |
| Max total current (voltage supply) | | 2 A (per byte) | 2 A (per byte) |
| 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 | Push-in connection | Push-in connection |
| | Controller level | IDC/FLK pin strip (2.54 mm) | IDC/FLK pin strip (2.54 mm) |
| Connection data solid / stranded / AWG | | 0.14 ... 2.5 mm² / 0.14 ... 2.5 mm² / 26 - 14 | |
| Dimensions | H / D | 72.1 mm / 56 mm | |

| Description | No. of pos. | Module width W | Type | Order No. | Pcs. / Pkt. | Type | Order No. | Pcs. / Pkt. |
|---|---|---|---|---|---|---|---|---|
| **VARIOFACE interface module,** for 32 channels, | | | | | | | | |
| - with screw connection | 50 | 106.1 mm | **VIP-2/SC/FLK50/PLC** | **2315227** | 1 | | | |
| - with push-in connection | 50 | 107.9 mm | | | | **VIP-2/PT/FLK50/PLC** | **2903803** | 1 |
| **VARIOFACE interface module,** for 32 channels with light indicator, | | | | | | | | |
| - with screw connection | 50 | 106.1 mm | **VIP-2/SC/FLK50/LED/PLC** | **2322252** | 1 | | | |
| - with push-in connection | 50 | 107.9 mm | | | | **VIP-2/PT/FLK50/LED/PLC** | **2904280** | 1 |




**VIP-2/SC/FLK50/PLC connection scheme**




**Connection scheme VIP-2/SC/FLK50/LED/PLC**

## VIP termination boards for SIMATIC® S7

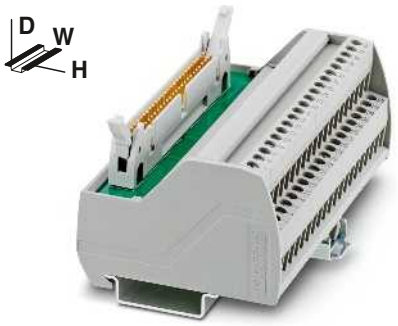
These VIP - VARIOFACE Professional modules are used in combination with 50-pos. system cables and the relevant front adapters for SIMATIC® S7.

### Features:

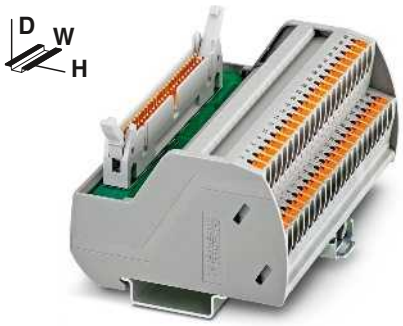
– Numerical marking
– Specifically for S7-300 or S7-400

**Notes:**

For marking systems (e.g., “ZB 22:UNBEDRUCKT”; Order No. 0811862) and mounting material, see Catalog 5.




**Passive interface modules for input/output, with SIMATIC®-specific marking and screw connection**



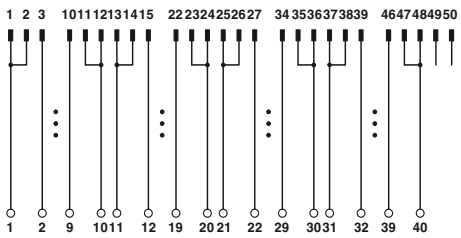

**Passive interface modules for input/output, with SIMATIC®-specific marking and push-in connection**

### Technical data

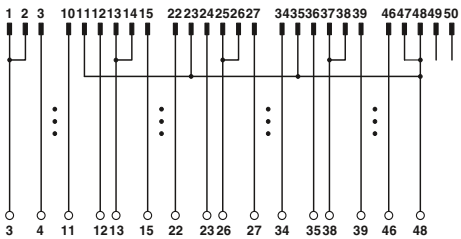
| | | | |
|---|---|---|---|
| Max. perm. operating voltage | | 60 V AC/DC | 60 V AC/DC |
| Max. perm. current (per branch) | | 1 A | 1 A |
| Ambient temperature (operation) | | -20 °C ... 50 °C | -20 °C ... 50 °C |
| Mounting position | | any | any |
| Standards/regulations | | IEC 60664, DIN EN 50178, IEC 62103 | IEC 60664, DIN EN 50178, IEC 62103 |
| Connection method | Field level | Screw connection | Push-in connection |
| | Controller level | IDC/FLK pin strip (2.54 mm) | IDC/FLK pin strip (2.54 mm) |
| Connection data solid / stranded / AWG | | 0.2 ... 4 mm² / 0.2 ... 2.5 mm² / 24 - 12 | 0.14 ... 2.5 mm² / 0.14 ... 2.5 mm² / 26 - 14 |
| Dimensions | H / D | 65.5 mm / 56 mm | 72.1 mm / 56 mm |

### Ordering data

| Description | No. of pos. | Module width W | Type | Order No. | Pcs. / Pkt. |
|---|---|---|---|---|---|
| **VARIOFACE interface module**, with SIMATIC® S7-300-specific marking from 1 to 40 | | | | | |
| - with screw connection | 50 | 106.1 mm | **VIP-2/SC/FLK50 (1-40) /S7** | **2315243** | 1 |
| - with push-in connection | 50 | 107.9 mm | **VIP-2/PT/FLK50 (1-40) /S7** | **2903804** | 1 |
| **VARIOFACE interface module**, with SIMATIC® S7-400-specific marking from 3 to 48 | | | | | |
| - with screw connection | 50 | 106.1 mm | **VIP-2/SC/FLK50/S7/A-S400** | **2322359** | 1 |
| - with push-in connection | 50 | 107.9 mm | **VIP-2/PT/FLK50/S7/A-S400** | **2904289** | 1 |




**Connection scheme VIP-2/.../FLK50 (1-40) /S7**




**Connection scheme VIP-2/.../FLK50/S7/A-S400**

## VIP termination boards for MODICON® TSX Quantum and Allen Bradley ControlLogix

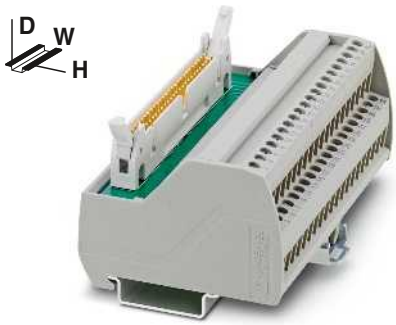
These VIP - VARIOFACE Professional modules are used in combination with 50-pos. system cables and the relevant front adapters.

### Features:

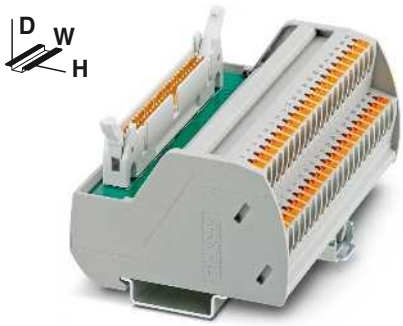
- Specific marking
- Specifically for MODICON TSX Quantum or ControlLogix

**Notes:**

For marking systems (e.g., "ZB 22:UNBEDRUCKT"; Order No. 0811862) and mounting material, see Catalog 5.



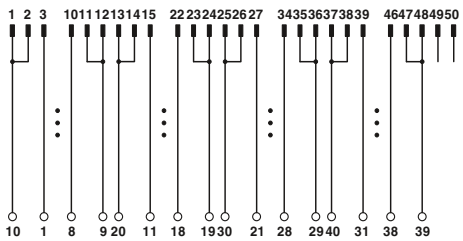

**Passive interface modules for input/output, with specific marking and screw connection**



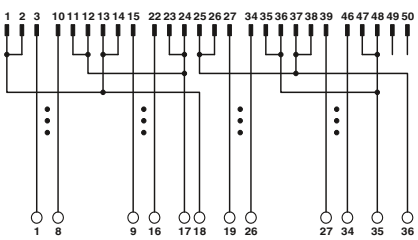

**Passive interface modules for input/output, with specific marking and push-in connection**

| | | Technical data | Technical data |
|---|---|---|---|
| Max. perm. operating voltage | | 60 V AC/DC | 60 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 | | IEC 60664, DIN EN 50178, IEC 62103 | IEC 60664, DIN EN 50178, IEC 62103 |
| Connection method | Field level | Screw connection | Push-in connection |
| | Controller level | IDC/FLK pin strip (2.54 mm) | IDC/FLK pin strip (2.54 mm) |
| Connection data solid / stranded / AWG | | 0.2 ... 4 mm² / 0.2 ... 2.5 mm² / 24 - 12 | 0.14 ... 2.5 mm² / 0.14 ... 2.5 mm² / 26 - 14 |
| Dimensions | H / D | 65.5 mm / 56 mm | 72.1 mm / 56 mm |

| Description | No. of pos. | Module width W | Ordering data: Type | Order No. | Pcs. / Pkt. | Ordering data: Type | Order No. | Pcs. / Pkt. |
|---|---|---|---|---|---|---|---|---|
| **VARIOFACE interface module**, with MODICON® TSX Quantum-specific marking from 1 to 40 | | | | | | | | |
| - with screw connection | 50 | 106.1 mm | **VIP-2/SC/FLK50/MODI-TSX/Q** | **2322304** | 1 | | | |
| - with push-in connection | 50 | 107.9 mm | | | | **VIP-2/PT/FLK50/MODI-TSX/Q** | **2904285** | 1 |
| **VARIOFACE interface module**, with ControlLogix-specific marking from 1 to 36 | | | | | | | | |
| - with screw connection | 50 | 95.9 mm | **VIP-2/SC/FLK50/AB-1756** | **2322317** | 1 | | | |
| - with push-in connection | 50 | 97.7 mm | | | | **VIP-2/PT/FLK50/AB-1756** | **2904286** | 1 |




**Connection scheme VIP-2/.../FLK50/MODI-TSX/Q**




**Connection scheme VIP-2/.../FLK50/AB-1756**

## VIP termination boards for Siemens SIMATIC® S7-300

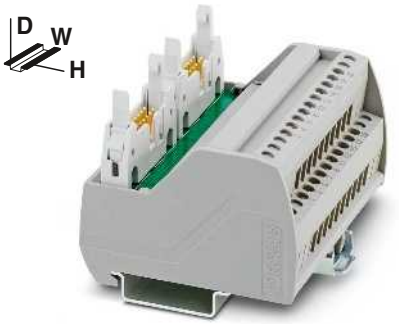
These VIP - VARIOFACE Professional modules are used in combination with two 14-pos. system cables and the relevant front adapters for Siemens SIMATIC® S7-300.

### Features:

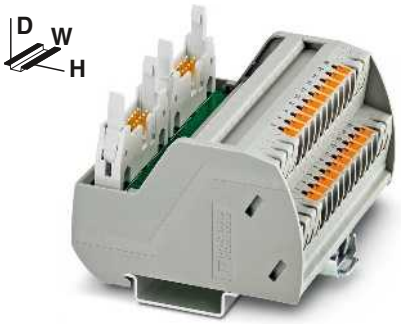
– Numerical marking (1-20)
– Specifically for S7-300

**Notes:**

For marking systems (e.g., “ZB 22:UNBEDRUCKT”; Order No. 0811862) and mounting material, see Catalog 5.




**Passive interface modules for SIMATIC® S7-300 with screw connection**



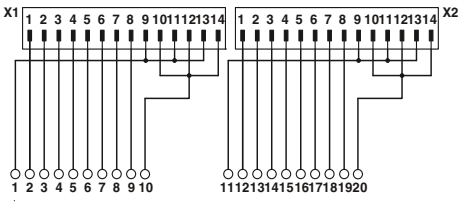

**Passive interface modules for SIMATIC® S7-300 with push-in connection**

### Technical data

| | | | |
|---|---|---|---|
| Max. perm. operating voltage | | 60 V AC/DC | 60 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 | | IEC 60664, DIN EN 50178, IEC 62103 | IEC 60664, DIN EN 50178, IEC 62103 |
| Connection method | Field level | Screw connection | Push-in connection |
| | Controller level | IDC/FLK pin strip (2.54 mm) | IDC/FLK pin strip (2.54 mm) |
| Connection data solid / stranded / AWG | | 0.2 ... 4 mm² / 0.2 ... 2.5 mm² / 24 - 12 | 0.14 ... 2.5 mm² / 0.14 ... 2.5 mm² / 26 - 14 |
| Dimensions | H / D | 65.5 mm / 56 mm | 72.1 mm / 56 mm |

### Ordering data

| Description | No. of pos. | Module width W | Type | Order No. | Pcs. / Pkt. |
|---|---|---|---|---|---|
| **VARIOFACE interface module**, with SIMATIC® S7-300-specific marking from 1 to 20 | | | | | |
| - with screw connection | 14 | 80.6 mm | **VIP-2/SC/2FLK14 (1-20) /S7** | **2315230** | 1 |
| - with push-in connection | 14 | 82.5 mm | **VIP-2/PT/2FLK14 (1-20) /S7** | **2903802** | 1 |




**Connection diagram: VIP-2/.../2FLK14 (1-20) /S7**

## VIP termination boards for Allen Bradley

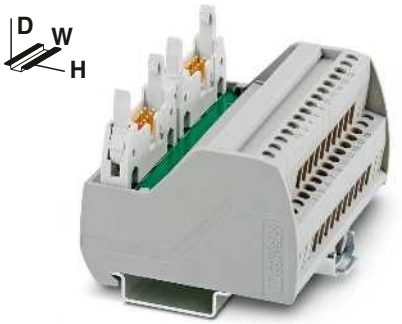
These VIP - VARIOFACE Professional modules are used in combination with two 14-pos. system cables and the relevant front adapters for Allen Bradley.

### Features:

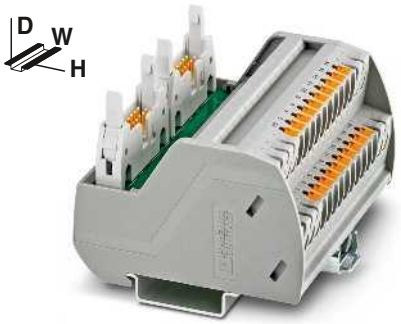
– Numerical marking (1-20)
– Specifically for ControlLogix

**Notes:**

For marking systems (e.g., “ZB 22:UNBEDRUCKT”; Order No. 0811862) and mounting material, see Catalog 5.




**Passive interface modules for Allen Bradley ControlLogix with screw connection**




**Passive interface modules for Allen Bradley ControlLogix with push-in connection**

### Technical data

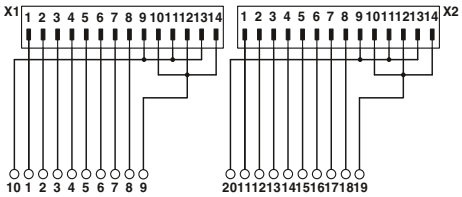
| | | |
|---|---|---|
| Max. perm. operating voltage | | 60 V AC/DC |
| Max. perm. current (per branch) | | 1 A |
| Ambient temperature (operation) | | -20 °C ... 50 °C |
| Mounting position | | any |
| Standards/regulations | | IEC 60664, DIN EN 50178, IEC 62103 |
| Connection method | Field level | Screw connection |
| | Controller level | IDC/FLK pin strip (2.54 mm) |
| Connection data solid / stranded / AWG | | 0.2 ... 4 mm² / 0.2 ... 2.5 mm² / 24 - 12 |
| Dimensions | H / D | 65.5 mm / 56 mm |

### Technical data

| | | |
|---|---|---|
| Max. perm. 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 method | Field level | Push-in connection |
| | Controller level | IDC/FLK pin strip (2.54 mm) |
| Connection data solid / stranded / AWG | | 0.2 ... 4 mm² / 0.2 ... 2.5 mm² / 24 - 12 |
| Dimensions | H / D | 72.1 mm / 56 mm |

### Ordering data

| Description | No. of pos. | Module width W | Type | Order No. | Pcs. / Pkt. |
|---|---|---|---|---|---|
| **VARIOFACE interface module**, with ControlLogix-specific marking from 1 to 20 | | | | | |
| - with screw connection | 14 | 80.6 mm | **VIP-2/SC/2FLK14/AB-1756** | **2322333** | 1 |
| - with push-in connection | 14 | 82.5 mm | **VIP-2/PT/2FLK14/AB-1756** | **2904288** | 1 |




**Connection scheme VIP-2/.../2FLK14/AB-1756**

## VIP termination boards in 2-conductor connection technology for 8 channels

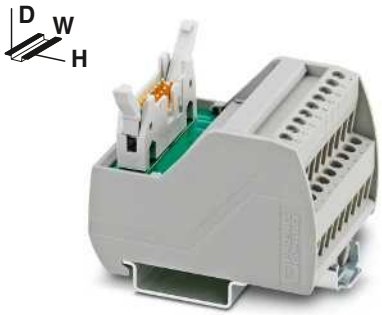
These VIP VARIOFACE modules are used in combination with 14-pos. system cables and the relevant front adapters.

### Features:

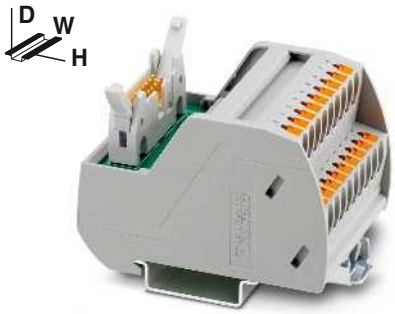
- Byte-by-byte marking
- For digital I/O modules
- Negative or positive connection per signal

**Notes:**

For marking systems (e.g., “ZB 22:UNBEDRUCKT”; Order No. 0811862) and mounting material, see Catalog 5.




**Passive interface modules with screw connection**




**Passive interface modules with push-in connection**

### Technical data

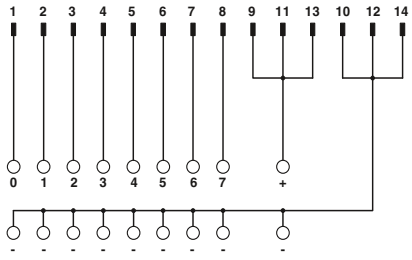
| | | |
|---|---|---|
| Max. perm. operating voltage | | 60 V DC |
| Max. perm. current (per branch) | | 1 A |
| Max total current (voltage supply) | | 3 A (per byte) |
| Ambient temperature (operation) | | -20 °C ... 50 °C |
| Mounting position | | any |
| Standards/regulations | | IEC 60664, DIN EN 50178, IEC 62103 |
| Connection method | Field level | Screw connection |
| | Controller level | IDC/FLK pin strip (2.54 mm) |
| Connection data solid / stranded / AWG | | 0.2 ... 4 mm² / 0.2 ... 2.5 mm² / 24 - 12 |
| Dimensions | H / D | 65.5 mm / 56 mm |

### Technical data

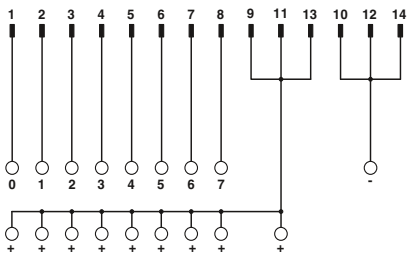
| | | |
|---|---|---|
| Max. perm. operating voltage | | 60 V AC/DC |
| Max. perm. current (per branch) | | 1 A |
| Max total current (voltage supply) | | 3 A (per byte) |
| Ambient temperature (operation) | | -20 °C ... 50 °C |
| Mounting position | | any |
| Standards/regulations | | IEC 60664, DIN EN 50178, IEC 62103 |
| Connection method | Field level | Push-in connection |
| | Controller level | IDC/FLK pin strip (2.54 mm) |
| Connection data solid / stranded / AWG | | 0.14 ... 2.5 mm² / 0.14 ... 2.5 mm² / 26 - 14 |
| Dimensions | H / D | 72.1 mm / 56 mm |

### Ordering data

| Description | No. of pos. | 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 | | | | | |
| - with screw connection | 14 | 50 mm | **VIP-2/SC/FLK14/8M/PLC** | **2322281** | 1 |
| - with push-in connection | 14 | 52 mm | **VIP-2/PT/FLK14/8M/PLC** | **2904283** | 1 |
| **VARIOFACE interface module**, for eight channels, each with an additional terminal block per signal for a common plus potential | | | | | |
| - with screw connection | 14 | 50 mm | **VIP-2/SC/FLK14/8P/PLC** | **2322294** | 1 |
| - with push-in connection | 14 | 52 mm | **VIP-2/PT/FLK14/8P/PLC** | **2904284** | 1 |




**Connection scheme VIP-2/.../FLK14/8M/PLC**




**Connection scheme VIP-2/.../FLK14/8P/PLC**

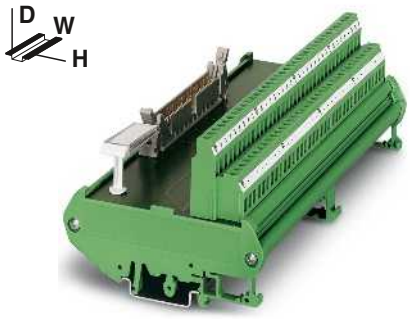
## Termination boards in 2-conductor connection technology for 32 channels

These VARIOFACE modules are used in combination with 50-pos. system cables and the relevant front adapters.

The following module types with 2-conductor connection technology are available:

### FLKM 50/32M/PLC
– Byte-by-byte marking
– For digital I/O modules
– Negative connection per signal

### FLKM 50/32P/PLC
– Byte-by-byte marking
– For digital I/O modules
– Positive connection per signal



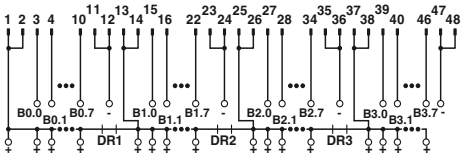

**Passive interface modules with screw connection**

### Technical data

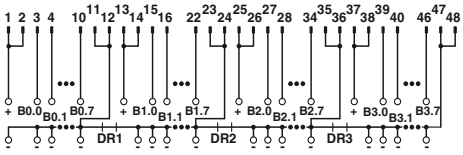
| | | |
|---|---|---|
| Max. perm. operating voltage | | 60 V DC |
| Max. perm. current (per branch) | | 1 A |
| Max total current (voltage supply) | | 8 A (per byte) |
| Ambient temperature (operation) | | -20 °C ... 50 °C |
| Mounting position | | any |
| Standards/regulations | | DIN EN 50178, IEC 60664, IEC 62103 |
| Connection method | Field level | Screw connection |
| | Controller level | IDC/FLK pin strip (2.54 mm) |
| 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 pos. | 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**

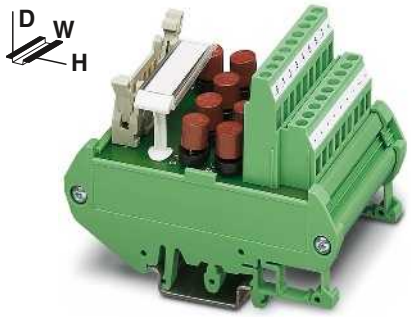
## Termination boards with fuses in 2-conductor connection technology

These VARIOFACE modules are used in combination with 14 or 50-pos. system cables and the relevant front adapters.

The following module types with fuses and 2-conductor connection technology are available:

**FLKM 14/8M/SI/PLC (for 8 channels)**
**FLKM 50/32M/SI/PLC (for 32 channels)**

- Byte-by-byte marking
- Can be used for digital I/O modules
- Plug-in fuse (IEC 127-3, 1AF) per signal path (F1)
- Plug-in fuse (IEC 127-3, 2AF) per voltage supply (F2)
- Negative connection per signal.



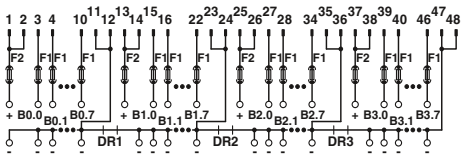

**Passive fuse modules for 8 or 32 channels**

### Technical data

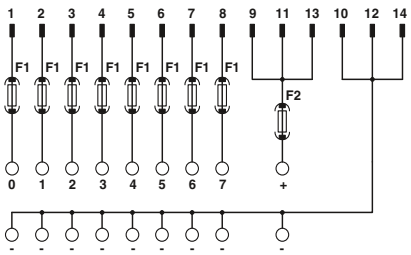
| | | FLKM 14/8M/SI/PLC | FLKM 50/32M/SI/PLC |
|---|---|---|---|
| Max. perm. operating voltage | | 60 V DC | 60 V DC |
| Max. perm. current (per branch) | | 1 A | 1 A |
| Max total current (voltage supply) | | 2 A | 2 A (per byte) |
| Ambient temperature (operation) | | -20 °C ... 50 °C | -20 °C ... 50 °C |
| Mounting position | | any | any |
| Standards/regulations | | DIN EN 50178, IEC 60664, IEC 62103 | |
| Connection method | Field level | Screw connection | Screw connection |
| | Controller level | IDC/FLK pin strip (2.54 mm) | IDC/FLK pin strip (2.54 mm) |
| 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 pos. | 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 for 8 channels

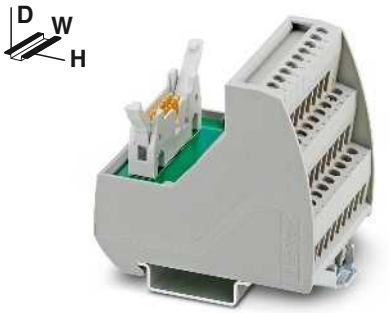
These VIP - VARIOFACE Professional modules are used in combination with 14-pos. system cables and the relevant front adapters.

### Features:

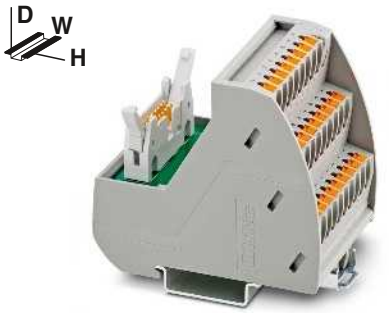
- Byte-by-byte marking
- For digital I/O modules
- Positive and negative connection per signal
- With LED as an option

**Notes:**

For marking systems (e.g., "ZB 22:UNBEDRUCKT"; Order No. 0811862) and mounting material, see Catalog 5.




