Measurement and control technology

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

Signal conditioners – Your advantages

– Achieve space savings of up to 65% compared to other isolators on the market with these highly compact signal conditioners
– Integrate field signals into industrial networks while also benefiting from safe electrical isolation with signal conditioners with a bus and network connection
– Precise transmission and high operational safety with signal conditioners with consistent SIL certification
– Maximum explosion protection for all Ex zones and gas groups: with single- and two-channel signal isolators for intrinsically safe circuits in the Ex area
– Integrate analog signals easily into the safety chain in accordance with the Machinery Directive: with signal conditioners with Performance Level

Process indicators and field devices – Your advantages

– Display, monitor, and control analog and temperature signals with the multifunctional process displays
– Interference-free transmission of analog signals as well as temperature measurement in the field, thanks to versatile signal conditioners and 2-conductor field devices

Product range overview

Highly compact signal conditioners with plug-in connection technology

MINI Analog Pro

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Process indicators and field devices

Field Analog

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Signal conditioners with functional safety

MACX Analog

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MACX Analog

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Ex n

Highly compact signal conditioners

Process indicators and field devices

Ex i process indicators and field devices

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Signal conditioners with functional safety

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Ex i signal conditioners with functional safety

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Glossary/the most important terms related to signal conditioners

Input

Maximum input signal:
Describes the value achieved before any damage occurs to the module.

Input resistance:
A minor input signal load can be achieved with low impedance for current inputs and high impedance for voltage inputs.

Common mode rejection:
Characterizes the suppression of identical signals at the two inputs.

Analog output

Maximum output signal:
During uninterrupted operation, an overload at the input cannot cause greater values than at the output.

Zero/span adjustment:
Zero adjustment = setting the zero point
Span adjustment = adjustment of the analog output compared to the input, increasing/reducing the amplification factor of the output characteristic curve.

Load:
Load capacity at the output; total resistance that can be "driven".

Residual ripple/ripple:
A superimposed ripple can appear on the output signal due to signal conditioning required by the circuit.

Open-circuit behavior:
If values exceed or fall below a tolerance limit, a defined output signal is sent.

Digital output

In the case of signal conditioners, digital outputs can be realized either using relays or transistor outputs. The switching behavior of the digital outputs can be configured.

Active isolation:
With active isolation, the module has its own power supply. A differentiation is made between three methods of active isolation:
– 3-way isolation
– Input isolation
– Repeater power supply

Passive isolation:
The modules draw the power needed for signal transmission and electrical isolation from an active input or output circuit.
A differentiation is therefore made between
– Input loop-powered
– Output loop-powered

Resistance temperature detector

Resistance temperature detectors (e.g., Pt 100, Ni 1000, etc.) change their resistance value depending on the temperature. They require a constant measurement current. Signal conditioners detect this value and convert it into a proportional analog signal. With regard to the connection technology, a differentiation is made between:
– 2-conductor
– 3-conductor
– 4-conductor

Thermocouples

As opposed to resistance temperature detectors, thermocouples are active sources. They are composed of different metals and generate a voltage that – due to the Seebeck effect – is dependent on the ambient temperature.

Refer to the user manual for detailed information on the principles of MCR technology. It includes explanations on technical and physical fundamentals, application cases, and circuits. Moreover, the user manual provides information on the basic elements of functional safety, digital fieldbus systems, and an introduction into surge protection in MCR technology.

The user manual is available for download free of charge:
https://www.phoenixcontact.com/assets/downloads_ed/global/web_dwl_promotion/52007057_EN_MCR_technology_User_manual.pdf

Order No.: 105238

Non-intrinsically-safe signal transmission in potentially explosive areas

Electrical equipment operated in systems with potentially explosive areas is subject to different requirements, depending on the application. Signal conditioners and measuring transducers are generally deployed in the safe area (non-potentially explosive area). In a housing with degree of protection IP54 that is suitable for zone 2, it is also possible to install the signal conditioners and measuring transducers in a zone 2 Ex area. If enclosed in a pressure-tight encapsulated housing with type of protection Ex d, they can also be used in Ex zone 1. The respective stipulations of the corresponding type of protection and the Ex zone must be taken into consideration at all times.

The figure shows a range of options for installing electrical devices in areas with a danger of gas explosions.

Example: A sensor/actuator with type of protection "n" can be connected to an isolator from the MINI Analog Pro or MACX Analog families in zone 2.

Ex n

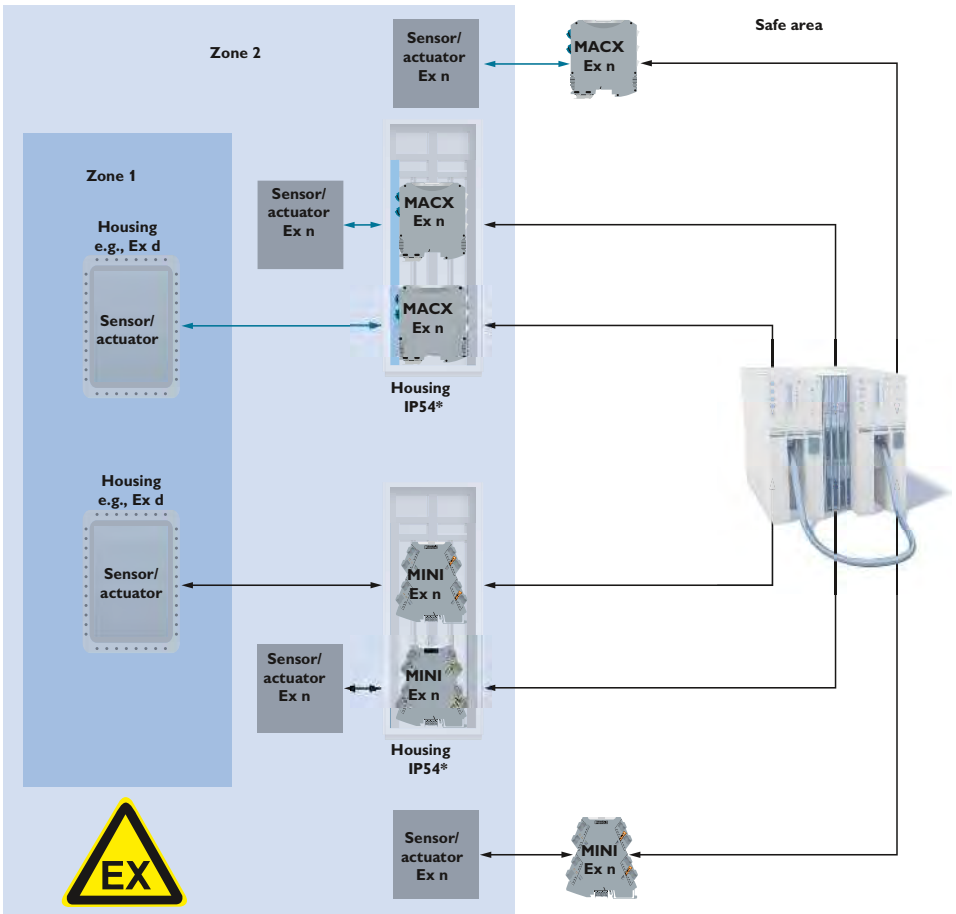
Ex n stands for type of protection n. In this case, it pertains to "non-sparking equipment", that at no time represents a source of ignition due to hot surfaces or electrically or mechanically generated sparks.

See our free brochure for detailed information on the topic of explosion protection:

https://www.phoenixcontact.com/assets/downloads_ed/global/web_dwl_promotion/5149416_EN_HQ_Explosion_protection_LoRes.pdf

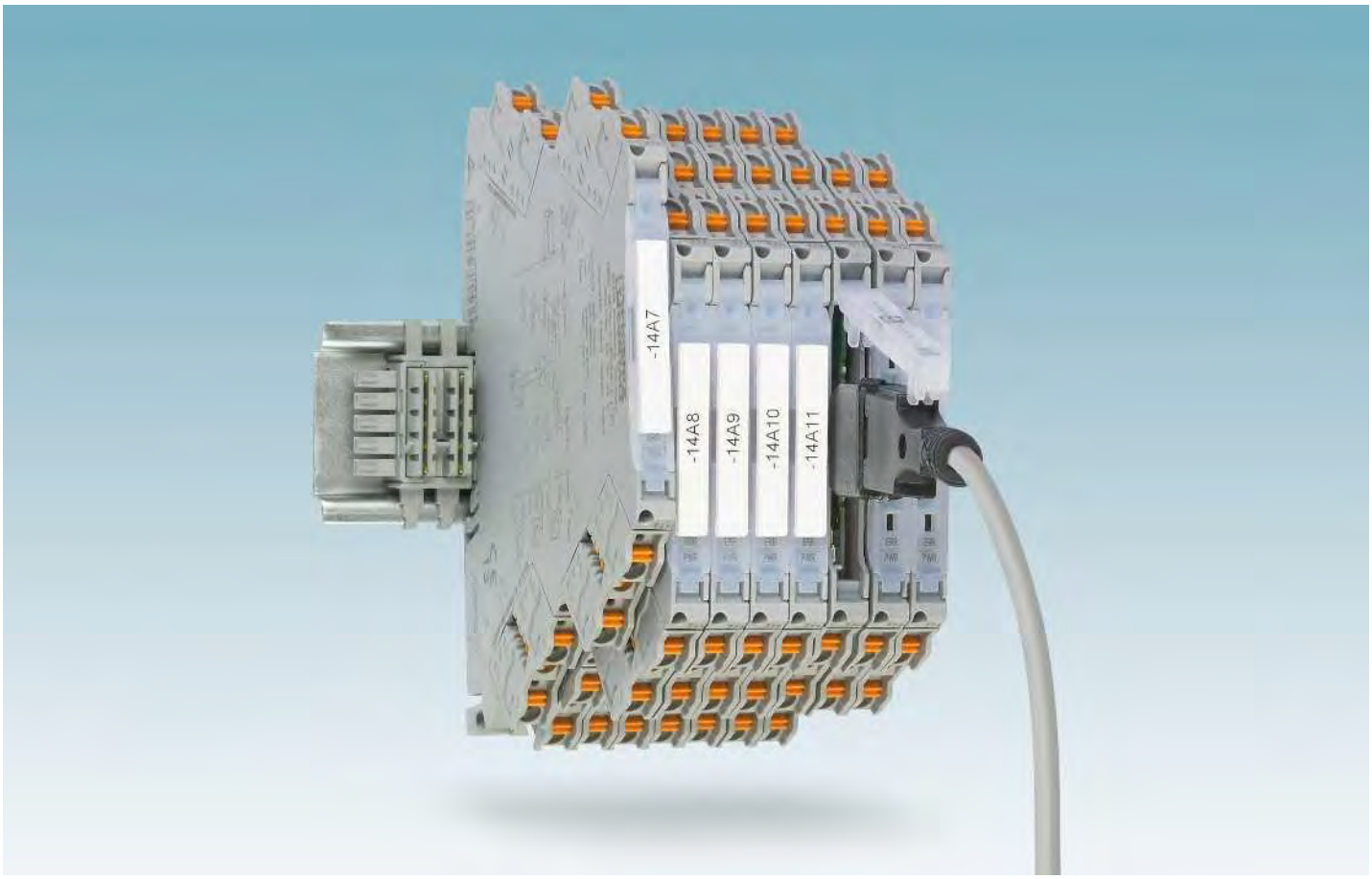
Order No.: 5149416

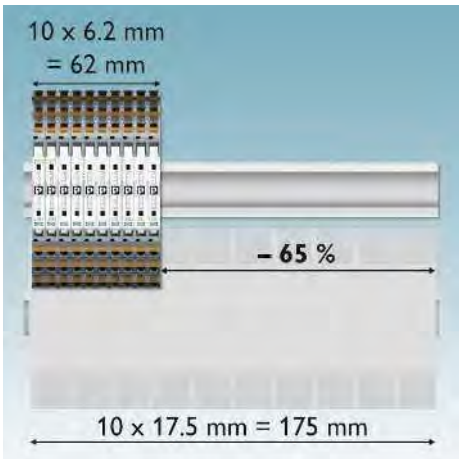
Installation of electrical devices for signal transmission



*Use of suitable housings approved for use in zone 2

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





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
– Potentiometers
– Digital IN
– Limit values
– Accessories

Easy installation

– Easily visible and accessible terminal points and FASTCON Pro pluggable connection terminal blocks

Power bridging and fault monitoring

– The DIN rail connector simplifies supply and enables remote diagnostics by means of group error monitoring

DIN-rail-connector-compatible
The DIN rail connector enables 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 measurement diodes.

– It is not necessary to break the circuit to integrate the measuring device into the signal circuit
– By setting the connector to the disconnect position, signal circuits can be easily interrupted during servicing and startup

Numerous configuration 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 your smartphone

Configuration via smartphone
– Via Bluetooth or NFC
– Access module information
– Display DIP switch setting help
– Wireless configuration via smartphone

Service-friendly

– Generous marking areas for complete loop identification using standard marking materials as well as permanently visible status LEDs on each 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 power supply with 3 kV test voltage

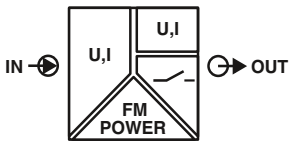
Suitable for any application

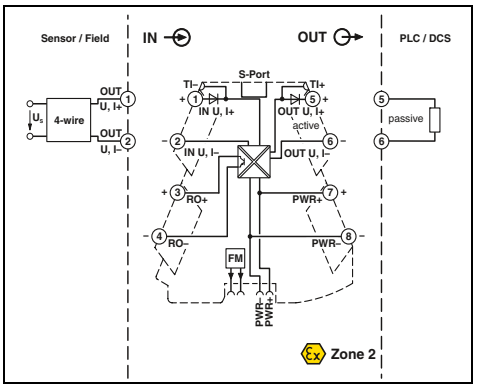
– Extended supply voltage and temperature range as well as multifunctional device types

The following parameters are generally valid for all MINI Analog Pro modules:

Test voltage input/output/power supply	3 kV (50 Hz, 1 min.)
Ambient temperature (operation)	-40°C ... 70°C
Dimensions (W / H / D)	6.2 / 110.5 / 120.5 mm
Push-in connection rigid / flexible / AWG	0.14 ... 2.5 mm² / 0.14 ... 2.5 mm² / 24 - 12
Screw connection rigid / flexible / AWG	0.2 ... 1.5 mm² / 0.2 ... 1.5 mm² / 24 - 12
Housing material	PBT
Mounting	Any

Analog IN/Analog OUT
4-way signal conditioners





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 with 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 111

Information on MINI Analog Pro accessories can be found from page 107

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 2 V ... 10 V 0 V ... 5 V 1 V ... 5 V 10 V ... 0 V 10 V ... 2 V 5 V ... 0 V 5 V ... 1 V 0 V ... 12 V	0 mA ... 20 mA 4 mA ... 20 mA 0 mA ... 10 mA 2 mA ... 10 mA 20 mA ... 0 mA 20 mA ... 4 mA 10 mA ... 0 mA 10 mA ... 2 mA 0 mA ... 24 mA
Input resistance	>120 kΩ	Approx. 50 Ω (+ 0.7 V for test diode)
Output data	**U output**	**I output**
Output signal (configurable via DIP switch or freely via software)	0 V ... 10 V 2 V ... 10 V 0 V ... 5 V 1 V ... 5 V 0 V ... 10.5 V	0 mA ... 20 mA 4 mA ... 20 mA 0 mA ... 10 mA 2 mA ... 10 mA 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)
Switching output		
Relay output	1 N/O contact	
Max. switching voltage	30 V DC	
Maximum switching current	100 mA (at 30 V)	
General data	**U output**	**I output**
Supply voltage range	9.6 V DC ... 30 V DC	
Nominal supply voltage	24 V DC	
Current consumption	32 mA (24 V DC)	63 mA (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, typically 0.01%/K	
Step response (10-90%)	Approx. 140 ms (15 Hz sample rate) Approx. 45 ms (60 Hz sample rate) Approx. 25 ms (240 Hz sample rate)	
Electrical isolation	Reinforced insulation in accordance with IEC 61010-1	
Conformance/approvals		
Conformance	CE-compliant	
ATEX	II 3 G Ex nA IIC T4 Gc X	
UL, USA/Canada	UL 508 Listed Class I, Div. 2, Groups A, B, C, D T6 Class I, Zone 2, Group IIC T6	
DNV GL	B, B, A, A	

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
USB programming adapter for configuring modules with Windows software	**TWN4 MIFARE NFC USB ADAPTER**	2909681	1
Bluetooth programming adapter, with USB and S-PORT interface	**IFS-BT-PROG-ADAPTER**	2905872	1

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

Order No.	Input			Output			Measuring range limit	Cut-off frequency	
	Input signal	Start	End	Output signal	Start	End			
2902024	**I**	**0.0**	**20.0**	**I**	**0.0**	**20.0**	**0**	**15**	**...**
2902024 ≙ MINI MCR-2-UNI-UI-UIRO-C 2902027 ≙ MINI MCR-2-UNI-UI-UIRO-PT-C	I ≙ I U ≙ U	0.0 ≙ 0 mA I: freely selectable between 0.0 ... 24 mA U: freely selectable between 0.0 ... 12 V	20.0 ≙ 20 mA I: freely selectable between 0.0 ... 24 mA U: freely selectable between 0.0 ... 12 V	I ≙ I U ≙ U	0.0 ≙ 0 mA I: freely selectable between 0.0 ... 21 mA U: freely selectable between 0.0 ... 10.5 V	20.0 ≙ 20 mA I: freely selectable between 0.0 ... 21 mA U: freely selectable between 0.0 ... 10.5 V	0 ≙ OFF 1 ≙ AN	15 ≙ 15 Hz 60 ≙ 60 Hz	

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

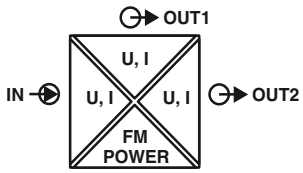
Output signal span at least 0.5 V / 1 mA
Increment 0.1 V / 0.1 mA

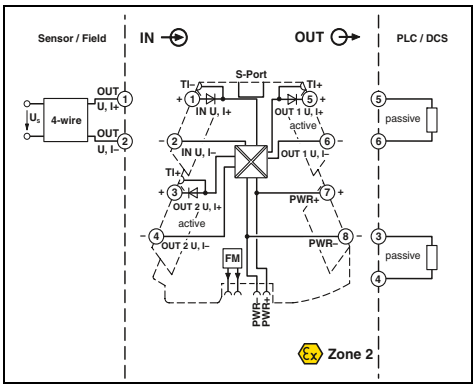
Failure information

...	Behavior in the event of an error	Open circuit / short circuit	Measuring value over-range	Measured value under-range
	NE43DO	**0.0**	**0.0**	**0.0**
	FD ≙ Freely definable	0.0 ≙ 0 mA I: freely selectable between 0.0 ... 21.5 mA U: freely selectable between 0.0 ... 11 V (free definition only for unlimited output) (signal type corresponds to selected output signal)	0.0 ≙ 0 mA I: freely selectable between 0.0 ... 21.5 mA U: freely selectable between 0.0 ... 11 V (free definition only for unlimited output) (signal type corresponds to selected output signal)	0.0 ≙ 0 mA I: freely selectable between 0.0 ... 21.5 mA U: freely selectable between 0.0 ... 11 V (free definition only for unlimited output) (signal type corresponds to selected output signal)
	Note: Failure information in accordance with NE 43 can only be selected for 4 ... 20 mA output			
	NE43UP ≙ NE 43 upscale NE43DO ≙ NE 43 downscale NE430 ≙ NE 43 0 mA NE43UD ≙ NE 43 upscale/downscale	21.5 mA 3.5 mA 0 mA 3.5 mA	21.5 mA 3.5 mA 0 mA 21.5 mA	21.5 mA 3.5 mA 0 mA 21.5 mA

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

Analog IN/Analog OUT
4-way signal duplicators





4-way signal duplicator

Ex:

Housing width 6.2 mm

- Universally configurable, highly-compact 4-way signal duplicator
- For electrical isolation, conversion, amplification, and filtering of standard signals
- Independently adjustable outputs
- Input side for current signals from 0 to 24 mA or voltage signals from 0 to 12 V
- Supports fault monitoring
- Plug-in connection system
- Safe 4-way isolation
- Standard behavior can be configured 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:

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 via DIP switch or freely via software)	U input	I input
	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	20 mA ... 0 mA
	0 V ... 12 V	0 mA ... 24 mA
Maximum input signal	12 V	24 mA
Input resistance	>120 kΩ	Approx. 50 Ω (+ 0.7 V for test diode)
Output data		
Output signal (configurable via DIP switch or freely via software)	U output	I output
	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	20 mA ... 0 mA
	0 V ... 10.5 V	0 mA ... 21 mA
Maximum output signal	Approx. 12.3 V	24.6 mA
No-load voltage		≤18.5 V
Short-circuit current	≤25 mA	
Load R_B	≥10 kΩ	≤600 Ω (per channel)
Ripple	<20 mV_{PP} (at 600 Ω)	<20 mV_{PP} (at 600 Ω)
General data	U output	I output
Supply voltage range	9.6 V DC ... 30 V DC	
Nominal supply voltage	24 V DC	
Current consumption	55 mA (24 V DC)	110 mA (12 V DC)
Power consumption		1.5 W (at I_{OUT} = 20 mA, 9.6 V DC, 600 Ω load)
Maximum transmission error	0.05% (of final value)	
Temperature coefficient	0.01%/K	
Step response (10-90%)	Approx. 140 ms (15 Hz sample rate) Approx. 45 ms (60 Hz sample rate) Approx. 25 ms (240 Hz sample rate)	
Electrical isolation	Reinforced insulation in accordance with IEC 61010-1	
Degree of protection	IP20	
EMC note	Class A product, see page 583	
Conformance/approvals		
Conformance	CE-compliant	
ATEX	II 3 G Ex nA IIC T4 Gc X	
UL, USA/Canada	UL 508 Listed Class I, Div. 2, Groups A, B, C, D T6 Class I, Zone 2, Group IIC T6	
DNV GL	B, B, A, A	

Ordering data

Description		Type	Order No.	Pcs./Pkt.
4-way signal duplicator, with independently adjustable outputs				
Standard configuration	Push-in connection	**MINI MCR-2-UNI-UI-2UI-PT**	2905028	1
Standard configuration	Screw connection	**MINI MCR-2-UNI-UI-2UI**	2905026	1
Order configuration	Push-in connection	**MINI MCR-2-UNI-UI-2UI-PT-C**	2905027	1
Order configuration	Screw connection	**MINI MCR-2-UNI-UI-2UI-C**	2905025	1

Accessories

Programming adapter for configuring modules with S-PORT interface	**IFS-USB-PROG-ADAPTER**	2811271	1
USB programming adapter for configuring modules with Windows software	**TWN4 MIFARE NFC USB ADAPTER**	2909681	1
Bluetooth programming adapter, with USB and S-PORT interface	**IFS-BT-PROG-ADAPTER**	2905872	1

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

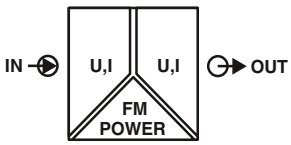
Order No.	Input			Output 1			Output 2			
	Input signal	Start	End	Output signal 1	Start	End	Output signal 2	Start	End	
2905027	**I**	**0.0**	**20.0**	**I**	**0.0**	**20.0**	**I**	**0.0**	**20.0**	**...**
2905025 ≙ MINI MCR-2-UNI-UI-2UI-C 2905027 ≙ MINI MCR-2-UNI-UI-2UI-PT-C	I ≙ I U ≙ U	0.0 ≙ 0 mA I: freely selectable between 0.0 ... 23.5 mA U: freely selectable between 0.0 ... 11.5 V	20.0 ≙ 20 mA I: freely selectable between 0.0 ... 24 mA U: freely selectable between 0.5 ... 12 V	I ≙ I U ≙ U	0.0 ≙ 0 mA I: freely selectable between 0.0 ... 20 mA U: freely selectable between 0.0 ... 10.5 V	20.0 ≙ 20 mA I: freely selectable between 1.0 ... 21 mA U: freely selectable between 0.5 ... 11 V	I ≙ I U ≙ U	0.0 ≙ 0 mA I: freely selectable between 0.0 ... 20 mA U: freely selectable between 0.0 ... 10.5 V	20.0 ≙ 20 mA I: freely selectable between 1.0 ... 21 mA U: freely selectable between 0.5 ... 11 V	

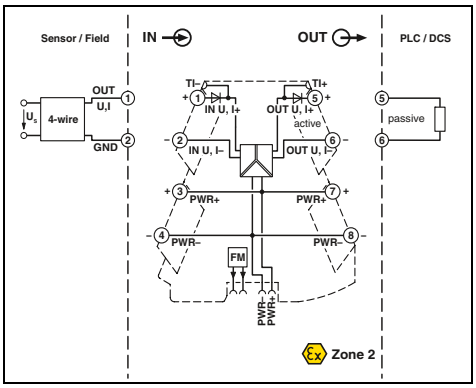
Measuring range span at least 0.5 V / 1 mA
Increment 0.1 V / 0.1 mA

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

	Sample rate	Factory calibration certificate
...	**15**	**None**
	15 ≙ 15 Hz 60 ≙ 60 Hz 250 ≙ 240 Hz	None ≙ no factory calibration certificate Yes ≙ certificate but no test data YesPlus ≙ certificate with test data

Analog IN/Analog OUT
3-way signal conditioners





Ex n

NFC

3-way signal conditioner for standard signals, configurable

Ex:

Housing width 6.2 mm

- Configurable, ultra-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 107

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 1 V ... 5 V -5 V ... 5 V 0 V ... 10 V 2 V ... 10 V -10 V ... 10 V 0 V ... 20 V 4 V ... 20 V -20 V ... 20 V 0 V ... 24 V 4.8 V ... 24 V -24 V ... 24 V 0 V ... 30 V 6 V ... 30 V -30 V ... 30 V	0 mA ... 20 mA 4 mA ... 20 mA -20 mA ... 20 mA
Input resistance	>1,000 kΩ	Approx. 63 Ω (+ 0.7 V for test diode)
Output data	**U output**	**I output**
Output signal (configurable using the DIP switch)	0 V ... 5 V 1 V ... 5 V -5 V ... 5 V 0 V ... 10 V 2 V ... 10 V -10 V ... 10 V	0 mA ... 20 mA 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 range	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, typically 0.01%/K	
Limit 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	
Degree of protection	IP20	
EMC note	Class A product, see page 583	
Conformance/approvals		
Conformance	CE-compliant	
ATEX	II 3 G Ex nA IIC T4 Gc X	
UL, USA/Canada	UL 508 Listed Class I, Div. 2, Groups A, B, C, D T6 Class I, Zone 2, Group IIC T6	
DNV GL	C, EMC2	

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 conditioners (standard configuration entered as an example)

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

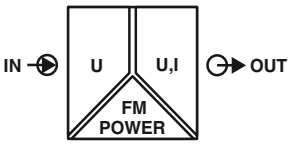
Signal combinations for MINI MCR-2-U-UI(-PT)(-C) signal conditioners

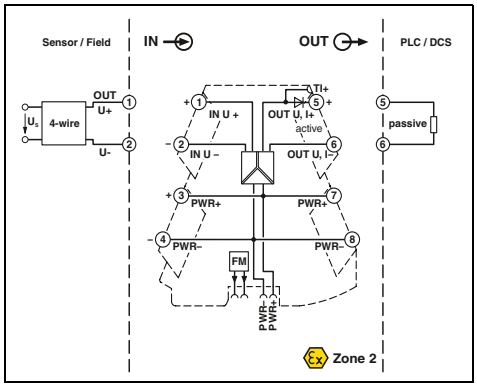
	Output							
Input	0 ... 20 mA	4 ... 20 mA	0 ... 5 V	1 ... 5 V	-5 ... 5 V	0 ... 10 V	2 ... 10 V	-10 ... 10 V
0 ... 20 mA	X	X	X	X	X	X	X	X
4 ... 20 mA	X	X	X	X	X	X	X	X
-20 ... 20 mA	X	X	X	X	X	X	X	X
0 ... 5 V	X	X	X	X	X	X	X	X
1 ... 5 V	X	X	X	X	X	X	X	X
-5 ... 5 V	X	X	X	X	X	X	X	X
0 ... 10 V	X	X	X	X	X	X	X	X
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

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

Analog IN/Analog OUT
3-way signal conditioners

new





Ex n

NFC

3-way signal conditioner for standard signals, configurable

Housing width 6.2 mm

- Configurable 3-way signal conditioner with plug-in connection technology
- Input and output signal range configurable via DIP switches
- Input signal range from ±50 mV to ±30 V
- Bipolar input/output signals
- Calibrated measuring range switch-over
- Approval for Ex zone 2 (nA)
- Screw or Push-in connection
- Reinforced insulation in accordance with IEC 61010-1
- Supply voltage range of 9.6 V ... 30 V DC

Notes:

Information on MINI Analog Pro accessories can be found from page 107

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 (configurable using the DIP switch)	See table	
Input resistance	>10 kΩ	
Output data	U output	I output
Output signal (configurable using the DIP switch)	0 V ... 5 V 1 V ... 5 V -5 V ... 5 V 0 V ... 10 V 2 V ... 10 V -10 V ... 10 V	0 mA ... 20 mA 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 range	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	
Limit 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	
Degree of protection	IP20	
Conformance/approvals		
Conformance	CE-compliant	
ATEX	Ex II 3 G Ex nA IIC T4 Gc X	
UL, USA/Canada	UL 508 Listed Class I, Div. 2, Groups A, B, C, D T6 Class I, Zone 2, Group IIC T6	
DNV GL	-	

Ordering data

Description		Type	Order No.	Pcs./Pkt.
Standard configuration	Push-in connection	**MINI MCR-2-U-UI-PT**	2902021	1
Standard configuration	Screw connection	**MINI MCR-2-U-UI**	2902019	1
Order configuration	Push-in connection	**MINI MCR-2-U-UI-PT-C**	2902020	1
Order configuration	Screw connection	**MINI MCR-2-U-UI-C**	2902018	1

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

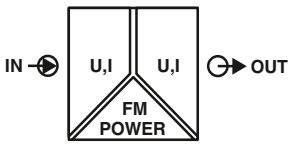
Order No.	Input		Output	Cut-off frequency
2902018	/ IN03		/ OUT01	/ 5K
2902018 ≙ MINI MCR-2-U-UI-C	IN40 ≙ 0 ... 50 mV	IN29 ≙ 0 ... 1 V	OUT 01 ≙ 0 ... 20 mA	30 Hz
	IN53 ≙ ±50 mV	IN18 ≙ ±1 V	OUT 02 ≙ 4 ... 20 mA	5 kHz
	IN24 ≙ 0 ... 60 mV	IN49 ≙ 0 ... 1.2 V	OUT 03 ≙ 0 ... 10 V	
	IN13 ≙ ±60 mV	IN62 ≙ ±1.2 V	OUT 04 ≙ 2 ... 10 V	
2902021 ≙ MINI MCR-2-U-UI-PT-C	IN41 ≙ 0 ... 75 mV	IN50 ≙ 0 ... 1.5 V	OUT 05 ≙ 0 ... 5 V	
	IN54 ≙ ±75 mV	IN63 ≙ ±1.5 V	OUT 06 ≙ 1 ... 5 V	
	IN42 ≙ 0 ... 80 mV	IN30 ≙ 0 ... 2 V	OUT 13 ≙ -5 ... 5 V	
	IN55 ≙ ±80 mV	IN19 ≙ ±2 V	OUT 14 ≙ -10 ... 10 V	
	IN25 ≙ 0 ... 100 mV	IN51 ≙ 0 ... 2.4 V		
	IN14 ≙ ±100 mV	IN64 ≙ ±2.4 V		
	IN43 ≙ 0 ... 120 mV	IN52 ≙ 0 ... 3 V		
	IN56 ≙ ±120 mV	IN65 ≙ ±3 V		
	IN44 ≙ 0 ... 150 mV	IN05 ≙ 0 ... 5 V		
	IN57 ≙ ±150 mV	IN21 ≙ ±5 V		
	IN26 ≙ 0 ... 200 mV	IN100 ≙ 0 ... 7.5 V		
	IN15 ≙ ±200 mV	IN107 ≙ ±7.5 V		
	IN45 ≙ 0 ... 240 mV	IN03 ≙ 0 ... 10 V		
	IN58 ≙ ±240 mV	IN22 ≙ ±10 V		
	IN27 ≙ 0 ... 300 mV	IN101 ≙ 0 ... 12 V		
	IN16 ≙ ±300 mV	IN108 ≙ ±12 V		
	IN28 ≙ 0 ... 500 mV	IN67 ≙ 0 ... 15 V		
	IN17 ≙ ±500 mV	IN79 ≙ ±15 V		
	IN46 ≙ 0 ... 600 mV	IN32 ≙ 0 ... 20 V		
	IN59 ≙ ±600 mV	IN23 ≙ ±20 V		
	IN47 ≙ 0 ... 750 mV	IN38 ≙ 0 ... 24 V		
	IN60 ≙ ±750 mV	IN93 ≙ ±24 V		
	IN48 ≙ 0 ... 800 mV	IN39 ≙ 0 ... 30 V		
	IN61 ≙ ±800 mV	IN80 ≙ ±30 V		

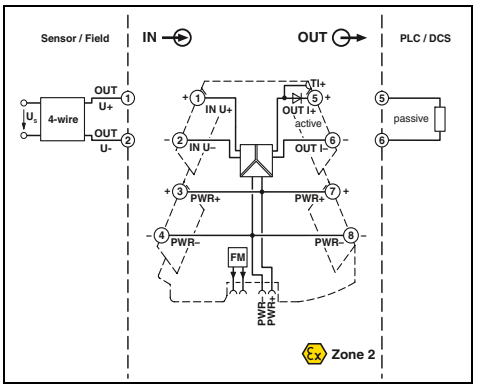
Signal combinations for MINI MCR-2-U-UI(-PT)(-C) signal conditioners

	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 ... 50 mV (±50 mV)	X	X	X	X	X	X	X	X
0 ... 60 mV (±60 mV)	X	X	X	X	X	X	X	X
0 ... 75 mV (±75 mV)	X	X	X	X	X	X	X	X
0 ... 80 mV (±80 mV)	X	X	X	X	X	X	X	X
0 ... 100 mV (±100 mV)	X	X	X	X	X	X	X	X
0 ... 120 mV (±120 mV)	X	X	X	X	X	X	X	X
0 ... 150 mV (±150 mV)	X	X	X	X	X	X	X	X
0 ... 200 mV (±200 mV)	X	X	X	X	X	X	X	X
0 ... 240 mV (±240 mV)	X	X	X	X	X	X	X	X
0 ... 300 mV (±300 mV)	X	X	X	X	X	X	X	X
0 ... 500 mV (±500 mV)	X	X	X	X	X	X	X	X
0 ... 600 mV (±600 mV)	X	X	X	X	X	X	X	X
0 ... 750 mV (±750 mV)	X	X	X	X	X	X	X	X
0 ... 800 mV (±800 mV)	X	X	X	X	X	X	X	X
0 ... 1 V (±1 V)	X	X	X	X	X	X	X	X
0 ... 1.2 V (±1.2 V)	X	X	X	X	X	X	X	X
0 ... 1.5 V (±1.5 V)	X	X	X	X	X	X	X	X
0 ... 2 V (±2 V)	X	X	X	X	X	X	X	X
0 ... 2.4 V (±2.4 V)	X	X	X	X	X	X	X	X
0 ... 3 V (±3 V)	X	X	X	X	X	X	X	X
0 ... 5 V (±5 V)	X	X	X	X	X	X	X	X
0 ... 7.5 V (±7.5 V)	X	X	X	X	X	X	X	X
0 ... 10 V (±10 V)	X	X	X	X	X	X	X	X
0 ... 12 V (±12 V)	X	X	X	X	X	X	X	X
0 ... 15 V (±15 V)	X	X	X	X	X	X	X	X
0 ... 20 V (±20 V)	X	X	X	X	X	X	X	X
0 ... 24 V (±24 V)	X	X	X	X	X	X	X	X
0 ... 30 V (±30 V)	X	X	X	X	X	X	X	X

Unipolar or bipolar selection option available for input signal via DIP switch.

Analog IN/Analog OUT
3-way signal conditioners





3-way signal conditioner with fixed signal combinations

- Highly compact signal conditioners 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 107

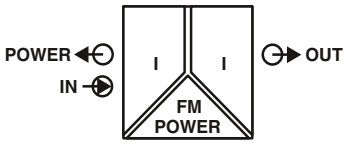
Technical data

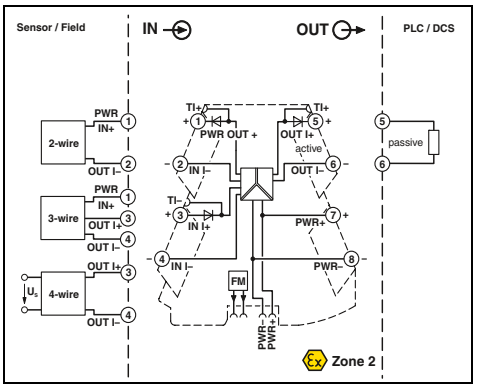
Input data		
Input resistance	U input	Approx. 1 MΩ
	I input	Approx. 63 Ω (+ 0.7 V for test diode)
Output data		
Maximum output signal	U output	11 V
	I output	22 mA
No-load voltage		<17 V
Short-circuit current		<15 mA
Load R_B		≥10 kΩ / ≤600 Ω (at 20 mA)
Ripple		<20 mV_{PP} (at 10 kΩ) / <20 mV_{PP} (at 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 (24 V DC)
Maximum transmission error		0.1% (of final value)
Temperature coefficient		0.01%/K, typically 0.01%/K
Limit 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
EMC note		Class A product, see page 583
Conformance/approvals		
Conformance		CE-compliant
ATEX		II 3 G Ex nA IIC T4 Gc X
UL, USA/Canada		UL 508 Listed Class I, Div. 2, Groups A, B, C, D T6 Class I, Zone 2, Group IIC T6
DNV GL		C, EMC2

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 4 ... 20 mA	0 ... 20 mA 4 ... 20 mA	**MINI MCR-2-I-I-PT**	2901999	1
Screw connection	0 ... 20 mA 4 ... 20 mA	0 ... 20 mA 4 ... 20 mA	**MINI MCR-2-I-I**	2901998	1
Push-in connection	0 ... 10 V -10 ... 10 V	0 ... 10 V -10 ... 10 V	**MINI MCR-2-U-U-PT**	2902043	1
Screw connection	0 ... 10 V -10 ... 10 V	0 ... 10 V -10 ... 10 V	**MINI MCR-2-U-U**	2902042	1

Analog IN/Analog OUT
3-way repeater power supplies





Ex n

NFC

3-way repeater power supply

Ex:

Housing width 6.2 mm

- Highly compact repeater power supply for electrical isolation, amplification, and filtering of standard analog signals
- Supply of 2-conductor and passive 3-conductor sensors
- Can also be used as an isolator without supply
- Plug-in connection system
- Safe 3-way isolation
- 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 starting at page 102

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 (+ 0.7 V for test diode)
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 range	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	0.05% (of final value, at 4 mA ... 20 mA)
Temperature coefficient	0.0075%/K, typically 0.0075%/K
Limit frequency (3 dB)	>1.75 kHz (typically)
Step response (10-90%)	<200 µs (typically)
Electrical isolation	Reinforced insulation in accordance with IEC 61010-1
Degree of protection	IP20
EMC note	Class A product, see page 583
Conformance/approvals	
Conformance	CE-compliant
ATEX	II 3 G Ex nA IIC T4 Gc X
UL, USA/Canada	UL 508 Listed Class I, Div. 2, Groups A, B, C, D T5 Class I, Zone 2, Group IIC T5
DNV GL	C, EMC2

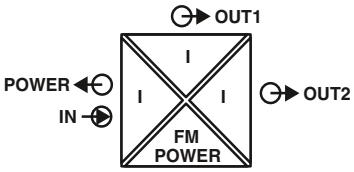
Ordering data

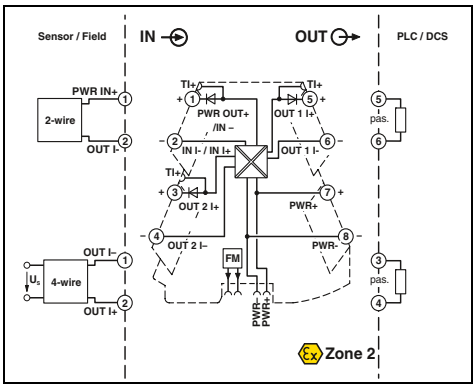
Description	Type	Order No.	Pcs./Pkt.
3-way repeater power supplies			
Push-in connection	**MINI MCR-2-RPSS-I-I-PT**	**2902015**	1
Screw connection	**MINI MCR-2-RPSS-I-I**	**2902014**	1

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

Analog IN / Analog OUT
Power supply doublers

new





Power supply doubler with HART transmission

Ex:

Housing width 6.2 mm

- Highly compact power supply doubler with electrical isolation for doubling, amplifying, and filtering standard analog signals
- Supply of 2-conductor sensors
- Can also be used as an isolator without supply
- Plug-in connection system
- Safe 3-way isolation
- Power supply and fault monitoring possible via DIN rail connector
- Status LED

Technical data

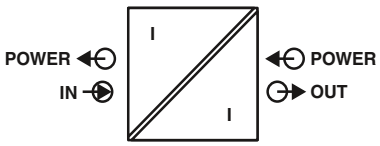
Input data	
Input signal	0 ... 20 mA, isolator operation / 4 ... 20 mA, repeater power supply and isolator operation
Input resistance	90 Ω (+1.6 V)
Transmitter supply voltage	>19.5 V
Output data	
Output signal	0 ... 20 mA / 4 ... 20 mA
Maximum output signal	25 mA
No-load voltage	<20 V
Load R_B	≤500 Ω (per channel)
Ripple	<20 mV_{PP} (at 500 Ω)
General data	
Supply voltage range	9.6 V DC ... 30 V DC
Nominal supply voltage	24 V DC
Current consumption	40 mA (at 24 V DC and in isolator operation)
Power consumption	1.6 W (at I_{OUT} = 20 mA, 500 Ω load)
Maximum transmission error	0.05% (of final value)
Temperature coefficient	0.0075%/K,
Limit frequency (3 dB)	>1 kHz (typically)
Step response (10-90%)	<400 µs (typically)
Electrical isolation	Reinforced insulation in accordance with IEC 61010-1
Degree of protection	IP20
EMC note	Class A product, see page 583
Conformance/approvals	
Conformance	CE-compliant
ATEX	II 3 G Ex nA IIC T4 Gc X
UL, USA/Canada	UL 508 Listed Class I, Div. 2, Groups A, B, C, D T5 Class I, Zone 2, Group IIC T5
DNV GL	B, B, A, A

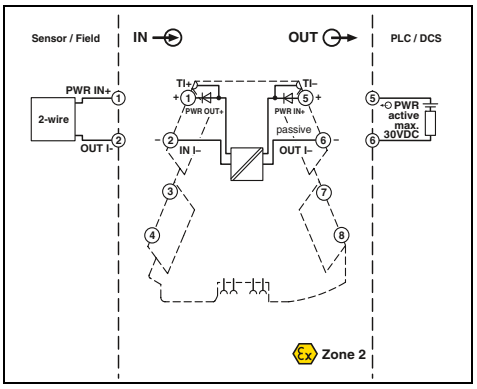
Ordering data

Description	Type	Order No.	Pcs./Pkt.
4-way power supply doubler, with HART transmission and automatic active/passive detection at the outputs			
Push-in connection	**MINI MCR-2-RPSS-I-2I-PT**	2905629	1
Screw connection	**MINI MCR-2-RPSS-I-2I**	2905628	1

Analog IN / Analog OUT
2-way repeater power supplies, output loop-powered

new





Ex n

NFC

Either 1- or 2-channel

Ex:

Housing width 6.2 mm

- The single or dual-channel output loop-powered 2-way repeater power supply with plug-in connection technology is used for the electrical isolation and filtering of analog signals
- This device allows operation on an active analog input module
- The module and the connected sensors are powered via the current loop of the controller
- As a result, no additional power supply is required
- Input signal = output signal: 0(4) mA ... 20 mA

Technical data

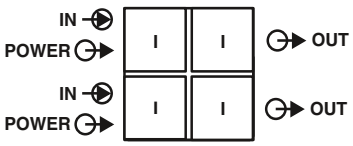
Input data	
Input signal	0 ... 20 mA / 4 ... 20 mA
Transmitter supply voltage	U_A - 5 V
Output data	
Output signal	0 ... 20 mA / 4 ... 20 mA
Output signal	5 V ... 30 V
General data	
Maximum transmission error	≤0.1% (at 5 V)
Additional error, depending on the input voltage	(U_A - 5 V) x 0.06%
Temperature coefficient	≤0.001%/K
Limit frequency (3 dB)	100 Hz
Electrical isolation	Reinforced insulation in accordance with IEC 61010-1
Degree of protection	IP20
EMC note	Class A product, see page 583
Conformance/approvals	
Conformance	CE-compliant
ATEX	II 3 G Ex nA IIC T4 Gc X
UL, USA/Canada	UL 508 Listed Class I, Div. 2, Groups A, B, C, D T6 Class I, Zone 2, Group IIC T6

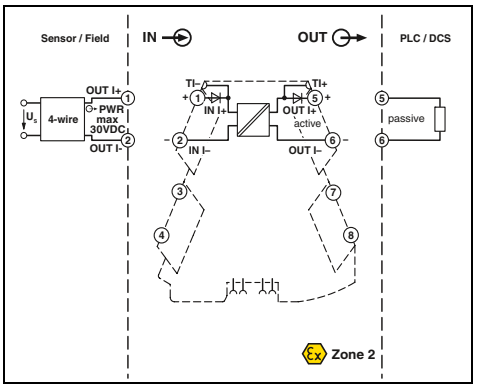
Ordering data

Description	Type	Order No.	Pcs./Pkt.
Output loop-powered 2-way repeater power supply, for isolating current signals without auxiliary power			
Push-in connection	**MINI MCR-2-RPS-I-I-OLP-PT**	2906447	1
Screw connection	**MINI MCR-2-RPS-I-I-OLP**	2906446	1
Push-in connection	**MINI MCR-2-RPS-2I-2I-OLP-PT**	2906449	1
Screw connection	**MINI MCR-2-RPS-2I-2I-OLP**	2906448	1

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

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





Either 1- or 2-channel

Ex:

Housing width 6.2 mm

- Highly-compact 2-way repeater power supply
- Input loop-supplied
- Does not require any additional auxiliary voltage
- For electrical isolation and filtering of analog signals
- Powered via the current loop of the sensor
- Input signal = output signal 0(4) to 20 mA
- Plug-in connection system
- Status LED

Notes:

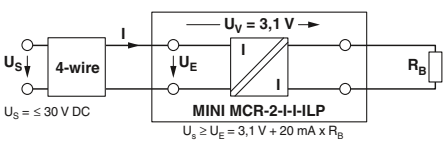
Information on MINI Analog Pro accessories can be found from page 107

Technical data

Input data	
Input signal	0 ... 20 mA / 4 ... 20 mA
Input voltage limitation	30 V
Voltage drop	3.1 V (I = 20 mA)
Response current	Approx. 200 µA
Output data	
Output signal	0 ... 20 mA / 4 ... 20 mA
Load R_B	<600 Ω (at I = 20 mA output signal)
Transmission Behavior	1:1 to input signal
General data	
Maximum transmission error	≤0.1% (of final value)
Additional error per 100 Ω load	<0.075% (of measured value / 100 Ω load)
Temperature coefficient	≤0.002%/K (of measured value / 100 Ω load)
Limit frequency (3 dB)	100 Hz
Electrical isolation	Reinforced insulation in accordance with IEC 61010-1
Degree of protection	IP20
EMC note	Class A product, see page 583
Conformance/approvals	
Conformance	CE-compliant
ATEX	II 3 G Ex nA IIC T4 Gc X
UL, USA/Canada	UL 508 Listed Class I, Div. 2, Groups A, B, C, D T6 Class I, Zone 2, Group IIC T6
GL	GL applied for

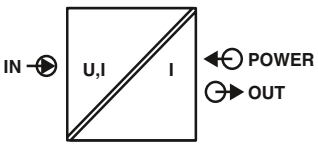
Ordering data

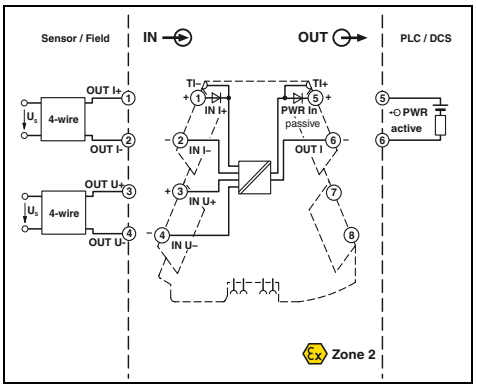
Description		Type	Order No.	Pcs./Pkt.
Input loop-powered 2-way isolator, for isolating current signals without auxiliary power				
single-channel	Push-in connection	**MINI MCR-2-I-I-ILP-PT**	2901995	1
single-channel	Screw connection	**MINI MCR-2-I-I-ILP**	2901994	1
two-channel	Push-in connection	**MINI MCR-2-2I-2I-ILP-PT**	2901997	1
two-channel	Screw connection	**MINI MCR-2-2I-2I-ILP**	2901996	1



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

new





Ex n

D W H

Configurable, up to 74 signal combinations

Ex:

Housing width 6.2 mm

- 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 system
- Voltage input from mV voltages up to 30 V
- Current input from 2 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 107

Technical data

	U input	I input
Input data		
Input signal (configurable using the DIP switch)	2 ... 10 V, additional areas can be configured, see table	
Maximum input signal	<30 V	50 mA (dielectric strength up to 30 V)
Input resistance	Approx. 100 kΩ (at ≤1 V, otherwise approximately 1 MΩ)	25 Ω (+ 0.7 V for test diode)
Output data		
Output signal	4 ... 20 mA	
Maximum output signal	32 mA	
Load R_B	<1,000 Ω ((U_B - 8 V) / 22 mA)	
Ripple	<10 mV_{rms} (at 600 Ω)	
General data		
Current consumption	≤20 mA	
Maximum transmission error	≤0.1% (of final value)	
Temperature coefficient	0.01%/K, typically 0.005%/K	
Limit frequency (3 dB)	Approx. 30 Hz	
Step response (10-90%)	20 ms	
Electrical isolation	Reinforced insulation in accordance with IEC 61010-1	
Degree of protection	IP20	
EMC note	Class A product, see page 583	
Conformance/approvals		
Conformance	CE-compliant	
ATEX	II 3 G Ex nA IIC T4 Gc X	
UL, USA/Canada	UL 508 Listed Class I, Div. 2, Groups A, B, C, D T5 Class I, Zone 2, Group IIC T5	
DNV GL	B, B, A, A	

Ordering data

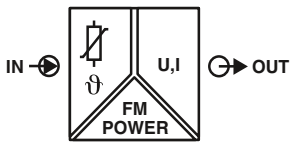
Description		Type	Order No.	Pcs./Pkt.
Output loop-powered 2-way isolator, for isolating current signals without auxiliary power				
Standard configuration	Push-in connection	**MINI MCR-2-UI-I-OLP-PT**	2902063	1
Standard configuration	Screw connection	**MINI MCR-2-UI-I-OLP**	2902061	1
Order configuration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

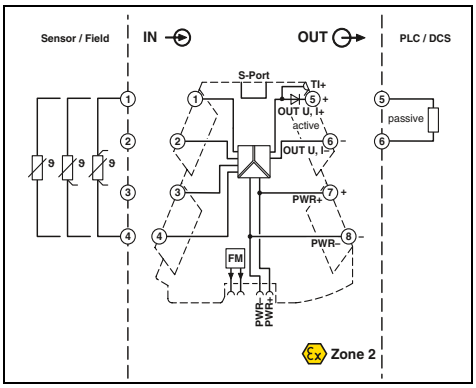
Order key for MINI MCR-2-UI-I-OLP(-PT)(-C)

Order No.	Input					
2902060	/ 0 mV ... 1,000 mV					
2902060 ≙ MINI MCR-2-UI-I-OLP-C	0 mV ... 1,000 mV	0 V ... 10 V	-1,000 mV ... 1,000 mV	-10 V ... 10 V	0 mA ... 40 mA	-2 mA ... 2 mA
	0 mV ... 750 mV	0 V ... 7.5 V	-750 mV ... 750 mV	-7.5 V ... 7.5 V	0 mA ... 30 mA	-3 mA ... 3 mA
	0 mV ... 500 mV	0 V ... 5 V	-500 mV ... 500 mV	-5 V ... 5 V	0 mA ... 20 mA	-10 mA ... 10 mA
	0 mV ... 300 mV	0 V ... 3 V	-300 mV ... 300 mV	-3 V ... 3 V	0 mA ... 12 mA	-15 mA ... 15 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	-20 mA ... 20 mA
	0 mV ... 200 mV	0 V ... 2 V	-200 mV ... 200 mV	-2 V ... 2 V	0 mA ... 8 mA	-30 mA ... 30 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	-40 mA ... 40 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	
		2 V ... 10 V		1 V ... 5 V	1 mA ... 5 mA	

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

Temperature
Temperature transducers
for resistance thermometers





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-conductor sensors in accordance with IEC 751, JIS, GOST
- 2-conductor resistance measurement, up to 4,000 Ω
- Plug-in connection system
- Safe 3-way isolation
- Standard signal combinations configurable via DIP switches
- Freely-configurable with 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 111

Information on MINI Analog Pro accessories can be found from page 107

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-conductor	
Temperature range	-200°C ... 850°C (range depends on sensor type, range can be set freely via software or in increments from -150°C to 850°C via DIP switches)	
Measuring range span	≥20 K	
Linear resistance measuring range	0 Ω ... 4,000 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	<10 mV_{rms}	<10 mV_{rms} (at 600 Ω)
General data		
Supply voltage range	9.6 V DC ... 30 V DC	
Current consumption	32 mA (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) 0.3% * 200 K / set measuring range; 0.3% >200 K (Cu)	
Temperature coefficient	0.01%/K	
Step response (0 - 99%)	Typically 200 ms (2-conductor) Typically 500 ms (3-conductor) Typically 500 ms (4-conductor)	
Electrical isolation	Reinforced insulation in accordance with IEC 61010-1	
EMC note	Class A product, see page 583	
Conformance/approvals		
Conformance	CE-compliant	
ATEX	II 3 G Ex nA IIC T4 Gc X	
UL, USA/Canada	UL 508 Listed Class I, Div. 2, Groups A, B, C, D T6 Class I, Zone 2, Group IIC T6	
DNV GL	C, EMC2	

Ordering data

Description		Type	Order No.	Pcs./Pkt.
Temperature transducers 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
USB programming adapter for configuring modules with Windows software	**TWN4 MIFARE NFC USB ADAPTER**	2909681	1
Bluetooth programming adapter, with USB and S-PORT interface	**IFS-BT-PROG-ADAPTER**	2905872	1

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

Order No.	Sensor type	Connection technology	Measuring unit	Measuring range Start	Measuring range End	Output signal	Output Start	Output End
2902048	PT100	3	C	-50	150	I	4.0	20.0
2902048 ≙ MINI MCR-2-RTD-UI-C 2902051 ≙ MINI MCR-2-RTD-UI-PT-C	PT100 ≙ Pt 100 IEC751 PT200 ≙ Pt 200 IEC751 PT500 ≙ Pt 500 IEC751 PT1000 ≙ Pt 1000 IEC751 PT100G ≙ Pt 100 GOST 6651-2009 (α = 0.00394) PT1000G ≙ Pt 1000 GOST 6651-2009 (α = 0.00394) PT100J ≙ Pt 100 JIS C1604/1997 PT1000J ≙ Pt 1000 JIS C1604/1997 NI100 ≙ Ni 100 DIN 43760 NI1000 ≙ Ni 1000 DIN 43760 CU50 ≙ Cu 50 GOST 6651-2009 (α = 0.00428) CU100 ≙ Cu 100 GOST 6651-2009 (α = 0.00428) CU53 ≙ Cu 53 GOST 6651-2009 (α = 0.00426)	2 ≙ 2-conductor 3 ≙ 3-conductor 4 ≙ 4-conductor	C ≙°C F ≙°F	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)	I ≙ I U ≙ U	0.0 ≙ 0 mA I: freely selectable between 0.0 ... 21 mA U: freely selectable between 0.0 ... 10.5 V	20.0 ≙ 20 mA I: freely selectable between 0.0 ... 21 mA 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

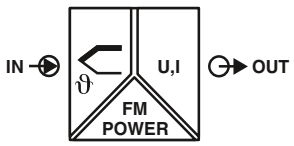
Failure information – Behavior in the event of an error	Open circuit	Short circuit	Measuring value over-range	Measured value under-range	Factory calibration certificate
NE43DO	0.0	0.0	0.0	0.0	None
FD ≙ Freely definable	0.0 ≙ 0 mA I: freely selectable between 0.0 ... 21.5 mA U: freely selectable between 0.0 ... 11 V (signal type corresponds to selected output signal)	0.0 ≙ 0 mA I: freely selectable between 0.0 ... 21.5 mA U: freely selectable between 0.0 ... 11 V (signal type corresponds to selected output signal)	0.0 ≙ 0 mA I: freely selectable between 0.0 ... 21.5 mA U: freely selectable between 0.0 ... 11 V (signal type corresponds to selected output signal)	0.0 ≙ 0 mA I: freely selectable between 0.0 ... 21.5 mA U: freely selectable between 0.0 ... 11 V (signal type corresponds to selected output signal)	None ≙ no factory calibration certificate Yes ≙ certificate but no test data YesPlus ≙ certificate with test data
Note: Failure information in accordance with NE 43 can only be selected for 4 ... 20 mA output					
NE43UP ≙ NE 43 upscale	21.5 mA	21.5 mA	21.5 mA	21.5 mA	
NE43DO ≙ NE 43 downscale	3.5 mA	3.5 mA	3.5 mA	3.5 mA	
NE430 ≙ NE 43 0 mA	0 mA	0 mA	0 mA	0 mA	
NE43UD ≙ NE 43 upscale/ downscale	3.5 mA	3.5 mA	21.5 mA	21.5 mA	

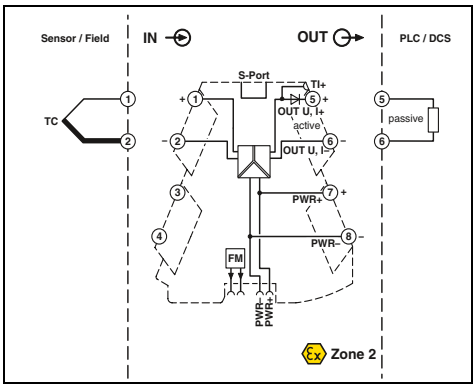
Sensor types and measuring ranges for MINI MCR-2-RTD-UI(-PT)(-C) temperature transducers

Sensor type	Standard	Measuring range	Smallest measuring span	Adjustable using:
Pt 100	IEC 751 = GOST 6651-2009 (α = 0.00385)	-200°C ... +850°C	20 K	DIP switch
Pt 200	IEC 751 = GOST 6651-2009 (α = 0.00385)	-200°C ... +850°C	20 K	DIP switch
Pt 500	IEC 751 = GOST 6651-2009 (α = 0.00385)	-200°C ... +850°C	20 K	Software or smartphone app
Pt 1000	IEC 751 = GOST 6651-2009 (α = 0.00385)	-200°C ... +850°C	20 K	Software or smartphone app
Pt 100	GOST 6651-2009 (α = 0.00391)	-200°C ... +850°C	20 K	Software or smartphone app
Pt 1000	GOST 6651-2009 (α = 0.00391)	-200°C ... +850°C	20 K	Software or smartphone app
Pt 100	JIS C1604-1997	-200°C ... +850°C	20 K	Software or smartphone app
Pt 1000	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
Ni 1000	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

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

Temperature
Temperature transducers 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
- Voltage measurement from ±0 ... 15 mV to ±0 ... 500 mV, fully adjustable
- For thermocouples in accordance with 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 with 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 111

Information on MINI Analog Pro accessories can be found from page 107

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, C, 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 from -150°C to 1350°C 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	<10 mV_{rms}	<10 mV_{rms} (at 600 Ω)
General data		
Supply voltage range	9.6 V DC ... 30 V DC	
Current consumption	32.7 mA (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 (C, 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) 0.2% * 600 K / set measuring range; 0.2% >600 K (E, J, K, N, T, L, U, M Gost, L Gost); Highspeed Mode 0.4% * 600 K / set measuring range; 0.4% >600 K (B, R, S, A1, A2, A3); Highspeed Mode	
Cold junction errors	- (typically 2 K (2 K + (0,2 K * ΔT)))	
Temperature coefficient	≤0.01%/K	
Step response (0 - 99%)	Typically 400 ms (highspeed Mode: typically 150 ms)	
Electrical isolation	Reinforced insulation in accordance with IEC 61010-1	
EMC note	Class A product, see page 583	
Conformance/approvals		
Conformance	CE-compliant	
ATEX	Ex II 3 G Ex nA IIC T4 Gc X	
UL, USA/Canada	UL 508 Listed Class I, Div. 2, Groups A, B, C, D T6 Class I, Zone 2, Group IIC T6	
DNV GL	C, EMC2	

Ordering data

Description		Type	Order No.	Pcs./Pkt.
Temperature transducers for thermocouples				
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
USB programming adapter for configuring modules with Windows software	**TWN4 MIFARE NFC USB ADAPTER**	2909681	1
Bluetooth programming adapter, with USB and S-PORT interface	**IFS-BT-PROG-ADAPTER**	2905872	1

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

Order No.	Sensor type	Cold junction error compensation	Measuring unit	Measuring range Start	Measuring range End	Output Output signal	Output Start	Output End
2902053	J	1	C	-200	1200	I	4.0	20.0
2902053 ≙ MINI MCR-2-TC-UI-C 2905248 ≙ MINI MCR-2-TC-UI-PT-C	B ≙ B IEC 584-1 (Pt30Rh-Pt6Rh) E ≙ E IEC 584-1 (NiCr-CuNi) J ≙ J IEC 584-1 (Fe-CuNi) K ≙ K IEC584-1(NiCr-Ni) N ≙ N IEC 584-1 (NiCrSi-NiSi) R ≙ R IEC 584-1 (Pt13Rh-Pt) S ≙ S IEC 584-1 (Pt10Rh-Pt) T ≙ T IEC 584-1 (Cu-CuNi) L ≙ L DIN 43760 (Fe-CuNi) U ≙ U DIN 43760 (Cu-CuNi) A1G ≙ A-1 GOST 8.585-2001 A2G ≙ A-2 GOST 8.585-2001 A3G ≙ A-3 GOST 8.585-2001 MG ≙ M GOST 8.585-2001 LG ≙ L GOST 8.585-2001	0 ≙ OFF 1 ≙ AN	C ≙°C F ≙°F	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)	I ≙ I U ≙ U	0.0 ≙ 0 mA I: freely selectable between 0.0 ... 21 mA U: freely selectable between 0.0 ... 10.5 V	20.0 ≙ 20 mA I: freely selectable between 0.0 ... 21 mA 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	Failure information Open circuit	Failure information Measuring value over-range	Failure information Measured value under-range	Factory calibration certificate
	NE43DO	0.0	0.0	0.0	None
	FD ≙ Freely definable	0.0 ≙ 0 mA I: freely selectable between 0.0 ... 21.5 mA U: freely selectable between 0.0 ... 11 V (signal type corresponds to selected output signal)	0.0 ≙ 0 mA I: freely selectable between 0.0 ... 21.5 mA U: freely selectable between 0.0 ... 11 V (signal type corresponds to selected output signal)	0.0 ≙ 0 mA I: freely selectable between 0.0 ... 21.5 mA U: freely selectable between 0.0 ... 11 V (signal type corresponds to selected output signal)	None ≙ no factory calibration certificate Yes ≙ certificate but no test data YesPlus ≙ certificate with test data
	Note: Failure information in accordance with NE 43 can only be selected for 4 ... 20 mA output				
	NE43UP ≙ NE 43 upscale NE43DO ≙ NE 43 downscale NE430 ≙ NE 43 0 mA NE43UD ≙ NE 43 upscale/downscale	21.5 mA 3.5 mA 0 mA 3.5 mA	21.5 mA 3.5 mA 0 mA 21.5 mA	21.5 mA 3.5 mA 0 mA 21.5 mA	

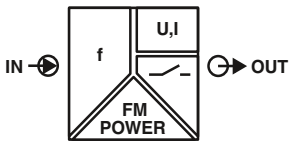
Sensor types and measuring ranges for MINI MCR-2-TC-UI(-PT)(-C) temperature transducers

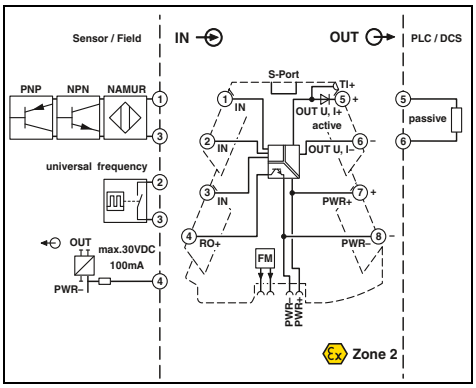
Sensor type	Standard	Measuring range	Smallest measuring span	Adjustable using:
B	IEC 584-1	+500°C ... +1,820°C	50 K	Software or smartphone app
E	IEC 584-1	-230°C ... +1,000°C	50 K	Software or smartphone app
J	IEC 584-1	-210°C ... +1,200°C	50 K	DIP switch
K	IEC 584-1	-250°C ... +1,372°C	50 K	DIP switch
N	IEC 584-1	-200°C ... +1,300°C	50 K	Software or smartphone app
R	IEC 584-1	-50°C ... +1,768°C	50 K	Software or smartphone app
S	IEC 584-1	-50°C ... +1,768°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 ... +2,500°C	50 K	Software or smartphone app
A-2	GOST 8.585	0°C ... +1,800°C	50 K	Software or smartphone app
A-3	GOST 8.585	0°C ... +1,800°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 ... +2,500°C	50 K	Software or smartphone app

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

Frequency
Universal frequency transducers

new





Configurable, universal frequency or PWM input

Ex:

Housing width 6.2 mm

- Universally configurable, highly compact 3-way isolated frequency transducer with inverting transistor switching output
- 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
- For electrical isolation, conversion, amplification, and filtering of frequency and PWM signals
- Frequency signals in the range from 0.002 to 200 kHz and PWM signals up to 1 kHz
- Supports fault monitoring
- Plug-in connection system
- Safe 3-way isolation
- Standard behavior can be configured 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 111

Technical data

Input data		
Input sources	NAMUR initiators NPN/PNP transistor outputs Floating contact (dry contact) Frequency generator Incremental encoder (speed only) HTL encoders TTL rotary transducer S0 signal	
Frequency measuring range	0.002 Hz ... 200 kHz	
Maximum input signal	30 V (incl. DC voltage)	
PWM (range)	0.002 Hz ... 60 Hz (Duty cycle 2 ... 98%) 60 Hz ... 300 Hz (Duty cycle 5 ... 95%) 300 Hz ... 600 Hz (Duty cycle 10 ... 90%) 600 Hz ... 1,000 Hz (Duty cycle 20 ... 80%)	
Measuring range span	≥2 V	
Output data	U output	I output
Output signal	0 ... 10 V / 2 ... 10 V 0 ... 5 V / 1 ... 5 V	0 ... 20 mA / 4 ... 20 mA 0 ... 10 mA / 2 ... 10 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)
Switching output		
Relay output	1 N/O contact	
Max. switching voltage	30 V DC	
Maximum switching current	100 mA (30 V)	
Minimum switching current	100 µA	
General data		
Supply voltage range	9.6 V DC ... 30 V DC	
Current consumption	32 mA (24 V DC) 63 mA (12 V DC)	
Power consumption	≤1 W (at I_{OUT} = 20 mA, 9.6 V DC, 600 Ω load)	
Maximum transmission error	0.1% (Frequency) 1% (PWM signal)	
Temperature coefficient	0.01%/K, typically 0.01%/K	
Step response (0 - 99%)	<35 ms (f >500 Hz)	
Electrical isolation	Reinforced insulation in accordance with IEC 61010-1	
EMC note	Class A product, see page 583	
Conformance/approvals		
Conformance	CE-compliant	
ATEX	II 3 G Ex nA IIC T4 Gc X	
UL, USA/Canada	UL 508 Listed Class I, Div. 2, Groups A, B, C, D T5 Class I, Zone 2, Group IIC T5	
DNV GL	B, B, A, A	

Ordering data

Description		Type	Order No.	Pcs./Pkt.
MCR frequency transducers				
Standard configuration	Push-in connection	**MINI MCR-2-F-UI-PT**	2902058	1
Standard configuration	Screw connection	**MINI MCR-2-F-UI**	2902056	1
Order configuration	Push-in connection	**MINI MCR-2-F-UI-PT-C**	2902059	1
Order configuration	Screw connection	**MINI MCR-2-F-UI-C**	2902057	1

Accessories

Programming adapter for configuring modules with S-PORT interface	**IFS-USB-PROG-ADAPTER**	2811271	1
USB programming adapter for configuring modules with Windows software	**TWN4 MIFARE NFC USB ADAPTER**	2909681	1
Bluetooth programming adapter, with USB and S-PORT interface	**IFS-BT-PROG-ADAPTER**	2905872	1
Constant voltage source			
with Push-in connection	**MINI MCR-2-SPS-24-15-PT**	1033201	1
with screw connection	**MINI MCR-2-SPS-24-15**	1033202	1

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

Order No.	Input				Frequency signal		PWM signal		Output signal	
	Input signal	Sensor	Low voltage level	High voltage level	Start	End	Start	End		
2902057	**f**	**NAMUR**	**0**	**30**	**0.002**	**200,000.000**	**2**	**98**	**I**	...
2902057 ≙ MINI MCR-2-F-UI-C 2902059 ≙ MINI MCR-2-F-UI-PT-C	f ≙ f PWM ≙ PWM	NAMUR ≙ NAMUR NPN ≙ NPN PNP ≙ PNP Frequency ≙ General frequency input	U: freely selectable between 0.0 ... 28 V The minimum measuring span must be 2 V.	U: freely selectable between 2.0 ... 30 V The minimum measuring span must be 2 V.	0.002 ≙ 0.002 Hz f: ≙ freely selectable between 0.002 ... 133,333.33 Hz	200,000.000 ≙ 200,000.000 Hz f: ≙ freely selectable between 0.003 ... 200,000 Hz	PWM: freely selectable between 2 ... 88%	PWM: freely selectable between 12 ... 98%	I ≙ I U ≙ U	
		Measuring range span at least 10%/see below* Increment 1% / 0.001 Hz					Output signal span at least 0.5 V / 1 mA Increment 0.1 V / 0.1 mA			

...	Output		Switching output			Factory calibration certificate
	Start	End	Switching function	Low switching point (SPL)	High switching point (SPH)	
...	**4.0**	**20.0**	**0**	**0.0**	**0.0**	**NONE**
	0 ≙ 0 mA I: freely selectable between 0.0 ... 20 mA U: freely selectable between 0.0 ... 10 V	0 ≙ 0 mA I: freely selectable between 0.0 ... 21 mA U: freely selectable between 0.0 ... 10.5 V	0 ≙ L 1 ≙ H 2 ≙ L -->SPH -->H 3 ≙ H -->SPH -->L 4 ≙ L -->SPH -->H -->SPH -->L 5 ≙ H -->SPH -->L -->SPH -->H 6 ≙ L -->SPL -->H -->SPH -->L 7 ≙ H -->SPL -->L -->SPH -->H	f: ≙ freely selectable between 0.002 ... 133,333.33 Hz PWM: freely selectable between 2 ... 88% Only values for switching functions 4, 5, 6, 7 can be set Values depend on the input range selected	f: ≙ freely selectable between 0.003 ... 200,000 Hz PWM: freely selectable between 12 ... 98% Only values for switching functions 2, 3, 4, 5, 6, 7 can be set Values depend on the input range selected	NONE YES YES PLUS

Note:
L = Low (relay off)
H = High (relay on)
SPL = Setpoint Low
SPH = Setpoint High

*** Note:**
The minimum separation between the two values depends on the frequency range in which they are located.
If the start value is being set, then the maximum possible value that can be set depends on the already set final value.
If the final value is being set, then the smallest possible value that can be set depends on the already set start value.