**Initiator modules with screw connection**




**Initiator modules with push-in connection**

### Technical data

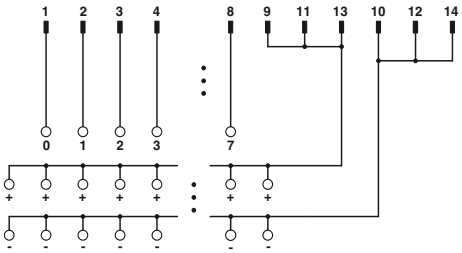
| | | VIP-3/SC/FLK14/8IM/PLC | VIP-3/SC/FLK14/8IM/LED/PLC |
|---|---|---|---|
| Max. perm. operating voltage | | 60 V DC | 24 V DC |
| Max. perm. current (per branch) | | 1 A | 1 A |
| Max total current (voltage supply) | | 3 A | 3 A |
| Ambient temperature (operation) | | -20 °C ... 50 °C | -20 °C ... 50 °C |
| Mounting position | | any | any |
| Standards/regulations | | IEC 60664, DIN EN 50178, IEC 62103 | |
| Connection method | Field level | Screw connection | Screw connection |
| | Controller level | IDC/FLK pin strip (2.54 mm) | IDC/FLK pin strip (2.54 mm) |
| Connection data solid / stranded / AWG | | 0.2 ... 4 mm² / 0.2 ... 2.5 mm² / 24 - 12 | |
| Dimensions | H / D | 69 mm / 62 mm | |

### Technical data

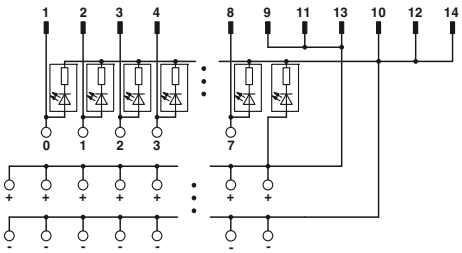
| | VIP-3/PT/FLK14/8IM/PLC | VIP-3/PT/FLK14/8IM/LED/PLC |
|---|---|---|
| Max. perm. operating voltage | 60 V AC/DC | 24 V DC |
| Max. perm. current (per branch) | 1 A | 1 A |
| Max total current (voltage supply) | 3 A | 3 A |
| Ambient temperature (operation) | -20 °C ... 50 °C | -20 °C ... 50 °C |
| Mounting position | any | any |
| Standards/regulations | IEC 60664, DIN EN 50178, IEC 62103 | |
| Connection method | Push-in connection | Push-in connection |
| | IDC/FLK pin strip (2.54 mm) | IDC/FLK pin strip (2.54 mm) |
| Connection data solid / stranded / AWG | 0.14 ... 2.5 mm² / 0.14 ... 2.5 mm² / 26 - 14 | |
| Dimensions | 75.8 mm / 63 mm | |

### Ordering data

| Description | No. of pos. | Module width W | Type | Order No. | Pcs. / Pkt. |
|---|---|---|---|---|---|
| **VARIOFACE initiator module**, for connecting 8 PNP initiators, with an additional positive and negative terminal block each per signal | | | | | |
| - with screw connection | 14 | 52.3 mm | **VIP-3/SC/FLK14/8IM/PLC** | **2322278** | 1 |
| - with push-in connection | 14 | 52 mm | **VIP-3/PT/FLK14/8IM/PLC** | **2904282** | 1 |
| **VARIOFACE initiator module with LED**, for connecting 8 PNP initiators, with an additional positive and negative terminal block each per signal | | | | | |
| - with screw connection | 14 | 52.3 mm | **VIP-3/SC/FLK14/8IM/LED/PLC** | **2322265** | 1 |
| - with push-in connection | 14 | 52 mm | **VIP-3/PT/FLK14/8IM/LED/PLC** | **2904281** | 1 |




**Connection scheme VIP-3/.../FLK14/8IM/PLC**



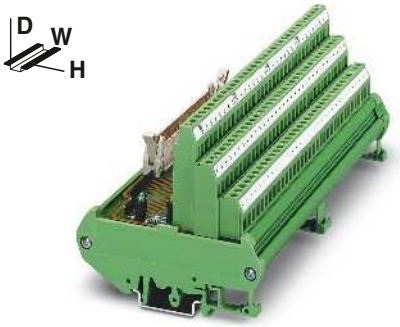

**Connection scheme VIP-3/.../FLK14/8IM/LED/PLC**

## Initiator modules for 32 channels

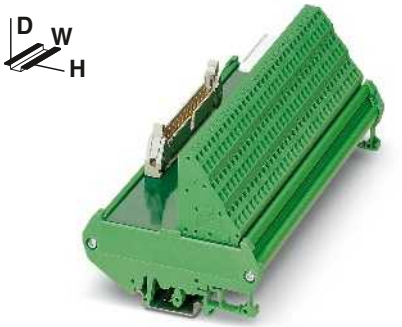
These VARIOFACE modules are used in combination with 50-pos. system cables and the relevant front adapters for digital I/O modules.

**Features:**

– Byte-by-byte marking
– Positive and negative connection per signal
– With LED as an option



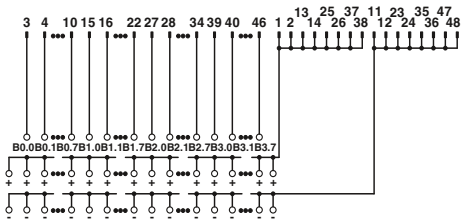

**Initiator modules for 32 channels, with screw connection**



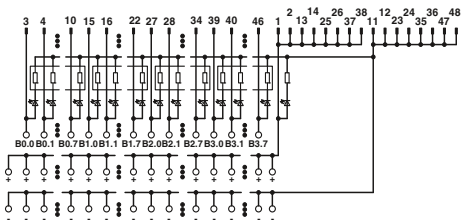

**Initiator modules for 32 channels, with spring-cage connection**

| | | Technical data | | Technical data |
|---|---|---|---|---|
| | | ... 50/32 IM | ... 50/32 IM/LA | |
| Max. perm. operating voltage | | 60 V DC | 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 | | - | LED | - |
| Ambient temperature (operation) | | -20 °C ... 50 °C | -20 °C ... 50 °C | -20 °C ... 50 °C |
| Mounting position | | any | any | any |
| Standards/regulations | | DIN EN 50178, IEC 60664, IEC 62103 | | DIN EN 50178, IEC 60664, IEC 62103 |
| Connection method | Field level | Screw connection | Screw connection | Spring-cage connection |
| | Controller level | IDC/FLK pin strip (2.54 mm) | IDC/FLK pin strip (2.54 mm) | IDC/FLK pin strip (2.54 mm) |
| 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 pos. | 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**, as above, however with light indicator | 50 | 180 mm | **FLKMS 50/32IM/LA/PLC** | **2284510** | 1 | | | |
| **VARIOFACE initiator module**, for connection of 32 PNP initiators | 50 | 180 mm | | | | **FLKMS 50/32IM/ZFKDS/PLC** | **2901389** | 1 |




**Connection scheme: FLKMS 50/32IM/PLC, ...50/32IM/ZFKDS/PLC**




**FLKMS 50/32IM/LA/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-by-byte marking
– Can be used for digital I/O modules

### FLKM-2FLK14/KDS3-MT/PPA/S7

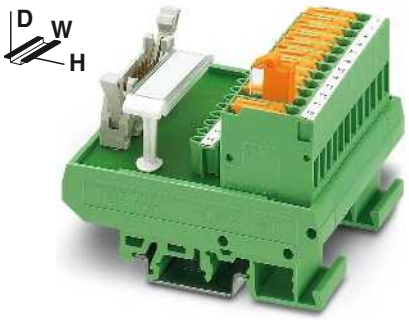
– Numerical marking (1-20)
– Specifically for S7-300
(in conjunction with the front adapter FLKM 14-PA-S300, Order No.: 2299770)

### FLKM 50/KDS3-MT/PPA/7-300

– Numerical marking (1-40)
– Specifically for S7-300
(in conjunction with the front adapter FLKM 50-PA-S300, Order No.: 2294445).

### FLKM 50/KDS3-MT/PPA/AN/PLC

– Numerical marking (1-50)
– Specifically for S7-400
(in conjunction with the front adapter FLKM 50-PA-S400 (3-48)
Order No.: 2294908).



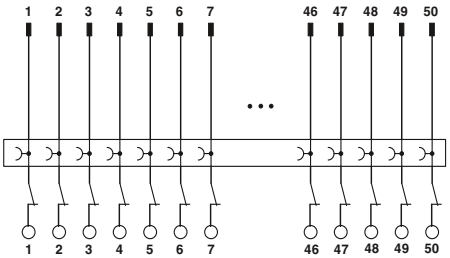

**Passive interface modules for eight or 32 channels with knife disconnect terminal blocks**

### Technical data

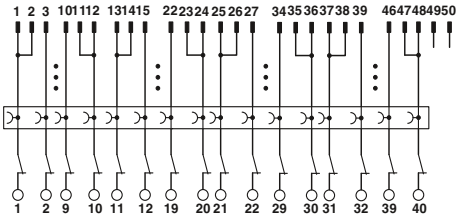
| | | | |
|---|---|---|---|
| | | FLKM...14/KDS 3-MT... | FLKM 50/KDS 3-MT... |
| Max. perm. operating voltage | | 60 V DC | 60 V DC |
| Max. perm. current (per branch) | | 1 A | 1 A |
| Max total current (voltage supply) | | 3 A | 2 A (per byte) |
| Ambient temperature (operation) | | -20 °C ... 50 °C | -20 °C ... 50 °C |
| Mounting position | | any | any |
| Standards/regulations | | DIN EN 50178, IEC 60664, IEC 62103 | |
| Connection method | Field level | Screw connection with disconnect knife | Screw connection with disconnect knife |
| | Controller level | IDC/FLK pin strip (2.54 mm) | IDC/FLK pin strip (2.54 mm) |
| 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

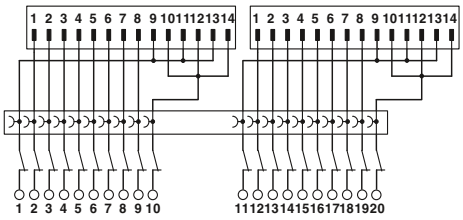
| Description | No. of pos. | Module width W | Type | Order No. | Pcs. / Pkt. |
|---|---|---|---|---|---|
| **VARIOFACE interface module**, for eight channels, with knife disconnect terminal blocks and test sockets to the field and the system | 14 | 67 mm | **FLKM 14/KDS3-MT/PPA/PLC** | **2290423** | 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 marking (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**, as above, however, with SIMATIC-specific marking (1-40) | 50 | 214 mm | **FLKM 50/KDS3-MT/PPA/S7-300** | **2304490** | 1 |
| **VARIOFACE interface module**, as above, however, for SIMATIC S7-400 with SIMATIC-specific marking (3-48) | 50 | 259 mm | **FLKM 50/KDS3-MT/PPA/AN/PLC** | **2291587** | 1 |



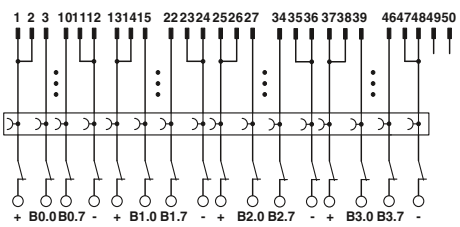

**FLKM 50/KDS3-MT/PPA/AN/PLC connection scheme**



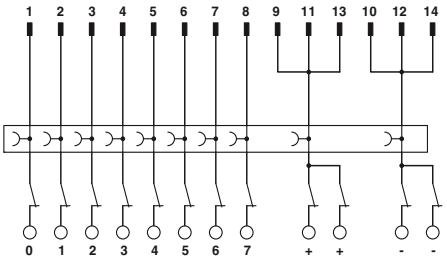

**FLKM 50/KDS3-MT/PPA/S7-300 connection scheme**




**FLKM-2FLK14/KDS3-MT/PPA/S7 connection scheme**




**FLKM 50/KDS3-MT/PPA/PLC connection scheme**




**FLKM 14/KDS3-MT/PPA/PLC connection scheme**

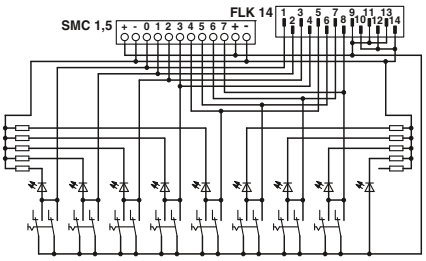
## Simulation module with switches

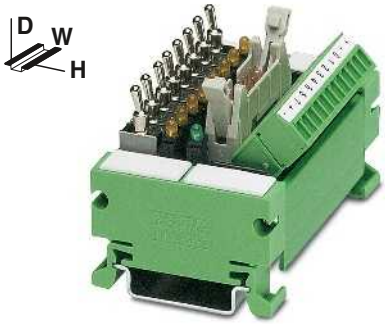
These VARIOFACE modules enable simple simulation of the control and peripheral hardware for 8 signals.

The UM 45-DI/DO/S/LA/SIM8 switch module is assembled for signal transmission with COMBICON screw connector for single-conductor wiring. Alternatively, connection to the PLC system cabling is established through a 14-pos. flat-ribbon cable pin strip. Connection to the front adapters of the PLC system cabling is established through 14-pos. 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:<br>Terminal blocks: Polyamide PA non-reinforced, color: green.<br>Housing: PVC |
| Marking systems and mounting material<br>See Catalog 5 |




Switch module

### Technical data

| | |
|---|---|
| Max. perm. operating voltage | 30 V DC |
| Max. perm. current (per branch) | 1 A |
| Max total current (voltage supply) | 8 A (+, - terminal block) |
| Ambient temperature (operation) | -20 °C ... 50 °C |
| Mounting position | any |
| Standards/regulations | DIN EN 50178, IEC 60664, 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 pos. | Module width W | Type | Order No. | Pcs. / Pkt. |
|---|---|---|---|---|---|
| **VARIOFACE switch module**, for simulation | | 75 mm | **UM 45-DI/DO/S/LA/SIM8** | **2968205** | 1 |

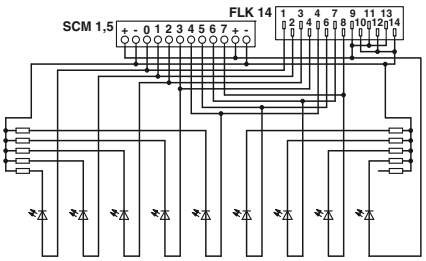
## Simulation module for display

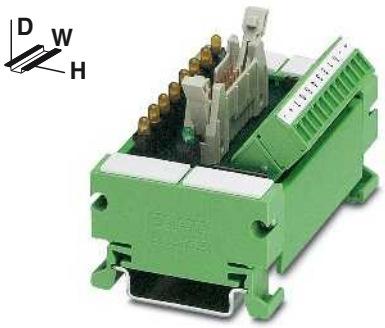
These VARIOFACE modules enable simple simulation of the control and peripheral hardware for 8 signals.

The UM 45-DO/LA/SIM8 display module is assembled for signal transmission with COMBICON screw connector for single-conductor wiring. Alternatively, connection to the PLC system cabling is established through a 14-pos. flat-ribbon cable pin strip. Connection to the front adapters of the PLC system cabling is established through 14-pos. 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:<br>Terminal blocks: Polyamide PA non-reinforced, color: green.<br>Housing: PVC |
| Marking systems and mounting material<br>See Catalog 5 |




Indicator module

### Technical data

| | |
|---|---|
| Max. perm. operating voltage | 30 V DC |
| Max. perm. current (per branch) | 1 A |
| Max total current (voltage supply) | 8 A (+, - terminal block) |
| Ambient temperature (operation) | -20 °C ... 50 °C |
| Mounting position | any |
| Standards/regulations | DIN EN 50178, IEC 60664, 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 pos. | Module width W | Type | Order No. | Pcs. / Pkt. |
|---|---|---|---|---|---|
| **VARIOFACE display module**, for simulation | | 75 mm | **UM 45-DO/LA/SIM8** | **2968195** | 1 |

## 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-pos. or 50-pos. system cables. The following features characterize these relay modules:

- Plug-in 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
- Freewheeling and reverse polarity protection diode for each signal path

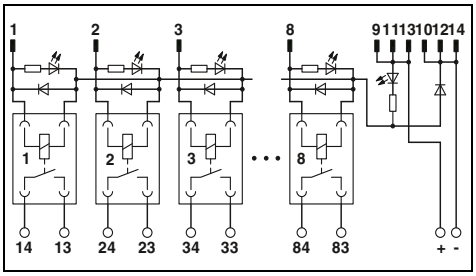
With the 32-channel version, the system cable is connected to the 16-channel base module UM 45-16RM/MR-G24/1/PLC. The output extension module UM 45-16RM/MR-G24/1/E/PLC with a further 16 channels is coupled to the base module via a 20-position flat-ribbon cable (length: 10 cm).

**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, 1 N/O contact**




### Technical data

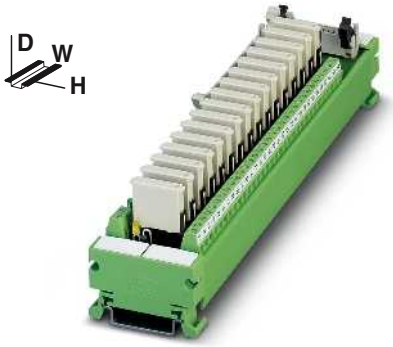
| | | |
|---|---|---|
| Coil side | | |
| Operating voltage $U_N$ | | 24 V DC |
| Typ. input current at $U_N$ | | 6.5 mA |
| Typ. response time at $U_N$ | | 5 ms |
| Typ. release time at $U_N$ | | 15 ms |
| Input circuit | | Freewheeling diode, protection against polarity reversal |
| Status display/channel | | Yellow LED |
| Connection method | | IDC/FLK pin strip (2.54 mm) |
| No. of pos. | | 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 | | |
| Rated insulation voltage | | 260 V AC |
| Rated surge voltage | | 4 kV (basic insulation) |
| Pollution degree / Surge voltage category | | 2 / III |
| Ambient temperature (operation) | | -20 °C ... 50 °C |
| Nominal operating mode | | 100% operating factor |
| Mechanical service life | | 2 x $10^7$ cycles |
| Standards/regulations | | DIN EN 50178, IEC 60664, IEC 62103 |
| Mounting position | | any |
| Mounting | | Can be aligned without spacing |
| Dimensions | H / D | 45 mm / 50 mm |
| EMC note | | Class A product, see page 625 |

### Ordering data

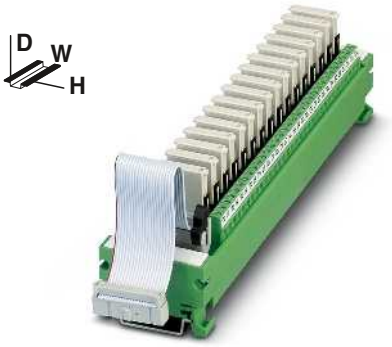
| Description | Module width W | Type | Order No. | Pcs. / Pkt. |
|---|---|---|---|---|
| **VARIOFACE COMPACT LINE output module,** for 24 V DC (including relays) | | | | |
| - with 8 miniature relays | 103 | **UM 45- 8RM/MR-G24/1/PLC** | **2962900** | 1 |
| - with 16 miniature relays (basic module) | 215 | | | |
| - with 16 miniature relays (extension module) | 200 | | | |

### Accessories

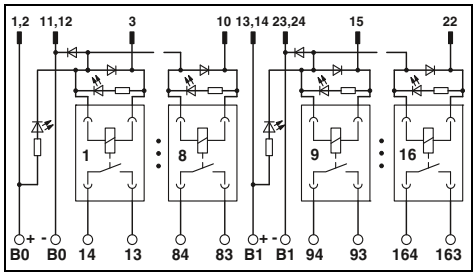
| | | | |
|---|---|---|---|
| **Plug-in miniature relay** | **REL-MR-G 24/1** | **2961037** | 8 |

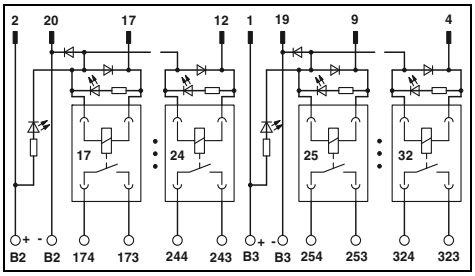



**Output base module with 16 miniature relays, 1 N/O contact**




**Output extension module with 16 miniature relays, 1 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 |
| Freewheeling diode, protection against polarity reversal | Freewheeling diode, protection against polarity reversal |
| Yellow LED | Yellow LED |
| IDC/FLK pin strip (2.54 mm) | IDC/FLK pin strip (2.54 mm) |
| 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 |
| 260 V AC | 260 V AC |
| 4 kV (basic insulation) | 4 kV (basic insulation) |
| 2 / III | 2 / III |
| -20 °C ... 50 °C | -20 °C ... 50 °C |
| 100% operating factor | 100% operating factor |
| 2 x $10^7$ cycles | 2 x $10^7$ cycles |
| DIN EN 50178, IEC 60664, IEC 62103 | DIN EN 50178, IEC 60664, IEC 62103 |
| any | any |
| Can be aligned without spacing | Can be aligned without spacing |
| 45 mm / 50 mm | 45 mm / 50 mm |
| Class A product, see page 625 | Class A product, see page 625 |

## 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 |

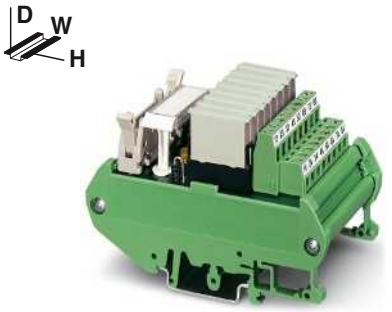
## Accessories

| | | |
|---|---|---|
| **REL-MR-G 24/1** | **2961037** | 8 |

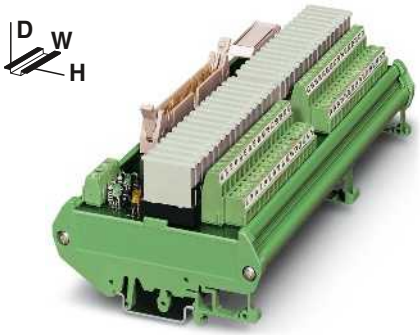
## Output modules with relays, one N/O contact

These VARIOFACE output modules are used in combination with the respective front adapters.

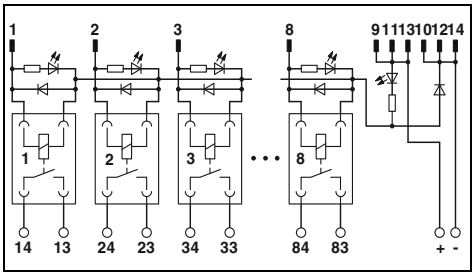
- Plug-in miniature relays, each with an N/O contact
- Universal applications from 1 mA to 3 A continuous current through 2-layer double contact with hard gold plating
- Narrow overall width of just 55 mm (8 channels) or 202 mm (32 channels)
- LED status display for each signal path and supply voltage
- Freewheeling and reverse polarity protection diode for each signal path

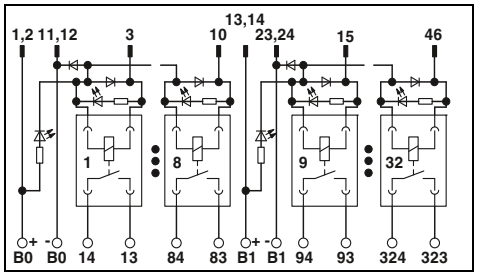



**Output module with eight miniature relays, 1 N/O contact**




**Output module with 32 miniature relays, 1 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 | | Freewheeling diode, protection against polarity reversal | Freewheeling diode, protection against polarity reversal |
| Status display/channel | | Yellow LED | Yellow LED |
| Connection method | | IDC/FLK pin strip (2.54 mm) | IDC/FLK pin strip (2.54 mm) |
| No. of pos. | | 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 | | | |
| Rated insulation voltage | | 260 V AC | 260 V AC |
| Rated surge voltage | | 4 kV (basic insulation) | 4 kV (basic insulation) |
| 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 | | 2 x $10^7$ cycles | 2 x $10^7$ cycles |
| Standards/regulations | | DIN EN 50178, IEC 60664, IEC 62103 | DIN EN 50178, IEC 60664, IEC 62103 |
| Mounting position | | any | any |
| Mounting | | Can be aligned without spacing | Can be aligned without spacing |
| Dimensions | H / D | 90 mm / 58 mm | 90 mm / 58 mm |
| EMC note | | Class A product, see page 625 | Class A product, see page 625 |

**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) | 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**

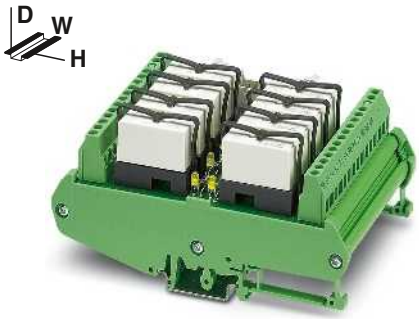
| | | | |
|---|---|---|---|
| **Plug-in miniature relay** | **REL-MR-G 24/1** | **2961037** | 8 |
| | **REL-MR-G 24/1** | **2961037** | 8 |

## Output modules with relay, 1 PDT

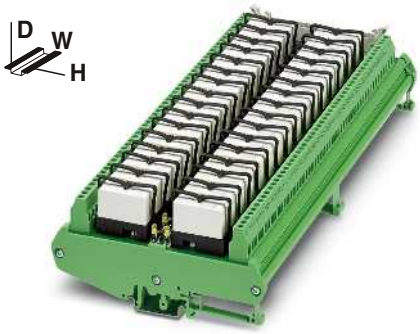
These VARIOFACE output modules are used in combination with the respective front adapters.

Like the front adapters, the modules are connected via 14-pos. or 50-pos. system cables. The following features characterize these relay modules:

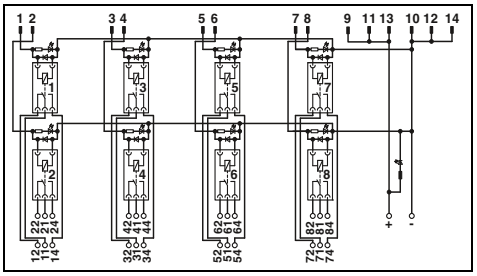
- Plug-in miniature relays, each with a PDT contact
- Narrow overall width of just 80 mm (8 channels) or 271 mm (32 channels)
- LED status display for each signal path and supply voltage
- Freewheeling diode for each signal path

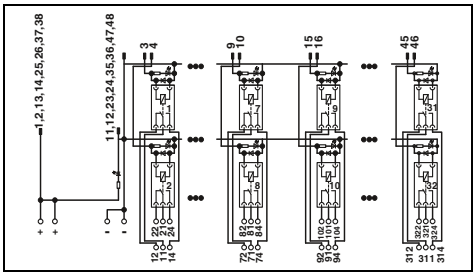



**Output module with eight miniature relays, 1 PDT**




**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 | | Freewheeling diode | Freewheeling diode |
| Status display/channel | | Yellow LED | Yellow LED |
| Connection method | | IDC/FLK pin strip (2.54 mm) | IDC/FLK pin strip (2.54 mm) |
| No. of pos. | | 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 | | | |
| Rated insulation voltage | | 260 V AC | 260 V AC |
| Rated surge voltage | | 4 kV (basic insulation between output contact current paths)<br>6 kV (safe isolation and reinforced insulation between input circuit and output contact paths) | 4 kV (basic insulation between output contact current paths)<br>6 kV (safe isolation and reinforced insulation between input circuit and output contact paths) |
| 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 | 3 x $10^7$ cycles |
| Standards/regulations | | DIN EN 50178, IEC 60664, IEC 62103 | DIN EN 50178, IEC 60664, IEC 62103 |
| Mounting position | | any | any |
| Mounting | | Can be aligned without spacing | Can be aligned without spacing |
| Dimensions | H / D | 123 mm / 68 mm | 123 mm / 68 mm |
| EMC note | | Class A product, see page 625 | Class A product, see page 625 |

| Description | Module width W | Ordering data: Type | Order No. | Pcs. / Pkt. | Ordering data: Type | Order No. | Pcs. / Pkt. |
|---|---|---|---|---|---|---|---|
| **VARIOFACE output module,** for 24 V DC (incl. relay) | | | | | | | |
| - with 8 miniature relays | 80 | **UM- 8 RM/RT-G24/21/PLC** | **2968386** | 1 | | | |
| - with 32 miniature relays | 271 | | | | **UM-32 RM/RT-G24/21/PLC** | **2968373** | 1 |
| | | **Accessories** | | | **Accessories** | | |
| **Plug-in miniature relay** | | **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.

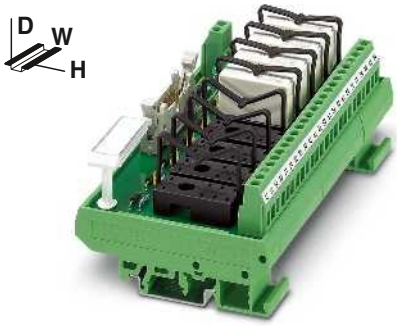
Like the front adapters, the modules are connected via 14-pos. or 50-pos. system cables. The following features characterize these relay modules:

– Plug-in miniature relays, each with a PDT contact
– LED status display for each signal path and supply voltage
– Freewheeling and reverse polarity protection diode for each signal path

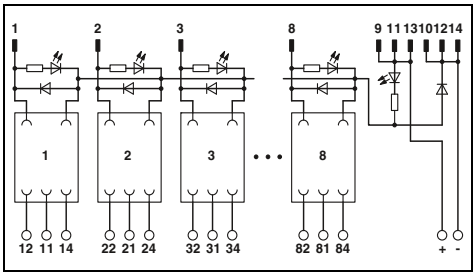
With the 32-channel version, the system cable is connected to the base module with the 16-channel UMK-16R.../KSR-G24/21/PLC. The output extension module UMK-16R.../ KSR-G24/21/E/PLC with a further 16 channels is coupled to the base module via a 20-position flat-ribbon cable (length: 10 cm).