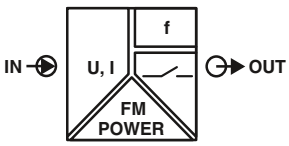
If the start value is being set:

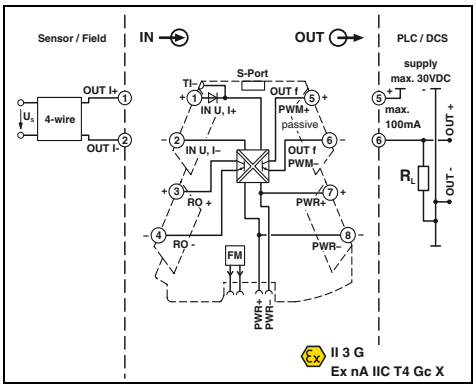
Final Value	Maximum possible start value that can be set
≤ 10.1 Hz	Final value 1.01
>10.1 Hz ... 110 Hz	Final value 1.1
>110 Hz ... 240 Hz	Final value 1.2
>240 Hz ... 364 Hz	Final value 1.3
>364 Hz ... 490 Hz	Final value 1.4
>490 Hz	Final value 1.5

If the final value is being set:

Start value	Smallest possible final value that can be set
≤ 10 Hz	Start value 1.01
>10 Hz ... 100 Hz	Start value 1.1
>100 Hz ... 200 Hz	Start value 1.2
>200 Hz ... 280 Hz	Start value 1.3
>280 Hz ... 350 Hz	Start value 1.4
>350 Hz	Start value 1.5

Frequency
Analog frequency transducers





Ex n

Configurable, frequency, PWM or switching output

Ex:

Housing width 6.2 mm

- Universally configurable highly-compact analog-to-frequency measuring transducer for electrical isolation, amplification, conversion and filtering of analog standard signals to frequencies or PWM signals
- Plug-in connection system
- 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 with 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 111

Information on MINI Analog Pro accessories can be found from page 107

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 via DIP switch or freely via software)	U input	I input
	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 (+ 0.7 V for test diode)
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 kHz (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	50 Hz (15 Bit) / 244 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 range	9.6 V DC ... 30 V DC	
Nominal supply voltage	24 V DC	
Current consumption	27 mA (12 V DC) 13.5 mA (24 V DC)	
Power consumption	≤350 mW (9.6 V DC)	
Transmission error, maximum	≤0.1% (>7 kHz ≤0.2%)	
Temperature coefficient	<0.01%/K, typically 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	
Degree of protection	IP20	
EMC note	Class A product, see page 583	
Conformance/approvals		
Conformance	CE-compliant	
ATEX	II 3 G Ex nA IIC T4 Gc X	
UL, USA/Canada	UL 508 Listed Class I, Div. 2, Groups A, B, C, D T6 Class I, Zone 2, Group IIC T6	
DNV GL	B, B, A, A	

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
USB programming adapter for configuring modules with Windows software	**TWN4 MIFARE NFC USB ADAPTER**	2909681	1
Bluetooth programming adapter, with USB and S-PORT interface	**IFS-BT-PROG-ADAPTER**	2905872	1

Order key for MINI MCR-2-UI-FRO(-PT)(-C) analog frequency measuring transducers (standard configuration entered as example)

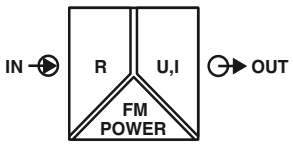
Order No.	Input			Output				Measuring range limit	
	Input signal	Start	End	Output signal	Carrier frequency	Start	End		
2906201	**I**	**0.0**	**20.0**	**I**	**0**	**0**	**1,000**	**15**	**...**
2906201 ≙ MINI MCR-2-UI-FRO-C 2906202 ≙ MINI MCR-2-UI-FRO-PT-C	I ≙ I U ≙ U	0.0 ≙ 0 mA I: freely selectable between 0.0 ... 24 mA U: freely selectable between 0.0 ... 12 V	20.0 ≙ 20 mA I: freely selectable between 0.0 ... 24 mA U: freely selectable between 0.0 ... 12 V	f ≙ f PWM ≙ PWM	0 ≙ at frequency output 15.6 k ≙ 15.6 kHz 15.6 kHz (10 bits) 1.9 kHz (10 bits) 7.8 kHz (11 bits) 977 Hz (11 bits) 3.9 kHz (12 bits) 488 Hz (12 bits) 1.9 kHz (13 bits) 244 Hz (13 bits) 977 Hz (14 bits) 122 Hz (14 bits) 488 Hz (15 bits) 61 Hz (15 bits) 244 Hz (16 bits) 31 Hz (16 bits)	0 ≙ 0 Hz f: freely selectable between 0 ... 10 kHz D: freely selectable between 0.0 ... 100%	10,000 ≙ 10 kHz f: freely selectable between 0 ... 10 kHz D: freely selectable between 0.0 ... 100%	0 ≙ off 1 ≙ on	

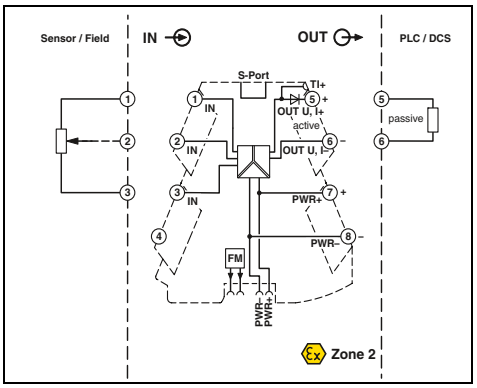
Measuring range span at least 0.5 V / 1 mA
Increment 0.1 V / 0.1 mA

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

...	Cut-off frequency	Failure information: Open circuit / short circuit	Behavior in the event of an error	Measuring value over-range	Measured value under-range	Factory calibration certificate
	15	**0**	**FD**	**0**	**0**	**NONE**
	15 Hz ≙ 15 Hz 60 Hz ≙ 60 Hz 240 Hz ≙ 240 Hz	0 ≙ 0 Hz f: freely selectable between 0 ... 11 kHz D: freely selectable between 0.0 and 100% (free definition only for unlimited output) (signal type corresponds to selected output signal)	FD ≙ Freely definable Failure information only adjustable for unlimited output	0 ≙ 0 Hz f: freely selectable between 0 ... 11 kHz D: freely selectable between 0.0 and 100% (free definition only for unlimited output) (signal type corresponds to selected output signal)	0 ≙ 0 Hz f: freely selectable between 0 ... 11 kHz D: freely selectable between 0.0 and 100% (free definition only for unlimited output) (signal type corresponds to selected output signal)	None ≙ no factory calibration certificate Yes ≙ certificate but no test data YesPlus ≙ certificate with test data

Potentiometers
Potentiometer transducers





Ex n

µC NFC

Potentiometer transducer, configurable

Ex:

Housing width 6.2 mm

- Universally configurable, highly compact potentiometer 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 with 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 111

Information on MINI Analog Pro accessories can be found from page 107

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	0 ... 20 mA / 4 ... 20 mA
	0 ... 5 V / 0 ... 10 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} (at 10 kΩ)	<20 mV_{PP}
Behavior in the event of a sensor error	configurable	
General data		
Supply voltage range	9.6 V DC ... 30 V DC	
Nominal supply voltage	24 V DC	
Current consumption	33 mA (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, typically 0.01%/K	
Step response (0 - 99%)	<60 ms	
Electrical isolation	Reinforced insulation in accordance with IEC 61010-1	
Degree of protection	IP20	
EMC note	Class A product, see page 583	
Conformance/approvals		
Conformance	CE-compliant	
ATEX	II 3 G Ex nA IIC T4 Gc X	
UL, USA/Canada	UL 508 Listed Class I, Div. 2, Groups A, B, C, D T5 Class I, Zone 2, Group IIC T5	
DNV GL	C, EMC2	

Ordering data

Description		Type	Order No.	Pcs./Pkt.
Potentiometer 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
USB programming adapter for configuring modules with Windows software	**TWN4 MIFARE NFC USB ADAPTER**	2909681	1
Bluetooth programming adapter, with USB and S-PORT interface	**IFS-BT-PROG-ADAPTER**	2905872	1

Order key for MINI MCR-2-POT-UI(-PT)(-C) potentiometer measuring transducers (standard configuration entered as an example)

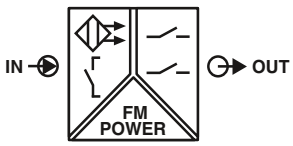
Order No.	Automatic potentiometer detection	Output Output signal	Start	End	Sliding mean value	Open circuit detection
2905005	**AUTO**	**I**	**4.0**	**20.0**	**1**	**ON**
2905005 ≙ MINI MCR-2-POT-UI-C 2905006 ≙ MINI MCR-2-POT-UI-PT-C	AUTO ≙ ON OFF ≙ OFF	I ≙ I U ≙ U	0.0 ≙ 0 mA I: freely selectable between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

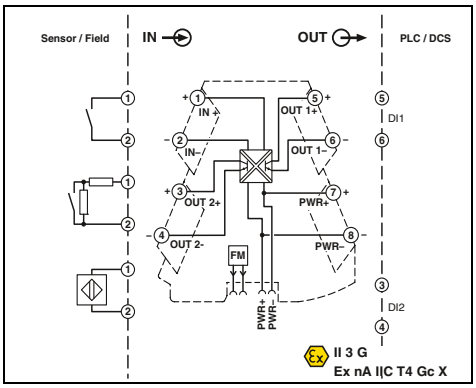
Output signal span at least 0.5 V / 1 mA
Increment 0.1 V / 0.1 mA

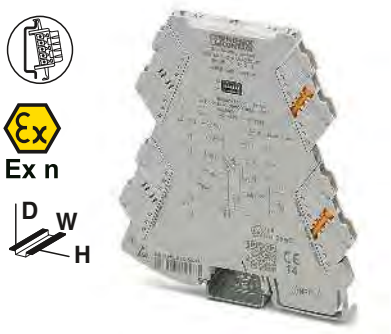
...	Failure information Behavior in the event of an error	Open circuit slider	Input open (no potentiometer connected)	Measuring value over-range	Measured value under-range
	NE43DO	**0.0**	**0.0**	**0.0**	**0.0**
	FD ≙ Freely definable	0.0 ≙ 0 mA I: freely selectable between 0.0 ... 21.5 mA U: freely selectable between 0.0 ... 11 V (only if open circuit detection is on) (signal type corresponds to selected output signal)	0.0 ≙ 0 mA I: freely selectable between 0.0 ... 21.5 mA U: freely selectable between 0.0 ... 11 V (signal type corresponds to selected output signal)	0.0 ≙ 0 mA I: freely selectable between 0.0 ... 21.5 mA U: freely selectable between 0.0 ... 11 V (signal type corresponds to selected output signal)	0.0 ≙ 0 mA I: freely selectable between 0.0 ... 21.5 mA U: freely selectable between 0.0 ... 11 V (signal type corresponds to selected output signal)
	Note: Failure information in accordance with NE 43 can only be selected for 4 ... 20 mA output				
	NE43UP ≙ NE 43 upscale NE43DO ≙ NE 43 downscale NE430 ≙ NE 43 0 mA NE43UD ≙ NE 43 upscale/downscale	21.5 mA 3.5 mA 0 mA 3.5 mA	21.5 mA 3.5 mA 0 mA 3.5 mA	21.5 mA 3.5 mA 0 mA 21.5 mA	21.5 mA 3.5 mA 0 mA 21.5 mA

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

Digital IN
Signal conditioners







Configurable, for NAMUR sensors and floating contacts

Ex:

Housing width 6.2 mm

- Highly compact signal conditioners 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 system
- 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 107

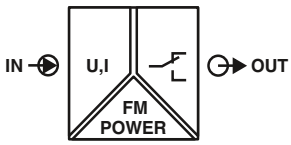
Technical data

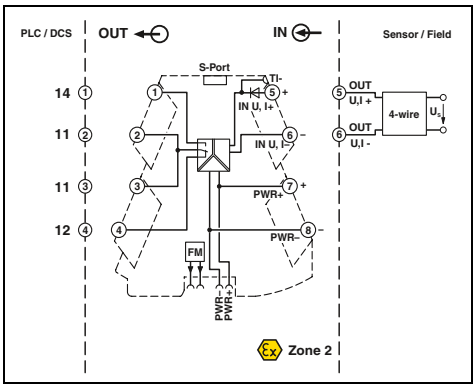
Input data	
Input signal	NAMUR proximity sensors (EN 60947-5-6) open circuit switch contacts Switch contacts with resistance circuit
Control circuit	
No-load voltage	8.2 V DC ±10%
Switching points (in accordance with IEC 60947-5-6)	<1.2 mA (blocking) >2.1 mA (conductive)
Line error detection	>6 mA (in the event of a short-circuit) <0.35 mA (with wire break)
Switching output	
Transistor output	N/O contact behavior 2x
Max. switching voltage	30 V DC
Max. switching current	50 mA
Switching frequency	5 kHz
General data	
Supply voltage range	9.6 V DC ... 30 V DC
Nominal supply voltage	24 V DC
Current consumption	18 mA (24 V DC) 35 mA (12 V DC)
Power consumption	450 mW (9.6 V DC)
Electrical isolation	Reinforced insulation in accordance with IEC 61010-1
Degree of protection	IP20
EMC note	Class A product, see page 583
Conformance/approvals	
Conformance	CE-compliant
ATEX	II 3 G Ex nA IIC T4 Gc X
UL, USA/Canada	UL 508 Listed Class I, Div. 2, Groups A, B, C, D T6 Class I, Zone 2, Group IIC T6
DNV GL	B, B, A, A

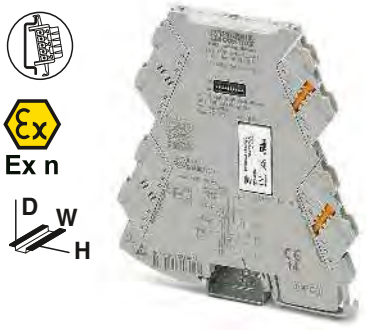
Ordering data

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 switches







Configurable, with relay PDT output

Ex:

Housing width 6.2 mm

- Universally configurable highly-compact threshold value switch for switching analog limit values
- Plug-in connection system
- Safe 3-way isolation
- Standard switching behavior can be configured via DIP switches
- Freely-configurable with 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 111

Information on MINI Analog Pro accessories can be found from page 107

Technical data

Input data		
Input signal (configurable using the DIP switch)	U input	I input
	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 (+ 0.7 V for test diode)
Specification of the switching point	Can be set via software or in steps 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 range	9.6 V DC ... 30 V DC	
Nominal supply voltage	24 V DC	
Current consumption	40 mA (12 V DC) 20 mA (24 V DC)	
Power consumption	≤0.5 W	
Maximum transmission error	0.1% (of final value)	
Temperature coefficient	0.01%/K	
Step response (0 - 99%)	Typically 140 ms (can be set via software)	
Electrical isolation	Reinforced insulation in accordance with IEC 61010-1	
Degree of protection	IP20	
Conformance/approvals		
Conformance	CE-compliant	
ATEX	II 3 G Ex nA nC IIC T4 Gc X	
UL, USA/Canada	UL 508 Listed Class I, Div. 2, Groups A, B, C, D T4A Class I, Zone 2, Group IIC T4A	
DNV GL	B, B, A, A	

Ordering data

Description	Type	Order No.	Pcs./Pkt.
Limit value switch with relay PDT output, standard configuration			
Push-in connection	**MINI MCR-2-UI-REL-PT**	2902035	1
Screw connection	**MINI MCR-2-UI-REL**	2902033	1
Push-in connection	**MINI MCR-2-UI-REL-PT-C**	2909887	1
Screw connection	**MINI MCR-2-UI-REL-C**	2909886	1

Accessories

Programming adapter for configuring modules with S-PORT interface	**IFS-USB-PROG-ADAPTER**	2811271	1
USB programming adapter for configuring modules with Windows software	**TWN4 MIFARE NFC USB ADAPTER**	2909681	1
Bluetooth programming adapter, with USB and S-PORT interface	**IFS-BT-PROG-ADAPTER**	2905872	1

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

Order No.	Input				
	Input signal	Start	End	Cut-off frequency	
2909886	**I**	**0.0**	**24.0**	**15**	**...**
2909886 ≙ MINI MCR-2-UI-REL-C 2909887 ≙ MINI MCR-2-UI-REL-PT-C	I ≙ I U ≙ U	0 ≙ 0 mA I: freely selectable between 0.0 ... 23.5 mA U: freely selectable between 0.0 ... 11.5 V	0 ≙ 0 mA I: freely selectable between 1 ... 24 mA U: freely selectable between 0.5 ... 12 V	15 ≙ 15 Hz 60 ≙ 60 Hz 240 ≙ 240 Hz	

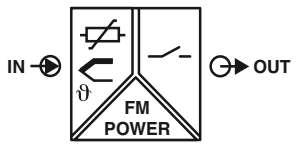
Measuring range span at least 0.5 V/1 mA
Increment 0.1 V/0.1 mA

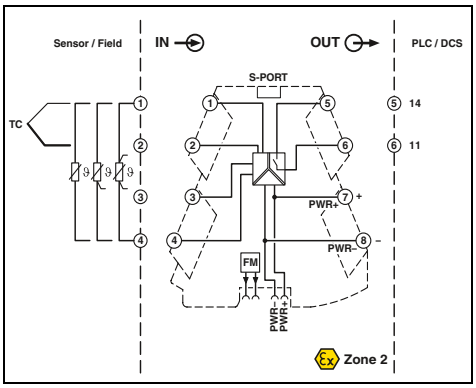
	Output						
	Switching function	Low switching point (SPL)	High switching point (SPH)	Switch-on delay	Switch-off delay	Error	
...	**2**	**–**	**10**	**0.0**	**0.0**	**0**	
	0 ≙ L 1 ≙ H 2 ≙ L -->SPH -->H 3 ≙ H -->SPH -->L 4 ≙ L -->SPH -->H -->SPH -->L 5 ≙ H -->SPH -->L -->SPH -->H 6 ≙ L -->SPL -->H -->SPH -->L 7 ≙ H -->SPL -->L -->SPH -->H	-- ≙ Off I: ≙ freely selectable between 0.04 ... 23.96 mA U: freely selectable between 0.02 ... 11.98 V Only values for switching functions 4, 5, 6, 7 can be set	10 ≙ 10 mA I: ≙ freely selectable between 0.08 ... 24 mA U: freely selectable between 0.04 ... 12 V Only values for switching functions 2, 3, 4, 5, 6, 7 can be set	0 ≙ 0 sec. t: freely selectable between 0.0 ... 10 sec.	0 ≙ 0 sec. t: freely selectable between 0.0 ... 10 sec.	0 ≙ No response 1 ≙ 0 relay on 2 ≙ 0 relay off	

Note:
L = Low (relay off)
H = High (relay on)
SPL = Setpoint Low
SPH = Setpoint High

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

Limit values
Temperature





Ex n

Configurable, temperature transducer with N/O relay output

Ex:

Housing width 6.2 mm

- Universally configurable, highly-compact temperature limit value switch for switching analog limit values from resistance thermometers and remote resistance-type sensor signals
- For 2-, 3- or 4-conductor RTD sensors in accordance with IEC 751, JIS, GOST
- For thermocouples in accordance with IEC 584 and GOST
- 2-conductor resistance measurement, up to 4,000 Ω
- Internal cold junction compensation
- Plug-in connection system
- Safe 3-way isolation
- Standard behavior can be configured via DIP switches
- Freely configurable via software or smartphone app
- N/O relay output (N/C function can be set via software)
- 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 111

Technical data

Input data	
Input signal (can be configured using DIP switches)	Pt, Ni, Cu sensors : 2-, 3-, 4-conductor
Temperature range	-250°C ... 2500°C
Measuring range span	min. 20 K
Linear resistance measuring range	0 Ω ... 4,000 Ω
Switching output	
Relay output	1 N/O contact
Contact material	$AgSnO_2$, hard gold-plated
Max. switching voltage	250 V AC
Maximum switching current	6 A (for 250 V AC)
Minimum switching current	100 mA (12 V DC)
Limiting continuous current	6 A
Hysteresis	Can be set freely via software
Setting range of the response delay	0 s ... 10 s (can be set freely via software)
General data	
Supply voltage range	9.6 V DC ... 30 V DC
Current consumption	44 mA (12 V DC) 22 mA (24 V DC)
Switching point accuracy	<0.1%
Power consumption	570 mW
Temperature coefficient	0.01%/K
Step response (0 - 99%)	Typically 300 ms Typically 570 ms Typically 380 ms Typically 300 ms Typically 570 ms
Electrical isolation	Reinforced insulation in accordance with IEC 61010-1
EMC note	Class A product, see page 583
Conformance/approvals	
Conformance	CE-compliant
ATEX	II 3 G Ex nA nC IIC T4 Gc X
UL, USA/Canada	UL 508 Listed Class I, Div. 2, Groups A, B, C, D T4A Class I, Zone 2, Group IIC T4A
DNV GL	B, B, A, A

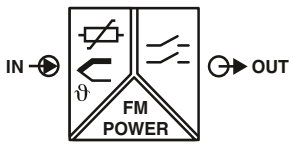
Ordering data

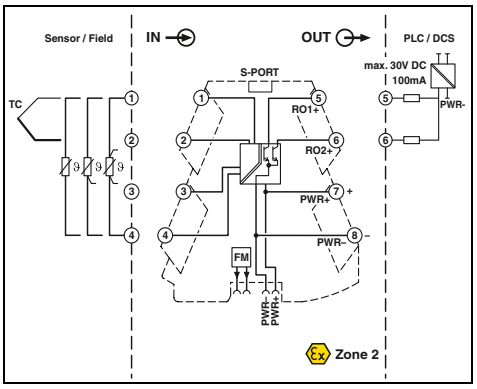
Description	Type	Order No.	Pcs./Pkt.
Temperature limit value switches			
Push-in connection	**MINI MCR-2-T-REL-PT**	2905633	1
Screw connection	**MINI MCR-2-T-REL**	2905632	1

Accessories

Programming adapter for configuring modules with S-PORT interface	**IFS-USB-PROG-ADAPTER**	2811271	1
USB programming adapter for configuring modules with Windows software	**TWN4 MIFARE NFC USB ADAPTER**	2909681	1
Bluetooth programming adapter, with USB and S-PORT interface	**IFS-BT-PROG-ADAPTER**	2905872	1

Limit values
Temperature





Ex n

NFC

Configurable, temperature transducer with transistor output

Ex:

Housing width 6.2 mm

- Universally configurable, highly-compact temperature limit value switch for switching analog limit values from resistance thermometers and remote resistance-type sensor signals
- For 2, 3 or 4-conductor RTD sensors in accordance with IEC 751, JIS, GOST
- For thermocouples in accordance with IEC 584 and GOST
- 2-conductor resistance measurement, up to 4,000 Ω
- Internal cold junction compensation
- Plug-in connection system
- Safe 3-way isolation
- Standard behavior can be configured via DIP switches
- Freely configurable via software or smartphone app
- 2 transistor switching contacts on the output
- Maximum switching current 30 V / 100 mA
- 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 111

Technical data

Input data	
Input signal (can be configured using DIP switches)	Pt, Ni, Cu sensors : 2-, 3-, 4-conductor
Temperature range	-250°C ... 2500°C
Measuring range span	min. 20 K
Linear resistance measuring range	0 Ω ... 4,000 Ω
Switching output	
Transistor output	2 N/O contacts
Max. switching voltage	30 V DC
Maximum switching current	100 mA (30 V (≤50°C))
General data	
Supply voltage range	9.6 V DC ... 30 V DC
Current consumption	20 mA (12 V DC) 10 mA (24 V DC)
Switching point accuracy	<0.1%
Power consumption	350 mW
Temperature coefficient	0.01%/K
Step response (0 - 99%)	Typically 300 ms Typically 570 ms Typically 380 ms Typically 300 ms Typically 570 ms
Electrical isolation	Reinforced insulation in accordance with IEC 61010-1
EMC note	Class A product, see page 583
Conformance/approvals	
Conformance	CE-compliant
ATEX	II 3 G Ex nA IIC T4 Gc X
UL, USA/Canada	UL 508 Listed Class I, Div. 2, Groups A, B, C, D T6 Class I, Zone 2, Group IIC T6
DNV GL	B, B, A, A

Ordering data

Description	Type	Order No.	Pcs./Pkt.
Temperature limit value switches			
Push-in connection	**MINI MCR-2-T-2RO-PT**	2906877	1
Screw connection	**MINI MCR-2-T-2RO**	2906876	1

Accessories

Programming adapter for configuring modules with S-PORT interface	**IFS-USB-PROG-ADAPTER**	2811271	1
USB programming adapter for configuring modules with Windows software	**TWN4 MIFARE NFC USB ADAPTER**	2909681	1
Bluetooth programming adapter, with USB and S-PORT interface	**IFS-BT-PROG-ADAPTER**	2905872	1

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

Safely isolated from field to network. MINI Analog Pro signal conditioners with bus and network connections combine the benefits of safe electrical isolation with those of digital communication. With an overall width of less than 50 mm, you can transmit, free of interference, up to eight field signals to industrial networks, without the need for signal-specific input cards.

Further advantages:

– Gateways for different protocols: Modbus/RTU, Modbus/TCP, EtherNet/IP™, and PROFIBUS DP
– Interference-free signal transmission from the field level to the CPU, thanks to safe electrical isolation
– Fast, fault-free wiring, by bundling the signals in one network cable

No need for input cards

– Cost and space savings, as signal-specific input cards are no longer needed

Modular and space-saving

– Space-saving network integration of freely combinable signal conditioners by means of plug-in gateways

Flexible configuration

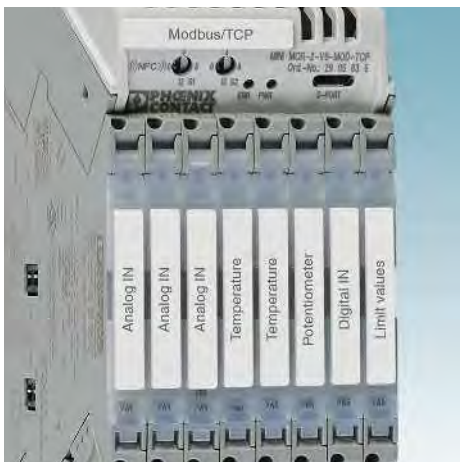
– Quick configuration via rotary coding switch, software, web server or app

Smart configuration and monitoring

– Carry out on-site configuration and read current values directly off a smartphone with the MINI Analog Pro app

Easy startup and service

– Measure current signals during operation, without disconnecting current loops



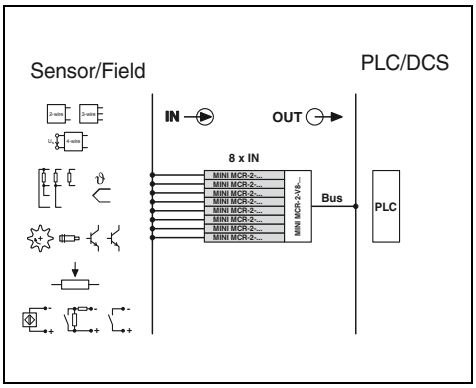
Easy maintenance

– Large-surface marking areas for standard marking material as well as permanently visible status and error LEDs on each module

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

MINI Analog Pro gateways

- Easy integration of up to eight field signals into the bus systems
- Any combination of signal conditioners is possible (standard signal, temperature, etc.)
- Easy attachment to the output side of MINI Analog Pro modules
- Huge savings in terms of input cards and bus couplers
- Safe channel-to-channel electrical isolation right through to the CPU
- Versions available with Modbus/RTU or PROFIBUS DP
- Can be configured via software or smartphone app



Gateway for bus and network connection

Ex:

Housing width 51.1 mm

Notes:

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

Information on the programming adapters can be found on page 111

Technical data

Input data	
Number of inputs	8
Configurable/programmable	Yes
Current input signal	4 mA ... 20 mA
Maximum input current	24 mA
Input resistance of current input	50 Ω
Maximum input voltage	5 V
Output data	
Number of outputs	1
Data update rate	15 ms
General data	
Nominal supply voltage range	12 V ... 24 V
Supply voltage range	9.6 V ... 30 V
Power consumption	<1,000 mW
Maximum transmission error	0.1%
Temperature coefficient	0.01%
Test voltage, input/output/supply	0.5 kV
Ambient temperature (operation)	-40°C ... 65°C
Housing material	PBT 7% GF V0
Dimensions W/H/D	51.1 / 104.1 / 56.8 mm
EMC note	Class A product, see page 583
Conformance/approvals	
Conformance	CE-compliant
UL, USA/Canada	UL 61010 Listed Class I, Div. 2, Groups A, B, C, D T5 Class I, Zone 2, Group IIC T5

Ordering data

Description	Type	Order No.	Pcs./Pkt.
For bus and network connection			
Modbus/RTU	**MINI MCR-2-V8-MOD-RTU**	2905634	1
PROFIBUS DP	**MINI MCR-2-V8-PB-DP**	2905636	1

Accessories

Programming adapter for configuring modules with S-PORT interface	**IFS-USB-PROG-ADAPTER**	2811271	1
USB programming adapter for configuring modules with Windows software	**TWN4 MIFARE NFC USB ADAPTER**	2909681	1
Bluetooth programming adapter, with USB and S-PORT interface	**IFS-BT-PROG-ADAPTER**	2905872	1

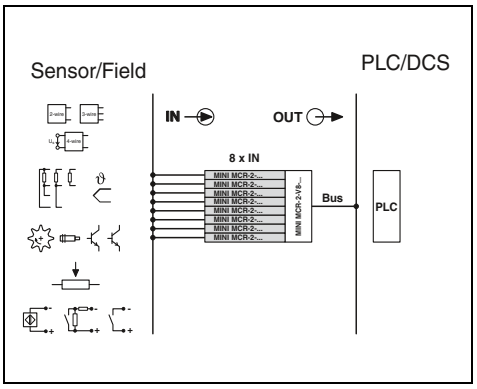
MINI Analog Pro gateways

- Easy integration of up to eight field signals in the bus systems
- Any combination of signal conditioners is possible (standard signal, temperature, etc.)
- Easy attachment to the output side of MINI Analog Pro modules
- Huge savings in terms of input cards and bus couplers
- Safe channel-to-channel electrical isolation right through to the CPU
- Versions available with Modbus/TCP or EtherNet/IP™
- Can be configured via software or smartphone app

Notes:

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

Information on the programming adapters can be found on page 111



Ex n

Gateway for bus and network connection

Ex:

Housing width 51.1 mm

Technical data

Input data	
Number of inputs	8
Configurable/programmable	Yes
Current input signal	4 mA ... 20 mA
Maximum input current	24 mA
Input resistance of current input	50 Ω
Maximum input voltage	5 V
Output data	
Number of outputs	1
Data update rate	15 ms
General data	
Nominal supply voltage range	12 V ... 24 V
Supply voltage range	9.6 V ... 30 V
Power consumption	<1200 mW
Maximum transmission error	0.1%
Temperature coefficient	0.01%
Test voltage, input/output/supply	0.5 kV
Ambient temperature (operation)	-40°C ... 55°C
Housing material	PBT 7% GF V0
Dimensions W/H/D	51.1 / 104.1 / 61 mm
EMC note	Class A product, see page 583
Conformance/approvals	
Conformance	CE-compliant
UL, USA/Canada	UL 508 Listed Class I, Div. 2, Groups A, B, C, D T5 Class I, Zone 2, Group IIC T5

Ordering data

Description	Type	Order No.	Pcs./Pkt.
Gateways for bus and network connection			
Modbus/TCP	**MINI MCR-2-V8-MOD-TCP**	2905635	1

Accessories

Programming adapter for configuring modules with S-PORT interface	**IFS-USB-PROG-ADAPTER**	2811271	1
USB programming adapter for configuring modules with Windows software	**TWN4 MIFARE NFC USB ADAPTER**	2909681	1
Bluetooth programming adapter, with USB and S-PORT interface	**IFS-BT-PROG-ADAPTER**	2905872	1

System cabling solutions for your MINI Analog Pro signal conditioners

System cabling adapter for plugging on to up to eight MINI Analog Pro signal conditioners

Thanks to its innovative plug-in concept, the MINI MCR-2-V8-FLK 16 system adapter offers a time-saving wiring solution. Eight MINI Analog Pro signal converters connect easily to a controller using pluggable system cabling. This leads to a considerable reduction in cabling effort and the risk of wiring errors compared to individual wiring on the controller side: Using the system cabling allows you to connect the MINI Analog Pro modules by simply plugging them on to the PLC.

The FLK 16 system adapter also offers all the advantages of gateways to bus and network connection, such as configuration and readout of measurement values over NFC, continuous measurement of currents, a generous marking area, and always visible diagnostic and status LEDs.

Further advantages:

– Plug and Play solution for your MINI Analog Pro signal conditioners
– Safe galvanic isolation per channel combined with major time and cost savings
– Saves space, thanks to modular plugging of the system cabling adapter

Termination Carriers for your MINI Analog Pro signal conditioners

Select standard DIN rail device

Select module carrier

Select controller-specific front adapter and system cable

TC... Termination Carriers are compact solutions for conveniently and smoothly connecting standard DIN rail signal conditioners from the MINI Analog Pro series to input and output cards of automation systems using system cabling. Termination Carriers are also available for MACX Analog and PSR safety devices.

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 combined with MINI Analog saves up to 65% of space in the control cabinet

Rugged 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

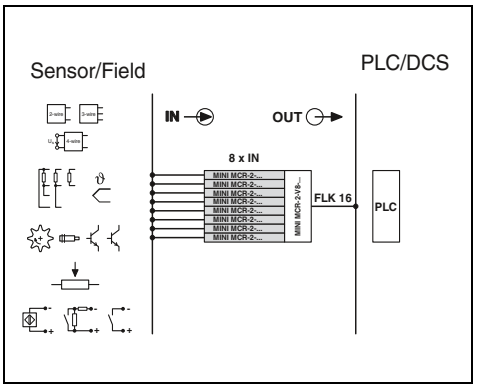
Flexible

– 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

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

MINI Analog Pro system adapters

- 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
- Easy attachment to the output side of MINI Analog Pro modules
- Especially easy to maintain, thanks to interruption-free current measurement function



Ex n

NFC

System cabling adapter

Ex:

Housing width 51.1 mm

Technical data

Input data	
Number of inputs	8
Configurable/programmable	no
Maximum input current	4 A (500 mA per ch.)
Maximum input voltage	30 V
Output data	
Number of outputs	8
Connection method	IDC/FLK pin strip
Configurable/programmable	no
General data	
Test voltage input/output	0.5 kV
Rated insulation voltage	50 V_{rms}
Degree of protection	IP20
Overvoltage category / Degree of pollution	II / 2
Ambient temperature (operation)	-40°C ... 70°C
Humidity	5% ... 95%
Maximum altitude for use above sea level	4,000 m
Housing material	PBT 7% GF V0
Dimensions W/H/D	51.1 / 104.1 / 56.8 mm
Conformance/approvals	
Conformance	CE-compliant
ATEX	II 3 G Ex nA IIC Gc U
UL, USA/Canada	UL 61010 Listed Class I, Div. 2, Groups A, B, C, D T5 Class I, Zone 2, Group IIC T5
GL	GL applied for

Ordering data

Description	Type	Order No.	Pcs./Pkt.
System cabling adapter for MINI Analog Pro modules	**MINI MCR-2-V8-FLK 16**	2901993	1

Termination Carriers for your MINI Analog Pro signal conditioners

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

The **TC-D37SUB-AIO16-MP-PS-UNI** Termination Carrier design, when combined with the MACX MCR-S-MUX HART multiplexer, also enables communication between HART-compatible 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-2-PTB-PT feed-in terminal and MINI MCR-2-FM-RC-PT fault signaling module

Notes:

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

TC-D37SUB-ADIO16-MP-P-UNI (Order No. 2906639) is not a class A product.

Ex:

Housing width 136 mm

Technical data

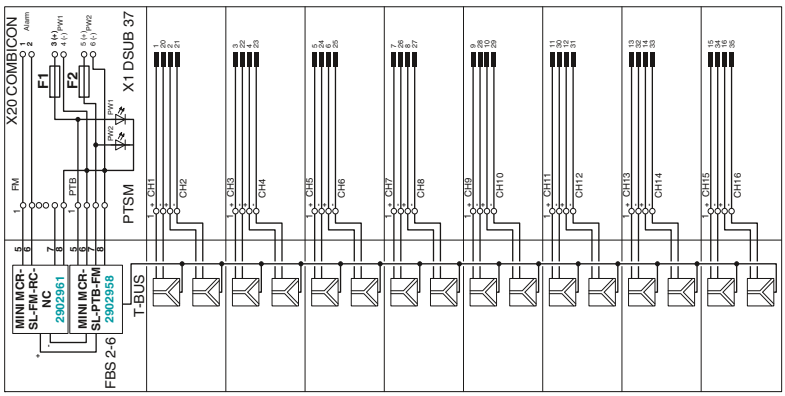
General data	
Connection to the control system level	D-SUB pin strip
No. of pos.	37
Maximum operating voltage	<30 V DC (per signal/channel)
Maximum permissible current	23 mA (signal/channel)
Rated insulation voltage	50 V (basic insulation)
Rated surge voltage	0.5 kV
Degree of pollution	2
Overvoltage category	II
Air clearances and creepage distances	DIN EN 50178 (basic insulation)
Ambient temperature range	-20°C ... 60°C (please observe module specifications)
Shock	15g, in accordance with IEC 60068-2-27
Vibration (operation)	2g, in accordance with IEC 60068-2-6
Dimensions W/H/D	136 / 170 / 160 mm
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) 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 - With connection for MACX MCR-S-MUX HART multiplexer	**TC-D37SUB-AIO16-MP-PS-UNI**	2906640	1
	TC-D37SUB-ADIO16-MP-P-UNI	2906639	1

Accessories

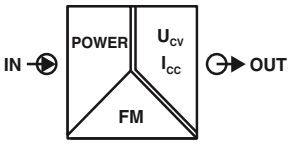
MINI Analog Pro power terminal block	**MINI MCR-2-PTB-PT**	2902067	1
MINI Analog Pro error signaling module	**MINI MCR-2-FM-RC-PT**	2904508	1
HART multiplexer, 32-chanel, including two 14-conductor flat-ribbon cable	**MACX MCR-S-MUX**	2865599	1

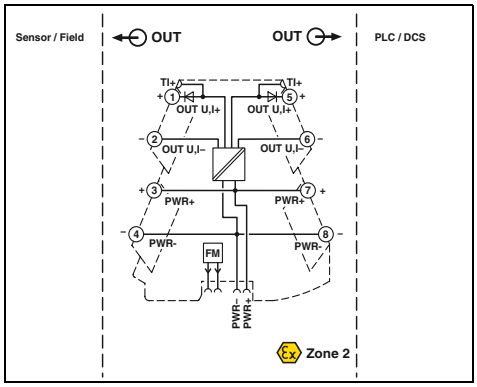


TC-D37SUB-ADIO16-M-P-UNI and TC-D37SUB-AIO16-M-PS-UNI connection scheme

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

Accessories
Constant voltage/constant current sources





Ex n

Configurable output signals

Ex:

Housing width 6.2 mm

- Constant voltage/constant current source for potentiometers, measuring bridges, encoders, etc.
- Plug-in connection system
- 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

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 range	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	
Degree of protection	IP20	
EMC note	Class A product, see page 583	
Conformance/approvals		
Conformance	CE-compliant	
ATEX	II 3 G Ex nA IIC T4 Gc X	
UL, USA/Canada	UL 508 Listed Class I, Div. 2, Groups A, B, C, D T6 Class I, Zone 2, Group IIC T6	
DNV GL	B, B, A, A	

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, to set setpoints individually			
Resistance value 4.7 kΩ	**EMG 30-SP- 4K7LIN**	2940252	10
Resistance value 10 kΩ	**EMG 30-SP-10K LIN**	2942124	10

Accessories
Connector set

- 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 or Push-in connection technology

With Push-in connection

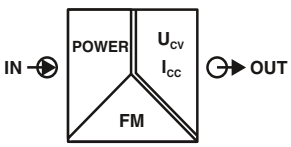
With screw connection

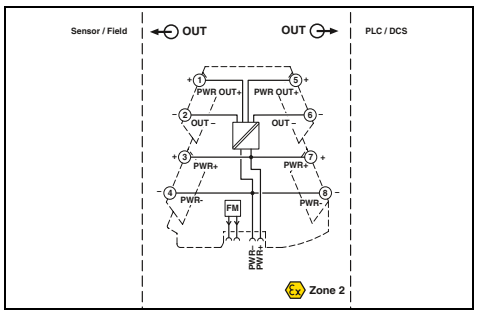
	Technical data	Technical data
Technical data		
Connection data solid/stranded/AWG	0.14 ... 2.5 mm² / 0.14 ... 2.5 mm² / 24 - 12	0.2 ... 1.5 mm² / 0.2 ... 1.5 mm² / 24 - 12

	Ordering data			Ordering data		
Description	Type	Order No.	Pcs./Pkt.	Type	Order No.	Pcs./Pkt.
FASTCON Pro connector set						
- with Push-in connection	**FASTCON PRO-SET-PT**	2906228	1			
- with screw connection				**FASTCON PRO-SET**	2906227	1

Accessories,
constant voltage sources

new





- Sensor feed from 2-conductor or 3-conductor 15 V / 30 mA sensors
- 15 V constant voltage source for sensors, encoders, etc.
- Plug-in connection system
- Input signal corresponds to power supply
- Input signal and therefore energy supply and fault monitoring via the DIN rail connector
- Status LED

	Technical data	
Input data		
Input signal	9.6 ... 30 V	
Output data	U output	I output
Output signal (can be configured using DIP switches)	15 V DC	
Short-circuit current	>35 mA	
Ripple	<20 mV_{PP} (at 600 Ω)	
General data		
EMC note	Class A product, see page 583	
Conformance/approvals		
Conformance	CE-compliant	
ATEX	Ⓔx II 3 G Ex nA IIC T4 Gc X	
UL, USA/Canada	UL 508 Listed Class I, Div. 2, Groups A, B, C, D T6 Class I, Zone 2, Group IIC T6	

		Ordering data		
Description		Type	Order No.	Pcs./Pkt.
Constant voltage source				
with Push-in connection	Push-in connection	**MINI MCR-2-SPS-24-15-PT**	1033201	1
with screw connection	Screw connection	**MINI MCR-2-SPS-24-15**	1033202	1

Accessories
DIN rail connectors for bridging the supply voltage

ME 6,2 TBUS

– Module replacement without interrupting the supply to the remaining modules (hot swappable)
– One DIN rail connector for two MINI Analog Pro modules

ME 17,5 TBUS

– For use with a MINI POWER system power supply unit

For bridging the supply voltage

For system power supply

Description	Ordering data			Ordering data		
	Type	Order No.	Pcs./Pkt.	Type	Order No.	Pcs./Pkt.
DIN rail connector, for bridging the supply voltage, can be snapped onto 35 mm DIN rails in accordance with EN 60715, UL-approved						
Color: gray	**ME 6,2 TBUS-2 1,5/5-ST-3,81 GY**	2695439	10			
Color: green	**ME 6,2 TBUS-2 1,5/5-ST-3,81 GN**	2869728	10			
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						
Color: green				**ME 17,5 TBUS 1,5/ 5-ST-3,81 GN**	2709561	10

Accessories
System power supplies

– 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 diagnostic LEDs

For applications with local voltages of over 100 V

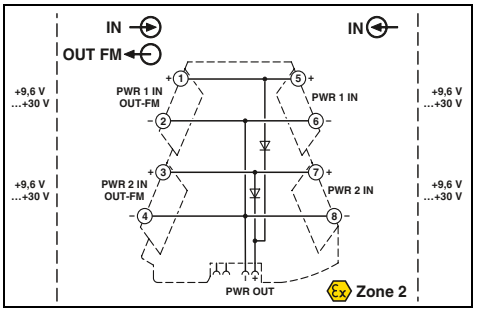
Description	Ordering data		
	Type	Order No.	Pcs./Pkt.
System power supply, primary-switched, with zone 2 approval. Further information can be found in Catalog 4, surge protection and power supplies.	**MINI-PS-100-240AC/24DC/1.5/EX**	2866653	1
System power supply, primary-switched (not for zone 2). You can find further information in Catalog 4, surge protection and power supplies.	**MINI-SYS-PS-100-240AC/24DC/1.5**	2866983	1

Accessories
Power terminal blocks

- Power terminal block 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:

Pay attention to the supply instructions for the MINI and MACX modules.