**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

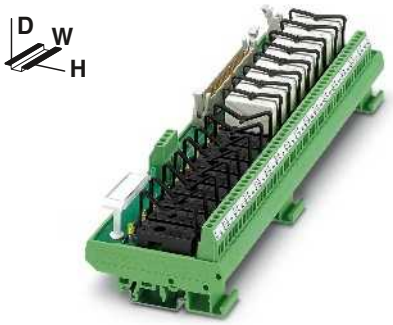
| | | |
|---|---|---|
| Coil side | | |
| Operating voltage $U_N$ | | 24 V DC ±10 % |
| Input circuit | | Freewheeling diode, protection against polarity reversal |
| Operating voltage display | | Green LED |
| Status display/channel | | Yellow LED |
| Connection method | | IDC/FLK pin strip (2.54 mm) |
| No. of pos. | | 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 | | |
| Rated insulation voltage | | 260 V AC |
| Rated surge voltage | | 4 kV (basic insulation between output contact current paths)<br>6 kV (safe isolation and reinforced insulation between input circuit and output contact paths) |
| Pollution degree / Surge voltage category | | 2 / III |
| Ambient temperature (operation) | | -20 °C ... 50 °C |
| Standards/regulations | | DIN EN 50178, IEC 60664, IEC 62103 |
| Mounting position | | any |
| Mounting | | Can be aligned without spacing |
| Dimensions | H / D | 77 mm / 59 mm |
| EMC note | | Class A product, see page 625 |

### Ordering data

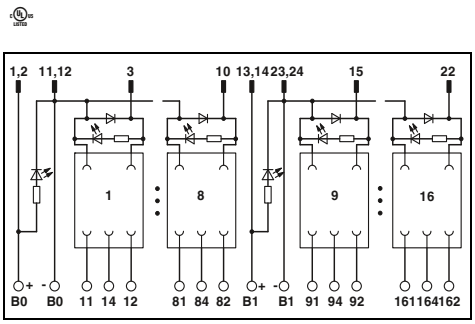
| Description | Module width W | Type | Order No. | Pcs. / Pkt. |
|---|---|---|---|---|
| **VARIOFACE output module,** for 24 V DC | | | | |
| - with 8 plug-in bases including relay | 135 | **UMK- 8 RM/KSR-G 24/21/PLC** | **2979485** | 1 |
| - with 8 plug-in bases without relay | 135 | **UMK- 8 RELS/KSR-G24/21/PLC** | **2974914** | 1 |
| **VARIOFACE output basic module,** for 24 V DC | | | | |
| - with 16 plug-in bases including relay | 259 | | | |
| - with 16 plug-in bases without relay | 259 | | | |
| **VARIOFACE output extension module,** for 24 V DC | | | | |
| - with 16 plug-in bases including relay | 259 | | | |
| - with 16 plug-in bases without relay | 259 | | | |

### Accessories

| | | | |
|---|---|---|---|
| **Plug-in miniature relay** | **REL-MR- 24DC/21HC** | **2961312** | 10 |




**Output base module with 16 miniature relays, 1 PDT**




## Technical data

| |
|---|
| 24 V DC ±10 % |
| Freewheeling diode, protection against polarity reversal |
| Green LED |
| Yellow LED |
| IDC/FLK pin strip (2.54 mm) |
| 50 |
| 1 PDT |
| 250 V AC/DC |
| 5 A |
| Screw connection |
| 0.2 ... 4 mm² / 0.2 ... 2.5 mm² / 24 - 12 |
| 260 V AC |
| 4 kV (basic insulation between output contact current paths) |
| 6 kV (safe isolation and reinforced insulation between input circuit and output contact paths) |
| 2 / III |
| -20 °C ... 50 °C |
| DIN EN 50178, IEC 60664, IEC 62103 |
| any |
| Can be aligned without spacing |
| 77 mm / 59 mm |
| Class A product, see page 625 |

## Ordering data

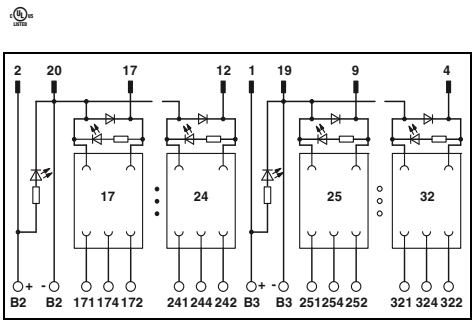
| Type | Order No. | Pcs. / Pkt. |
|---|---|---|
| **UMK-16 RM/KSR-G 24/21/PLC** | **2979498** | 1 |
| **UMK-16 RELS/KSR-G24/21/PLC** | **2974901** | 1 |

## Accessories

| | | |
|---|---|---|
| **REL-MR- 24DC/21HC** | **2961312** | 10 |




**Output extension module with 16 miniature relays, 1 PDT**




## Technical data

| |
|---|
| 24 V DC ±10 % |
| Freewheeling diode, protection against polarity reversal |
| Green LED |
| Yellow LED |
| IDC/FLK pin strip (2.54 mm) |
| 20 |
| 1 PDT |
| 250 V AC/DC |
| 5 A |
| Screw connection |
| 0.2 ... 4 mm² / 0.2 ... 2.5 mm² / 24 - 12 |
| 260 V AC |
| 4 kV (basic insulation between output contact current paths) |
| 6 kV (safe isolation and reinforced insulation between input circuit and output contact paths) |
| 2 / III |
| -20 °C ... 50 °C |
| DIN EN 50178, IEC 60664, IEC 62103 |
| any |
| Can be aligned without spacing |
| 77 mm / 59 mm |
| Class A product, see page 625 |

## 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-pos. cables. All modules feature the following:

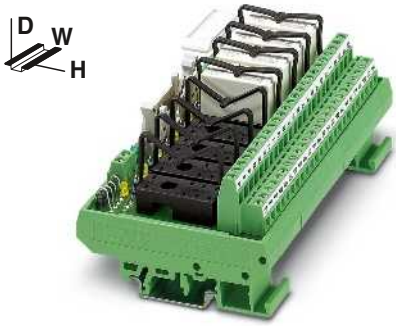
– Plug-in miniature relays
– LED status indicator and freewheeling diode per signal path
– Supply voltage indicator (LED)
– Polarity protection diode

With the 32-channel version (1 PDT with knife disconnect terminal blocks), the 50-pos. system cable is connected to the base module with 16 channels.

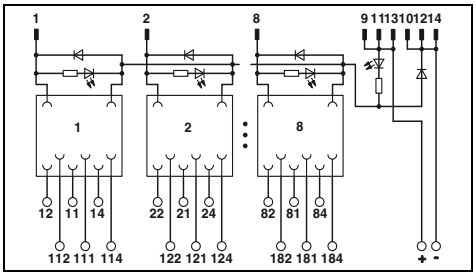
The output extension module with a further 16 channels is coupled to the base module via a 20-pos. flat-ribbon cable (length: 10 cm).

**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

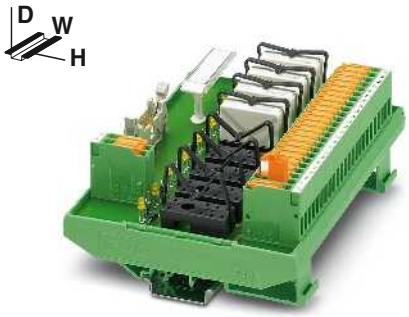
| | |
|---|---|
| **Coil side** | |
| Operating voltage $U_N$ | 24 V DC |
| Input circuit | Freewheeling diode |
| Operating voltage display | Green LED |
| Status display/channel | Yellow LED |
| Connection method | IDC/FLK pin strip (2.54 mm) |
| No. of pos. | 14 |
| **Contact side** | |
| Contact 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 $mm^2$ / 0.14 ... 1.5 $mm^2$ / 26 - 14 |
| **General data** | |
| Rated insulation voltage | 260 V AC |
| Rated surge voltage | 4 kV (basic insulation between output contact current paths)<br>6 kV (safe isolation and reinforced insulation between input circuit and output contact paths) |
| Pollution degree / Surge voltage category | 2 / III |
| Ambient temperature (operation) | -20 °C ... 50 °C |
| Standards/regulations | DIN EN 50178, IEC 60664, IEC 62103 |
| Mounting position | any |
| Mounting | Can be aligned without spacing |
| Dimensions H / D | 77 mm / 59 mm |
| EMC note | Class A product, see page 625 |

### Ordering data

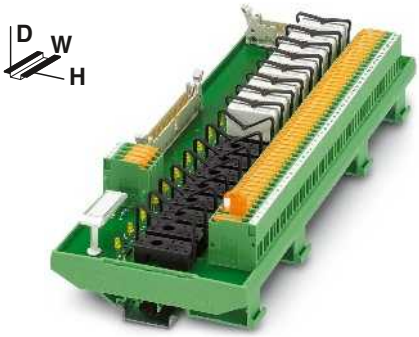
| Description | Module width W | Type | Order No. | Pcs. / Pkt. |
|---|---|---|---|---|
| **VARIOFACE output module**, for 24 V DC (2 PDTs) | | | | |
| - with 8 plug-in bases without relay | 135 | **UMK- 8 RELS/KSR-G24/21-21/PLC** | **2976187** | 1 |
| **VARIOFACE output module with disconnect terminal blocks**, for 24 V DC (1 PDT) | | | | |
| - with 8 plug-in bases without relay | 145 | | | |
| **VARIOFACE output module with disconnect terminal blocks**, for 24 V DC (1 PDT) | | | | |
| - basic module with 16 plug-in bases without relay | 285 | | | |
| - extension module with 16 plug-in bases without relay | 285 | | | |

### Accessories

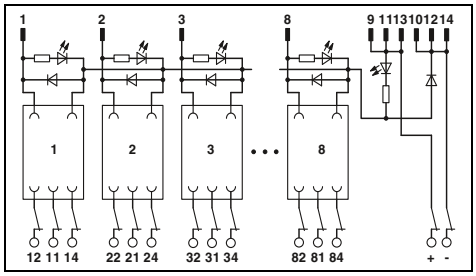
| | | | |
|---|---|---|---|
| **Plug-in miniature relay** | **REL-MR- 24DC/21-21** | **2961192** | 10 |

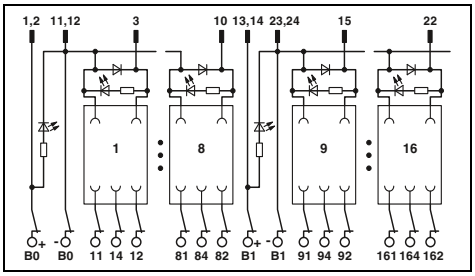



**Output module for 8 miniature relays with knife/disconnect terminal blocks, 1 PDT**




**Output module for 16 miniature relays with knife/disconnect terminal blocks, 1 PDT**




## Technical data

| | |
|---|---|
| 24 V DC | 24 V DC |
| Freewheeling diode, protection against polarity reversal | Freewheeling diode |
| Green LED | Green LED |
| Yellow LED | Yellow LED |
| IDC/FLK pin strip (2.54 mm) | IDC/FLK pin strip (2.54 mm) |
| 14 | 50 |
| 1 PDT | 1 PDT |
| 250 V AC/DC | 250 V AC/DC |
| 5 A | 5 A |
| Screw connection with disconnect knife | Screw connection with disconnect knife |
| 0.2 ... 4 mm² / 0.2 ... 2.5 mm² / 24 - 12 | 0.2 ... 4 mm² / 0.2 ... 2.5 mm² / 24 - 12 |
| 260 V AC | 260 V AC |
| 4 kV (basic insulation between output contact current paths) | 4 kV (basic insulation between output contact current paths) |
| 6 kV (safe isolation and reinforced insulation between input circuit and output contact paths) | 6 kV (safe isolation and reinforced insulation between input circuit and output contact paths) |
| 2 / III | 2 / III |
| -20 °C ... 50 °C | -20 °C ... 50 °C |
| DIN EN 50178, IEC 60664, IEC 62103 | DIN EN 50178, IEC 60664, IEC 62103 |
| any | any |
| Can be aligned without spacing | Can be aligned without spacing |
| 111.5 mm / 59 mm | 111.5 mm / 59 mm |
| Class A product, see page 625 | Class A product, see page 625 |

## Ordering data

| Type | Order No. | Pcs. / Pkt. |
|---|---|---|
| **UM- 8 RELS/KSR-G24/21/MT/PLC** | **2962463** | 1 |

## Ordering data

| Type | Order No. | Pcs. / Pkt. |
|---|---|---|
| **UM-16 RELS/KSR-G24/21/MT/PLC** | **2962382** | 1 |
| **UM-16 RELS/KSR-G24/21/E/MT/PLC** | **2962379** | 1 |

## Accessories

| | | |
|---|---|---|
| **REL-MR- 24DC/21HC** | **2961312** | 10 |

## Accessories

| | | |
|---|---|---|
| **REL-MR- 24DC/21HC** | **2961312** | 10 |

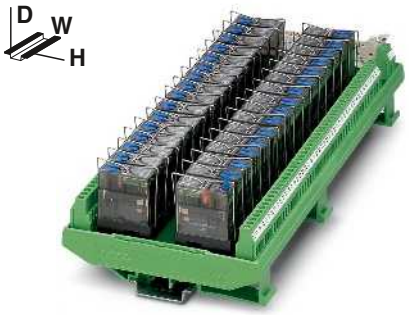
## Output modules with relays, 1 PDT with detectable manual operation

These VARIOFACE output modules are used in combination with the respective front adapters.

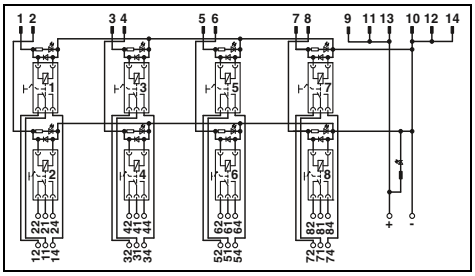
The modules are connected via 14 or 50-pos. system cable. These relay modules offer the following features:

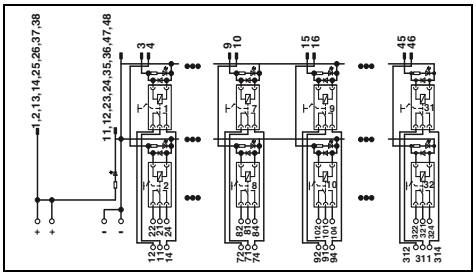
– Plug-in miniature relays each with a PDT contact and detectable manual operation
– Narrow overall width of just 92 mm (8 channels) or 285 mm (32 channels)
– LED status indicator and freewheeling diode per signal path (integrated in relay)
– Supply voltage indicator (LED)

**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 | | Freewheeling diode (integrated in relay) | Freewheeling diode (integrated in relay) |
| Status display/channel | | Yellow LED (integrated in relay) | Yellow LED (integrated in relay) |
| Connection method | | IDC/FLK pin strip (2.54 mm) | IDC/FLK pin strip (2.54 mm) |
| No. of pos. | | 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 between output contact current paths)<br>6 kV (safe isolation and reinforced insulation between input circuit and output contact paths) | 4 kV (basic insulation between output contact current paths)<br>6 kV (safe isolation and reinforced insulation between input circuit and output contact paths) |
| 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, IEC 60664, IEC 62103 | DIN EN 50178, IEC 60664, IEC 62103 |
| Mounting position | | any | any |
| Mounting | | Can be aligned without spacing | Can be aligned without spacing |
| Dimensions | H / D | 111 mm / 64 mm | 111 mm / 64 mm |
| EMC note | | Class A product, see page 625 | Class A product, see page 625 |

### Ordering data

| Description | Module width W | Type | Order No. | Pcs. / Pkt. | Type | Order No. | Pcs. / Pkt. |
|---|---|---|---|---|---|---|---|
| **VARIOFACE output module,** for 24 V DC (incl. relay) | | | | | | | |
| - with 8 miniature relays | 92 | **UM- 8RM/KSR-G24/21/MS/PLC** | **2900890** | 1 | | | |
| - with 32 miniature relays | 285 | | | | **UM-32RM/KSR-G24/21/MS/PLC** | **2900891** | 1 |

### Accessories

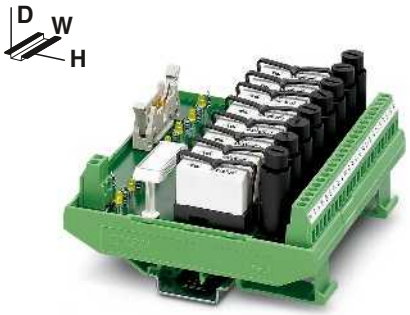
| | | | | | | |
|---|---|---|---|---|---|---|
| **Plug-in miniature power relay, with power contacts** | **REL-MR- 24DC/21HC/MS** | **2987888** | 10 | **REL-MR- 24DC/21HC/MS** | **2987888** | 10 |

## Output modules with relays, 1 PDT with or without manual operation and fuses

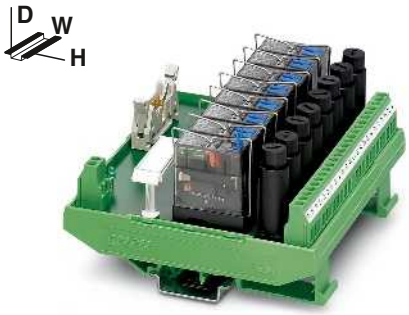
These VARIOFACE output modules are used in combination with the respective front adapters.

The modules are connected via 14-pos. system cable. These relay modules offer the following features:

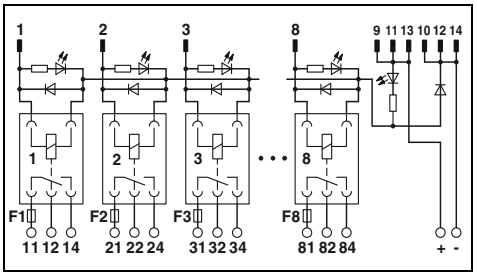
- Plug-in miniature relays each with a PDT contact with or without manual operation
- Fuse per output circuit as short-circuit protection
- Narrow overall width of just 127 mm
- LED status indicator and freewheeling diode per signal path
- Supply voltage indicator (LED)
- Polarity protection diode

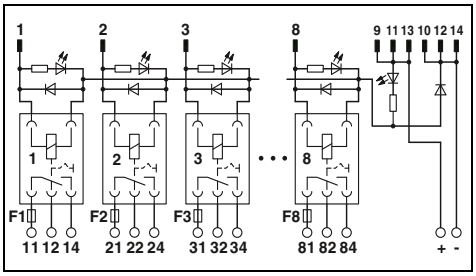



**Output module with 8 miniature relays, 1 PDT and fuse per output circuit**




**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 | | Freewheeling diode | Freewheeling diode (integrated in relay) |
| Status display/channel | | Yellow LED | Yellow LED (integrated in relay) |
| Connection method | | IDC/FLK pin strip (2.54 mm) | IDC/FLK pin strip (2.54 mm) |
| No. of pos. | | 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 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 between output contact current paths)<br>6 kV (safe isolation and reinforced insulation between input circuit and output contact paths) | 4 kV (basic insulation between output contact current paths)<br>6 kV (safe isolation and reinforced insulation between input circuit and output contact paths) |
| 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, IEC 60664, IEC 62103 | DIN EN 50178, IEC 60664, IEC 62103 |
| Mounting position | | any | any |
| Mounting | | Can be aligned without spacing | Can be aligned without spacing |
| Dimensions | H / D | 111 mm / 60 mm | 111 mm / 64 mm |
| EMC note | | Class A product, see page 625 | Class A product, see page 625 |

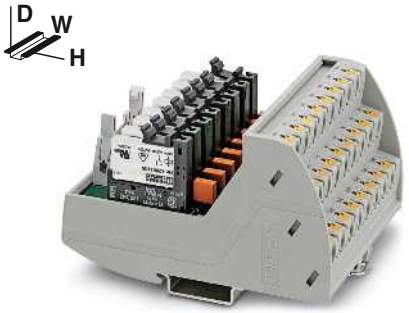
| | | Ordering data | | | Ordering data | | |
|---|---|---|---|---|---|---|---|
| Description | Module width W | Type | Order No. | Pcs. / Pkt. | Type | Order No. | Pcs. / Pkt. |
| **VARIOFACE output module,** with 8 miniature relays, plugged in, for 24 V DC (including relays) | 127 | **UM- 8RM/KSR-G24/21/SI/PLC** | **2900892** | 1 | **UM- 8RM/KSR-G24/21/MS/SI/PLC** | **2900893** | 1 |
| | | **Accessories** | | | **Accessories** | | |
| **Plug-in miniature relay** | | **REL-MR- 24DC/21HC** | **2961312** | 10 | **REL-MR- 24DC/21HC/MS** | **2987888** | 10 |

## VIP output module

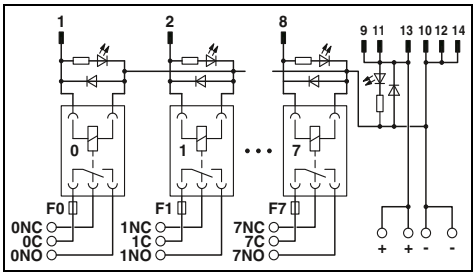
This VIP VARIOFACE output module is used in combination with the respective front adapters. Like the front adapters, the module is connected via 14-pos. system cables.

Features:

- Plug-in miniature relays, each with a PDT contact
- LED status display for each signal path and supply voltage
- Freewheeling diode for each signal path
- Push-in connection




**Output module with 8 miniature relays, 1 PDT and fuse per output circuit**




### Technical data

| | | |
|---|---|---|
| Coil side | | |
| Operating voltage $U_N$ | | 24 V DC |
| Typ. input current at $U_N$ | | 9 mA |
| Typ. response time at $U_N$ | | 5 ms |
| Typ. release time at $U_N$ | | 8 ms |
| Input circuit | | Freewheeling diode |
| Status display/channel | | Yellow LED |
| Connection method | | IDC/FLK pin strip (2.54 mm) |
| No. of pos. | | 14 |
| Contact side | | |
| 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 | | 5 A (observe derating) |
| Min. switching current | | 10 mA |
| Max. interrupting rating: | 24 V DC | 120 W |
| | 48 V DC | 20 W |
| | 60 V DC | 18 W |
| | 110 V DC | 23 W |
| | 220 V DC | 40 W |
| | 250 V AC | 1250 VA |
| Connection method | | Push-in connection |
| Connection data solid / stranded / AWG | | 0.14 ... 2.5 $mm^2$ / 0.14 ... 2.5 $mm^2$ / 26 - 14 |
| General data | | |
| Ambient temperature (operation) | | -20 °C ... 60 °C |
| Nominal operating mode | | 100% operating factor |
| Mechanical service life | | 2 x $10^7$ cycles |
| Standards/regulations | | DIN EN 50178 |
| Mounting position | | any |
| Mounting | | Can be aligned without spacing |
| Dimensions | H / D | 109.8 mm / 63 mm |
| EMC note | | Class A product, see page 625 |

### Ordering data

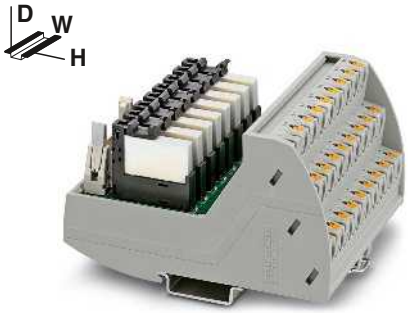
| Description | Module width W | Type | Order No. | Pcs. / Pkt. |
|---|---|---|---|---|
| **VARIOFACE output module,** with eight miniature relays, plugged in, for 24 V DC (incl. relays) | 87.6 | **VIP-8RPT-24DC/21/D0/FU/PLC** | **2903601** | 1 |

## VIP input modules

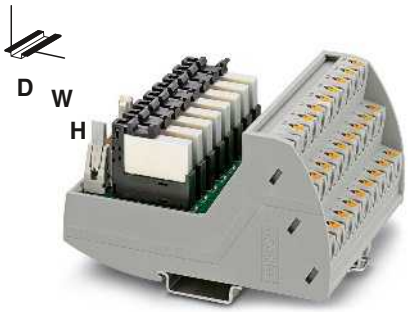
These VIP VARIOFACE input modules are used in combination with the respective front adapters. Like the front adapters, the modules are connected via 14-pos. system cables.

Features:

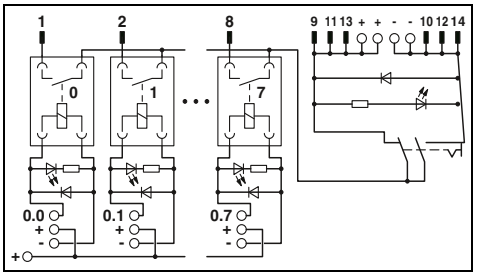
- Plug-in miniature relays, each with an N/O contact
- LED status display for each signal path and supply voltage
- Freewheeling diode for each signal path
- Push-in connection

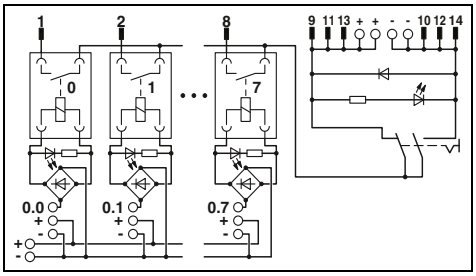



**Digital input module with 8 channels for 24 V DC**




**Digital input module with 8 channels for 120 V AC**




| | Technical data | Technical data |
|---|---|---|
| Coil side | | |
| Operating voltage $U_N$ | 24 V DC ±10 % (supply, 2 A ) | 120 V AC ±10 % (supply, 2 A ) |
| Typ. input current at $U_N$ | 9 mA (per channel) | 3.5 mA (per channel) |
| Typ. response time at $U_N$ | 5 ms | 6 ms |
| Typ. release time at $U_N$ | 8 ms | 15 ms |
| Input circuit | Freewheeling diode | Freewheeling diode |
| Status display/channel | Yellow LED | Yellow LED |
| Connection method | Push-in connection | Push-in connection |
| 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 - 26 |
| Contact side | | |
| Contact type | 1 N/O contact | 1 N/O contact |
| Contact material | AgSnO, hard gold-plated | AgSnO, hard gold-plated |
| Limiting continuous current | 50 mA | 50 mA |
| Connection method | IDC/FLK pin strip (2.54 mm) | IDC/FLK pin strip (2.54 mm) |
| No. of pos. | 14 | 14 |
| General data | | |
| Ambient temperature (operation) | -20 °C ... 60 °C | -20 °C ... 60 °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 | DIN EN 50178 | DIN EN 50178 |
| Mounting position | any | any |
| Mounting | Can be aligned without spacing | Can be aligned without spacing |
| Dimensions H / D | 109.8 mm / 63 mm | 109.8 mm / 63 mm |
| EMC note | Class A product, see page 625 | Class A product, see page 625 |

| Description | Module width W | Ordering data: Type | Order No. | Pcs. / Pkt. | Ordering data: Type | Order No. | Pcs. / Pkt. |
|---|---|---|---|---|---|---|---|
| **VARIOFACE interface module,** for eight channels, | | | | | | | |
| 24 V DC (incl. relays) | 92.7 | **VIP-8RPT-24DC/1AU/DI/PLC** | **2903600** | 1 | | | |
| 120 V AC (incl. relays) | 92.7 | | | | **VIP-8RPT-120AC/1AU/DI/PLC** | **2904576** | 1 |

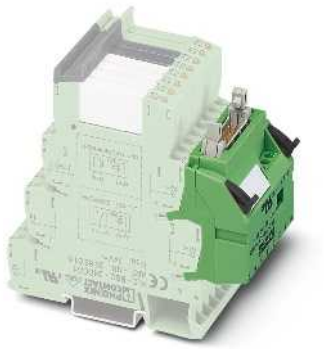
## Adapters for PLC RELAY (6.2 mm)

**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 RELAY modules
- Freely definable configuration with relays, optocouplers, and passive feed-through terminal blocks
- With D-SUB connection as an option for universal connections

**Notes:**

For cross-reference list with matching PLC-INTERFACE modules, see page 572



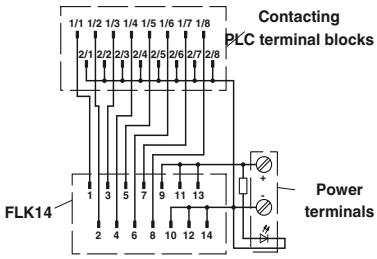
**VARIOFACE adapter for 6.2 mm PLC RELAY**

### Technical data

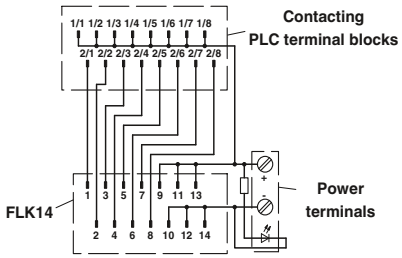
| | | |
|---|---|---|
| Max. perm. operating voltage | | 30 V DC |
| Max. perm. current (per branch) | | 1 A (per signal path) |
| Max total current (voltage supply) | | 3 A |
| Ambient temperature (operation) | | -40 °C ... 70 °C |
| Standards/regulations | | IEC 60664, DIN EN 50178, IEC 62103 |
| Connection method | Power supply | Screw connection |
| | Signal level | IDC/FLK pin strip (2.54 mm) |
| 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

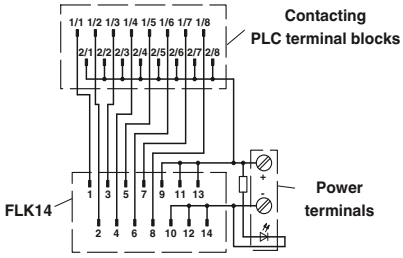
| Description | No. of pos. | Module width W | Type | Order No. | Pcs. / Pkt. |
|---|---|---|---|---|---|
| **V8 adapter**, for 8 PLC interfaces (6.2 mm), with FLK connection, for PLC system cabling, **positive switching** | | | | | |
| OUTPUT | 14 | 49.6 mm | **PLC-V8/FLK14/OUT** | **2295554** | 1 |
| 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-pos. 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-pos. 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 |



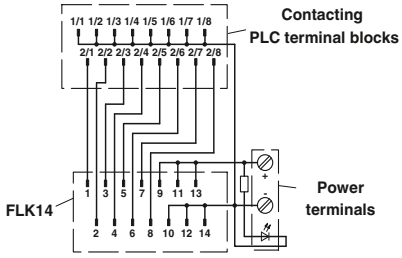

**PLC-V8/FLK14/OUT connection scheme**




**PLC-V8/FLK14/OUT/M connection scheme**




**Connection scheme: PLC-V8/FLK14/IN**




**Connection scheme: PLC-V8/FLK14/IN/M**

## Adapters for PLC RELAY (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 RELAY modules
- Freely definable configuration with relays or optocouplers

**Notes:**

For cross-reference list with matching PLC-INTERFACE modules, see page 572

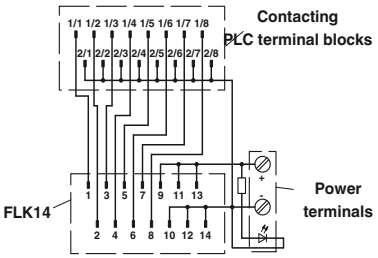
**VARIOFACE adapter for 14 mm PLC RELAY**

### Technical data

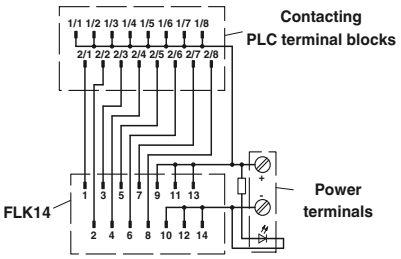
| | | |
|---|---|---|
| Max. perm. operating voltage | | 30 V DC |
| Max. perm. current (per branch) | | 1 A (per signal path) |
| Max total current (voltage supply) | | 3 A |
| Ambient temperature (operation) | | -40 °C ... 70 °C |
| Mounting position | | any |
| Standards/regulations | | IEC 60664, DIN EN 50178, IEC 62103 |
| Connection method | Power supply | Screw connection |
| | Signal level | IDC/FLK pin strip (2.54 mm) |
| 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 pos. | 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 RELAY

The VARIOFACE PLC-VT terminals are passive feed-through terminal blocks, with the same shape as the 6.2 mm slim relays and PLC RELAY optocoupler interfaces. It is thus possible to implement 8-channel interface blocks for the system cabling, which can be adapted to the specific application with bit accuracy. For individual requirements, the relay, optocoupler or the PLC-VT terminal blocks for passive signal transmission can be combined as needed.