Ex n

D W H

Redundant supply for existing 24 V

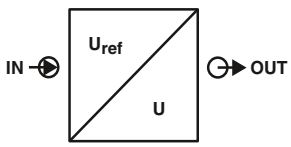
Technical data

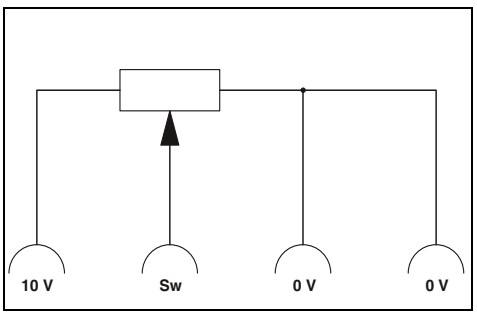
Input data/output data	
Input voltage range	9.9 V DC ... 30 V DC
Output voltage	9.6 V DC ... 29.7 V DC
Output current	≤3.2 A
General data	
EMC note	Class A product, see page 583
Conformance/approvals	
Conformance	CE-compliant
ATEX	Ⓔx II 3 G Ex nA IIC T4 Gc X
UL, USA/Canada	UL 508 Listed Class I, Div. 2, Groups A, B, C, D T6 Class I, Zone 2, Group IIC T6
DNV GL	C, EMC2

Ordering data

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

Accessories
Setpoint potentiometers





D W H

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

Technical data

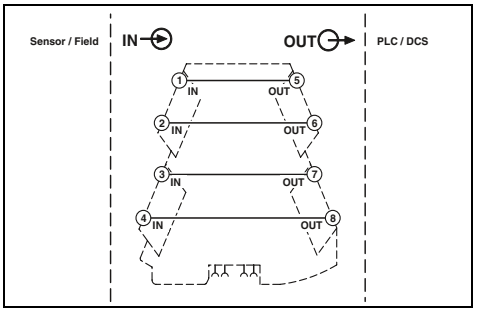
Input data	EMG 30-SP- 4K7LIN	EMG 30-SP-10K LIN
Resistance value	4.7 kΩ ±20%	10 kΩ ±20%
Linearity	5% (of final value)	5% (of final value)
Load capacity	0.5 W	0.5 W
General data		
Ambient temperature (operation)	0°C ... 40°C	
Mounting	Any	
Housing material	Polycarbonate fiber reinforced PC-F	
Dimensions W/H/D	30 / 75 / 68 mm	
Screw connection rigid / flexible / AWG	0.2 ... 4 mm² / 0.2 ... 2.5 mm² / 24 - 14	

Ordering data

Description	Type	Order No.	Pcs./Pkt.
Setpoint potentiometer, to set setpoints individually			
Resistance value 4.7 kΩ	**EMG 30-SP- 4K7LIN**	2940252	10
Resistance value 10 kΩ	**EMG 30-SP-10K LIN**	2942124	10

Accessories
Feed-through terminal blocks

– 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

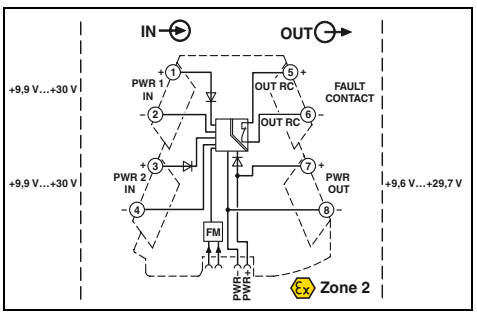
General data	
Degree of protection	IP20
Ambient temperature (operation)	-40°C ... 70°C
Mounting	any
Housing material	PBT
Dimensions W/H/D	6.2 / 110.5 / 120.5 mm
Screw connection rigid / flexible / AWG	0.2 ... 1.5 mm² / 0.2 ... 1.5 mm² / 24 - 12
Conformance/approvals	
Conformance	CE-compliant
ATEX	II 3 G Ex nA IIC T4 Gc X
UL, USA/Canada	UL 508 Listed Class I, Div. 2, Groups A, B, C, D T6 Class I, Zone 2, Group IIC T6
DNV GL	C, EMC2

Ordering data

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

Accessories
Error message modules

– 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 terminal blocks
– Drawing off the supply is possible
– Fault signaling via an N/C contact
– Status and error indicator LEDs
– CE-compliant



Ex n

D W H

For group error message 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
Maximum 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 583
Conformance/approvals	
ATEX	II 3 G Ex nA IIC T4 Gc X
UL, USA/Canada	UL 508 Listed Class I, Div. 2, Groups A, B, C, D T6 Class I, Zone 2, Group IIC T6
DNV GL	C, EMC2

Ordering data

Description	Type	Order No.	Pcs./Pkt.
MINI Analog Pro error 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 programming adapter for configuring Phoenix Contact INTERFACE modules with S-PORT interface.

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

Technical data

General data	
EMC note	Class A product, see page 583

Ordering data

Description	Type	Order No.	Pcs./Pkt.
Programming adapter for configuring modules with S-PORT interface	IFS-USB-PROG-ADAPTER	2811271	1
Bluetooth programming adapter, with USB and S-PORT interface	IFS-BT-PROG-ADAPTER	2905872	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 in accordance with customer requirements

Unlabeled or labeled in accordance with customer specifications

Ordering data

Description	Color	Type	Order No.	Pcs./Pkt.
UniCard, for marking the CLIPFIX 35-5, 24-part end brackets, 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
Continuous labels, can be marked with thermal transfer printer, can be separated with a cutter, pitch as desired, strip length up to 1,000 mm				
1 roll = 90 m continuous, height: 5.0 mm, 10 strips	white			

Ordering data

Type	Order No.	Pcs./Pkt.
SK 5,0 WH:REEL	0805221	1

MACX Analog – Signal conditioners with functional safety and explosion protection

Reliable and safe

In all phases of the product lifecycle, MACX signal conditioners have been developed and produced in accordance with IEC 61508 standards for functional safety. This ensures the highest level of safety for your machines and systems. Save planning and operating costs by combining high signal flexibility with comprehensive SIL certification.

SIL IEC 61508 Ex n

From the cost-effective standard signal conditioner to multifunctional universal devices, MACX signal conditioners provide you with comprehensive solutions for signal processing.

SIL IEC 61508 PL EN ISO 13849 Ex n Ex i IECEx

In addition to being SIL-certified, certain MACX signal conditioners also feature performance level PL d. This means that you can integrate analog signals easily into your safety application in accordance with the Machinery Directive.

Versions with PL d and Ex i approval are also available.

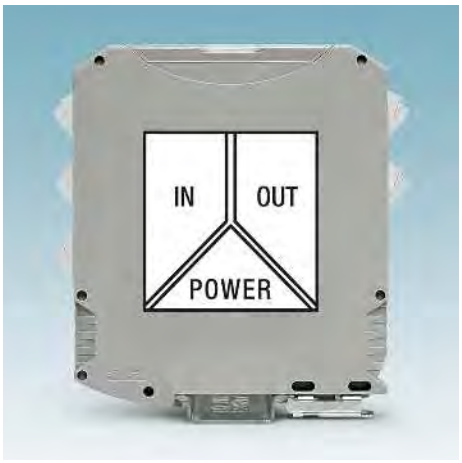
SIL IEC 61508 Ex n Ex i IECEx

All Ex i versions are SIL-certified and also have ATEX and IECEx approval. Single and two-channel signal isolators are available for intrinsically safe circuits up to zone 0 and zone 20 and for all gas and dust groups – with an overall width of just 12.5 mm. The products are type-tested by an independent NAMUR test laboratory in accordance with NE 95, ensuring that they satisfy the high requirements of the chemical industry.

Reliable and safe

Highest safety for your machines and systems.

Phoenix Contact meets the requirements of functional safety in accordance with 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.



Precise, interference-free signal transmission and long service life

– Patented transmission concept with safe electrical isolation
– Low power consumption and self-heating

Easy configuration and monitoring

– Either via FDT/DTM or alternatively with user-friendly stand-alone software – with integrated monitoring function
– Or without software via DIP switches on the housing front

Intelligent concept for supply and diagnostics

– 24 Volt power bridging via DIN rail connector for easy wiring, system expansion, or hot-swap module replacement. Direct feed via a MACX module or via supply and fault reporting module with the option of redundant, diode-decoupled supply and fault reporting
– Wide-range power supply: Versions with wide range input for direct installation in all power supply networks – anywhere in the world with no additional power supply unit required

Fast, error-free signal connection

– Compact Termination Carriers for quickly and smoothly connecting MACX DIN rail devices to automation system input and output cards using preassembled VARIOFACE system cabling – Plug and Play
– Saves up to 30% of space when compared to other solutions on the market
– High system availability, thanks to robust aluminum profile with mechanically decoupled PCB
– Easy to service, with a single engineering design for both DIN rail and system applications

Easy-maintenance connection technology

– Plug-in connection technology, with either screw connection or a spring-cage version with fast Push-in technology
– Coding and clear marking ensure reliable protection against polarity reversal and prevent unintentional mismatching of pre-conductord connection terminal blocks
– Integrated sockets for testing, or for connecting to HART communicators, for example

Intrinsically safe signal transmission in potentially explosive areas

Many process technology systems have areas where potentially explosive atmospheres may occur. As such, measuring and control circuits around the world are usually designed with intrinsic safety protection (Ex i).

The **intrinsic safety type of protection**, as opposed to other types of protection (such as increased safety, or Ex e), refers not only to an individual item of equipment but to the entire circuit. A circuit is described as intrinsically safe if the current and voltage are limited to such an extent that no spark or thermal effect can cause a potentially explosive atmosphere to ignite.

An intrinsically safe circuit typically consists of at least one item of intrinsically safe equipment (field device) and one item of associated equipment (Ex i signal conditioner) and the connecting cables. Intrinsically safe equipment and intrinsically safe parts of associated items of equipment are classed in accordance with IEC/EN 60079-11 in safety levels ia, ib, and ic. The demonstration of intrinsic safety that the user is required to carry out as described in IEC/EN 60079-14, among others, serves to ensure that the interconnection described above is intrinsically safe.

This type of protection offers the user the following advantages, among others:

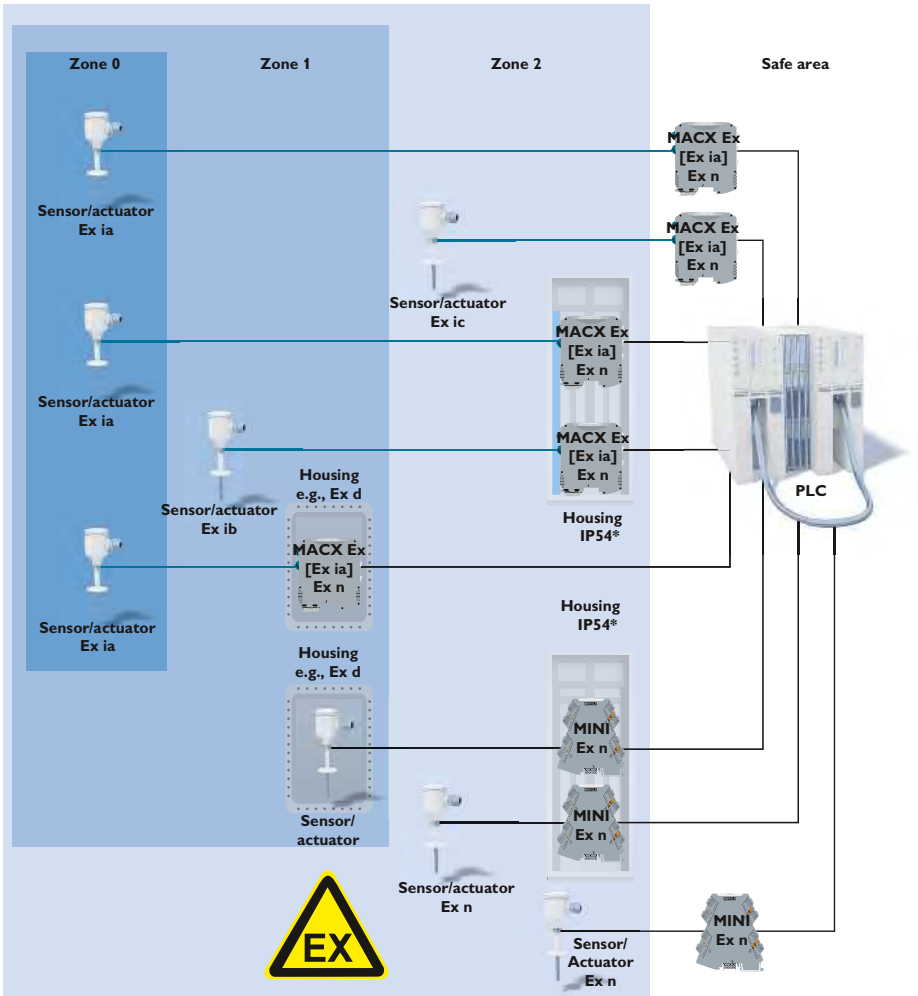
– Service and conversions while the system is operating requiring no special permits
– Cost-effective, thanks to the lack of expensive housing designs
– Ex i field devices and Ex i signal conditioners can be combined regardless of manufacturer

See our free brochure for detailed information on the topic of explosion protection:

https://www.phoenixcontact.com/assets/downloads_ed/global/web_dwl_promotion/5149416_EN_HQ_Explosion_protection_LoRes.pdf

Order No. 5149416

Installation examples for intrinsically safe circuits:



Functional safety (SIL)

The term SIL (safety integrity level) is an important one in the field of process technology. It defines the requirements that a device or a system is expected to fulfill so that the failure probability can be specified. If a device or system fails, a defined safe state is attained.

The basic standard **IEC 61508** "Functional safety of electrical/electronic/programmable electronic safety-related systems" describes the requirements that manufacturers must take into consideration for their devices or systems.

The standard **IEC 61511** "Functional safety – Safety instrumented systems for the process industry sector" describes the requirements for constructing systems with functional safety. The operator, proprietor, and planner are responsible for complying with this standard in observance of national regulations.

The attached table is an excerpt from IEC 61508 and IEC 61511 and describes the correlation between the average probability of failure and the SIL level of the safety instrumented function (SIF) attained and the reduction in risk.

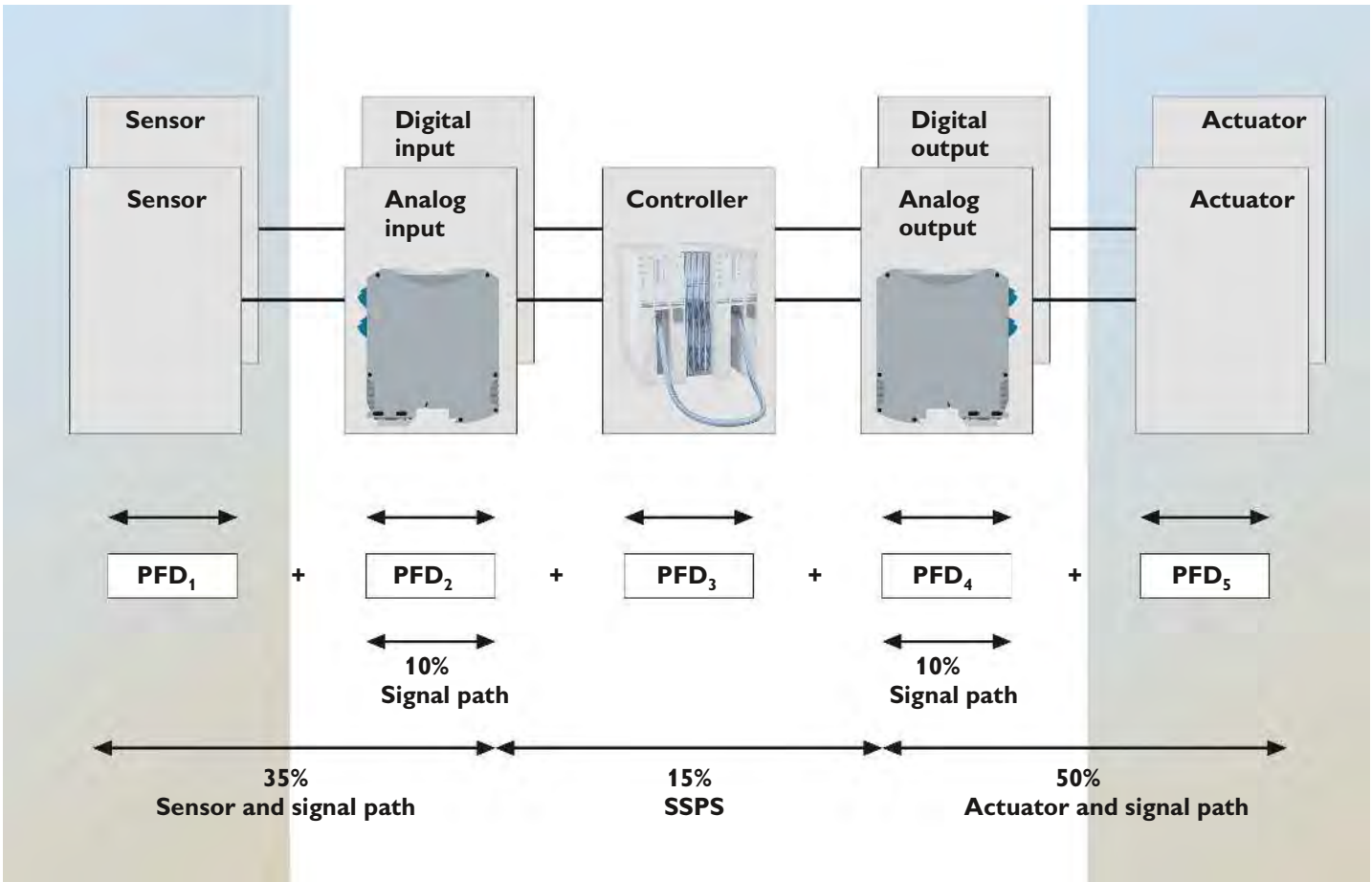
SIL Safety Integrity Level	PFD_{avg} Low demand mode (average probability of failure of the function on demand)	PFH High demand mode (Probability of a dangerous failure per hour)	RRF Risk reduction factor (Risk Reduction Factor)
SIL 1	$\geq 10^{-2} \ldots < 10^{-1}$	$\geq 10^{-6} \ldots < 10^{-5}$	≤ 100 ... >10
SIL 2	$\geq 10^{-3} \ldots < 10^{-2}$	$\geq 10^{-7} \ldots < 10^{-6}$	≤ 1,000 ... >100
SIL 3	$\geq 10^{-4} \ldots < 10^{-3}$	$\geq 10^{-8} \ldots < 10^{-7}$	≤ 10,000 ... >1,000
SIL 4	$\geq 10^{-5} \ldots < 10^{-4}$	$\geq 10^{-9} \ldots < 10^{-8}$	≤ 100,000 ... >10,000

Functional safety (PL)

The term Performance Level (PL) in accordance with EN ISO 13849 refers to safety of machinery. The attached table depicts the correlation between the required Performance Level (PL) and the average probability of a dangerous failure per hour (PFH_d).

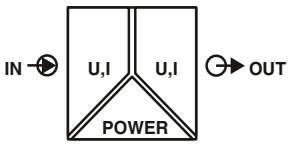
PL Performance level	PFH_d Probability of dangerous failure on average per hour
PL a	$10^{-5} \leq PFH_d < 10^{-4}$
PL b	$3 \times 10^{-6} \leq PFH_d < 10^{-5}$
PL c	$10^{-6} \leq PFH_d < 3 \times 10^{-6}$
PL d	$10^{-7} \leq PFH_d < 10^{-6}$
PL e	$10^{-8} \leq PFH_d < 10^{-7}$

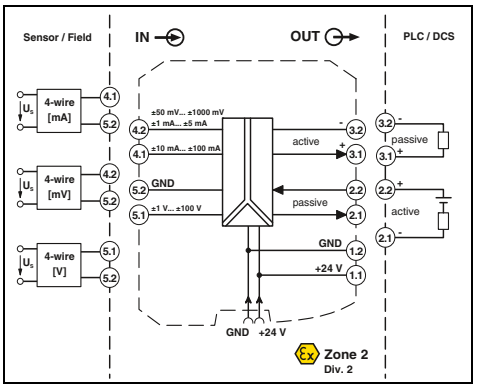
Furthermore, parameters such as category, degree of diagnostic coverage (DC), and mean time to dangerous failure ($MTTF_d$) must be taken into consideration for safety of machinery in accordance with EN ISO 13849.



Example of error distribution in a safety-related closed-loop control circuit with low demand rate in accordance with IEC 61508

Analog IN/Analog OUT
3-way signal conditioners





3-way signal conditioner, universal, configurable, over 1600 signal combinations

Functional Safety
Ex:
Housing width 12.5 mm

Universal signal conditioners for operating 4-conductor measuring transducers.