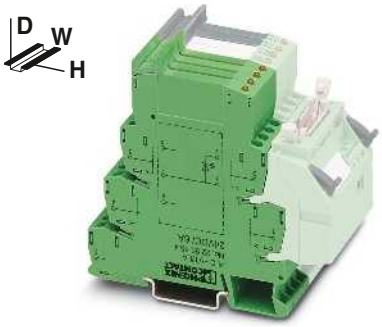
### PLC-VT
### PLC-VT/LA

– Can be combined with PLC RELAY universal series
– Signal path with additional potential level for free assignment (two-conductor connection)
– With LED as an option

### PLC-VT/ACT
### PLC-VT/ACT/LA

– Can be combined with PLC RELAY actuator series
– Signal path with two additional potential levels for free assignment (three-conductor connection)
– With LED as an option

The system connection is made via the PLC-V8 adapter.



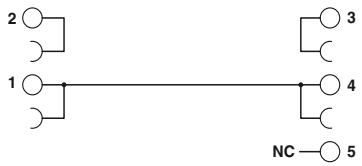

**VARIOFACE feed-through terminal blocks for PLC-INTERFACE universal series**

### Technical data

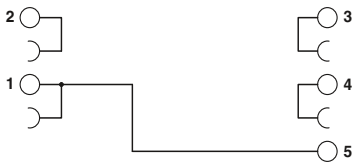
| | | |
|---|---|---|
| | PLC-VT, PLC-VT/ACT | PLC-VT/LA, PLC-VT/ACT/LA |
| Max. perm. operating voltage | 250 V AC/DC | 30 V DC |
| Max. perm. current (per branch) | 6 A (per signal conductor) | 6 A (per signal conductor) |
| Ambient temperature (operation) | -40 °C ... 70 °C | -40 °C ... 70 °C |
| Mounting position | any | any |
| Standards/regulations | DIN EN 50178, IEC 60664, 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

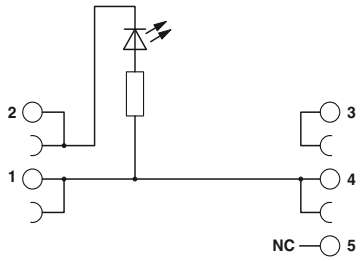
| Description | No. of pos. | Module width W | Type | Order No. | Pcs. / Pkt. |
|---|---|---|---|---|---|
| **VARIOFACE feed-through terminal block** (two-conductor connection), for PLC RELAY universal series | | 6.2 mm | **PLC-VT** | **2296870** | 10 |
| **VARIOFACE feed-through terminal block**, as above, however, with 24 V DC light indicator | | 6.2 mm | **PLC-VT/LA** | **2296854** | 10 |
| **VARIOFACE feed-through terminal block** (three-conductor connection), for PLC-INTERFACE actuator series | | 6.2 mm | **PLC-VT/ACT** | **2295567** | 10 |
| **VARIOFACE feed-through terminal block**, as above, however, with 24 V DC light indicator | | 6.2 mm | **PLC-VT/ACT/LA** | **2296867** | 10 |



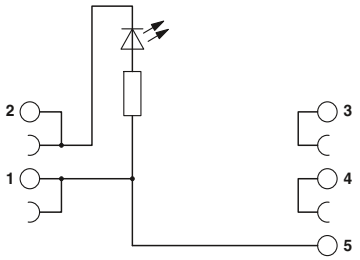

**PLC-VT connection scheme**




**PLC-VT/ACT connection scheme**




**PLC-VT/LA connection scheme**




**PLC-VT/ACT/LA connection scheme**

## Adapter for RIFLINE complete RF-1

new

**VARIOFACE adapter for RIFLINE complete RIF-1**

RIF-1-V8/... are the VARIOFACE adapters that connect the eight RIF-1 relay modules with the system cabling:
- Can be plugged into eight RIF-1 relay modules in series
- The adapter has one LED indicator and one freewheeling diode per relay

The following RIF-1 relay modules can be connected with the adapter:
- RIF-1-BPT/2X21, Order No. 2900931
- RIF-1-RPT-LDP-24DC/1X21, Order No. 2903342
- RIF-1-RPT-LDP-24DC/1X21 AU, Order No. AU 2903338
- RIF-1-RPT-LDP-24DC/2X21, Order No. 2903334
- RIF-1-RPT-LDP-24DC/2X21 AU, Order No. 2903330

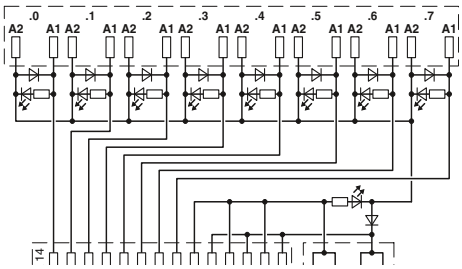
If fully assembled RIF-1 relay modules are used, the indicator/interference suppression modules must be removed before installation.

### Technical data

| | | |
|---|---|---|
| Max. perm. operating voltage | | 30 V DC |
| Max. perm. current (per branch) | | 1 A (per signal path) |
| Max total current (voltage supply) | | 3 A |
| Ambient temperature (operation) | | -40 °C ... 60 °C |
| Mounting position | | any |
| Standards/regulations | | IEC 60664, IEC 62103, DIN EN 50178 |
| Connection method | Power supply | Spring-cage connection |
| | Signal level | IDC/FLK pin strip (2.54 mm) |
| Connection data solid / stranded / AWG | | 0.2 ... 1.5 mm² / 0.2 ... 1.5 mm² / 24 - 16 |
| Dimensions | H / D | 101 mm / 75 mm |

### Ordering data

| Description | No. of pos. | Module width W | Type | Order No. | Pcs. / Pkt. |
|---|---|---|---|---|---|
| **V8 adapter,** for eight RIF-1 relay modules, with FLK connection for PLC system cabling, **positive switching** | | 128 mm | **RIF-1-V8/PT/FLK14/OUT** | **2905195** | 1 |

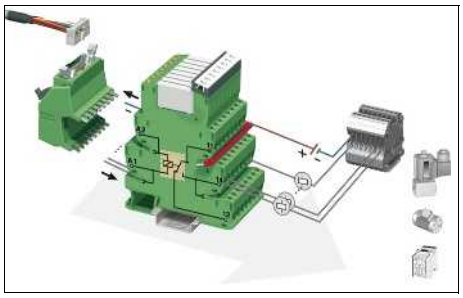


## Cross-reference list for PLC-V8 adapters with matching PLC-INTERFACE modules

| Series | Function | Contact | Input | Output | Page | Spring-cage connection | Order No. |
|---|---|---|---|---|---|---|---|
| Universal | Relay | 1 PDT | 24 V DC | 250 V AC/DC/ 6 A | 400 | PLC-RSP-24DC/21 | 2966472 |
| | | | 24 V DC | 250 V AC/DC/10 A | 411 | PLC-RSP-24DC/21HC | 2912277 |
| | | | 12 V DC | 30 V AC/36 V DC/50 mA | 401 | PLC-RSP-12DC/21AU | 2967442 |
| | | | 24 V DC | 30 V AC/36 V DC/50 mA | 401 | PLC-RSP-24DC/21AU | 2966540 |
| | | | 24 V AC/DC | 30 V AC/36 V DC/50 mA | 401 | PLC-RSP-24UC/21AU | 2966553 |
| | | | 48 V DC | 30 V AC/36 V DC/50 mA | 401 | PLC-RSP-48DC/21AU | 2966566 |
| | | | 60 V DC | 30 V AC/36 V DC/50 mA | 401 | PLC-RSP-60DC/21AU | 2966579 |
| | | | 120 V AC/DC | 30 V AC/36 V DC/50 mA | 401 | PLC-RSP-120UC/21AU | 2966582 |
| | | | 230 V AC/DC | 30 V AC/36 V DC/50 mA | 401 | PLC-RSP-230UC/21AU | 2966647 |
| | | | 120 V AC | 30 V AC/36 V DC/50 mA[1]) | 414 | PLC-BSP-120UC/21/SO46 | 2980351[3]) |
| | | | 230 V AC | 30 V AC/36 V DC/50 mA[1]) | 414 | PLC-BSP-230UC/21/SO46 | 2980377[3]) |
| | | 2 PDTs | 24 V DC | 250 V AC/DC/ 6 A | 401 | PLC-RSP-24DC/21-21 | 2912507 |
| | | | 24 V DC | 30 V AC/DC/50 mA | 401 | PLC-RSP-24DC/21-21AU | 2912578 |
| | Relay switch | 1 N/O contact | 24 V AC/DC | 250 V AC/DC/ 6 A | 430 | PLC-RSP-24UC/1/S/H | 2982249 |
| | | | 24 V AC/DC | 250 V AC/DC/ 6 A | 430 | PLC-RSP-24UC/1/S/L | 2834889 |
| | Optocoupler | 1 N/O contact, electronic | 24 V DC | 24 V DC/ 3 A | 403 | PLC-OSP-24DC/24DC/2 | 2967471 |
| | | | 24 V DC | 24 V DC/10 A | 433 | PLC-OSP-24DC/24DC/10/R | 2982715 |
| | | | 24 V DC | 250 V AC/0.75 A | 403 | PLC-OSP-24DC/230AC/1 | 2967895 |
| | | | 24 V DC | 300 V DC/1 A | 432 | PLC-OSP-24DC/300DC/1 | 2980830 |
| | | | 24 V DC | 48 V DC/100 mA | 402 | PLC-OSP-24DC/48DC/100 | 2967549 |
| | | | 48 V DC | 48 V DC/100 mA | 402 | PLC-OSP-48DC/48DC/100 | 2967743 |
| | | | 60 V DC | 48 V DC/100 mA | 402 | PLC-OSP-60DC/48DC/100 | 2967756 |
| | | | 120 V AC/DC | 48 V DC/100 mA | 402 | PLC-OSP-120UC/48DC/100 | 2967552 |
| | | | 230 V AC/DC | 48 V DC/100 mA | 402 | PLC-OSP-230UC/48DC/100 | 2967565 |
| | | | NAMUR | 24 V DC/50 mA | 446 | PLC-SP-EIK 1-SVN 24P/P | 2982676 |
| | | | 120 V AC | 48 V DC/100 mA[2]) | 414 | PLC-BSP-120UC/21/SO46 | 2980351[3]) |
| | | | 230 V AC | 48 V DC/100 mA[2]) | 414 | PLC-BSP-230UC/21/SO46 | 2980377[3]) |
| | | 1 PDT, electronic | 24 V DC | 48 V DC/0.5 A | 433 | PLC-OSP-24DC/48DC/500/W | 2980649 |
| | Feed-through | – | 250 V AC/DC | 250 V AC/DC | 570 | – | |
| | | | 24 V DC | 24 V DC | 570 | – | |
| Actuator | Relay | 1 N/O contact | 24 V DC | 250 V AC/DC/6 A | 404 | PLC-RSP-24DC/1/ACT | 2967345 |
| | | | 24 V DC | 250 V AC/DC/10 A (80 A; 20 ms) | 410 | PLC-RSP-24DC/1IC/ACT | 2912413 |
| | | 2 N/O contacts | 24 V DC | 250 V AC/DC/6 A | 405 | – | |
| | Optocoupler | 1 N/O contact, electronic | 24 V DC | 24 V DC/3 A | 405 | PLC-OSP-24DC/24DC/2/ACT | 2967507 |
| | | | 24 V DC | 24 V DC/5 A | 406 | – | |
| | | | 24 V DC | 250 V AC/0.75 A | 405 | – | |
| | | | 24 V DC | 250 V AC/2 A | 406 | – | |
| | Feed-through | – | 250 V AC/DC | 250 V AC/DC | 570 | – | |
| | | | 24 V DC | 24 V DC | 570 | – | |
| Sensor[4]) | Relay | 1 N/O contact | 24 V DC | 30 V AC/36 V DC/50 mA | 408 | PLC-RSP-24DC/1AU/SEN | 2967374 |
| | | | 120 V AC/DC | 30 V AC/36 V DC/50 mA | 408 | PLC-RSP-120UC/1AU/SEN | 2967390 |
| | | | 230 V AC/DC | 30 V AC/36 V DC/50 mA | 408 | PLC-RSP-230UC/1AU/SEN | 2967413 |
| | | | 120 V AC | 30 V AC/36 V DC/50 mA[1]) | 415 | PLC-BSP-120UC/1/SEN/SO46 | 2980364[3]) |
| | | | 230 V AC | 30 V AC/36 V DC/50 mA[1]) | 415 | PLC-BSP-230UC/1/SEN/SO46 | 2980380[3]) |
| | Optocoupler | 1 N/O contact, electronic | 24 V DC | 48 V DC/100 mA | 409 | PLC-OSP-24DC/48DC/100/SEN | 2967578 |
| | | | 120 V AC/DC | 48 V DC/100 mA | 409 | PLC-OSP-120UC/48DC/100/SEN | 2967581 |
| | | | 230 V AC/DC | 48 V DC/100 mA | 409 | PLC-OSP-230UC/48DC/100/SEN | 2967594 |
| | | | 120 V AC | 48 V DC/100 mA[2]) | 415 | PLC-BSP-120UC/1/SEN/SO46 | 2980364[3]) |
| | | | 230 V AC | 48 V DC/100 mA[2]) | 415 | PLC-BSP-230UC/1/SEN/SO46 | 2980380[3]) |

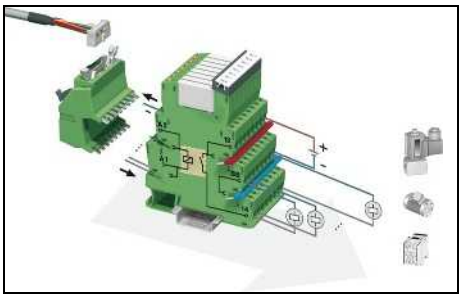
[1]) Plug-in miniature relay insert: REL-MR-60DC/21AU, 2961134
[2]) Plug-in solid-state relay insert: OPT-60DC/48DC/100, 2966621
[3]) PLC-...SO46 is supplied as a basic terminal block with filter, but without relay or solid-state relay.
[4]) Cannot be combined with the universal series (within a byte)

| Push-in connection | Order No. | Screw connection | Order No. | PLC-V8...OUT(/M) | PLC-V8...IN(/M) | PLC-V8L...OUT |
|---|---|---|---|---|---|---|
| PLC-RPT-24DC/21 | 2900299 | PLC-RSC-24DC/21 | 2966171 | X | | |
| PLC-RPT-24DC/21HC | 2900291 | PLC-RSC-24DC/21HC | 2967620 | | | X |
| PLC-RPT-12DC/21AU | 2900317 | PLC-RSC-12DC/21AU | 2966919 | | X | |
| PLC-RPT-24DC/21AU | 2900306 | PLC-RSC-24DC/21AU | 2966265 | X | X | |
| PLC-RPT-24UC/21AU | 2900307 | PLC-RSC-24UC/21AU | 2966278 | X | X | |
| PLC-RPT-48DC/21AU | 2900308 | PLC-RSC-48DC/21AU | 2966126 | | X | |
| PLC-RPT-60DC/21AU | 2900309 | PLC-RSC-60DC/21AU | 2966142 | | X | |
| PLC-RPT-120UC/21AU | 2900310 | PLC-RSC-120UC/21AU | 2966281 | | X | |
| PLC-RPT-230UC/21AU | 2900311 | PLC-RSC-230UC/21AU | 2966294 | | X | |
| PLC-RPT-120UC/21/SO46 | 2900453[3]) | PLC-BSC-120UC/21/SO46 | 2980319[3]) | | X | |
| PLC-RPT-230UC/21/SO46 | 2900455[3]) | PLC-BSC-230UC/21/SO46 | 2980335[3]) | | X | |
| PLC-RPT-24DC/21-21 | 2900330 | PLC-RSC-24DC/21-21 | 2967060 | | | X |
| PLC-RPT-24DC/21-21AU | 2900338 | PLC-RSC-24DC/21-21AU | 2967125 | | | X |
| PLC-RPT-24UC/1/S/H | 2900328 | PLC-RSC-24UC/1/S/H | 2982236 | X | | |
| PLC-RPT-24UC/1/S/L | 2900327 | PLC-RSC-24UC/1/S/L | 2834876 | X | | |
| PLC-OPT-24DC/24DC/2 | 2900364 | PLC-OSC-24DC/24DC/2 | 2966634 | X | | |
| PLC-OPT-24DC/24DC/10/R | 2900398 | PLC-OSC-24DC/24DC/10/R | 2982702 | X | | |
| PLC-OPT-24DC/230AC/1 | 2900369 | PLC-OSC-24DC/230AC/1 | 2967840 | X | | |
| PLC-OPT-24DC/300DC/1 | 2900383 | PLC-OSC-24DC/300DC/1 | 2980678 | X | | |
| PLC-OPT-24DC/48DC/100 | 2900352 | PLC-OSC-24DC/48DC/100 | 2966728 | X | X | |
| PLC-OPT-48DC/48DC/100 | 2900353 | PLC-OSC-48DC/48DC/100 | 2966993 | | X | |
| PLC-OPT-60DC/48DC/100 | 2900354 | PLC-OSC-60DC/48DC/100 | 2967455 | | X | |
| PLC-OPT-120UC/48DC/100 | 2900355 | PLC-OSC-120UC/48DC/100 | 2966744 | | X | |
| PLC-OPT-230UC/48DC/100 | 2900356 | PLC-OSC-230UC/48DC/100 | 2966757 | | X | |
| PLC-PT-EIK 1-SVN 24P/P | 2900397 | PLC-SC-EIK 1-SVN 24P/P | 2982663 | | X | |
| PLC-BPT-120UC/21/SO46 | 2900453[3]) | PLC-BSC-120UC/21/SO46 | 2980319[3]) | | X | |
| PLC-BPT-230UC/21/SO46 | 2900455[3]) | PLC-BSC-230UC/21/SO46 | 2980335[3]) | | X | |
| PLC-OPT-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-RPT-24DC/1/ACT | 2900312 | PLC-RSC-24DC/1/ACT | 2966210 | X | | |
| PLC-RPT-24DC/1IC/ACT | 2900298 | PLC-RSC-24DC/1IC/ACT | 2967604 | | | X |
| – | | PLC-RSC-24DC/1-1/ACT | 2967109 | | | X |
| PLC-OPT-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-RPT-24DC/1AU/SEN | 2900313 | PLC-RSC-24DC/1AU/SEN | 2966317 | | X | |
| PLC-RPT-120UC/1AU/SEN | 2900314 | PLC-RSC-120UC/1AU/SEN | 2966320 | | X | |
| PLC-RPT-230UC/1AU/SEN | 2900315 | PLC-RSC-230UC/1AU/SEN | 2966333 | | X | |
| PLC-BPT-120UC/1/SEN/SO46 | 2900456[3]) | PLC-BSC-120UC/1/SEN/SO46 | 2980322[3]) | | X | |
| PLC-BPT-230UC/1/SEN/SO46 | 2900457[3]) | PLC-BSC-230UC/1/SEN/SO46 | 2980348[3]) | | X | |
| PLC-OPT-24DC/48DC/100/SEN | 2900358 | PLC-OSC-24DC/48DC/100/SEN | 2966773 | | X | |
| PLC-OPT-120UC/48DC/100/SEN | 2900359 | PLC-OSC-120UC/48DC/100/SEN | 2966799 | | X | |
| PLC-OPT-230UC/48DC/100/SEN | 2900361 | PLC-OSC-230UC/48DC/100/SEN | 2966809 | | X | |
| PLC-BPT-120UC/1/SEN/SO46 | 2900456[3]) | PLC-BSC-120UC/1/SEN/SO46 | 2980322[3]) | | X | |
| PLC-BPT-230UC/1/SEN/SO46 | 2900457[3]) | PLC-BSC-230UC/1/SEN/SO46 | 2980348[3]) | | X | |



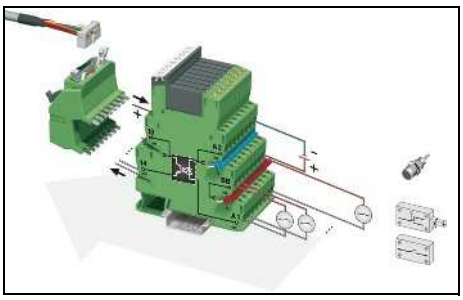
**PLC universal series**

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) or a plug-in solid-state relay.



**PLC actuator series**

When used as an interface between the PLC and actuators, such as motors, contactors or solenoid valves, only one N/O contact function is normally 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**

When used as an interface between the PLC and sensors, such as proximity switches, limit switches or auxiliary contacts, only one N/O contact function is normally 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 terminal blocks.

## System cable with flat-ribbon cable connector

- 1:1 connection
- 14 and 50-pos.
- Connectors as per IEC 60603-13
- Unshielded
- Shielded
- Halogen-free see page 605
- Special lengths see page 609

Unshielded

Shield connection at one end

Applied for: cUL / UL

| | Technical data | Technical data |
|---|---|---|
| Max. perm. operating voltage | < 50 V AC / 60 V DC | < 50 V AC / 60 V DC |
| Max. perm. current carrying capacity 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 |
| Outside diameter | | |
| 14-position | 6.4 mm | 6.7 mm |
| 50-position | 10.3 mm | 11 mm |

| Description | No. of pos. | Cable length | Ordering data: Type | Order No. | Pcs. / Pkt. | Ordering data: Type | Order No. | Pcs. / Pkt. |
|---|---|---|---|---|---|---|---|---|
| **Assembled round cable**, with two 14-pos. socket strips in fixed lengths for transfer of 8 channels | | | | | | | | |
| | 14 | 0.3 m | FLK 14/EZ-DR/ 30/KONFEK | 2295729 | 5 | | | |
| | 14 | 0.5 m | FLK 14/EZ-DR/ 50/KONFEK | 2288901 | 5 | FLK 14/EZ-DR/ 50/KONFEK/S | 2296977 | 1 |
| | 14 | 1 m | FLK 14/EZ-DR/ 100/KONFEK | 2288914 | 1 | FLK 14/EZ-DR/ 100/KONFEK/S | 2296980 | 1 |
| | 14 | 1.5 m | FLK 14/EZ-DR/ 150/KONFEK | 2288927 | 1 | FLK 14/EZ-DR/ 150/KONFEK/S | 2296993 | 1 |
| | 14 | 2 m | FLK 14/EZ-DR/ 200/KONFEK | 2288930 | 1 | FLK 14/EZ-DR/ 200/KONFEK/S | 2297002 | 1 |
| | 14 | 2.5 m | FLK 14/EZ-DR/ 250/KONFEK | 2288943 | 1 | | | |
| | 14 | 3 m | FLK 14/EZ-DR/ 300/KONFEK | 2288956 | 1 | FLK 14/EZ-DR/ 300/KONFEK/S | 2299013 | 1 |
| | 14 | 3.5 m | FLK 14/EZ-DR/ 350/KONFEK | 2288969 | 1 | | | |
| | 14 | 4 m | FLK 14/EZ-DR/ 400/KONFEK | 2288972 | 1 | FLK 14/EZ-DR/ 400/KONFEK/S | 2299026 | 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 | FLK 14/EZ-DR/ 600/KONFEK/S | 2299039 | 1 |
| | 14 | 8 m | FLK 14/EZ-DR/ 800/KONFEK | 2299563 | 1 | FLK 14/EZ-DR/ 800/KONFEK/S | 2299042 | 1 |
| | 14 | 10 m | FLK 14/EZ-DR/1000/KONFEK | 2299576 | 1 | FLK 14/EZ-DR/1000/KONFEK/S | 2299055 | 1 |
| **Assembled round cable**, with two 50-pos. socket strips in fixed lengths for transfer of 32 channels | | | | | | | | |
| | 50 | 0.5 m | FLK 50/EZ-DR/ 50/KONFEK | 2289065 | 5 | FLK 50/EZ-DR/ 50/KONFEK/S | 2299097 | 1 |
| | 50 | 1 m | FLK 50/EZ-DR/ 100/KONFEK | 2289078 | 1 | FLK 50/EZ-DR/ 100/KONFEK/S | 2299107 | 1 |
| | 50 | 1.5 m | FLK 50/EZ-DR/ 150/KONFEK | 2289081 | 1 | FLK 50/EZ-DR/ 150/KONFEK/S | 2299110 | 1 |
| | 50 | 2 m | FLK 50/EZ-DR/ 200/KONFEK | 2289094 | 1 | FLK 50/EZ-DR/ 200/KONFEK/S | 2299123 | 1 |
| | 50 | 2.5 m | FLK 50/EZ-DR/ 250/KONFEK | 2289104 | 1 | | | |
| | 50 | 3 m | FLK 50/EZ-DR/ 300/KONFEK | 2289117 | 1 | FLK 50/EZ-DR/ 300/KONFEK/S | 2299136 | 1 |
| | 50 | 3.5 m | FLK 50/EZ-DR/ 350/KONFEK | 2289120 | 1 | | | |
| | 50 | 4 m | FLK 50/EZ-DR/ 400/KONFEK | 2289133 | 1 | FLK 50/EZ-DR/ 400/KONFEK/S | 2299149 | 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 | FLK 50/EZ-DR/ 600/KONFEK/S | 2299152 | 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 | FLK 50/EZ-DR/ 800/KONFEK/S | 2299165 | 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 | FLK 50/EZ-DR/1000/KONFEK/S | 2299178 | 1 |

## Splitting cable with flat-ribbon cable connector

- Splitting of 32 channels to 4 x 8 channels
- 50-pos. connector at one end
- 4 x 14-pos. connector at one end
- Connectors as per IEC 60603-13
- Unshielded
- Shielded
- Special lengths

**Splitting cable unshielded 50 positions on 4 x 14**

**Splitting cable shielded 50 positions 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 capacity 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 plugs on the module side | 4 | 4 |
| Outside diameter 50-position | 6.3 mm | 6.3 mm |

| Description | No. of pos. | Cable length | Ordering data: Type | Order No. | Pcs. / Pkt. | Ordering data: Type | Order No. | Pcs. / Pkt. |
|---|---|---|---|---|---|---|---|---|
| **Assembled round cable,** with a 50-pos. socket strip and four 14-pos. socket strips, for splitting 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 cable,** as above, however in variable lengths | | | | | | | | |
| | 50 | | **FLK 50-4X14-EZ-DR ...** | **2302405** | 1 | | | |
| **Assembled round cable,** as above, however shielded and in variable lengths | | | | | | | | |
| | 50 | | | | | **FLK 50-4X14-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 |

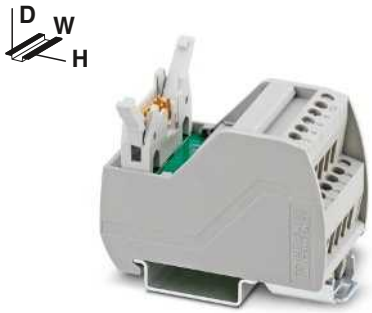
[1]) min. 0.30 m

## 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
– With status indicator as an option
Low and high engagement latches are supplied with all modules.

**Notes:**

For marking systems (e.g., “ZB 22:UNBEDRUCKT”; Order No. 0811862) and mounting material, see Catalog 5.



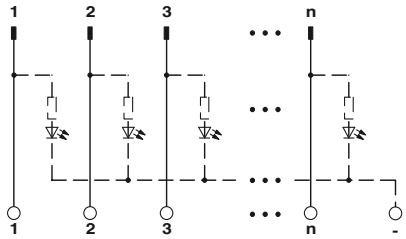

**10 to 20 positions with screw connection**

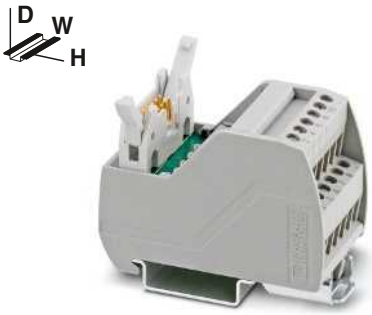
### Technical data

| | |
|---|---|
| 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 |

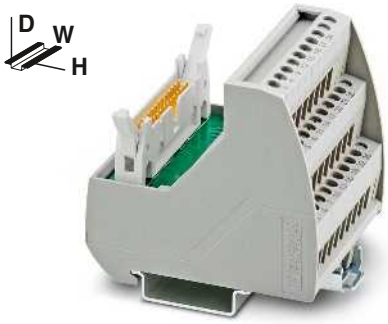
### Ordering data

| Description | No. of pos. | 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 | | | |

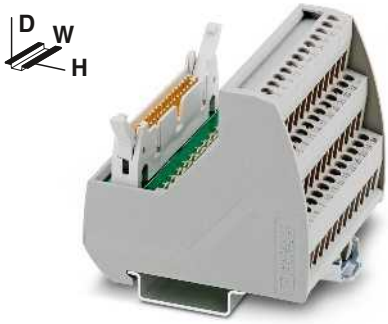





**10 to 20 positions**
**with screw connection and light indicator**




**26 to 64 positions**
**with screw connection**




**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
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 |

### 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 |

### 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

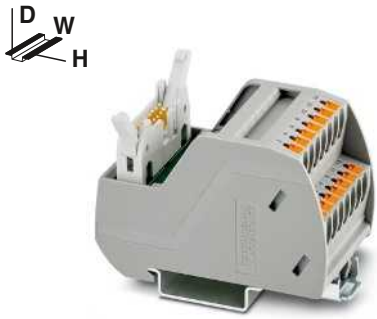
| Type | Order No. | Pcs. / Pkt. |
|---|---|---|
| VIP-3/SC/FLK26/LED | 2322087 | 1 |
| VIP-3/SC/FLK34/LED | 2322090 | 1 |
| VIP-3/SC/FLK40/LED | 2322100 | 1 |
| VIP-3/SC/FLK50/LED | 2322113 | 1 |
| VIP-3/SC/FLK60/LED | 2322126 | 1 |
| VIP-3/SC/FLK64/LED | 2322139 | 1 |

## VIP – VARIOFACE Professional modules with flat-ribbon cable connectors

– 1:1 connection
– 10 to 64-pos.
– Push-in connection
– Metal foot
– As per IEC 60603-13
– With status indicator as an option
Low and high engagement latches are supplied with all modules.

**Notes:**

For marking systems (e.g., “ZB 22:UNBEDRUCKT”; Order No. 0811862) and mounting material, see Catalog 5.



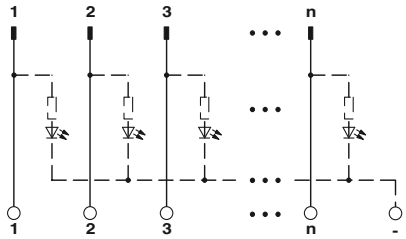

**10 to 20 positions with push-in connection**

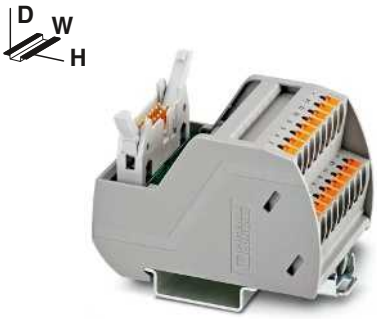
### Technical data

| | |
|---|---|
| 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 | 0.14 - 2.5 mm² / 0.14 - 2.5 mm² / 26 - 14 |
| Dimensions H / D | 72.1 mm / 56 mm |

### Ordering data

| Description | No. of pos. | Module width W | Type | Order No. | Pcs. / Pkt. |
|---|---|---|---|---|---|
| **VARIOFACE module**, with pin strip | | | | | |
| | 10 | 36.80 | **VIP-2/PT/FLK10** | **2903787** | 1 |
| | 14 | 41.90 | **VIP-2/PT/FLK14** | **2903788** | 1 |
| | 16 | 46.90 | **VIP-2/PT/FLK16** | **2903789** | 1 |
| | 20 | 57.10 | **VIP-2/PT/FLK20** | **2903790** | 1 |
| **VARIOFACE module**, with pin strip and light indicator | | | | | |
| | 10 | 36.80 | | | |
| | 14 | 41.90 | | | |
| | 16 | 46.90 | | | |
| | 20 | 57.10 | | | |
| **VARIOFACE module**, with pin strip | | | | | |
| | 26 | 57.10 | | | |
| | 34 | 67.30 | | | |
| | 40 | 77.40 | | | |
| | 50 | 92.70 | | | |
| | 60 | 107.90 | | | |
| | 64 | 118.10 | | | |
| **VARIOFACE module**, with pin strip and light indicator | | | | | |
| | 26 | 57.10 | | | |
| | 34 | 67.30 | | | |
| | 40 | 77.40 | | | |
| | 50 | 92.70 | | | |
| | 60 | 107.90 | | | |
| | 64 | 118.10 | | | |





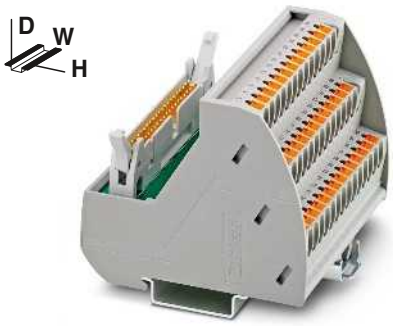

**10 to 20 positions**
**with push-in connection and light indicator**

### Technical data

24 V DC
1 A
-20 °C ... 50 °C
any
IEC 60664, DIN EN 50178, IEC 62103
0.14 - 2.5 mm² / 0.14 - 2.5 mm² / 26 - 14
72.1 mm / 56 mm

### Ordering data

| Type | Order No. | Pcs. / Pkt. |
|---|---|---|
| VIP-2/PT/FLK10/LED | 2904248 | 1 |
| VIP-2/PT/FLK14/LED | 2904249 | 1 |
| VIP-2/PT/FLK16/LED | 2904250 | 1 |
| VIP-2/PT/FLK20/LED | 2904251 | 1 |



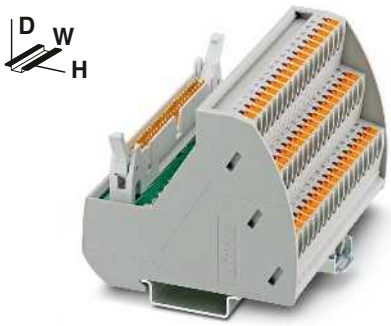

**26 to 64 positions**
**with push-in connection**

### Technical data

60 V AC/DC
1 A
-20 °C ... 50 °C
any
IEC 60664, DIN EN 50178, IEC 62103
0.14 - 2.5 mm² / 0.14 - 2.5 mm² / 26 - 14
75.8 mm / 63 mm

### Ordering data

| Type | Order No. | Pcs. / Pkt. |
|---|---|---|
| VIP-3/PT/FLK26 | 2903791 | 1 |
| VIP-3/PT/FLK34 | 2903792 | 1 |
| VIP-3/PT/FLK40 | 2903793 | 1 |
| VIP-3/PT/FLK50 | 2903794 | 1 |
| VIP-3/PT/FLK60 | 2903795 | 1 |
| VIP-3/PT/FLK64 | 2903796 | 1 |




**26 to 64 positions**
**with push-in connection and light indicator**

### Technical data

24 V DC
1 A
-20 °C ... 50 °C
any
IEC 60664, DIN EN 50178, IEC 62103
0.14 - 2.5 mm² / 0.14 - 2.5 mm² / 26 - 14
75.8 mm / 63 mm

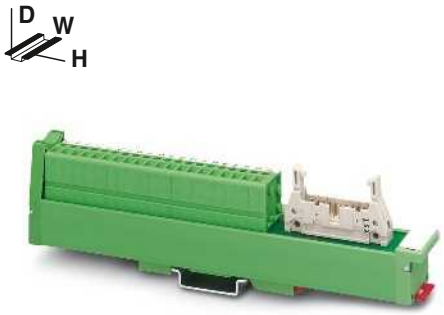
### Ordering data

| Type | Order No. | Pcs. / Pkt. |
|---|---|---|
| VIP-3/PT/FLK26/LED | 2904252 | 1 |
| VIP-3/PT/FLK34/LED | 2904253 | 1 |
| VIP-3/PT/FLK40/LED | 2904254 | 1 |
| VIP-3/PT/FLK50/LED | 2904255 | 1 |
| VIP-3/PT/FLK60/LED | 2904256 | 1 |
| VIP-3/PT/FLK64/LED | 2904257 | 1 |

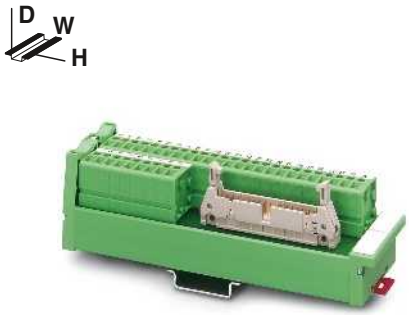
## SLIM-LINE modules for flat-ribbon cable connectors

VARIOFACE SLIM-LINE modules connect flat-ribbon cable connectors in accordance with IEC 60603-13/DIN 41651 to front connection 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% simultaneity factor) | 1 A (data valid for 100% simultaneity factor) |
| Ambient temperature (operation) | | -10 °C ... 50 °C | -10 °C ... 50 °C |
| Mounting position | | any | any |
| Standards/regulations | | DIN EN 50178, IEC 60664, IEC 62103 | DIN EN 50178, IEC 60664, 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 pos. | 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 |

## Feed-through modules for IDC/FLK connectors (pitch 2.54 mm) with screw connection

VARIOFACE DFLK... feed-through modules 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**

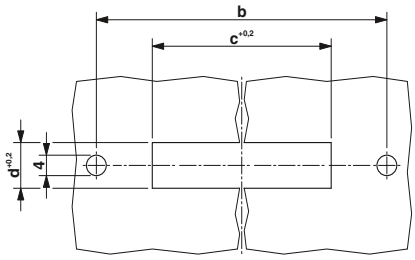
### Technical data

| | |
|---|---|
| Operating voltage | < 50 V AC / 60 V DC |
| Max. perm. current (per branch) | 1 A |
| Ambient temperature (operation) | -20 °C ... 50 °C |
| Mounting position | any |
| Standards/regulations | DIN EN 50178, IEC 60664, IEC 62103 |
| Connection data solid / stranded / AWG | 0.2 - 4 mm² / 0.2 - 2.5 mm² / 24 - 12 |

### Ordering data

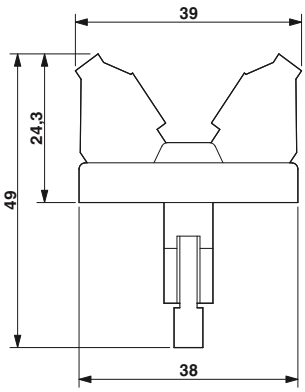
| Description | No. of pos. | Module width W | Type | Order No. | Pcs. / Pkt. |
|---|---|---|---|---|---|
| **VARIOFACE feed-through module**, with pin strip | | | | | |
| | 16 | 39.00 | **DFLK 16** | **2280239** | 5 |
| | 20 | 39.00 | **DFLK 20** | **2280242** | 5 |
| | 26 | 39.00 | **DFLK 26** | **2280255** | 5 |
| | 34 | 39.00 | **DFLK 34** | **2280268** | 5 |
| | 40 | 39.00 | **DFLK 40** | **2280271** | 5 |
| | 50 | 39.00 | **DFLK 50** | **2280284** | 5 |

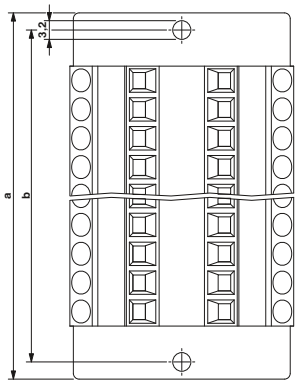
**Dimensioning of the housing cutout**




| 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 |

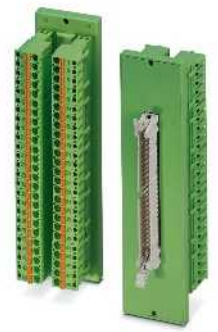
**Dimensional drawing DFLK:**



## Feed-through modules for IDC/FLK connectors (pitch 2.54 mm) with spring-cage connection

- 1:1 connection
- 10 to 50-pos.
- Plug-in push-in spring-cage connection
- Connectors as per IEC 60603-13
- Short and long catches are supplied with the module
- Select housing cutout for side panel mounting according to dimensioning table



**With pin strip and push-in spring-cage connection**

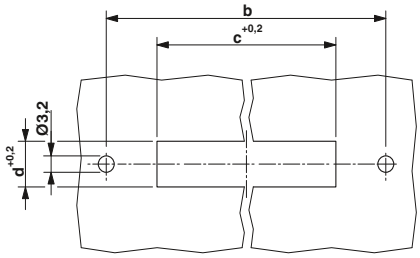
### Technical data

| | |
|---|---|
| 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 | DIN EN 50178, IEC 60664, IEC 62103 |
| Connection data solid / stranded / AWG | 0.2 - 2.5 mm² / 0.2 - 2.5 mm² / 24 - 12 |

### Ordering data

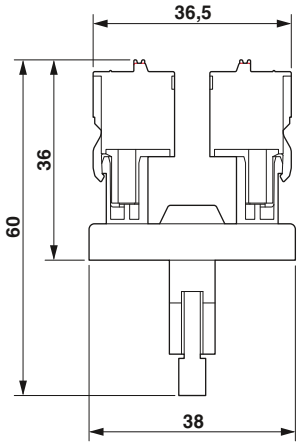
| Description | No. of pos. | Module width W | Type | Order No. | Pcs. / Pkt. |
|---|---|---|---|---|---|
| **VARIOFACE feed-through module**, with pin strip | | | | | |
| | 10 | 36.50 | **DFLK 10/FKCT** | **2903034** | 1 |
| | 14 | 36.50 | **DFLK 14/FKCT** | **2903035** | 1 |
| | 16 | 36.50 | **DFLK 16/FKCT** | **2903036** | 1 |
| | 20 | 36.50 | **DFLK 20/FKCT** | **2903038** | 1 |
| | 26 | 36.50 | **DFLK 26/FKCT** | **2903039** | 1 |
| | 34 | 36.50 | **DFLK 34/FKCT** | **2903041** | 1 |
| | 40 | 36.50 | **DFLK 40/FKCT** | **2903042** | 1 |
| | 50 | 36.50 | **DFLK 50/FKCT** | **2903043** | 1 |

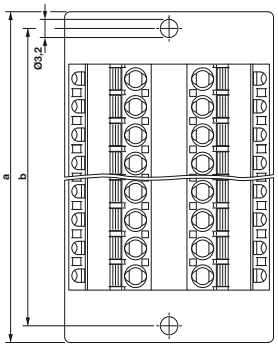
**Dimensioning of the housing cutout**




| Type | a | b | c | d |
|---|---|---|---|---|
| DFLK 10/FKCT | 58.4 | 52.5 | 40.1 + 0.2 | 9 + 0.2 |
| DFLK 14/FKCT | 58.4 | 52.5 | 40.1 + 0.2 | 9 + 0.2 |
| DFLK 16/FKCT | 58.4 | 52.5 | 40.1 + 0.2 | 9 + 0.2 |
| DFLK 20/FKCT | 68.4 | 62.5 | 45.2 + 0.2 | 9 + 0.2 |
| DFLK 26/FKCT | 83.4 | 77.5 | 52.8 + 0.2 | 9 + 0.2 |
| DFLK 34/FKCT | 103.4 | 97.5 | 63.0 + 0.2 | 9 + 0.2 |
| DFLK 40/FKCT | 128.4 | 122.5 | 70.6 + 0.2 | 9 + 0.2 |
| DFLK 50/FKCT | 143.4 | 137.5 | 83.3 + 0.2 | 9 + 0.2 |

**Dimensional drawing DFLK...FKCT**



## VIP – VARIOFACE Professional modules with D-SUB connectors

– 1:1 connection
– 9 to 50-pos.
– Screw connection
– Metal foot
– As per IEC 60807-2
– With status indicator as an option
The D-SUB-4-40 UNC threads are led directly to a connection terminal block.

**Notes:**

For marking systems (e.g., “ZB 22:UNBEDRUCKT”; Order No. 0811862) and mounting material, see Catalog 5.

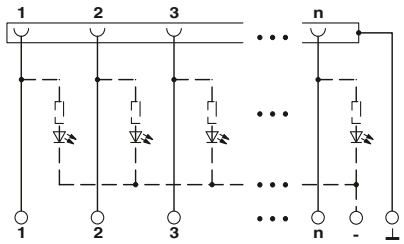
**9 to 15 positions with screw connection**

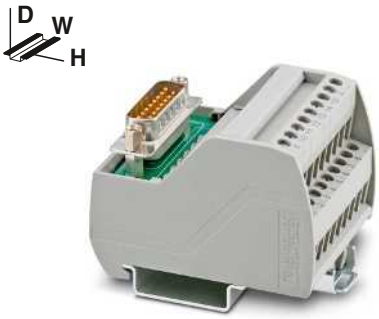
### Technical data

| | |
|---|---|
| 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 |

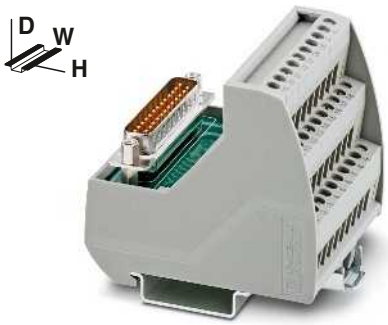
### Ordering data

| Description | No. of pos. | 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 strip | | | | | |
| | 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 strip 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 strip | | | | | |
| | 25 | 57.40 | | | |
| | 37 | 72.70 | | | |
| | 50 | 98.20 | | | |
| **VARIOFACE module**, with D-Subminiature socket strip and light indicator | | | | | |
| | 25 | 57.40 | | | |
| | 37 | 72.70 | | | |
| | 50 | 98.20 | | | |

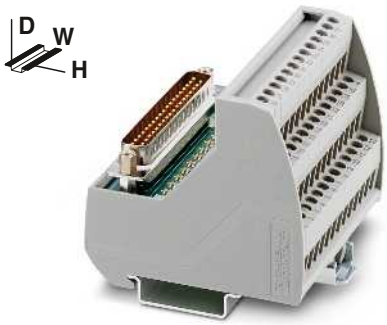





**9 to 15 positions**
**with screw connection and light indicator**




**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 |

## VIP – VARIOFACE Professional modules with D-SUB connectors

– 1:1 connection
– 9 to 50-pos.
– Push-in connection
– Metal foot
– As per IEC 60807-2
– With status indicator as an option
The D-SUB-4-40 UNC threads are led directly to a connection terminal block.

**Notes:**

For marking systems (e.g., “ZB 22:UNBEDRUCKT”; Order No. 0811862) and mounting material, see Catalog 5.

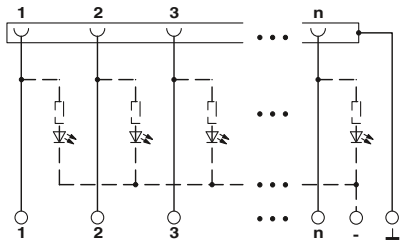
**9 to 15 positions with push-in connection**

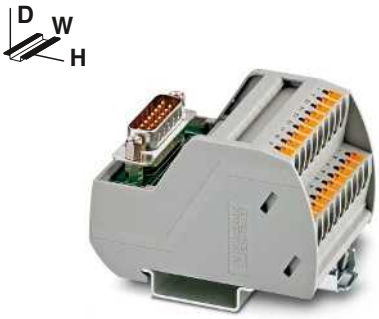
### Technical data

| | | |
|---|---|---|
| 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 | | 0.14 - 2.5 mm² / 0.14 - 2.5 mm² / 26 - 14 |
| Dimensions | H / D | 72.1 mm / 46.6 mm |

### Ordering data

| Description | No. of pos. | Module width W | Type | Order No. | Pcs. / Pkt. |
|---|---|---|---|---|---|
| **VARIOFACE module**, with D-Subminiature pin strip | | | | | |
| | 9 | 36.80 | **VIP-2/PT/D 9SUB/M** | **2903777** | 1 |
| | 15 | 46.90 | **VIP-2/PT/D15SUB/M** | **2903779** | 1 |
| **VARIOFACE module**, with D-Subminiature pin strip and light indicator | | | | | |
| | 9 | 36.80 | | | |
| | 15 | 52.00 | | | |
| **VARIOFACE module**, with D-Subminiature socket strip | | | | | |
| | 9 | 36.80 | **VIP-2/PT/D 9SUB/F** | **2903778** | 1 |
| | 15 | 46.90 | **VIP-2/PT/D15SUB/F** | **2903780** | 1 |
| **VARIOFACE module**, with D-Subminiature socket strip and light indicator | | | | | |
| | 9 | 36.80 | | | |
| | 15 | 52.00 | | | |
| **VARIOFACE module**, with D-Subminiature pin strip | | | | | |
| | 25 | 57.10 | | | |
| | 37 | 72.30 | | | |
| | 50 | 97.70 | | | |
| **VARIOFACE module**, with D-Subminiature pin strip and light indicator | | | | | |
| | 25 | 57.10 | | | |
| | 37 | 72.30 | | | |
| | 50 | 97.70 | | | |
| **VARIOFACE module**, with D-Subminiature socket strip | | | | | |
| | 25 | 57.10 | | | |
| | 37 | 72.30 | | | |
| | 50 | 97.70 | | | |
| **VARIOFACE module**, with D-Subminiature socket strip and light indicator | | | | | |
| | 25 | 57.10 | | | |
| | 37 | 72.30 | | | |
| | 50 | 97.70 | | | |





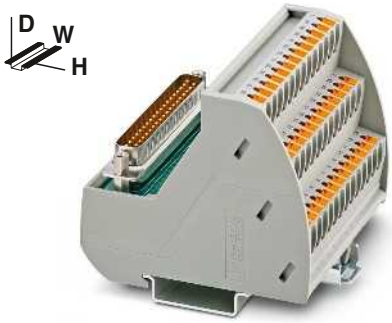

**9 to 15 positions**
**with push-in connection and light indicator**

### Technical data

24 V DC
2 A
-20 °C ... 50 °C
any
IEC 60664, DIN EN 50178, IEC 62103
0.14 - 2.5 mm² / 0.14 - 2.5 mm² / 26 - 14
72.1 mm / 46.6 mm

### Ordering data

| Type | Order No. | Pcs. / Pkt. |
|---|---|---|
| VIP-2/PT/D 9SUB/M/LED | 2904258 | 1 |
| VIP-2/PT/D15SUB/M/LED | 2904259 | 1 |
| VIP-2/PT/D 9SUB/F/LED | 2904263 | 1 |
| VIP-2/PT/D15SUB/F/LED | 2904264 | 1 |



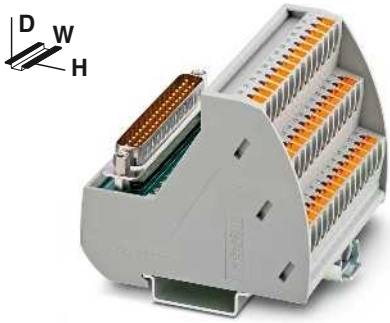

**25 to 50 positions**
**with push-in connection**

### Technical data

125 V AC/DC
2 A
-20 °C ... 50 °C
any
IEC 60664, DIN EN 50178, IEC 62103
0.14 - 2.5 mm² / 0.14 - 2.5 mm² / 26 - 14
75.8 mm / 63 mm

### Ordering data

| Type | Order No. | Pcs. / Pkt. |
|---|---|---|
| VIP-3/PT/D25SUB/M | 2903781 | 1 |
| VIP-3/PT/D37SUB/M | 2903783 | 1 |
| VIP-3/PT/D50SUB/M | 2903785 | 1 |
| VIP-3/PT/D25SUB/F | 2903782 | 1 |
| VIP-3/PT/D37SUB/F | 2903784 | 1 |
| VIP-3/PT/D50SUB/F | 2903786 | 1 |




**25 to 50 positions**
**with push-in connection and light indicator**

### Technical data

24 V DC
2 A
-20 °C ... 50 °C
any
IEC 60664, DIN EN 50178, IEC 62103
0.14 - 2.5 mm² / 0.14 - 2.5 mm² / 26 - 14
75.8 mm / 63 mm

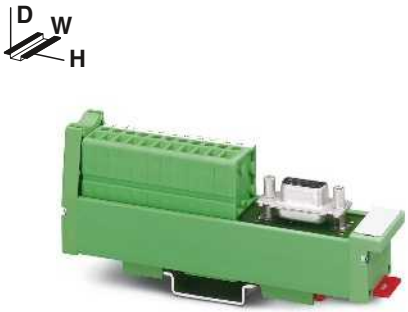
### Ordering data

| Type | Order No. | Pcs. / Pkt. |
|---|---|---|
| VIP-3/PT/D25SUB/M/LED | 2904260 | 1 |
| VIP-3/PT/D37SUB/M/LED | 2904261 | 1 |
| VIP-3/PT/D50SUB/M/LED | 2904262 | 1 |
| VIP-3/PT/D25SUB/F/LED | 2904265 | 1 |
| VIP-3/PT/D37SUB/F/LED | 2904266 | 1 |
| VIP-3/PT/D50SUB/F/LED | 2904267 | 1 |