- Analog signal conditioners for isolating, filtering, amplifying, and converting standard analog signals
- Configurable input and output signals, including bipolar current and voltage signals
- 3-way electrical isolation
- Over 1600 signal conversions can be set via DIP switches on the front
- 10 kHz limit frequency for time-critical applications
- Output active or passive
- Plug-in screw or Push-in connection technology
- Power supply via DIN rail connector possible
- Status indicator for supply voltage
- Up to SIL 2 in accordance with 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 supply and error evaluation module as well as about the DIN rail connectors and marking material can be found from page 175

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	U output	I output
Output signal (configurable using the DIP switch)	0 ... 10 V, configurable via DIP switches	
	0 ... 20 mA, please indicate if different setting when ordering	
Load R_B	≥1 kΩ (10 V)	≤600 Ω (20 mA; active) passive: ≤(UB-2 V) / I_{outmax}
General data		
Supply voltage range	12 V DC ... 24 V DC (-20% ... +25%)	
Power dissipation	<0.7 W (at 24 V DC / 20 mA)	
Maximum transmission error	≤0.1% (compared to the final value)	
Temperature coefficient	0.0075%/K	
ZERO / SPAN adjustment	± 4% / ± 4%	
Limit frequency (3 dB)	10 kHz (can be switched to 30 Hz)	
Step response (10-90%)	35 µs (at 10 kHz) 11 ms (at 30 Hz)	
Electrical isolation		
Input/output/power supply	2.5 kV (50 Hz, 1 min., test voltage) 300 V_{rms} (rated insulation voltage (overvoltage category II; degree of pollution 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 6.6-FR	
Dimensions W/H/D	12.5 / 99 / 114.5 mm	
Screw connection rigid / flexible / AWG	0.2 ... 2.5 mm² / 0.2 ... 2.5 mm² / 24 - 14	
Push-in connection rigid / flexible / AWG	0.2 ... 1.5 mm² / 0.2 ... 1.5 mm² / 24 - 16	
EMC note		
Conformance/approvals		
Conformance	CE-compliant	
ATEX	II 3 G Ex nA IIC T4 Gc	
IECEx	Ex nA IIC T4 Gc	
UL, USA/Canada	UL 61010 Listed Class I, Div. 2, Groups A, B, C, D T6 Class I, Zone 2, Group IIC	
SIL in accordance with IEC 61508	2	

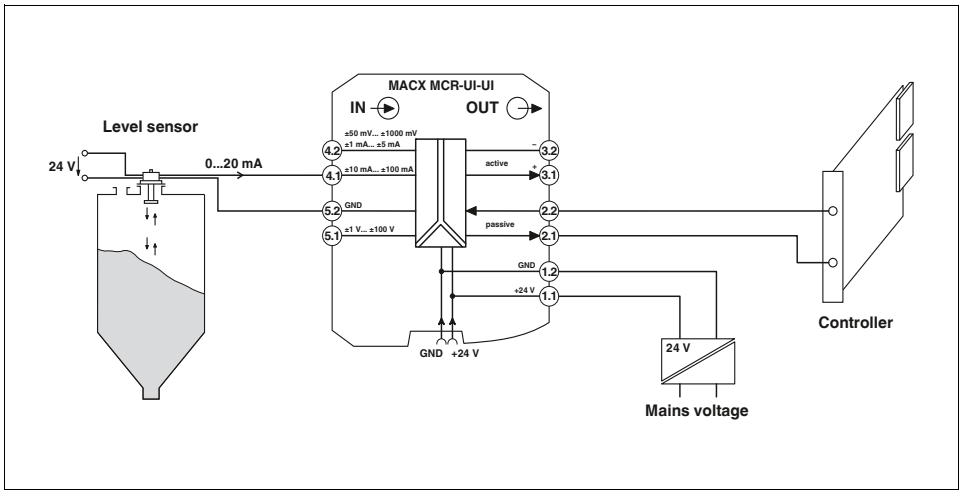
Ordering data

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

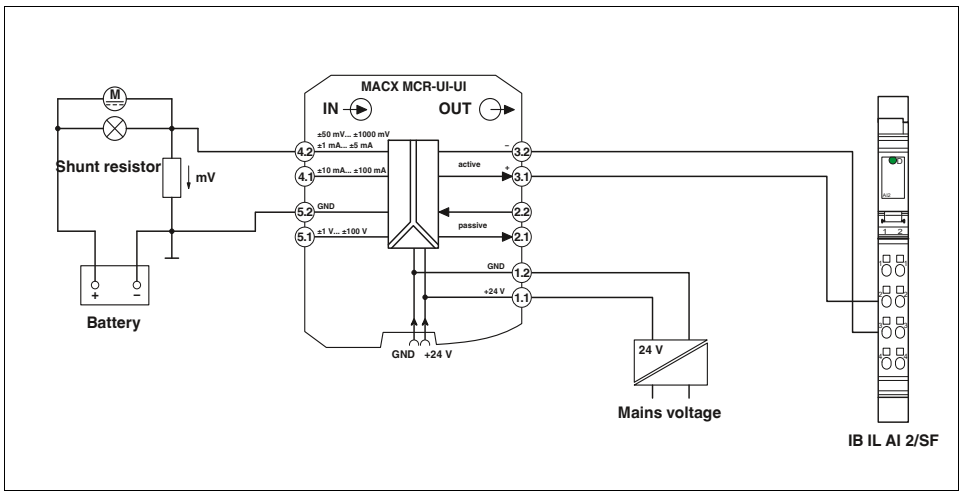
Order key for MACX MCR-UI-UI(-SP) (standard configuration entered as an example)

Order No.	Input			Output		Cut-off frequency	Factory calibration certificate (FCC)
2811284	IN03			OUT01		10K	NONE
2811284 ≙ MACX MCR-UI-UI 2811572 ≙ MACX MCR-UI-UI-SP	IN40 ≙ 0 ... 50 mV IN24 ≙ 0 ... 60 mV IN41 ≙ 0 ... 75 mV IN25 ≙ 0 ... 100 mV IN43 ≙ 0 ... 120 mV IN44 ≙ 0 ... 150 mV IN26 ≙ 0 ... 200 mV IN27 ≙ 0 ... 300 mV IN28 ≙ 0 ... 500 mV IN66 ≙ 0 ... 1,000 mV IN29 ≙ 0 ... 1.0 V IN50 ≙ 0 ... 1.5 V IN30 ≙ 0 ... 2.0 V IN52 ≙ 0 ... 3.0 V IN05 ≙ 0 ... 5 V IN03 ≙ 0 ... 10 V IN67 ≙ 0 ... 15 V IN32 ≙ 0 ... 20 V IN39 ≙ 0 ... 30 V IN68 ≙ 0 ... 50 V IN69 ≙ 0 ... 100 V IN06 ≙ 1 ... 5 V IN04 ≙ 2 ... 10 V	IN53 ≙ -50 ... +50 mV IN13 ≙ -60 ... +60 mV IN54 ≙ -75 ... +75 mV IN14 ≙ -100 ... +100 mV IN56 ≙ -120 ... +120 mV IN57 ≙ -150 ... +150 mV IN15 ≙ -200 ... +200 mV IN16 ≙ -300 ... +300 mV IN17 ≙ -500 ... +500 mV IN78 ≙ -1,000 ... +1,000 mV IN18 ≙ -1.0 ... +1.0 V IN63 ≙ -1.5 ... +1.5 V IN19 ≙ -2.0 ... +2.0 V IN65 ≙ -3.0 ... +3.0 V IN21 ≙ -5 ... +5 V IN22 ≙ -10 ... +10 V IN79 ≙ -15 ... +15 V IN23 ≙ -20 ... +20 V IN80 ≙ -30 ... +30 V IN81 ≙ -50 ... +50 V IN82 ≙ -100 ... +100 V	IN70 ≙ 0 ... 1.0 mA IN71 ≙ 0 ... 1.5 mA IN72 ≙ 0 ... 2.0 mA IN73 ≙ 0 ... 3.0 mA IN36 ≙ 0 ... 5 mA IN37 ≙ 0 ... 10 mA IN74 ≙ 0 ... 15 mA IN01 ≙ 0 ... 20 mA IN75 ≙ 0 ... 30 mA IN76 ≙ 0 ... 50 mA IN77 ≙ 0 ... 100 mA IN83 ≙ -1.0 ... +1.0 mA IN84 ≙ -1.5 ... +1.5 mA IN85 ≙ -2.0 ... +2.0 mA IN86 ≙ -3.0 ... +3.0 mA IN33 ≙ -5 ... +5 mA IN34 ≙ -10 ... +10 mA IN87 ≙ -15 ... +15 mA IN35 ≙ -20 ... +20 mA IN88 ≙ -30 ... +30 mA IN89 ≙ -50 ... +50 mA IN90 ≙ -100 ... +100 mA IN91 ≙ 1 ... 5 mA IN92 ≙ 2 ... 10 mA IN02 ≙ 4 ... 20 mA	OUT19 ≙ 0 ... 2.5 V OUT05 ≙ 0 ... 5 V OUT03 ≙ 0 ... 10 V OUT20 ≙ -2.5 ... +2.5 V OUT13 ≙ -5 ... +5 V OUT14 ≙ -10 ... +10 V OUT24 ≙ 0.5 ... +2.5 V OUT06 ≙ 1 ... 5 V OUT04 ≙ 2 ... 10 V OUT27 ≙ 2.5 ... 0 V OUT11 ≙ 5 ... 0 V OUT09 ≙ 10 ... 0 V	OUT15 ≙ 0 ... 5 mA OUT16 ≙ 0 ... 10 mA OUT01 ≙ 0 ... 20 mA OUT21 ≙ -5 ... +5 mA OUT22 ≙ -10 ... +10 mA OUT23 ≙ -20 ... +20 mA OUT25 ≙ 1 ... 5 mA OUT26 ≙ 2 ... 10 mA OUT02 ≙ 4 ... 20 mA OUT28 ≙ 5 ... 0 mA OUT29 ≙ 10 ... 0 mA OUT07 ≙ 20 ... 0 mA	30 ≙ 30 Hz 10K ≙ 10 kHz	NONE ≙ Without FCC YES ≙ With FCC (a fee is charged) YESPLUS ≙ FCC with 5 measuring points (a fee is charged)

Application example: Level measurement and active analog input card

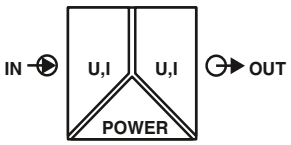


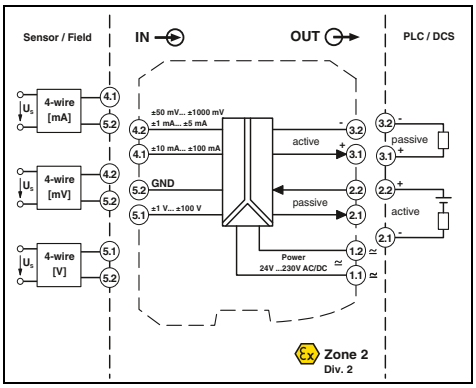
Application example: Shunt measurement and Inline terminal with passive analog input channels within an Inline station



(Information on automation solutions from Phoenix Contact is to be found in Catalog 6 and at phoenixcontact.net/products)

Analog IN/Analog OUT
3-way signal conditioners





3-way signal conditioner, configurable, over 1600 signal combinations

DNV GL Functional Safety
Ex:
Housing width 12.5 mm

- Analog signal conditioners 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 of 19.2 to 253 V AC/DC
- Status indicator for supply voltage
- Up to SIL 2 in accordance with 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)	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	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) passive: ≤(UB-2 V) / I_{outmax}
General data		
Supply voltage range	24 V ... 230 V AC/DC (-20%/+10%, 50/60 Hz)	
Power dissipation	<0.8 W (at 24 V DC / 20 mA) <0.9 W (at 230 V AC / 20 mA)	
Maximum transmission error	≤0.1% (compared to the final value)	
Temperature coefficient	0.0075%/K	
ZERO / SPAN adjustment	± 4% / ± 4%	
Electrical isolation		
Input/output/power supply	2.5 kV (50 Hz, 1 min., test voltage) 300 V_{rms} (rated insulation voltage (overvoltage category II; degree of pollution 2, safe isolation as per EN 61010-1))	
Degree of protection	IP20	
Ambient temperature (operation)	-20°C ... 70°C	
Housing material	PA 6.6-FR	
Dimensions W/H/D	12.5 / 99 / 114.5 mm	
Screw connection rigid / flexible / AWG	0.2 ... 2.5 mm² / 0.2 ... 2.5 mm² / 24 - 14	
Push-in connection rigid / flexible / AWG	0.2 ... 1.5 mm² / 0.2 ... 1.5 mm² / 24 - 16	
EMC note		
Conformance/approvals		
Conformance	CE-compliant	
ATEX	II 3 G Ex nA IIC T4 Gc	
SIL in accordance with IEC 61508	2	

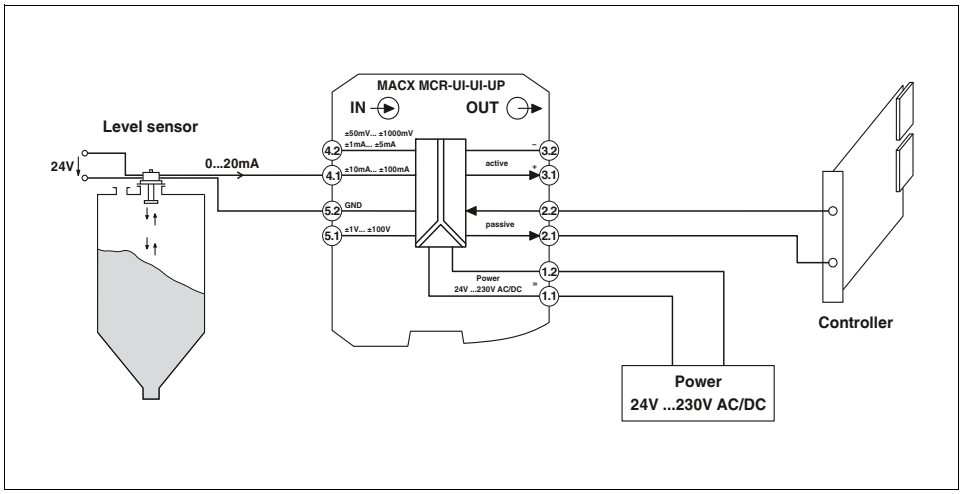
Ordering data

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

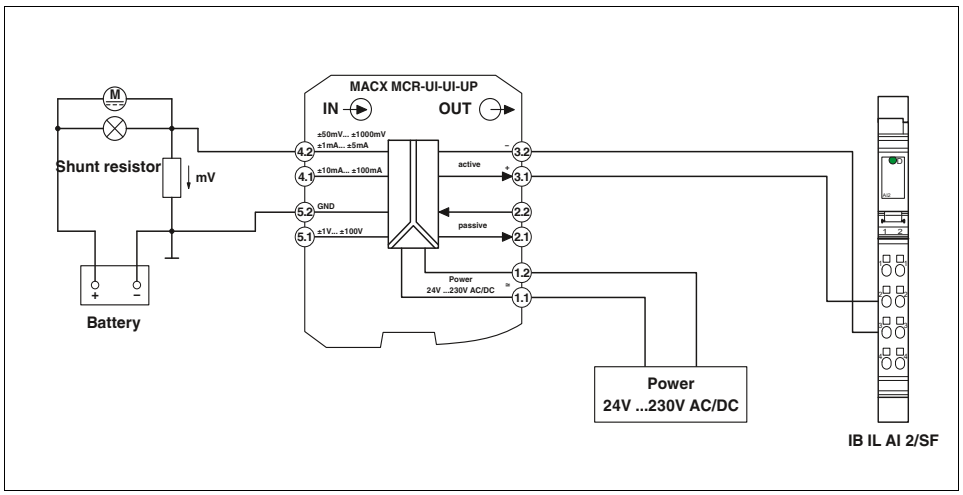
Order key for MACX MCR-UI-UI(-SP) (standard configuration entered as an example)

Order No.	Input			Output		Cut-off frequency	Factory calibration certificate (FCC)
2811459	IN03			OUT01		10K	NONE
2811459 ≙ MACX MCR-UI-UI-UP 2811585 ≙ MACX MCR-UI-UI-UP-SP	IN40 ≙ 0 ... 50 mV IN24 ≙ 0 ... 60 mV IN41 ≙ 0 ... 75 mV IN25 ≙ 0 ... 100 mV IN43 ≙ 0 ... 120 mV IN44 ≙ 0 ... 150 mV IN26 ≙ 0 ... 200 mV IN27 ≙ 0 ... 300 mV IN28 ≙ 0 ... 500 mV IN66 ≙ 0 ... 1,000 mV IN29 ≙ 0 ... 1.0 V IN50 ≙ 0 ... 1.5 V IN30 ≙ 0 ... 2.0 V IN52 ≙ 0 ... 3.0 V IN05 ≙ 0 ... 5 V IN03 ≙ 0 ... 10 V IN67 ≙ 0 ... 15 V IN32 ≙ 0 ... 20 V IN39 ≙ 0 ... 30 V IN68 ≙ 0 ... 50 V IN69 ≙ 0 ... 100 V IN06 ≙ 1 ... 5 V IN04 ≙ 2 ... 10 V	IN53 ≙ -50 ... +50 mV IN13 ≙ -60 ... +60 mV IN54 ≙ -75 ... +75 mV IN14 ≙ -100 ... +100 mV IN56 ≙ -120 ... +120 mV IN57 ≙ -150 ... +150 mV IN15 ≙ -200 ... +200 mV IN16 ≙ -300 ... +300 mV IN17 ≙ -500 ... +500 mV IN78 ≙ -1,000 ... +1,000 mV IN18 ≙ -1.0 ... +1.0 V IN63 ≙ -1.5 ... +1.5 V IN19 ≙ -2.0 ... +2.0 V IN65 ≙ -3.0 ... +3.0 V IN21 ≙ -5 ... +5 V IN22 ≙ -10 ... +10 V IN79 ≙ -15 ... +15 V IN23 ≙ -20 ... +20 V IN80 ≙ -30 ... +30 V IN81 ≙ -50 ... +50 V IN82 ≙ -100 ... +100 V	IN70 ≙ 0 ... 1.0 mA IN71 ≙ 0 ... 1.5 mA IN72 ≙ 0 ... 2.0 mA IN73 ≙ 0 ... 3.0 mA IN36 ≙ 0 ... 5 mA IN37 ≙ 0 ... 10 mA IN74 ≙ 0 ... 15 mA IN01 ≙ 0 ... 20 mA IN75 ≙ 0 ... 30 mA IN76 ≙ 0 ... 50 mA IN77 ≙ 0 ... 100 mA IN83 ≙ -1.0 ... +1.0 mA IN84 ≙ -1.5 ... +1.5 mA IN85 ≙ -2.0 ... +2.0 mA IN86 ≙ -3.0 ... +3.0 mA IN33 ≙ -5 ... +5 mA IN34 ≙ -10 ... +10 mA IN87 ≙ -15 ... +15 mA IN35 ≙ -20 ... +20 mA IN88 ≙ -30 ... +30 mA IN89 ≙ -50 ... +50 mA IN90 ≙ -100 ... +100 mA IN91 ≙ 1 ... 5 mA IN92 ≙ 2 ... 10 mA IN02 ≙ 4 ... 20 mA	OUT19 ≙ 0 ... 2.5 V OUT05 ≙ 0 ... 5 V OUT03 ≙ 0 ... 10 V OUT20 ≙ -2.5 ... +2.5 V OUT13 ≙ -5 ... +5 V OUT14 ≙ -10 ... +10 V OUT24 ≙ 0.5 ... +2.5 V OUT06 ≙ 1 ... 5 V OUT04 ≙ 2 ... 10 V OUT27 ≙ 2.5 ... 0 V OUT11 ≙ 5 ... 0 V OUT09 ≙ 10 ... 0 V	OUT15 ≙ 0 ... 5 mA OUT16 ≙ 0 ... 10 mA OUT01 ≙ 0 ... 20 mA OUT21 ≙ -5 ... +5 mA OUT22 ≙ -10 ... +10 mA OUT23 ≙ -20 ... +20 mA OUT25 ≙ 1 ... 5 mA OUT26 ≙ 2 ... 10 mA OUT02 ≙ 4 ... 20 mA OUT28 ≙ 5 ... 0 mA OUT29 ≙ 10 ... 0 mA OUT07 ≙ 20 ... 0 mA	30 ≙ 30 Hz 10K ≙ 10 kHz	NONE ≙ Without FCC YES ≙ With FCC (a fee is charged) YESPLUS ≙ FCC with 5 measuring points (a fee is charged)

Application example: Level measurement and active analog input card

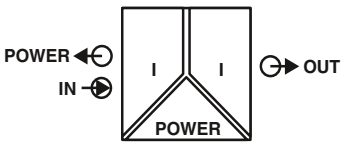


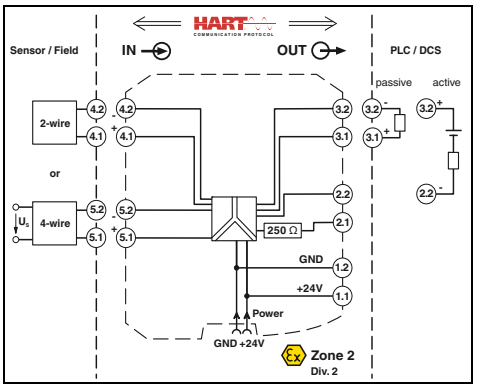
Application example: Shunt measurement and Inline terminal with analog input channels within an Inline station



(Information on automation solutions from Phoenix Contact is to be found in Catalog 6 and at phoenixcontact.net/products)

Analog IN / Analog OUT repeater power supplies





Ex n

Repeater power supply and input signal conditioner

Functional Safety
Ex:
Housing width 12.5 mm

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

- 0/4 to 20 mA input (powered or not powered)
- 0/4 to 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 in accordance with IEC 61508
- Installation in zone 2 permitted

Notes:

Information about the supply and error evaluation module as well as about the DIN rail connectors and marking material can be found from page 175

Test plugs for test sockets can be found on page 177

Information on "Plug and play" connection using system cabling can be found from page 170

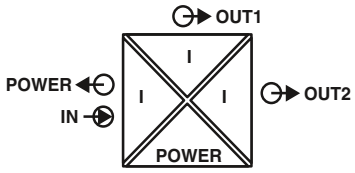
Technical data

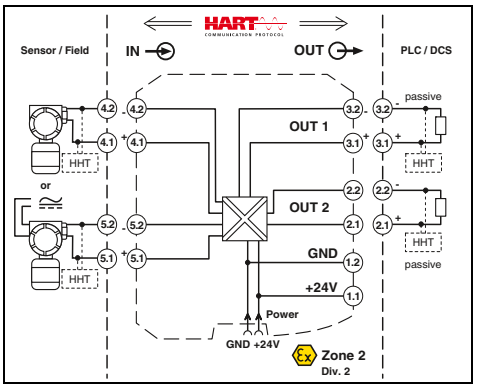
Input data		
Input signal		4 mA ... 20 mA
Transmitter supply voltage		>21.5 V (20 mA)
Voltage drop		<3.5 V (in input signal conditioner operation)
Output data		
Output signal		4 mA ... 20 mA (active) 4 mA ... 20 mA (14 ... 26 V ext. source voltage)
Load		<1,000 Ω (20 mA)
Output ripple		<20 mV_{rms}
General 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 / 1,000 Ω) ; <55 mA (24 V DC / 20 mA / 250 Ω)
Power dissipation		<1.1 W (24 V DC/ 20 mA) <0.95 W (24 V DC / 20 mA / 250 Ω) <1.2 W (24 V DC / 20 mA / 0 Ω)
Temperature coefficient		<0.01%/K
Step response (10-90%)		<200 µs (for jump 4 mA ... 20 mA, load 600 Ω)
Transmission error, typical		<0.05% (of final value)
Maximum transmission error		<0.1% (of final value)
Under-/overload range		In accordance with NE 43
Electrical isolation		
	Input/output/power supply	300 V_{rms} (rated insulation voltage (overvoltage category II; degree of pollution 2, safe isolation as per EN 61010-1)) 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 6.6-FR
Dimensions W/H/D		12.5 / 112.5 / 114.5 mm
Screw connection rigid / flexible / AWG		0.2 ... 2.5 mm^2 / 0.2 ... 2.5 mm^2 / 24 - 14
Push-in connection rigid / flexible / AWG		0.2 ... 1.5 mm^2 / 0.2 ... 1.5 mm^2 / 24 - 16
Conformance/approvals		
Conformance		CE-compliant, additionally EN 61326
ATEX		II 3 G Ex nA II T4 Gc X
UL, USA/Canada		UL 61010 Listed UL 508 Listed Class I, Div. 2, Groups A, B, C, D T4 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, HART®-transparent			
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 supplies





Ex n

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 conditioners for the operation of 2-conductor measuring transducers, 4-conductor measuring transducers, and mA current sources

- 0/4 to 20 mA input (powered or not powered)
- Two electrically isolated outputs, 0/4 to 20 mA (active)
- 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 in accordance with IEC 61508
- PL d in accordance with EN ISO 13849-1
- Installation in zone 2 permitted

Notes:

Information about the supply and error evaluation module as well as about the DIN rail connectors and marking material can be found from page 175

Test plugs for test sockets can be found on page 177

Information on “Plug and play” connection using system cabling can be found from page 170