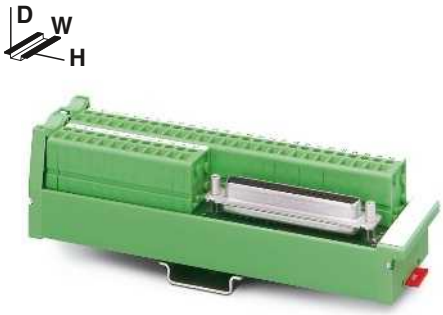
## SLIM-LINE modules for D-SUB connectors

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 connection 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 | | DIN EN 50178, IEC 60664, IEC 62103 | DIN EN 50178, IEC 60664, IEC 62103 |
| Dimensions | D / W | 45 mm / 25 mm | 45 mm / 45 mm |

| Description | No. of pos. | 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 | 157.00 | | | | **UM 45-D37SUB/S/FRONT/Q** | **2959638** | 1 |
| | 50 | 187.00 | | | | **UM 45-D50SUB/S/FRONT/Q** | **2959654** | 1 |
| **VARIOFACE SLIM-LINE module**, with D-Subminiature socket strip | | | | | | | | |
| | 37 | 157.00 | | | | **UM 45-D37SUB/B/FRONT/Q** | **2959625** | 1 |
| | 50 | 187.00 | | | | **UM 45-D50SUB/B/FRONT/Q** | **2959641** | 1 |

## Feed-through modules for D-SUB connectors with screw connection

- 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

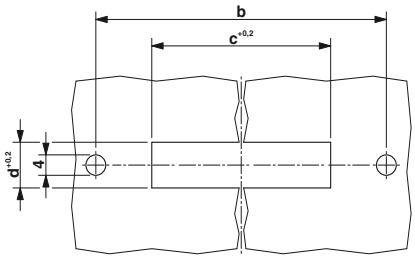
With D-SUB pin strip

With D-SUB socket strip

| | 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 | 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 - 4 mm² / 0.2 - 2.5 mm² / 24 - 12 |

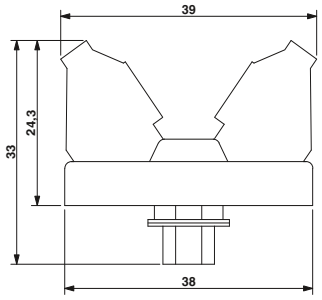
| Description | No. of pos. | Module width W | Ordering data: Type | Order No. | Pcs. / Pkt. | Ordering data: Type | Order No. | Pcs. / Pkt. |
|---|---|---|---|---|---|---|---|---|
| **VARIOFACE feed-through module**, with D-subminiature connector | | | | | | | | |
| | 9 | 39.00 | **DFLK-D 9 SUB/S** | **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 |

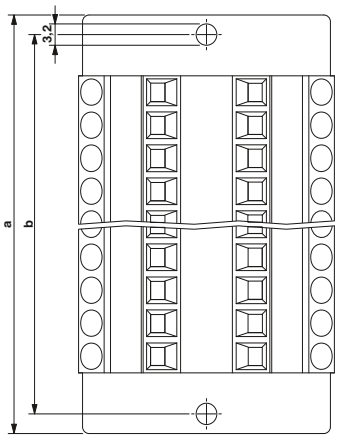
**Dimensioning of the housing cutout**




| 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 modules for D-SUB connectors with push-in connection

- 1:1 connection
- 9 to 50-pos.
- Plug-in push-in spring-cage connection
- Connector according to IEC 60807-2
- D-SUB 4-40 UNC thread
- 9 to 37-pos. with separate ground tap
- 50-pos.: no ground tap
- Select housing cutout for side panel mounting according to dimensions table

**With D-SUB pin strip and push-in connection**

**With D-SUB socket strip and push-in connection**

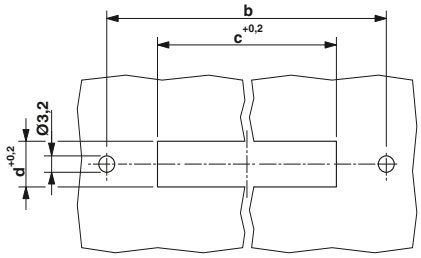
### Technical data

| | | |
|---|---|---|
| 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 | DIN EN 50178, IEC 60664, IEC 62103 | DIN EN 50178, IEC 60664, IEC 62103 |
| Connection data 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 |

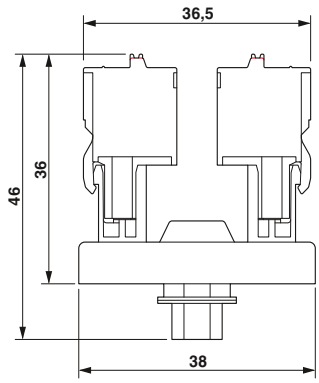
### Ordering data

| Description | No. of pos. | Module width W | Type | Order No. | Pcs. / Pkt. | Type | Order No. | Pcs. / Pkt. |
|---|---|---|---|---|---|---|---|---|
| **VARIOFACE feed-through module**, with D-subminiature connector | | | | | | | | |
| | 9 | 36.50 | **DFLK-D 9 SUB/M/FKCT** | **2903052** | 1 | **DFLK-D 9 SUB/F/FKCT** | **2903063** | 1 |
| | 15 | 36.50 | **DFLK-D15 SUB/M/FKCT** | **2903054** | 1 | **DFLK-D15 SUB/F/FKCT** | **2903065** | 1 |
| | 25 | 36.50 | **DFLK-D25 SUB/M/FKCT** | **2903055** | 1 | **DFLK-D25 SUB/F/FKCT** | **2903067** | 1 |
| | 37 | 36.50 | **DFLK-D37 SUB/M/FKCT** | **2903056** | 1 | **DFLK-D37 SUB/F/FKCT** | **2903069** | 1 |
| | 50 | 36.50 | **DFLK-D50 SUB/M/FKCT** | **2903058** | 1 | **DFLK-D50 SUB/F/FKCT** | **2903070** | 1 |

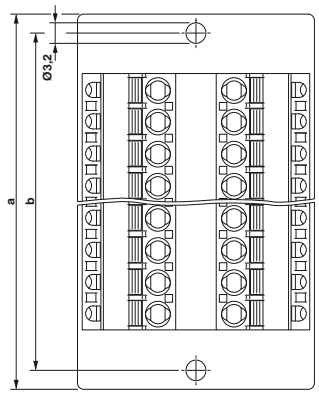
**Dimensioning of the housing cutout**




**Dimensional drawing DFLK-D...SUB...FKCT**




| Type | a | b | c | d |
|---|---|---|---|---|
| DFLK-D 9 SUB/M/FKCT | 58.4 | 52.5 | 40.2 + 0.2 | 13 + 0.2 |
| DFLK-D15 SUB/M/FKCT | 58.4 | 52.5 | 40.2 + 0.2 | 13 + 0.2 |
| DFLK-D25 SUB/M/FKCT | 83.4 | 77.5 | 54.2 + 0.2 | 13 + 0.2 |
| DFLK-D37 SUB/M/FKCT | 128.4 | 122.5 | 70.6 + 0.2 | 13 + 0.2 |
| DFLK-D50 SUB/M/FKCT | 143.4 | 137.5 | 67.8 + 0.2 | 15.8 + 0.2 |
| DFLK-D 9 SUB/F/FKCT | 58.4 | 52.5 | 40.2 + 0.2 | 13 + 0.2 |
| DFLK-D15 SUB/F/FKCT | 58.4 | 52.5 | 40.2 + 0.2 | 13 + 0.2 |
| DFLK-D25 SUB/F/FKCT | 83.4 | 77.5 | 54.2 + 0.2 | 13 + 0.2 |
| DFLK-D37 SUB/F/FKCT | 128.4 | 122.5 | 70.6 + 0.2 | 13 + 0.2 |
| DFLK-D50 SUB/F/FKCT | 143.4 | 137.5 | 67.8 + 0.2 | 15.8 + 0.2 |



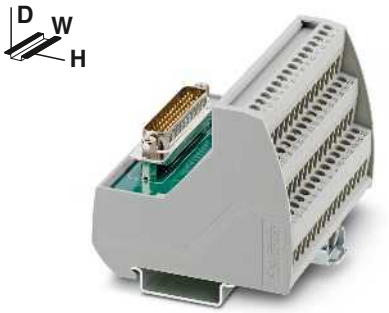
## VIP – VARIOFACE Professional modules for high density D-SUB connectors

– 1:1 connection
– 15 to 62-pos.
– Screw and push-in connection
– Metal foot
The D-SUB-4-40 UNC threads are led directly to a connection terminal block.

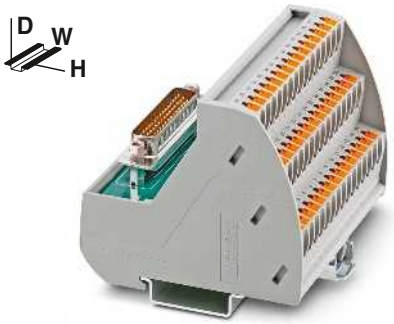
**Notes:**

For marking systems (e.g., "ZB 22:UNBEDRUCKT"; Order No. 0811862) and mounting material, see Catalog 5.

[1]) Module with double-level terminal blocks




**15 to 62 positions with screw connection**




**15 to 62 positions with push-in connection**

| | Technical data | Technical data |
|---|---|---|
| Operating voltage | 125 V AC/DC | 125 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 | EN 50178 | EN 50178 |
| Connection data solid / stranded / AWG | 0.2 - 4 mm² / 0.2 - 2.5 mm² / 24 - 12 | 0.14 - 2.5 mm² / 0.14 - 2.5 mm² / 26 - 14 |
| Dimensions H / D | 69 mm / 62 mm | 75.8 mm / 63 mm |

| Description | No. of pos. | Module width W | Ordering data: Type | Order No. | Pcs. / Pkt. | Ordering data: Type | Order No. | Pcs. / Pkt. |
|---|---|---|---|---|---|---|---|---|
| **VARIOFACE module**, with D-Subminiature pin strip | | | | | | | | |
| With screw connection [1]) | 15 | 44.90 | **VIP-2/SC/HD15SUB/M** | **2322326** | 1 | | | |
| With screw connection | 26 | 52.30 | **VIP-3/SC/HD26SUB/M** | **2322375** | 1 | | | |
| With screw connection | 44 | 82.90 | **VIP-3/SC/HD44SUB/M** | **2322388** | 1 | | | |
| With screw connection | 62 | 113.50 | **VIP-3/SC/HD62SUB/M** | **2322391** | 1 | | | |
| With push-in connection [1]) | 15 | 46.90 | | | | **VIP-2/PT/HD15SUB/M** | **2904268** | 1 |
| With push-in connection | 26 | 52.00 | | | | **VIP-3/PT/HD26SUB/M** | **2904269** | 1 |
| With push-in connection | 44 | 82.50 | | | | **VIP-3/PT/HD44SUB/M** | **2904270** | 1 |
| With push-in connection | 62 | 113.00 | | | | **VIP-3/PT/HD62SUB/M** | **2904271** | 1 |
| **VARIOFACE module**, with D-Subminiature socket strip | | | | | | | | |
| With screw connection [1]) | 15 | 44.90 | **VIP-2/SC/HD15SUB/F** | **2322401** | 1 | | | |
| With screw connection | 26 | 52.30 | **VIP-3/SC/HD26SUB/F** | **2322414** | 1 | | | |
| With screw connection | 44 | 82.90 | **VIP-3/SC/HD44SUB/F** | **2322427** | 1 | | | |
| With screw connection | 62 | 113.50 | **VIP-3/SC/HD62SUB/F** | **2322430** | 1 | | | |
| With push-in connection [1]) | 15 | 46.90 | | | | **VIP-2/PT/HD15SUB/F** | **2904272** | 1 |
| With push-in connection | 26 | 52.00 | | | | **VIP-3/PT/HD26SUB/F** | **2904273** | 1 |
| With push-in connection | 44 | 82.50 | | | | **VIP-3/PT/HD44SUB/F** | **2904274** | 1 |
| With push-in connection | 62 | 113.00 | | | | **VIP-3/PT/HD62SUB/F** | **2904275** | 1 |

## Modules for connectors IEC 60603/DIN 41612

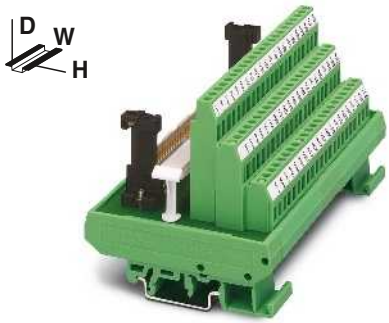
These VARIOFACE interface modules connect high-position connectors in acc. with IEC 60603/DIN 41612 to screw connection terminal blocks.

The following VARIOFACE modules are available:

– **UMK** modules with double-level connection terminal blocks
– **UMKS** modules with three-level connection terminal blocks

**Notes:**

Suitable cable housings, see the table on page 620



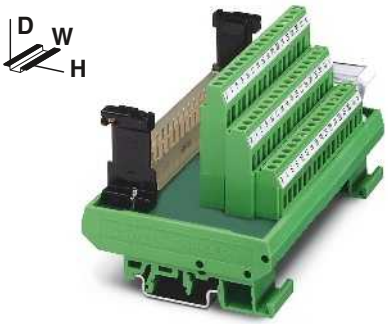

**Type C, 64-position, a, c assembled**

### Technical data

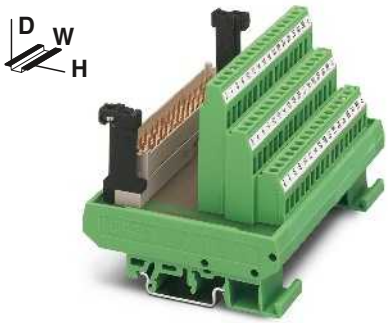
| | |
|---|---|
| Operating voltage | 125 V AC/DC |
| Max. perm. current (per branch) | 1 A |
| Ambient temperature (operation) | -20 °C ... 50 °C |
| Mounting position | any |
| Standards/regulations | DIN EN 50178, IEC 60664, IEC 62103 |
| Connection data solid / stranded / AWG | 0.2 - 4 $mm^2$ / 0.2 - 2.5 $mm^2$ / 24 - 12 |
| Dimensions H / D | 77 mm / 72 mm |

### Ordering data

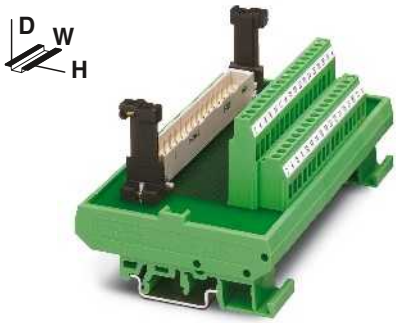
| Description | No. of pos. | Module width W | Type | Order No. | Pcs. / Pkt. |
|---|---|---|---|---|---|
| **VARIOFACE module**, C 64-pos., screw-on cable housing, with: | | | | | |
| - Pin contact strip | 64 | 135.00 | **UMKS- C64M-VS** | **2970565** | 1 |
| **VARIOFACE module**, E 48-pos., screw-on cable housing, with: | | | | | |
| - Pin contact strip | 48 | 123.80 | | | |
| **VARIOFACE module**, F 48-pos., screw-on cable housing, with: | | | | | |
| - Pin contact strip | 48 | 112.50 | | | |
| **VARIOFACE module**, F 48-pos., snap-on cable housing, with: | | | | | |
| - Pin contact strip | 48 | 112.50 | | | |
| **VARIOFACE module**, D 32-pos., screw-on cable housing, with: | | | | | |
| - Pin contact strip | 32 | 135.00 | | | |




**Type E,**
**48-position, a, c, e assembled**




**Type F,**
**48-position, z, b, d assembled**




**Type D,**
**32-position, a, c assembled**

EAC

## Technical data

125 V AC/DC
4 A
-20 °C ... 50 °C
any
DIN EN 50178, IEC 60664, 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 |

EAC

## Technical data

250 V AC/DC
4 A
-20 °C ... 45 °C
any
DIN EN 50178, IEC 60664, 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 |

EAC

## Technical data

250 V AC/DC
2 A
-20 °C ... 50 °C
any
DIN EN 50178, IEC 60664, 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 |

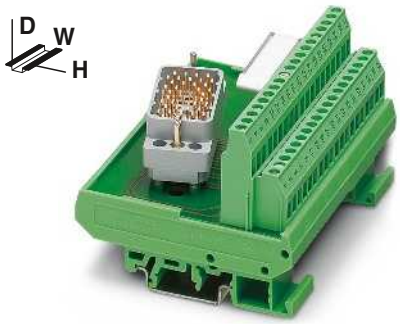
## Modules for ELCO connectors

These modules can be used to connect ELCO connectors of the 8016 series to screw connection terminal blocks.

The diagonal position of the ELCO 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 620



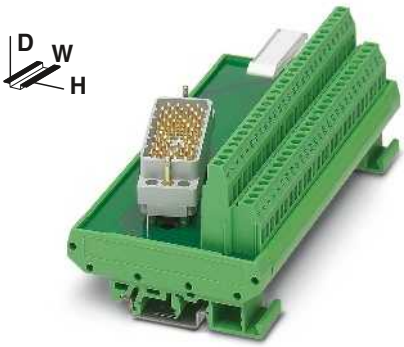

38-pos.

### Technical data

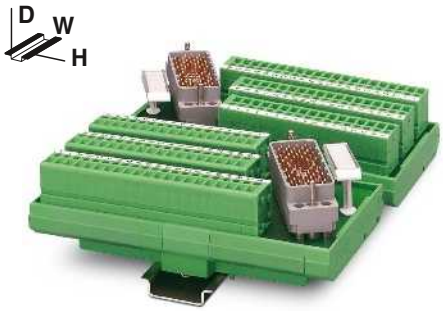
| | |
|---|---|
| Operating voltage | 25 V AC / 60 V DC |
| Max. perm. current (per branch) | 2 A |
| Total current | 76 A |
| Ambient temperature (operation) | -20 °C ... 40 °C |
| Mounting position | any |
| Standards/regulations | IEC 60664, DIN EN 50178, IEC 62103 |
| Connection data solid / stranded / AWG | 0.2 - 4 $mm^2$ / 0.2 - 2.5 $mm^2$ / 24 - 12 |
| Dimensions H / D | 77 mm / 58.5 mm |

### Ordering data

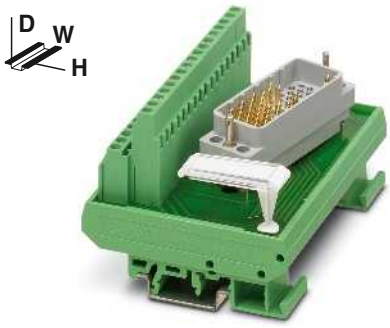
| Description | No. of pos. | Module width W | Type | Order No. | Pcs. / Pkt. |
|---|---|---|---|---|---|
| **VARIOFACE module**, with: | | | | | |
| - Pin strip 8016 right | 38 | 101.50 | **UMK- EC38/38-XOR** | **2976297** | 1 |
| - Pin strip 8016 left | 38 | 101.50 | **UMK- EC38/38-XOL** | **2976284** | 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.

EAC

## 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 |

EAC

## Technical data

25 V AC / 60 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 |

EAC

## 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 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.

For clear identification for intrinsically safe circuits, the modules are fitted with blue screw connection terminal blocks.

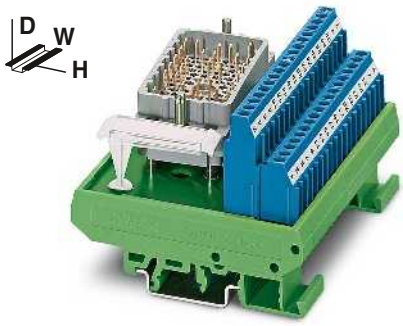
The arrangement of angled ELCO connectors makes it possible to lead the lines led out from the cable housing away from the adjacent modules without any negative effects.

To separate 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 621

Facts about explosion protection, see page 144



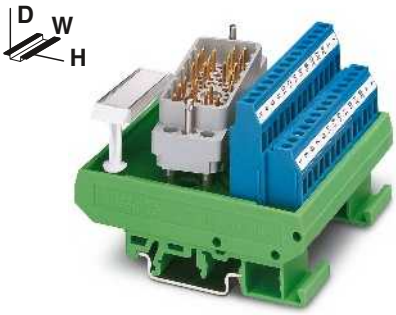

32-pos.

### Technical data

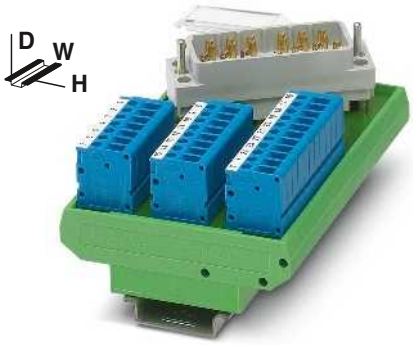
| | |
|---|---|
| Operating voltage | max. 30 V DC<br>(max. voltage between two intrinsically safe circuits: 60 V DC) |
| Max. perm. current (per branch) | 500 mA |
| Ambient temperature (operation) | -20 °C ... 50 °C |
| Mounting position | any |
| Standards/regulations | DIN EN 60079-11 |
| Connection data solid / stranded / AWG | 0.2 - 4 mm² / 0.2 - 2.5 mm² / 24 - 12 |
| Dimensions H / D | 77 mm / 58.5 mm |

### Ordering data

| Description | No. of pos. | 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

EAC

| Technical data |
|---|
| max. 30 V DC |
| (max. voltage between two intrinsically safe circuits: 60 V DC) |
| 500 mA |
| -20 °C ... 50 °C |
| any |
| DIN EN 60079-11 |
| 0.2 - 4 mm² / 0.2 - 2.5 mm² / 24 - 12 |
| 77 mm / 58.5 mm |

| Technical data |
|---|
| max. 30 V DC |
| (max. voltage between two intrinsically safe circuits: 60 V DC) |
| 500 mA |
| -20 °C ... 50 °C |
| any |
| DIN EN 60079-11 |
| 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 -R** | **2900112** | 1 |
| **UMK- EC56/25/EX -L** | **2900113** | 1 |

**Ordering data**

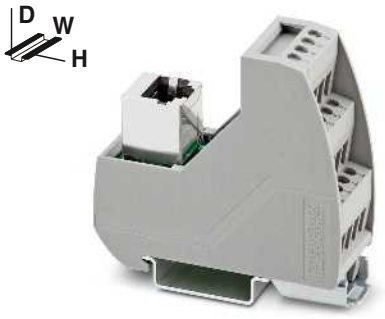
| Type | Order No. | Pcs. / Pkt. |
|---|---|---|
| **UMK- EC56/25/EX -FRONT 2,5V/R** | **2900114** | 1 |
| **UMK- EC56/25/EX -FRONT 2,5V/L** | **2900115** | 1 |

## Modules with RJ45 connector

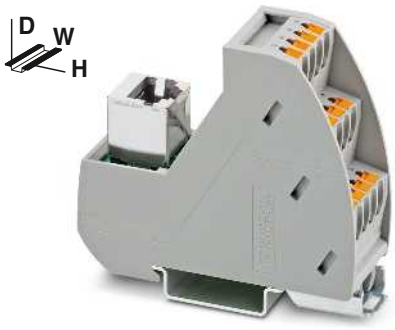
- 1:1 connection
- 8-pos., RJ45 connector
- Screw or push-in connection (direct plug-in technology)
- Connector housing led to separate connection terminal blocks

**Notes:**

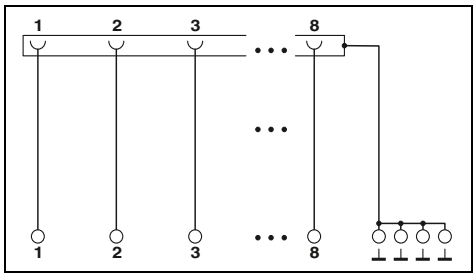
For marking systems (e.g., “ZB 22:UNBEDRUCKT”; Order No. 0811862) and mounting material, see Catalog 5.

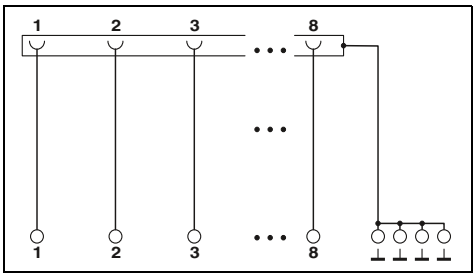



**8-pos.**
**With srew connection**




**8-pos.**
**With push-in connection**




### Technical data

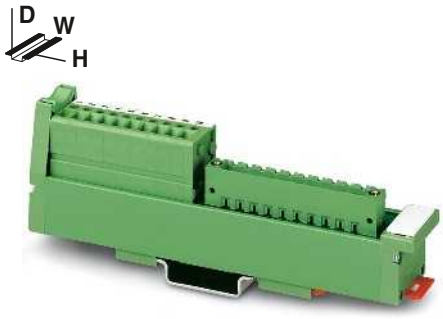
| | | |
|---|---|---|
| Operating voltage | 48 V AC/DC | 48 V AC/DC |
| Max. perm. current (per branch) | 1 A | 1 A |
| Ambient temperature (operation) | -20 °C ... 50 °C | -20 °C ... 50 °C |
| Mounting position | any | any |
| Standards/regulations | DIN EN 50178 | EN 50178 |
| Connection data solid / stranded / AWG | 0.2 - 4 $mm^2$ / 0.2 - 2.5 $mm^2$ / 24 - 12 | 0.14 - 2.5 $mm^2$ / 0.14 - 2.5 $mm^2$ / 26 - 14 |
| Dimensions H / D | 69 mm / 62 mm | 75.8 mm / 63 mm |

### Ordering data

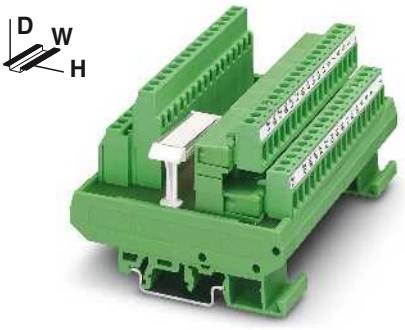
| Description | No. of pos. | Module width W | Type | Order No. | Pcs. / Pkt. |
|---|---|---|---|---|---|
| **VARIOFACE module**, with RJ45 connector | | | | | |
| With screw connection | 8 | 26.90 | **VIP-3/SC/RJ45** | **2900701** | 1 |
| With push-in connection | 8 | 26.60 | **VIP-3/PT/RJ45** | **2904290** | 1 |

## Modules with COMBICON connection

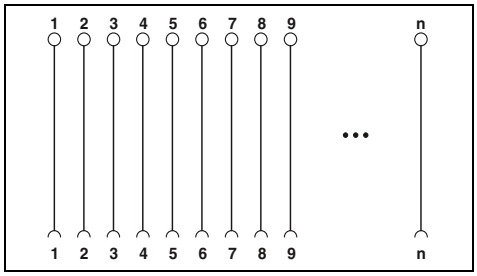
- The slim 10 and 18-pos. VARIOFACE SLIM-LINE modules connect the front connection terminal blocks to a COMBICON header. The corresponding COMBICON connectors (5.0 mm pitch) can be found in the COMBICON catalog, PCB connection technology.
- The 32-pos. module UMK-32 MDSTB/MKKDS 3/R connects screw connection terminal blocks with coded COMBICON plug-in screw connectors.

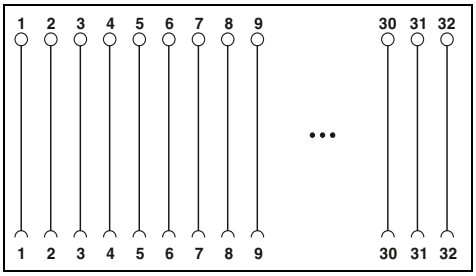



**10 and 18-pos.**
**With screw connection**




**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 pos. | 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 connector, coded | | | | | | | | |
| | 32 | 77.00 | | | | **UMK-32 MDSTB/MKKDS3/R** | **2970196** | 1 |

## VIP – VARIOFACE Professional system cables with flat-ribbon connectors

– 1:1 connection
– 10 to 20-pos.
– Connectors as per IEC 60603-13
– In the desired lengths
– Individual serial number

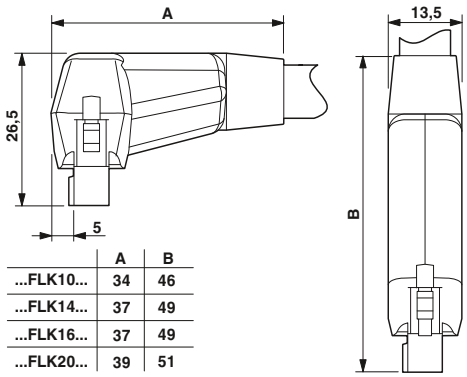
**Note:**

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-pos.) can be connected.

For example, for 20 positions:
– 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 |

**Unshielded**

### Technical data

| | | |
|---|---|---|
| Max. perm. operating voltage | | < 50 V AC / 60 V DC |
| Max. perm. current carrying capacity 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-position | 6.1 mm |
| | 14-position | 6.4 mm |
| | 16-position | 6.8 mm |
| | 20-position | 7.6 mm |

### Ordering data

| Description | No. of pos. | Cable length | Type | Order No. | Pcs. / Pkt. |
|---|---|---|---|---|---|
| **Round cable,** with two molded socket strips | | | | | |
| | 10 | 1 m | **VIP-CAB-FLK10/0,14/1,0M** | **2318318** | 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 |
| **Round cable**, as above, in variable lengths (minimum ordering quantity five pieces) | | | | | |
| | 10 | | **VIP-CAB-FLK10-0,14/...** | **2318376** | 1 |
| **Round cable,** with two molded socket strips | | | | | |
| | 14 | 1 m | **VIP-CAB-FLK14/0,14/1,0M** | **2318392** | 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 |
| **Round cable**, as above, in variable lengths (minimum ordering quantity five pieces) | | | | | |
| | 14 | | **VIP-CAB-FLK14-0,14/...** | **2318457** | 1 |
| **Round cable,** with two molded socket strips | | | | | |
| | 16 | 1 m | **VIP-CAB-FLK16/0,14/1,0M** | **2318473** | 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 |
| **Round cable**, as above, in variable lengths (minimum ordering quantity five pieces) | | | | | |
| | 16 | | **VIP-CAB-FLK16-0,14/...** | **2318538** | 1 |
| **Round cable,** with two molded socket strips | | | | | |
| | 20 | 1 m | **VIP-CAB-FLK20/0,14/1,0M** | **2318554** | 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 |
| **Round cable**, as above, 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 |
| **Increment** | 0.1 m |

## VIP – VARIOFACE Professional system cables with flat-ribbon connectors

– 1:1 connection
– 26 to 50-pos.
– Connectors as per IEC 60603-13
– In the desired lengths
– Individual serial number

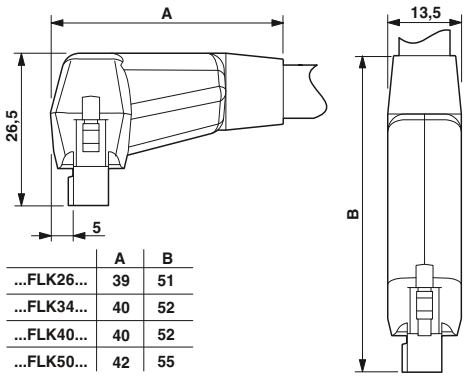
**Note:**

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-pos.) can be connected.

For example, for 20 positions:
– 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 |

Unshielded

### Technical data

| | | |
|---|---|---|
| Max. perm. operating voltage | | < 50 V AC / 60 V DC |
| Max. perm. current carrying capacity 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-position | 8.3 mm |
| | 34-position | 8.7 mm |
| | 40-position | 9.9 mm |
| | 50-position | 10.3 mm |

### Ordering data

| Description | No. of pos. | Cable length | Type | Order No. | Pcs. / Pkt. |
|---|---|---|---|---|---|
| **Round cable,** with two molded socket strips | | | | | |
| | 26 | 1 m | **VIP-CAB-FLK26/0,14/1,0M** | **2318635** | 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 |
| **Round cable**, as above, in variable lengths (minimum ordering quantity five pieces) | 26 | | **VIP-CAB-FLK26-0,14/...** | **2318693** | 1 |
| **Round cable,** with two molded socket strips | | | | | |
| | 34 | 1 m | **VIP-CAB-FLK34/0,14/1,0M** | **2318716** | 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 |
| **Round cable**, as above, in variable lengths (minimum ordering quantity five pieces) | 34 | | **VIP-CAB-FLK34-0,14/...** | **2318774** | 1 |
| **Round cable,** with two molded socket strips | | | | | |
| | 40 | 1 m | **VIP-CAB-FLK40/0,14/1,0M** | **2318790** | 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 |
| **Round cable**, as above, in variable lengths (minimum ordering quantity five pieces) | 40 | | **VIP-CAB-FLK40-0,14/...** | **2318855** | 1 |
| **Round cable,** with two molded socket strips | | | | | |
| | 50 | 1 m | **VIP-CAB-FLK50/0,14/1,0M** | **2318871** | 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 |
| **Round cable**, as above, 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 |
| **Increment** | 0.1 m |

## System cable with a flat-ribbon cable connector and an open end

– 1:1 connection
– 10, 14, and 16-pos.
– Connectors as per IEC 60603-13
– Open end at the other end
The individual wires at the open end are marked (1, 2, 3, 4, ...) and fitted with a ferrule.

**Notes:**

In the case of molded connectors, please observe the dimensional drawing and note, see page 600

**Molded connectors, unshielded**

**Unshielded**

| | Technical data | Technical data |
|---|---|---|
| Max. perm. operating voltage | < 50 V AC / 60 V DC | < 50 V AC / 60 V DC |
| Max. perm. current carrying capacity 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 | | |
| 10-position | 6.1 mm | 6.1 mm |
| 14-position | 6.4 mm | 6.4 mm |
| 16-position | 6.5 mm | 6.5 mm |

| Description | No. of pos. | Cable length | Ordering data: Type | Order No. | Pcs. / Pkt. | Ordering data: Type | Order No. | Pcs. / Pkt. |
|---|---|---|---|---|---|---|---|---|
| **Round cable** with an open end | | | | | | | | |
| | 10 | 0.5 m | | | | **CABLE-FLK10/OE/0,14/ 0,5M** | **2904073** | 1 |
| | 10 | 1 m | | | | **CABLE-FLK10/OE/0,14/ 1,0M** | **2904074** | 1 |
| | 10 | 1.5 m | | | | **CABLE-FLK10/OE/0,14/ 1,5M** | **2904075** | 1 |
| | 10 | 2 m | | | | **CABLE-FLK10/OE/0,14/ 2,0M** | **2904076** | 1 |
| | 10 | 2.5 m | | | | **CABLE-FLK10/OE/0,14/ 2,5M** | **2904077** | 1 |
| | 10 | 3 m | | | | **CABLE-FLK10/OE/0,14/ 3,0M** | **2904078** | 1 |
| | 10 | 4 m | | | | **CABLE-FLK10/OE/0,14/ 4,0M** | **2904079** | 1 |
| | 10 | 6 m | | | | **CABLE-FLK10/OE/0,14/ 6,0M** | **2904080** | 1 |
| | 10 | 8 m | | | | **CABLE-FLK10/OE/0,14/ 8,0M** | **2904081** | 1 |
| | 10 | 10 m | | | | **CABLE-FLK10/OE/0,14/10,0M** | **2904082** | 1 |
| **Round cable,** as above, however in variable lengths | | | | | | | | |
| | 10 | | | | | **CABLE-FLK10-OE-0,14/...** | **2904331** | 1 |
| **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 | | | | **CABLE-FLK14/OE/0,14/ 400** | **2305774** | 1 |
| | 14 | 6 m | | | | **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,** as above, 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 | | | | **CABLE-FLK16/OE/0,14/ 4,0M** | **2318185** | 1 |
| | 16 | 6 m | | | | **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,** as above, 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-pos.
– Connectors as per IEC 60603-13
– Open end at the other end
The individual wires at the open end are marked (1, 2, 3, 4, ...) and fitted with a ferrule.

**Notes:**

In the case of molded connectors, please observe the dimensional drawing and note, see page 600

**Molded connectors, unshielded**

**Unshielded**

| | Technical data | Technical data |
|---|---|---|
| Max. perm. operating voltage | < 50 V AC / 60 V DC | < 50 V AC / 60 V DC |
| Max. perm. current carrying capacity 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-position | 7.6 mm | 7.6 mm |
| 50-position | 10.3 mm | 10.3 mm |

| Description | No. of pos. | 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 | | | | **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 | | | | **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 | | | | **CABLE-FLK20/OE/0,14/ 400** | **2305839** | 1 |
| | 20 | 6 m | | | | **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,** as above, however in variable lengths | | | | | | | | |
| | 20 | | | | | **CABLE-FLK20/OE/0,14/...** | **2305745** | 1 |
| **Round cable** with an open end | | | | | | | | |
| | 50 | 0.5 m | | | | **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 | | | | **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 | | | | **CABLE-FLK50/OE/0,14/ 400** | **2305884** | 1 |
| | 50 | 6 m | | | | **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,** as above, however in variable lengths | | | | | | | | |
| | 50 | | | | | **CABLE-FLK50/OE/0,14/...** | **2305758** | 1 |

## System cable with flat-ribbon cable connector

### Standard lengths

Pre-assembled round cables are used to connect the PLC front adapters to the corresponding VARIOFACE controller boards.

The following versions are available with 14 and 50 positions:
– Unshielded
– Shielded
– Halogen-free

Connector strips are fitted on both ends 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 608.

Unshielded

EAC

### Technical data

| | |
|---|---|
| Max. perm. operating voltage | < 50 V AC / 60 V DC |
| Max. perm. current carrying capacity 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-position | 6.4 mm |
| 50-position | 10.3 mm |

### Ordering data

| Description | No. of pos. | Cable length | Type | Order No. | Pcs. / Pkt. |
|---|---|---|---|---|---|
| **Assembled round cable[1])**, with two 14-pos. 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 cable[2])**, with two 50-pos. 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 |

**Shield connection at one end**

Applied for: cUL / UL

## 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 |

## 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 |

**Halogen-free (cable only)**

## 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 |

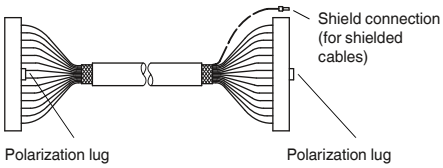
## Ordering data

| Type | Order No. | Pcs. / Pkt. |
|---|---|---|
| FLK 14/EZ-DR/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 |

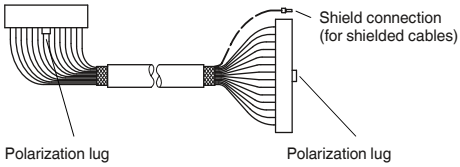
**Color code of system cables**

| Wire No. | PIN | Wire 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 |
| | 47 | Gray-red |
| | 48 | Gray-orange |
| | 49 | Gray-yellow |
| 50-pos. | 50 | Gray-green |

**[1]) Socket strips assembled straight at both ends.**




**[2]) Socket strips assembled 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 ends 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 608.

| Notes: |
|---|
| **Outside diameter of the cable** |
| 10-pos.: 6 mm<br>16-pos.: 6.5 mm<br>20-pos.: 7.6 mm<br>26-pos.: 7.8 mm<br>34-pos.: 10 mm |

**Unshielded**

EAC

Applied for: cUL / UL

### Technical data

| | |
|---|---|
| Max. perm. operating voltage | < 50 V AC / 60 V DC |
| Max. perm. current carrying capacity 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 pos. | 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

Pre-assembled round cables are used to connect the PLC front adapters to the corresponding VARIOFACE controller boards.

Connector strips are fitted on both ends 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 608.

**Unshielded**

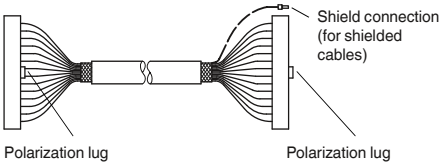
### Technical data

| | |
|---|---|
| Max. perm. operating voltage | < 50 V AC / 60 V DC |
| Max. perm. current carrying capacity 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-position | 9.9 mm |

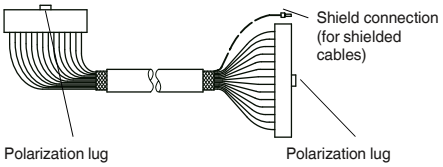
### Ordering data

| Description | No. of pos. | 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]) Socket strips assembled straight at both ends.**




**[2]) Socket strips assembled straight at one end and angled at the other.**



## System cable with flat-ribbon cable connector

### Special lengths

Pre-assembled **round cables** for connecting, e.g., PLC front adapters to the corresponding VARIOFACE termination boards. The cables are assembled with connector strips at both ends according to IEC 60603-13/DIN 41651. For shielded cables, a cable end with ferrule is available additionally as a shielded connection (length: approx. 0.5 m; cable: H05V-K 1 mm², black).

The order key for special lengths is described using three features.

The order of the features is as follows:

- Cable type
- Assembly
- Length in meters

There are two order keys, one for unshielded round cables, FLK EZ-DR/.../.../..., and one for shielded round cables, FLK EZ-DR-S/.../.../.... To ensure clear specification when ordering, the features are described in detail below:

### Cable type

- This specifies the number of individual conductors of the specific cable.

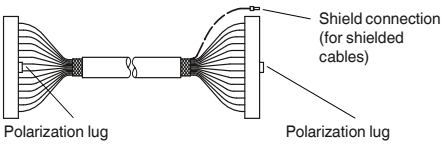
### Assembly

- None,
  the cable is not assembled at either end;
- 10-pos. socket strip at both ends, the cable is assembled with 10-pos. connectors at both ends (1:1 connection);
- 14-pos. socket strip at both ends, the cable is assembled with 14-pos. connectors at both ends (1:1 connection); and so on up to
- 50-pos. socket strip at both ends, the cable is assembled with 50-pos. connectors at both ends (1:1 connection);
- 14-pos. socket strip at one end, 16-pos. socket strip at one end, the cable is assembled with a 14-pos. connector at one end and a 16-pos. connector at the other end (for SIMATIC S7; no 1:1 connection).

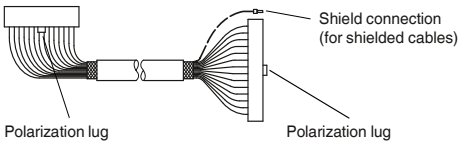
### Features of permissible assemblies:

| Cable type / Assembly | Unshielded 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/...** |
| 10-pos. socket strip at both ends | **10U/C55/...**[1]) | | | | | | | | | | | |
| 14-pos. socket strip at both ends | | **14U/C23/...**[1]) | | | | | | | **14S/C23/...**[1]) | | | |
| 16-pos. socket strip at both ends | | | **16U/C58/...**[1]) | | | | | | | **16S/C58/...**[1]) | | |
| 20-pos. socket strip at both ends | | | | **20U/C61/...**[1]) | | | | | | | | |
| 26-pos. socket strip at both ends | | | | | **26U/C63/...**[1]) | | | | | | | |
| 34-pos. socket strip at both ends | | | | | | **34U/C65/...**[1]) | | | | | | |
| 40-pos. socket strip at both ends | | | | | | | **40U/C30/...**[3]) | | | | **40S/C30/...**[3]) | |
| 50-pos. socket strip at both ends | | | | | | | | **50U/C38/...**[2]) | | | | **50S/C38/...**[2]) |
| 14-pos. socket strip at one end; 16-pos. socket strip at one end | | **14U/C52/...**[1]) | | | | | | | **14S/C52/...**[1]) | | | |

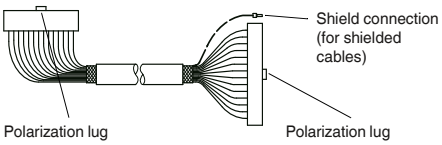
**[1]) Socket strips assembled straight at both ends.**




**[2]) Socket strips assembled straight at one end and angled at the other.**




**[3]) Socket strips assembled straight at one end and angled at the other.**




### **Ordering example for unshielded** round cable**:**

– Unshielded 50-pos. round cable, assembled with two 50-pos. socket strips, 11.5 m long

| 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 the other (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

### **Ordering example for shielded** round cable**:**

– Shielded 14-pos. round cable, assembled with two 14-pos. socket strips, 12.75 m long

| 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 the other (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

Unshielded

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 capacity 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 pos. | Cable length | Ordering data: Type | Order No. | Pcs. / Pkt. | Ordering data: Type | Order No. | Pcs. / Pkt. |
|---|---|---|---|---|---|---|---|---|
| **Unshielded round cable,** as above, but in variable lengths of type **"FLK EZ-DR/14U/C52/..."** | | | **FLK EZ-DR.../.../...** | **2295059** | 1 | **FLK EZ-DR-S.../.../...** | **2295046** | 1 |

## System cable with DSUB socket and pin strip

### Standard lengths

Pre-assembled shielded round cables 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 end and D-SUB pin strip on the other
– D-SUB sockets on both ends
– DSUB pin strips on both ends
– Cable outlet: straight
– Screw connection: 2 UNC 4-40 screws

Special lengths and assembly versions are defined using an order key, refer to page 612.

**Socket strip at one end and pin strip at the other**

### Technical data

| | | |
|---|---|---|
| Max. perm. operating voltage | | 125 V AC/DC |
| Max. perm. current carrying capacity 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-position | 7.5 mm |
| | 15-position | 9 mm |
| | 25-position | 10.5 mm |
| | 37-position | 12.5 mm |
| | 50-position | 13.5 mm |

### Ordering data

| Description | No. of pos. | Cable length | Type | Order No. | Pcs. / Pkt. |
|---|---|---|---|---|---|
| **Shielded round cable,** fitted with two D-SUB strips, various numbers of positions 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

Pin strip 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 socket and pin strip

### Special lengths

Pre-assembled 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 end
- 9-pos. D-SUB socket strip at one end and 9-pos. D-SUB pin strip at the other 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 the other 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 the other end, the cable connects (1:1) a 50-pos. D-SUB socket and pin strip.

**Ordering example** for round cable assembled with pin strip on one end and socket strip on the other end

– Unshielded 25-pos. round cable, 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<br>**15S** ≙ 15-pos. shielded<br>**25S** ≙ 25-pos. shielded<br>**37S** ≙ 37-pos. shielded<br>**50S** ≙ 50-pos. shielded | **C00** ≙ no assembly<br>**C01** ≙ 9-pos. D-SUB socket strip at one end 9-pos. D-SUB pin strip at one end<br>**C28** ≙ 15-pos. D-SUB socket strip at one end 15-pos. D-SUB pin strip at one end<br>**C36** ≙ 25-pos. D-SUB socket strip at one end 25-pos. D-SUB pin strip at one end<br>**C43** ≙ 37-pos. D-SUB socket strip at one end 37-pos. D-SUB pin strip at one end<br>**C49** ≙ 50-pos. D-SUB socket strip at one end 50-pos. D-SUB pin strip at one end | [1]) min. 0.20 m |

**Ordering example** for round cable 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<br>**15S** ≙ 15-pos. shielded<br>**25S** ≙ 25-pos. shielded<br>**37S** ≙ 37-pos. shielded<br>**50S** ≙ 50-pos. shielded | **C00** ≙ no assembly<br>**C22** ≙ 9-pos. D-SUB socket strip at both ends<br>**C29** ≙ 15-pos. D-SUB socket strip at both ends<br>**C37** ≙ 25-pos. D-SUB socket strip at both ends<br>**C44** ≙ 37-pos. D-SUB socket strip at both ends<br>**C50** ≙ 50-pos. D-SUB socket strip at both ends | [1]) min. 0.20 m |

**Ordering example** for round cable 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<br>**15S** ≙ 15-pos. shielded<br>**25S** ≙ 25-pos. shielded<br>**37S** ≙ 37-pos. shielded<br>**50S** ≙ 50-pos. shielded | **C00** ≙ no assembly<br>**C70** ≙ 9-pos. D-SUB pin strip at both ends<br>**C71** ≙ 15-pos. D-SUB pin strip at both ends<br>**C72** ≙ 25-pos. D-SUB pin strip at both ends<br>**C73** ≙ 37-pos. D-SUB pin strip at both ends<br>**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 capacity 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 |

## Ordering data

| Description | No. of pos. | Cable length | Type | Order No. | Pcs. / Pkt. |
|---|---|---|---|---|---|
| **Assembled round cable,** in variable lengths, **pin strip on one end** and **socket strip on the other end** | | | **CABLE D-SUB-S/.../.../...** | **2302340** | 1 |
| **Assembled round cable,** in variable lengths, **socket strip on both ends** | | | **CABLE D-SUB-B-B-S/.../.../...** | **2302421** | 1 |
| **Assembled round cable,** in variable lengths, **pin strip on both ends** | | | **CABLE D-SUB-S-S-S/.../.../...** | **2302434** | 1 |

## System cable with D-SUB socket or pin strip and one open end

- 1:1 connection
- D-SUB socket 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

**Socket strip 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 capacity 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-position | 7.5 mm | 7.5 mm |
| 15-position | 9 mm | 9 mm |
| 25-position | 10.5 mm | 10.5 mm |

| Description | No. of pos. | 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,** as above, however in variable lengths | | | | | | | | |
| | 9 | | 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,** as above, however in variable lengths | | | | | | | | |
| | 15 | | 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,** as above, however in variable lengths | | | | | | | | |
| | 25 | | 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-pos. D-SUB socket strip and one open end, 12.75 m in length:

**1 pcs. 2900907/12,75**

**Socket strip at one end and open end at the other end**

**Pin strip at one end and open end at the other end**

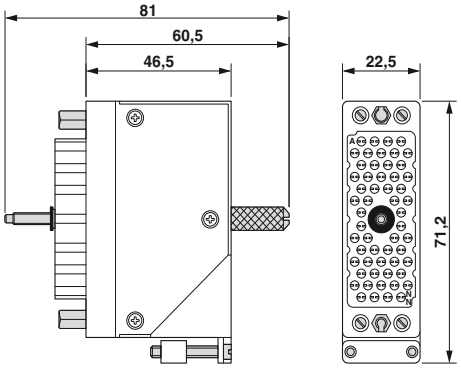
| | | Technical data | Technical data |
|---|---|---|---|
| Max. perm. operating voltage | | 125 V AC/DC | 125 V AC/DC |
| Max. perm. current carrying capacity per path | | 2 A | 2 A |
| Max. conductor resistance | | 0.09 Ω/m | 0.09 Ω/m |
| Ambient temperature (operation) | | -20 °C ... 50 °C | -20 °C ... 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-position | 12 mm | 12 mm |
| | 50-position | 13.5 mm | 13.5 mm |

| | | | Ordering data | | | Ordering data | | |
|---|---|---|---|---|---|---|---|---|
| Description | No. of pos. | Cable length | Type | Order No. | Pcs. / Pkt. | 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,** as above, however in variable lengths | | | | | | | | |
| | 37 | | 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,** as above, however in variable lengths | | | | | | | | |
| | 50 | | CABLE-D-50SUB-F-OE-0,25-S/... | 2900908 | 1 | CABLE-D-50SUB-M-OE-0,25-S/... | 2900913 | 1 |

## System cable with a 56-pos. ELCO/EDAC connector and an open end

Assembled system cable for connecting 56-pos. EDAC connectors from the 516 series or ELCO connectors from the 8016 series.

- Series 516 EDAC socket connector at one end
- Metal housing with lateral cable outlet
- Coding sockets in location 1 by default
- Open end at the other end
- Single wire marking: 1, 2, 3, ... 53, 54, Y, Z (see pin assignment)
- Shield connection on both ends: H05V-K 1 mm² cable, black, length: 0.5 m



56-pos. system cable

| Notes: |
|---|
| The system cables are designed specifically for the UMK-EC56/56-XOR (2975900) and UMK-EC56/56-XOL (2975890) modules. |
| When using the UMK-EC56/FRONT 2,5V/R (2976161) or UMK-EC56/FRONT 2,5V/L (2976158) modules, the coding sockets must be adapted accordingly. |
| Observe the module and system cable layouts. |

### Technical data

| | |
|---|---|
| Max. perm. operating voltage | 25 V AC / 60 V DC |
| Max. perm. current carrying capacity per path | 1.5 A |
| Max. conductor resistance | 0.056 Ω/m |
| Ambient temperature (operation) | -20 °C ... 60 °C |
| Shield | Tinned copper-braided shield, approx. 85% covering |
| Conductor cross section | AWG 22 / 0.34 mm² |
| Conductor structure: stranded wires / material | 19 / Cu uninsulated |

### Ordering data

| Description | No. of pos. | Cable length | Type | Order No. | Pcs. / Pkt. |
|---|---|---|---|---|---|
| **Shielded round cable,** assembled with EDAC socket connector at one end and an open end at the other | | | | | |
| | 56 | 1 m | **CABLE-EC56/F/OE/0,34/S/ 1,0M** | **2903395** | 1 |
| | 56 | 2 m | **CABLE-EC56/F/OE/0,34/S/ 2,0M** | **2903396** | 1 |
| | 56 | 4 m | **CABLE-EC56/F/OE/0,34/S/ 4,0M** | **2903397** | 1 |
| | 56 | 6 m | **CABLE-EC56/F/OE/0,34/S/ 6,0M** | **2903398** | 1 |
| | 56 | 8 m | **CABLE-EC56/F/OE/0,34/S/ 8,0M** | **2903399** | 1 |
| | 56 | 10 m | **CABLE-EC56/F/OE/0,34/S/10,0M** | **2903400** | 1 |
| | 56 | 15 m | **CABLE-EC56/F/OE/0,34/S/15,0M** | **2903401** | 1 |
| | 56 | 20 m | **CABLE-EC56/F/OE/0,34/S/20,0M** | **2903402** | 1 |
| **Shielded round cable,** as above, but in variable lengths | | | | | |
| | 56 | | **CABLE-EC56-F-OE-0,34-S/...** | **2904025** | 1 |

**Pin assignment**

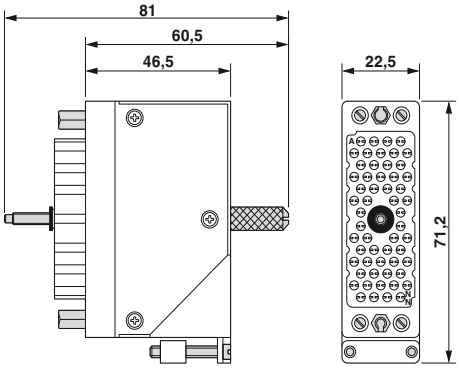
| Single wire marking | EDAC socket connector | Single wire marking | EDAC socket connector |
|---|---|---|---|
| Z | Z | 31 | m |
| 1 | A | 32 | n |
| 2 | B | 33 | p |
| 3 | C | 34 | r |
| 4 | D | 35 | s |
| 5 | E | 36 | t |
| 6 | F | 37 | u |
| 7 | H | 38 | v |
| 8 | J | 39 | w |
| 9 | K | 40 | x |
| 10 | L | 41 | y |
| 11 | M | 42 | z |
| 12 | N | 43 | AA |
| 13 | P | 44 | BB |
| 14 | R | 45 | CC |
| 15 | S | 46 | DD |
| 16 | T | 47 | EE |
| 17 | U | 48 | FF |
| 18 | V | 49 | HH |
| 19 | W | 50 | JJ |
| 20 | X | 51 | KK |
| 21 | a | 52 | LL |
| 22 | b | 53 | MM |
| 23 | c | 54 | NN |
| 24 | d | Y | Y |
| 25 | e | | |
| 26 | f | | |
| 27 | h | | |
| 28 | j | | |
| 29 | k | | |
| 30 | l | | |

## System cable with 56-pos. EDAC/ELCO connector

Assembled system cable for connecting 56-pos. EDAC connectors from the 516 series or ELCO connectors from the 8016 series.

– Series 516 EDAC socket connectors at both ends
– Metal housing with lateral cable outlet
– Coding sockets in location 1 by default
– Shield connection at both ends: H05V-K 1 mm² cable, black, length: 0.5 m

| Notes: |
|---|
| The system cables are designed specifically for the UMK-EC56/56-XOR (2975900) and UMK-EC56/56-XOL (2975890) modules. |
| When using the UMK-EC56/FRONT 2,5V/R (2976161) or UMK-EC56/FRONT 2,5V/L (2976158) modules, the coding sockets must be adapted accordingly. |
| Observe the module and system cable layouts. |



### Technical data

| | |
|---|---|
| Max. perm. operating voltage | 25 V AC / 60 V DC |
| Max. perm. current carrying capacity per path | 1.5 A |
| Max. conductor resistance | 0.056 Ω/m |
| Ambient temperature (operation) | -20 °C ... 60 °C |
| Shield | Tinned copper-braided shield, approx. 85% covering |
| Conductor cross section | AWG 22 / 0.34 mm² |
| Conductor structure: stranded wires / material | 19 / Cu uninsulated |

### Ordering data

| Description | No. of pos. | Cable length | Type | Order No. | Pcs. / Pkt. |
|---|---|---|---|---|---|
| **Shielded round cable,** assembled in various lengths with EDAC socket connectors at both ends | | | | | |
| | 56 | | **CABLE-EC56-F-F-0,34-S/...** | **2906066** | 1 |

**Ordering example** for system cable**:**
– 56-pos. cable, 13.50 m long

| Quantity | Order No. | Length [m] |
|---|---|---|
| 1 | 2906066 | / 13.50 |

| | |
|---|---|
| **Min.** | 0.5 m |
| **Max.** | 100.0 m |
| **Increment** | 0.1 m |

## Modules as compact potential distributors

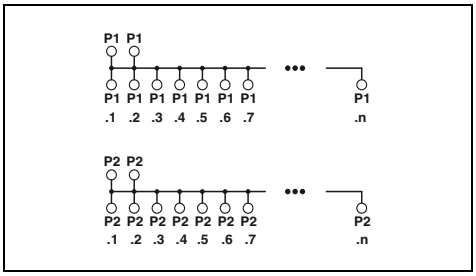
The VIP-2/.../PDM... modules offer the following features:
– Two potential levels
– Separate supply
– Screw or push-in connection
– Consecutive marking
– With fuse as an option

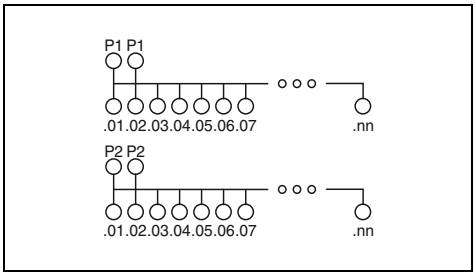
The modules UMK-PVB and UMK-PVB 6 have three or six potential levels.

**Notes:**
Marking systems and mounting material
See Catalog 5

**With screw connection and 2 potential levels**

**With push-in connection and 2 potential levels**

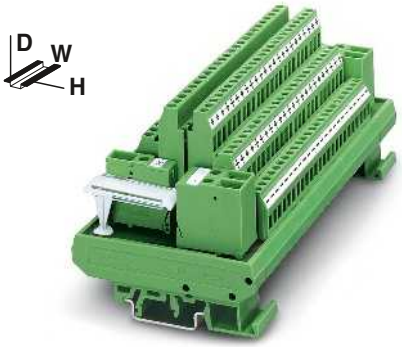


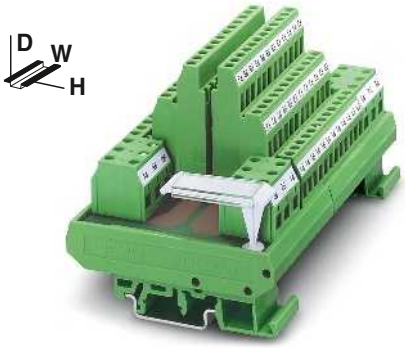

| | Technical data | Technical data |
|---|---|---|
| Operating voltage | 250 V AC/DC | 250 V AC/DC |
| Max. perm. current (per branch) | 15 A | 15 A |
| Total current | 30 A (per potential) | 30 A (per potential) |
| Ambient temperature (operation) | -20 °C ... 50 °C | -20 °C ... 50 °C |
| Mounting position | any | any |
| Standards/regulations | IEC 60664, DIN EN 50178, IEC 62103 | IEC 60664, DIN EN 50178, IEC 62103 |
| Supply connection data solid / stranded / AWG | 0.2 - 6 mm² / 0.2 - 4 mm² / 24 - 10 | 0.25 - 6 mm² / 0.25 - 4 mm² / 24 - 10 |
| Distribution connection data solid / stranded / AWG | 0.2 - 4 mm² / 0.2 - 2.5 mm² / 24 - 12 | 0.14 - 2.5 mm² / 0.14 - 2.5 mm² / 26 - 14 |
| Dimensions H / D | 65.5 mm / 50 mm | 75.8 mm / 63 mm |

| Description | No. of pos. | Module width W | Ordering data: Type | Order No. | Pcs. / Pkt. | Ordering data: Type | Order No. | Pcs. / Pkt. |
|---|---|---|---|---|---|---|---|---|
| **VARIOFACE module**, with two busbars (P1, P2) for potential distribution, per potential: | | | | | | | | |
| 2 power terminals/8 distributor terminal blocks | | 50.00 | **VIP-2/SC/PDM-2/16** | **2315256** | 1 | | | |
| 2 power terminals/12 distributor terminal blocks | | 70.40 | **VIP-2/SC/PDM-2/24** | **2315269** | 1 | | | |
| 2 power terminals/16 distributor terminal blocks | | 90.80 | **VIP-2/SC/PDM-2/32** | **2315272** | 1 | | | |
| 2 power terminals/24 distributor terminal blocks | | 131.50 | **VIP-2/SC/PDM-2/48** | **2903717** | 1 | | | |
| **VARIOFACE module**, with two busbars (P1, P2) for potential distribution, per potential: | | | | | | | | |
| 2 power terminals/8 distributor terminal blocks | | 41.90 | | | | **VIP-3/PT/PDM-2/16** | **2903797** | 1 |
| 2 power terminals/12 distributor terminal blocks | | 57.10 | | | | **VIP-3/PT/PDM-2/24** | **2903798** | 1 |
| 2 power terminals/16 distributor terminal blocks | | 67.30 | | | | **VIP-3/PT/PDM-2/32** | **2903799** | 1 |
| 2 power terminals/24 distributor terminal blocks | | 97.70 | | | | **VIP-3/PT/PDM-2/48** | **2903800** | 1 |
| **VARIOFACE module** with 2 busbars for potential distribution | | | | | | | | |
| - 2 power terminals/8 distributor terminal blocks | | 97.70 | | | | | | |
| **VARIOFACE module**, with three busbars (+, -, PE) for potential distribution, per potential: (+) two power terminals/48 distributor terminal blocks (-) two power terminals/24 distributor terminal blocks (PE) 2 power terminals/72 distributor terminal blocks | | 168.80 | | | | | | |
| **VARIOFACE module**, with six busbars (P1 to P6) for potential distribution, per potential: | | | | | | | | |
| 2 power terminals/12 distributor terminal blocks | | 123.80 | | | | | | |

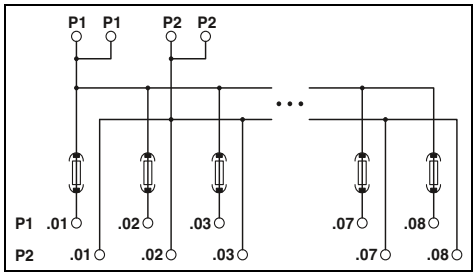
**With push-in connection and 2 potential levels and eight 6.3 A fuses**

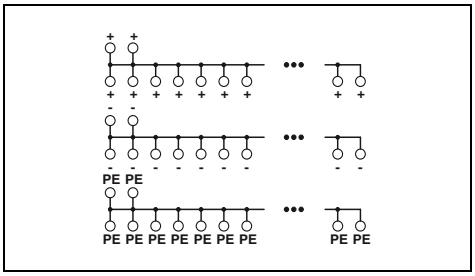


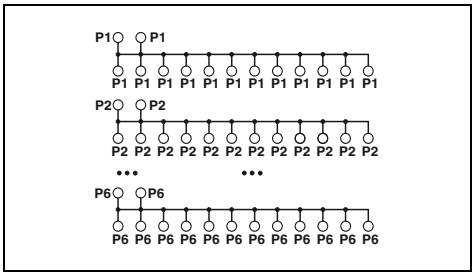

**With screw connection and 3 potential levels**




**With screw connection and 6 potential levels**




## Technical data

250 V AC/DC
6.3 A (fuse limited)
30 A (per potential)
-20 °C ... 60 °C
any
IEC 60664, DIN EN 50178, IEC 62103
0.2 - 10 mm² / 0.2 - 6 mm² / 24 - 8

0.14 - 2.5 mm² / 0.14 - 2.5 mm² / 26 - 14

109.8 mm / 51 mm

## 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

## 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. |
|---|---|---|
| VIP-2/PT/PDM-2/16/FU 6.3A | 2903603 | 1 |

## Ordering data

| Type | Order No. | Pcs. / Pkt. |
|---|---|---|
| UMK- PVB | 2971302 | 1 |

## Ordering data

| Type | Order No. | Pcs. / Pkt. |
|---|---|---|
| UMK- PVB 6 | 2972136 | 1 |

## Modules for IEC 60603/DIN 41612 connectors

**Cable housing suitable for snap-in locking:**

| Manufacturer | Type F<br>32 and 48-pos. |
|---|---|
| HARTING | Types “B” and “D” |

**Cable housing suitable for screw locking:**

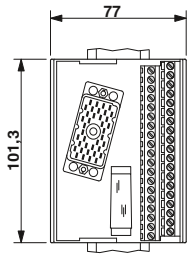
| Manufacturer | Type<br>C, 64-pos. | Type<br>D, 32-pos. |
|---|---|---|
| ERNI | KSG 173... | KSG 173... |
| AMP | 826196-1 | 826196-1 |

**Cable housing suitable for screw locking:**

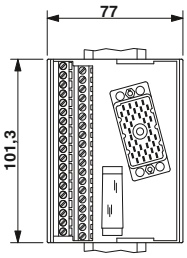
| Manufacturer | Type<br>E, 48-pos. | Type<br>F, 32 and 48-pos. |
|---|---|---|
| ERNI | KSG 173... | KSG 203... |
| AMP | – | 826198-1 |

## Modules for ELCO connectors

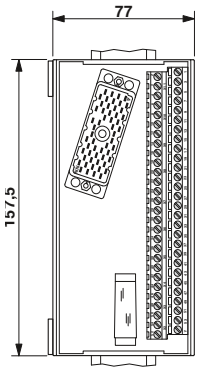
**Dimensional drawing for UMK-EC38/38-XOL**



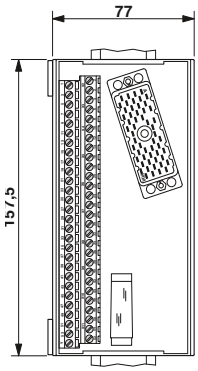

**Dimensional drawing for UMK-EC38/38-XOR**



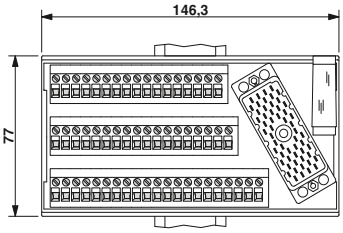

**Dimensional drawing for UMK-EC56/56-XOL**



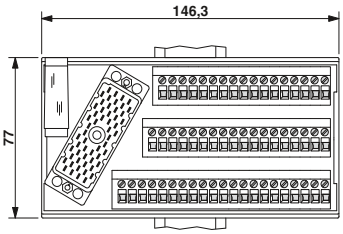

**Dimensional drawing for UMK-EC56/56-XOR**




**Dimensional drawing for UMK-EC56/FRONT 2,5V/R**




**Dimensional drawing for UMK-EC56/FRONT 2,5V/L**



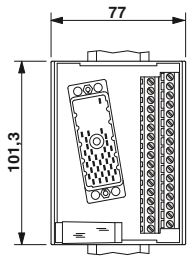

**Pin assignment UMK-EC38/38...**

| Terminal block | 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 |

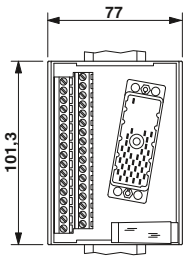
**Pin assignment UMK-EC56/56...**

| Terminal block | 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) |

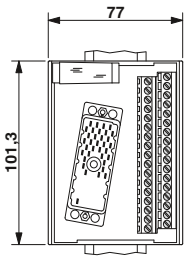
**Dimensional drawing for UMK-EC56/32-XOL**



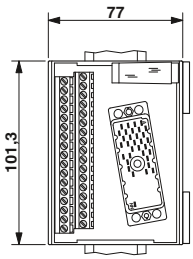

**Dimensional drawing for UMK-EC56/32-XOR**




**Dimensional drawing for UMK-EC56/32-XUL**




**Dimensional drawing for UMK-EC56/32-XUR**



## Modules for ELCO connectors with protection type Ex i

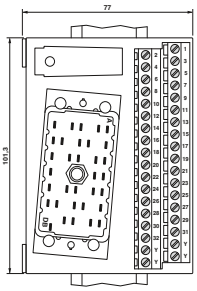
**Pin assignment UMK-EC56/FRONT 2,5V/...**

| Terminal block | 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) |

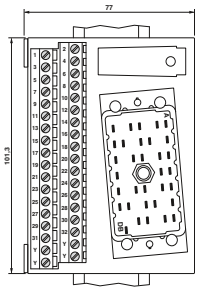
**Pin assignment UMK-EC56/32-...**

| Terminal block | 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 |

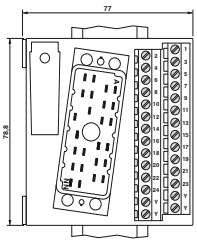
**Dimensional drawing for UMK-EC90/32/EX-XUL**



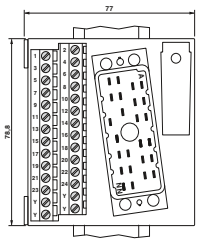

**Dimensional drawing for UMK-EC90/32/EX-XUR**



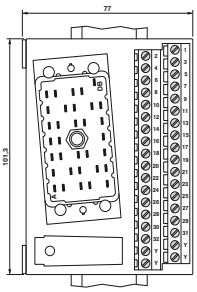

**Dimensional drawing for UMK-EC56/25/EX-L**



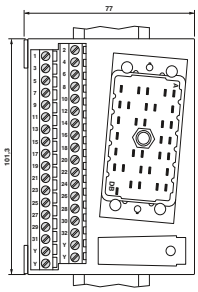

**Dimensional drawing for UMK-EC56/25/EX-R**



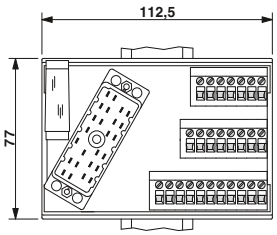

**Dimensional drawing for UMK-EC90/32/EX-XOL**



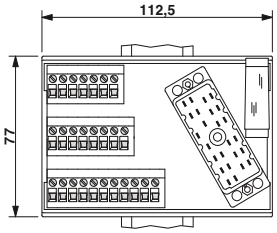

**Dimensional drawing for UMK-EC90/32/EX-XOR**




**Dimensional drawing for UMK-EC 56/25/EX/FRONT 2,5 V/L**




**Dimensional drawing for UMK-EC 56/25/EX/FRONT 2,5 V/R**



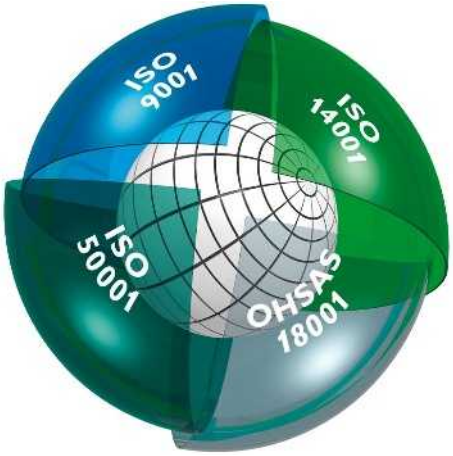

**Pin assignment UMK-EC90/32/EX...**

| Terminal block | Pin strip | Channel |
|---|---|---|
| 1<br>2 | H<br>J | 1 |
| 3<br>4 | L<br>M | 2 |
| 5<br>6 | P<br>X | 3 |
| 7<br>8 | Z<br>AA | 4 |
| 9<br>10 | AC<br>AD | 5 |
| 11<br>12 | AM<br>ON | 6 |
| 13<br>14 | AR<br>AS | 7 |
| 15<br>16 | AU<br>BC | 8 |
| 17<br>18 | AZ<br>BA | 9 |
| 19<br>20 | BJ<br>BK | 10 |
| 21<br>22 | BM<br>BN | 11 |
| 23<br>24 | BR<br>BY | 12 |
| 25<br>26 | CA<br>CB | 13 |
| 27<br>28 | CD<br>CE | 14 |
| 29<br>30 | CN<br>CP | 15 |
| 31<br>32 | CS<br>CT | 16 |
| Y | DB | |

**Pin assignment UMK-EC 56/25/EX/...**

| Terminal block | Pin strip | Channel |
|---|---|---|
| 1<br>2 | C<br>D | 1 |
| 3<br>4 | E<br>F | 2 |
| 5<br>6 | N<br>P | 3 |
| 7<br>8 | R<br>S | 4 |
| 9<br>10 | a<br>b | 5 |
| 11<br>12 | d<br>j | 6 |
| 13<br>14 | k<br>l | 7 |
| 15<br>16 | s<br>t | 8 |
| 17<br>18 | u<br>v | 9 |
| 19<br>20 | BB<br>CC | 10 |
| 21<br>22 | DD<br>EE | 11 |
| 23<br>24 | MM<br>NN | 12 |
| Y | Y | |

## 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.

The Phoenix Contact management system is monitored by internationally recognized independent bodies each year to ensure that quality, environmental protection, energy efficiency, and occupational safety have been integrated in conformance with the relevant requirements. Certification in accordance with international standards ISO 9001, ISO 14001, ISO 50001, 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 through efficient production and products that conserve resources, and responsibility in the field of occupational health and safety. It goes without saying that we integrate all further requirements of standards, international approvals or special customer requirements into our company processes.

This system provides a building block for the success of the Phoenix Contact Group and its products and services.

### CE marking

CE marking was introduced as an important instrument for the free movement of goods and services 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 scope of the following directives:

– 2006/95/EC and 2014/35/EU
  Electrical equipment designed for use within certain voltage limits (Low-Voltage Directive)
– 2004/108/EC and 2014/30/EU
  Electromagnetic compatibility (EMC Directive)
– 2004/22/EC and 2014/32/EU
  Measuring instruments
– 2006/42/EC
  Safety of machinery (Machinery Directive)
– 94/9/EC and 2014/34/EU
  Equipment and protective systems intended for use in potentially explosive areas (ATEX Directive)
– 1999/5/EC
  R&TTE Directive and
  2014/53/EU
  Radio Equipment Directive

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 area.

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. It was with a view to providing other companies with this expertise that our associate company, Phoenix Testlab, was founded. Phoenix Testlab GmbH is an independent, accredited service provider offering EMC testing that conforms to 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 in the product area on our website at **www.phoenixcontact.net/products**.

### Online product information service on the web

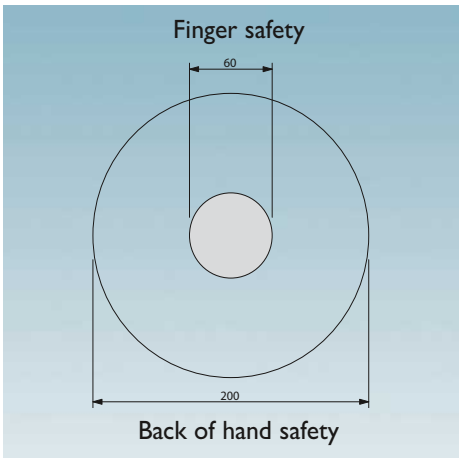
Phoenix Contact's product range is growing constantly.

Due to our commitment to product monitoring, all products are subject to improvement.

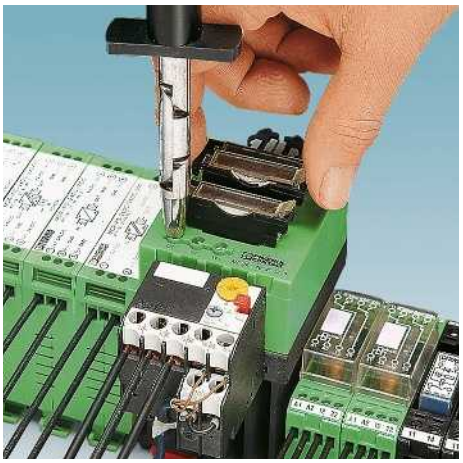
The Internet is an ideal platform to quickly communicate new product developments and improvements to the market.

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.

## Shock protection




Example: pressure actuation



Finger safety

Back of hand safety

The accident prevention regulations BGV A 2 issued by the German employer's liability insurance association for precision mechanics and electrical engineering apply to the operators of electrical systems and are aimed at the prevention of electrical accidents by means of special safety requirements.

These regulations contain specifications regarding the safety distances for work, operation, and occasional handling in the proximity of "live parts" in low-voltage systems up to 1000 V ~ or 1500 V –.

– Work with live parts is only permitted once they have been de-energized. Operational activities are only permitted in the vicinity of live parts if these parts are de-energized or are protected against direct contact (§ 6). The following safety measures apply when working in the vicinity of live parts:
– Provision of the de-energized state for the duration of the work
– Ensure shock protection is in place in the form of covers or barriers during the work
– Assurance that the permitted proximity limits will not be violated (§ 7).

The term "occasional handling" has been introduced for the operation of elements such as pushbuttons, rocker arms or rotary buttons in the proximity of live parts.

According to 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. This specifies to what degree live parts in the proximity of operating elements are 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 30 mm in radius must surround the live parts. This area must be **touch proof**, i.e., the live parts of the electrical device must not be within reach of the VDE test finger according to IEC 60529/DIN VDE 0470-1 (test finger).

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 parts of the equipment. No special measures for ensuring contact safety are stipulated outside this area.

Note: systems and equipment that are operated with SELV up to 25 V ~ or 60 V – are considered to be protected against "direct contact".

According to § 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 equipment conform to BGV A 2. The confirmation required relates to systems and 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 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 equipment to be used.

In the field of connection technology, Phoenix Contact offers a wide range of products that are touch proof or that can be protected against contact using covers. Depending on the conditions, all of this must be taken into account when selecting the individual types of terminal block and accessories.

## 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 re-used. 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 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 stresses, amplify this effect. Special tests on samples can yield characteristic data which provides a good means of drawing comparisons between different plastics. However, applying these characteristics to an evaluation of molded plastic parts is only possible to a limited extent, and can only give the designer a rough guide when it comes to selecting a plastic material. This catalog uses the following assessment criteria: the **RTI value** according to UL746B/ANSI 746 B (elec. based on electric strength) and the **Ti value** according to IEC 60216-1 (based on 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 terminal blocks under nominal 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 become 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 jumpers, bending of cables and lines, etc.), as there is always an associated risk of damage. Unless otherwise indicated, it is recommended that you carry out the specified mounting/operational tasks in a temperature range from -10°C to +40°C.

### Inflammability characteristics of plastics (UL 94)

The inflammability tests for plastics have been defined by the Underwriters Laboratory (USA) in regulation UL 94. This applies to all usage ranges, 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 flame-retardant behavior, the evaluation classes are HB, V2, V1, V0, and 5V. Test results are recorded on "yellow cards" and are published annually in the **Recognized Component Directory.**

### Thermoplastics: non-reinforced polyamide, PA

We use the modern, semi-crystalline polyamide insulation material, which has now become an essential component in electrical engineering and electronics. It has long occupied a leading position and is authorized for use by the relevant approval authorities such as the 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 up to approximately 200°C are permitted 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 the semi-crystalline thermoplastic polyester in non-reinforced and fiberglass-reinforced variants for special applications which require increased dimensional and form stability.

In addition to the high operating temperature, the material is characterized by excellent mechanical strength and hardness, and does not absorb moisture from its surroundings. PBT is therefore particularly suitable for strips, for example, which are soldered onto PCBs and subsequently have to pass a burn-in test while they are subjected to 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 electronic 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 against mineral acids, saturated aliphatic hydrocarbons, gasoline, greases, and oils.

The material is less resistant to solvents, benzene, lyes, 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

Compared to non-reinforced materials, fiber-reinforced polycarbonates feature greater 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.

The inflammability class of the molding compound used is HB to V0 according to UL 94.

| 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 mechanical load)** | °C | -40 | -40 | -40 | -40 | -40 |
| **Electric strength acc. to IEC 60243-1/DIN VDE 0303-21** | kV/cm | 600 | 400 | > 300 | | 850 |
| **Resistance to creepage IEC 60112/DIN VDE 0303-1** | CTI...M | 550 | 225 | 175 | | 200 |
| | 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

## Dimensions

**Dimensions: W**idth/**H**eight/**D**epth

The dimensions "**W**idth/**H**eight/**D**epth" are defined as follows for all DIN-rail-mountable products in the INTERFACE range:

– **W**idth: measurement taken along the DIN rail
– **H**eight: measurement taken across the DIN rail
– **D**epth: measurement taken starting from the mounting plate and including the NS 35/7,5 DIN rail (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 above two symbols has been included next to each product photo:

## EMC: Class A product:

In accordance with statutory regulations, our products are indicated with this footnote if they are intended for use in industrial environments. This means that the permitted limit values for residential applications may be exceeded in the event of conducted and emitted disturbance variables. In such cases, the operator may have to take additional safety measures in order to ensure electromagnetic compatibility in residential applications.

## Note:

Subject to changes that serve the purpose of technical progress.

## Connection cross section

The rated cross section of terminal blocks must be specified by the manufacturer according to IEC 60947-7-1. The rated cross section is the maximum conductor cross section that can be connected in single, multi or fine-strand versions subject to specific thermal, mechanical, and electrical requirements.

The manufacturer must also specify the **rated connection capacity**, 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 capacity of Phoenix Contact terminal blocks usually exceeds standard requirements, which 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 usually be wired with ferrules with plastic sleeve.

Phoenix Contact terminal blocks are designed to allow copper cables to be connected to them without any special treatment. "Special treatment" or the use of ferrules – both permitted according to IEC 60947-7-1 – are not required. If ferrules are nevertheless used to protect stranded conductors against splicing, the connection capacity 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 | [Ø mm] | [circ. mils] | [mm²] | [Ø mm] | [circ. mils] | [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 tightening torques for screw connections based on the screw size for electrical and mechanical type tests.

### Extract from IEC 60947-1/EN 60947-1, Table 4

The torque according to IEC and the recommended torque for Phoenix Contact terminal blocks are specified

| Thread | Head screw with slot | |
|---|---|---|
| | Torque [Nm] | Recommended tightening torque [Nm] |
| M2.5 (M2.6) | 0.4 | 0.4-0.5 |
| M3 | 0.5 | 0.5-0.6 |
| M3.5 | 0.8 | 0.8-1.0 |
| M4 | 1.2 | 1.2-1.5 |

## Current carrying capacity

Standard IEC 60947-7-1/ EN 60947-7-1/DIN VDE 0611-1 specifies the test currents for the individual conductor cross sections listed in the adjacent table. The corresponding currents are listed with the connection data for the individual terminal blocks. The type tests of 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 |

## Certification bodies and safety marks

| Certification bodies and approvals | Country code |
|---|---|
| IECEE CB Scheme (in combination with certifying body) | International |
| CENELEC Certification Agreement (CCA inspection report) (in combination with certifying body) | EU |
| Canadian Standards Association (CSA) | CA |
| Canadian Standards Association (CSA) - CSA approval for the USA - | US |
| Canadian Standards Association. (CSA) Combined logo - CSA approval for Canada and the USA - | CA US |
| 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 |
| INSIEME PER LA QUALITA'E LA SICUREZZA | IT |
| Eurasian Conformity | BY KZ RU |
| DEKRA Certification B.V. | NL |
| Österreichischer Verband für Elektrotechnik | AT |
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| Intertek ETL Listed - Approval for Canada - | CA |
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| TÜV Rheinland Industrie Service GmbH | DE |
| China Compulsory Certificate | CN |

| Explosion protection | Country code |
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| Physikalisch-Technische Bundesanstalt | DE |
| KIWA Nederland B.V. | NL |
| QS Schaffhausen AG | CH |
| VTT Expert Services Oy | FI |
| IBExU Institut für Sicherheitstechnik GmbH | DE |
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| Technischer Überwachungsverein Nord | DE |
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INSPIRING INNOVATIONS

ООО «ЛайфЭлектроникс» “LifeElectronics” LLC

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