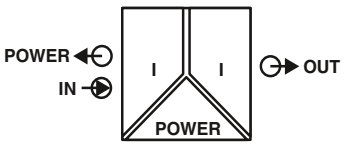
Technical data

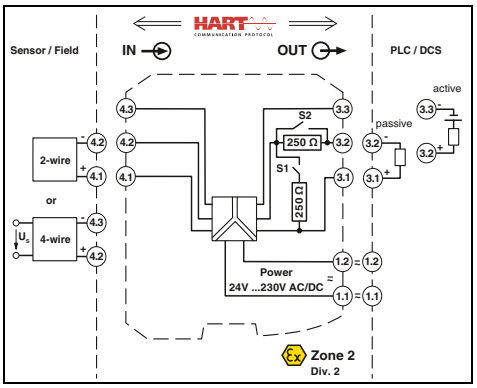
Input data		
Input signal		4 mA ... 20 mA / 0 mA ... 20 mA
Transmitter supply voltage		>21.5 V (20 mA)
Voltage drop		<3.9 V (in input signal conditioner operation)
Output data		
Output signal (per output)		4 mA ... 20 mA (active) 0 mA ... 20 mA
Load		<450 Ω (20 mA)
Output ripple		<20 mV_{rms}
General data		
Supply voltage range		19.2 V DC ... 30 V DC (24 V DC -20%...+25%)
Current consumption		<75 mA (24 V DC / 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 jump 4 mA ... 20 mA, typical)
Transmission error, typical		<0.05% (of final value)
Maximum transmission error		<0.1% (of final value)
Under-/overload range		In accordance with NE 43
Electrical isolation		
	Input/output/power supply	300 V_{rms} (rated insulation voltage (overvoltage category II; degree of pollution 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) -20°C ... 70°C (any mounting position, module distance> 5 mm, MTBF reduction factor 2.5, not assessed by UL)
Status indication		Green LED (PWR supply voltage)
SMART communication (per output)		Yes
Protocols supported		HART
Housing material		PA 6.6-FR
Dimensions W/H/D		12.5 / 112.5 / 114.5 mm
Screw connection rigid / flexible / AWG		0.2 ... 2.5 mm^2 / 0.2 ... 2.5 mm^2 / 24 - 14
Push-in connection rigid / flexible / AWG		0.2 ... 1.5 mm^2 / 0.2 ... 1.5 mm^2 / 24 - 16
Conformance/approvals		
Conformance		CE-compliant, additionally EN 61326-1
ATEX		Ex 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, HART®-transparent			
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 supplies





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-conductor measuring transducers, 4-conductor measuring transducers, and mA current sources

- 0/4 to 20 mA input (powered or not powered)
- 0/4 to 20 mA output (active or passive), 0/1 to 5 V, can be selected via 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 of 19.2 to 253 V AC/DC
- Up to SIL 2 in accordance with IEC 61508
- Installation in zone 2 permitted

Notes:

Information about the supply and error evaluation module as well as about the DIN rail connectors and marking material can be found from page 175

Test plugs for test sockets can be found on page 177

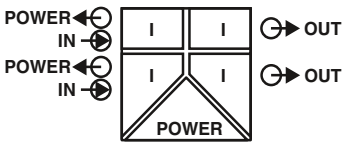
Technical data

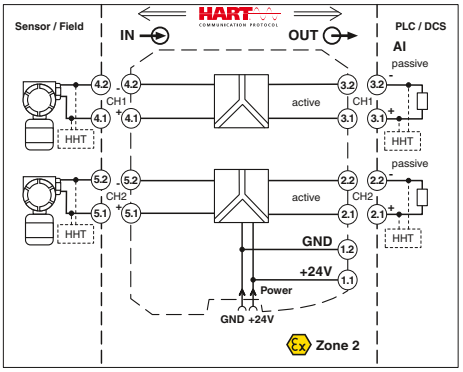
Input data		
Input signal		4 mA ... 20 mA
Transmitter supply voltage		>16 V (20 mA)
Voltage drop		<3.5 V (in input signal conditioner operation)
Output data		
Output signal		4 mA ... 20 mA (active) 4 mA ... 20 mA (14 ... 26 V ext. source voltage) 1 V ... 5 V (internal resistance, 250 Ω, 0.1%) Configurable via DIP switches
Load		<600 Ω (20 mA)
Output ripple		<20 mV_{rms}
General data		
Supply voltage range		19.2 V AC/DC ... 253 V AC/DC (24 V AC/DC ... 230 V AC/DC (-20% ... +10%, 50/60 Hz))
Current consumption		<75 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)
Under-/overload range		In accordance with NE 43
Electrical isolation		
	Input/output/power supply	300 V_{rms} (rated insulation voltage (overvoltage category II; degree of pollution 2, safe isolation as per EN 61010-1)) 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 6.6-FR
Dimensions W/H/D		17.5 / 112.5 / 114.5 mm
Screw connection rigid / flexible / AWG		0.2 ... 2.5 mm^2 / 0.2 ... 2.5 mm^2 / 24 - 14
Push-in connection rigid / flexible / AWG		0.2 ... 1.5 mm^2 / 0.2 ... 1.5 mm^2 / 24 - 16
Conformance/approvals		
Conformance		CE-compliant, additionally EN 61326-1
ATEX		II 3 G Ex nA IIC T4 Gc X
UL, USA/Canada		UL 508 Listed UL 61010 Listed Class I, Div. 2, Groups A, B, C, D T4 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, HART®-transparent			
Screw connection	**MACX MCR-SL-RPSSI-I-UP**	2865968	1
Push-in connection	**MACX MCR-SL-RPSSI-I-UP-SP**	2924210	1

Analog IN / Analog OUT repeater power supplies





Ex n

2-channel repeater power supply

Functional Safety
Ex:
Housing width 12.5 mm

Repeater power supply for the operation of 2-conductor measuring transducers.
- 2-channel
- Input: 4 to 20 mA (powered)
- Output: 4 to 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 in accordance with IEC 61508
- PL d in accordance with EN ISO 13849-1
- Installation in zone 2 permitted

Notes:

Information about the supply and error evaluation module as well as about the DIN rail connectors and marking material can be found from page 175

Test plugs for test sockets can be found on page 177

Information on “Plug and play” connection using system cabling can be found from page 170

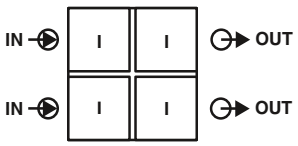
Technical data

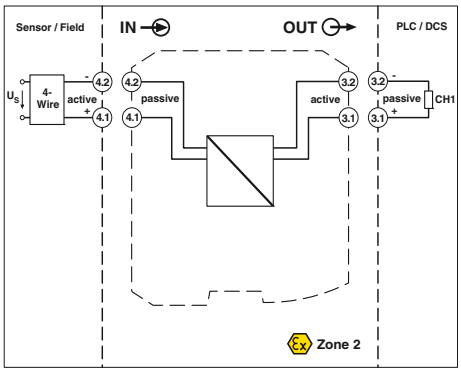
Input data	**per channel**
Input signal	4 mA ... 20 mA
Transmitter supply voltage	>16 V (at 20 mA)
Underload/overload signal range	0 mA ... 24 mA
Output data	**per channel**
Output signal	4 mA ... 20 mA (active)
Load	≤450 Ω (20 mA)
Underload/overload signal range	0 mA ... 24 mA
General data	
Supply voltage 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 (overvoltage category II; degree of pollution 2, safe isolation as per EN 61010-1)) 2.5 kV (50 Hz, 1 min., test voltage)
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 6.6-FR
Dimensions W/H/D	12.5 / 112.5 / 114.5 mm
Screw connection rigid / flexible / AWG	0.2 ... 2.5 mm^2 / 0.2 ... 2.5 mm^2 / 24 - 14
Push-in connection rigid / flexible / AWG	0.2 ... 1.5 mm^2 / 0.2 ... 1.5 mm^2 / 24 - 16
Conformance/approvals	
Conformance	CE-compliant, additionally EN 61326
ATEX	II 3 G Ex nA IIC T4 Gc X
UL, USA/Canada	UL 61010 Listed Class I, Div. 2, Groups A, B, C, D T4 Class I, Zone 2, Group IIC T4
SIL in accordance with IEC 61508	2 3
Systematic Capability	SC 3

Ordering data

Description	Type	Order No.	Pcs./Pkt.
Repeater power supply, 2-channel, HART®-transparent			
Screw connection	**MACX MCR-SL-RPSS-2I-2I**	2904089	1
Push-in connection	**MACX MCR-SL-RPSS-2I-2I-SP**	2904090	1

Analog IN / Analog OUT passive isolators





Ex n

Passive isolator, one and two channel

Ex:

Housing width 12.5 mm

The single- or dual-channel input loop-powered 2-way isolator with increased isolation voltage and plug-in connection technology is used for the electrical isolation and filtering of analog signals.

The device allows operation on active sensor technology with a supply voltage of 6 to 30 V DC.

The device is powered via the current loop of the sensor. As a result, no additional power supply is required.

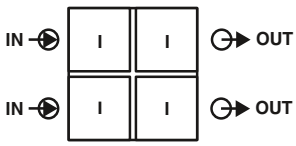
Technical data

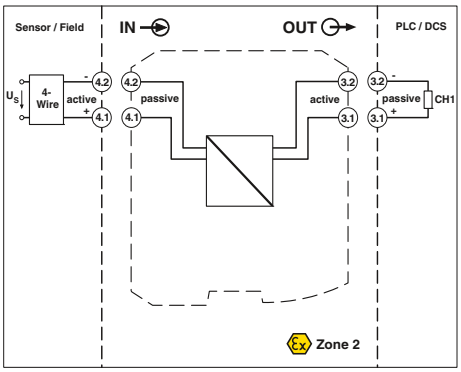
Input data	
Max. voltage input signal	<30.5 V
Input signal	0 mA ... 20 mA / 4 mA ... 20 mA
Input voltage limitation	30.5 V
Voltage dissipation	2.9 V (I = 20 mA)
Response current	Approx. 50 µA
Output data	
Max. voltage output signal	27.5 V
Output signal	0 mA ... 20 mA / 4 mA ... 20 mA
Residual ripple	<10 mV_{rms} (500 Ω load)
Transmission Behavior	1:1 to input signal
Load	≤1375 Ω (I = 20 mA)
General data	
Supply voltage range	no separate supply voltage necessary
Temperature coefficient	≤0.002%/K (of measured value / 100 Ω load)
Maximum transmission error	≤0.1% (of final value)
Electrical isolation	
Input/output/power supply	300 V_{rms} (rated insulation voltage (overvoltage category II; degree of pollution 2, safe isolation as per EN 61010-1)) 2.5 kV (50 Hz, 1 min., test voltage)
Ambient temperature range	-40°C ... 85°C
Humidity	5% ... 95% (non-condensing)
Degree of protection	IP20
Inflammability class in accordance with UL 94	V0
Housing material	PA 6.6-FR
Dimensions W/H/D	12.5 / 99 / 114.5 mm
Screw connection rigid / flexible / AWG	0.2 ... 2.5 mm^2 / 0.2 ... 2.5 mm^2 / 24 - 14
Push-in connection rigid / flexible / AWG	0.2 ... 1.5 mm^2 / 0.2 ... 1.5 mm^2 / 24 - 16
Conformance/approvals	
Conformance	CE-compliant, additionally EN 61326-1
ATEX	II 3 G Ex nA IIC T4 Gc X
UL, USA/Canada	UL 61010 Listed Class I, Div. 2, Groups A, B, C, D T4 Class I, Zone 2, Group IIC T4
SIL in accordance with IEC 61508	3

Ordering data

Description	Type	Order No.	Pcs./Pkt.
Passive isolator, one or two channel			
Screw connection	**MACX MCR-SL-I-I-ILP**	2905278	1
Push-in connection	**MACX MCR-SL-I-I-ILP-SP**	2905279	1
Screw connection	**MACX MCR-SL-2I-2I-ILP**	2905280	1
Push-in connection	**MACX MCR-SL-2I-2I-ILP-SP**	2905281	1

Analog IN / Analog OUT passive isolators





Ex n

Passive isolator, one and two channel 5 kV test voltage

Housing width 12.5 mm

The single- or dual-channel input loop-powered 2-way isolator with increased isolation voltage and plug-in connection technology is used for the electrical isolation and filtering of analog signals.

The device allows operation on active sensor technology with a supply voltage of 6 to 30 V DC.

The device is powered via the current loop of the sensor. As a result, no additional power supply is required.

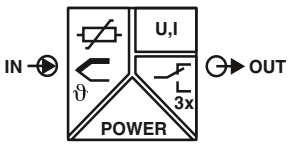
Technical data

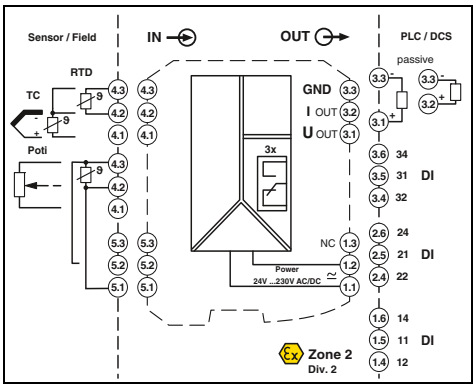
Input data	
Max. voltage input signal	<30.5 V
Input signal	0 mA ... 20 mA / 4 mA ... 20 mA
Input voltage limitation	30.5 V
Voltage dissipation	2.9 V (I = 20 mA)
Response current	Approx. 50 µA
Output data	
Max. voltage output signal	27.5 V
Output signal	0 mA ... 20 mA / 4 mA ... 20 mA
Residual ripple	<10 mV_{rms} (500 Ω load)
Transmission Behavior	1:1 to input signal
Load	≤1375 Ω (I = 20 mA)
General data	
Supply voltage range	no separate supply voltage necessary
Temperature coefficient	≤0.002%/K (of measured value / 100 Ω load)
Maximum transmission error	≤0.1% (of final value)
Electrical isolation	
Input/output/power supply	600 V_{rms} (rated insulation voltage (overvoltage category II; degree of pollution 2, safe isolation as per EN 61010-1)) 5 kV (50 Hz, 1 min., test voltage)
Ambient temperature range	-40°C ... 85°C
Humidity	5% ... 95% (non-condensing)
Degree of protection	IP20
Inflammability class in accordance with UL 94	V0
Housing material	PA 6.6-FR
Dimensions W/H/D	12.5 / 99 / 114.5 mm
Screw connection rigid / flexible / AWG	0.2 ... 2.5 mm^2 / 0.2 ... 2.5 mm^2 / 24 - 14
Push-in connection rigid / flexible / AWG	0.2 ... 1.5 mm^2 / 0.2 ... 1.5 mm^2 / 24 - 16
Conformance/approvals	
Conformance	CE-compliant, additionally EN 61326-1
ATEX	II 3 G Ex nA IIC T4 Gc X
UL, USA/Canada	UL 61010 Listed Class I, Div. 2, Groups A, B, C, D T4 Class I, Zone 2, Group IIC T4
SIL in accordance with IEC 61508	3

Ordering data

Description	Type	Order No.	Pcs./Pkt.
Passive isolator, one or two channel			
Screw connection	**MACX MCR-SL-I-I-HV-ILP**	2907704	1
Push-in connection	**MACX MCR-SL-I-I-HV-ILP-SP**	2907705	1
Screw connection	**MACX MCR-SL-2I-2I-HV-ILP**	2907706	1
Push-in connection	**MACX MCR-SL-2I-2I-HV-ILP-SP**	2907707	1

Temperature, temperature transducers





Ex n

SIL IEC 61508 PL EN ISO 13849

Temperature transducer, universal, with three limit value relays, wide range supply

Functional Safety

Ex:

Housing width 35 mm

Universal temperature transducers 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)
- 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 of 19.2 to 253 V AC/DC
- Status indicator for supply voltage, cable, sensor, and module errors
- Up to SIL 2 in accordance with IEC 61508
- PL d in accordance with EN ISO 13849-1
- Installation in zone 2 permitted

Notes:

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

For information on the programming adapter, refer to page 173

Technical data

Input data		
Resistance thermometers		Pt, Ni, Cu sensors: 2-, 3-, 4-conductor
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		-1,000 mV ... 1,000 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 (at 20 mA)
Behavior in the event of a sensor error	In accordance with 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)	
Maximum 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 (overvoltage category II; degree of pollution 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	Typically 5% ... 95% (non-condensing)	
Inflammability class in accordance with UL 94	V0	
Housing material	PA 6.6-FR	
Dimensions W/H/D	35 / 99 / 114.5 mm	
Screw connection rigid / flexible / AWG	0.2 ... 2.5 mm² / 0.2 ... 2.5 mm² / 24 - 14	
Push-in connection rigid / flexible / AWG	0.2 ... 1.5 mm² / 0.2 ... 1.5 mm² / 24 - 16	
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	
UL, USA/Canada	UL 508 Listed Class I, Div. 2, Groups A, B, C, D T6 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
Order configuration	Screw connection	**MACX MCR-T-UIREL-UP-C**	2811514	1
Order configuration	Push-in connection	**MACX MCR-T-UIREL-UP-SP-C**	2811831	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-UIREL-UP(-SP)-C temperature transducers (standard configuration entered as an example)

Order No.	SIL	Measuring unit	Sensor type	Connection technology	Measuring range: Start	Measuring range: End	Output signal	Switching function 1	Lower switching point 1	Upper switching point 1	Switching function 2	Lower switching point 2	Upper switching point 2	Factory calibration certificate
2811514	ON	C	PT100	4	-50	150	OUT02	0	99999	99999	0	99999	99999	NONE
2811514 ≙ MACX MCR-T-UIREL-UP-C 2811831 ≙ MACX MCR-T-UIREL-UP-SP-C	ON ≙ Active NONE ≙ Not active ON only with output range = OUT02	Celsius [C] Ω [O] Millivolts [V]	See below	2 ≙ 2-conductor 3 ≙ 3-conductor 4 ≙ 4-conductor	See below	See below	0...20 mA [OUT01] 4...20 mA [OUT02] 0...10 V [OUT03] 2...10 V [OUT04] 0...5 V [OUT05] 1...5 V [OUT06] -5...+5 V [OUT13] -10...+10 V [OUT14] 0...5 mA [OUT15] 0...10 mA [OUT16] 1...5 mA [OUT25] 2...10 mA [OUT26]	L [0] H [1] L → SPH → H [2] H → SPH → L [3] L → SPH → H → SPL → L [4] H → SPH → L → SPL → H [5] L → SPL → H → SPH → L [6] H → SPL → L → SPH → H [7]	Free input, see web site for more	Free input, see web site for more		Free input, see web site for more	Free input, see web site for more	NONE ≙ Without FCC YES ≙ With FCC (a fee is charged) YESPLUS ≙ FCC with 5 measuring points (a fee is charged)

					Smallest measuring range span
Resistance temperature detector (RTD)	°C	PT50 ≙ Pt 50 IEC60751	-200	850	20k
	°C	PT100 ≙ Pt 100 IEC60751	-200	850	20k
	°C	PT200 ≙ Pt 200 IEC60751	-200	850	20k
	°C	PT500 ≙ Pt 500 IEC60751	-200	850	20k
	°C	PT1000 ≙ Pt 1000 IEC60751	-200	850	20k
	°C	PT2000 ≙ Pt 2000 IEC60751	-200	850	20k
	°C	PT5000 ≙ Pt 5000 IEC60751	-200	850	20k
	°C	PT50S ≙ PT50 SAMA RC21-4-1966	-200	850	20k
	°C	PT100S ≙ PT100 SAMA RC21-4-1966	-200	850	20k
	°C	PT200S ≙ PT200 SAMA RC21-4-1966	-200	850	20k
	°C	PT500S ≙ PT500 SAMA RC21-4-1966	-200	850	20k
	°C	PT1000S ≙ PT1000 SAMA RC21-4-1966	-200	850	20k
	°C	PT2000S ≙ PT2000 SAMA RC21-4-1966	-200	850	20k
	°C	PT5000S ≙ PT5000 SAMA RC21-4-1966	-200	850	20k
	°C	PT100G ≙ PT100 G GOST 6651-2009 (α=0.00391)	-200	850	20k
	°C	PT200G ≙ PT200 G GOST 6651-2009 (α=0.00391)	-200	850	20k
	°C	PT500G ≙ PT500 G GOST 6651-2009 (α=0.00391)	-200	850	20k
	°C	PT1000G ≙ PT1000 G GOST 6651-2009 (α=0.00391)	-200	850	20k
	°C	PT100J ≙ Pt 100 JIS C1604/1997	-200	850	20k
	°C	PT200J ≙ Pt 200 JIS C1604/1997	-200	850	20k
	°C	PT500J ≙ Pt 500 JIS C1604/1997	-200	850	20k
	°C	PT1000J ≙ Pt 1000 JIS C1604/1997	-200	850	20k
	°C	NI100 ≙ NI100 DIN 43760	-60	250	20k
	°C	NI200 ≙ NI200 DIN 43760	-60	250	20k
	°C	NI500 ≙ NI500 DIN 43760	-60	250	20k
	°C	NI1000 ≙ NI1000 DIN 43760	-60	250	20k
	°C	NI100S ≙ NI100 SAMA RC21-4-1966	-60	180	20k
	°C	NI200S ≙ NI200 SAMA RC21-4-1966	-60	180	20k
	°C	NI500S ≙ NI500 SAMA RC21-4-1966	-60	180	20k
	°C	NI1000S ≙ NI1000 SAMA RC21-4-1966	-60	180	20k
	°C	NI1000L ≙ NI1000 Landis&Gyr	-50	160	20k
	°C	CU10 ≙ CU10 SAMA RC21-4-1966	-70	500	20k
	°C	CU50 ≙ CU 50 GOST 6651-2009 (α=0.00428)	-50	200	20k
	°C	CU100 ≙ CU 100 GOST 6651-2009 (α=0.00428)	-50	200	20k
	°C	CU53 ≙ CU 53 GOST 6651-2009 (α=0.00426)	-50	180	20k
	°C	KTY81 ≙ KTY81 KTY81-110 (Philips)	-55	150	20k
	°C	KTY84 ≙ KTY81 KTY84-130 (Philips)	-40	300	20k
Thermocouples (TC)	°C	A1G ≙ A-1 GOST 8.585-2001	0	2,500	50k
	°C	A2G ≙ A-2 GOST 8.585-2001	0	1,800	50k
	°C	A3G ≙ A-3 GOST 8.585-2001	0	1,800	50k
	°C	B ≙ B IEC584-1 (Pt30Rh-Pt6Rh)	500	1,820	50k
	°C	C ≙ C ASTM E988	0	2,315	50k
	°C	D ≙ DA ASTM E988(2002)	0	2,315	50k
	°C	E ≙ E IEC584-1 (NiCr-CuNi)	-230	1,000	50k
	°C	J ≙ J IEC584-1(Fe-CuNi)	-210	1,200	50k
	°C	K ≙ K IEC584-1(NiCr-Ni)	-250	1372	50k
	°C	MG ≙ MG GOST 8.585-2001	-200	100	50k
	°C	N ≙ N IEC 584-1 (NiCrSi-NiSi)	-200	1,300	50k
	°C	R ≙ R IEC 584-1 (Pt13Rh-Pt)	-50	1,768	50k
	°C	S ≙ S IEC 584-1 (Pt10Rh-Pt)	-50	1,768	50k
	°C	T ≙ T IEC 584-1 (Cu-CuNi)	-200	400	50k
	°C	L ≙ L DIN 43760 (Fe-CuNi)	-200	900	50k
	°C	LG ≙ LG GOST 8.585-2001	-200	800	50k
	°C	U ≙ U DIN 43760 (Cu-CuNi)	-200	600	50k
Remote resistance-type sensors (R) (2-, 3-, 4-conductor)	Ω	RES12 ≙ Resistance 0…50,000 Ω For more values, visit www.phoenixcontact.com	0	50,000	10% of the selected measuring range
Potentiometers (3-conductor)	Ω	POT12 ≙ Potentiometer 0…50,000 Ω For more values, visit www.phoenixcontact.com	0	50,000	10% of the selected measuring range
Voltage signals (mV)	mV	V04 ≙ Voltage -1,000 mV…+1,000 mV For more values, visit www.phoenixcontact.com	-1,000	1,000	10% of nominal span

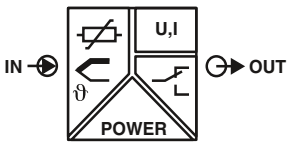
Other setting options can be configured with the IFS-CONF software:

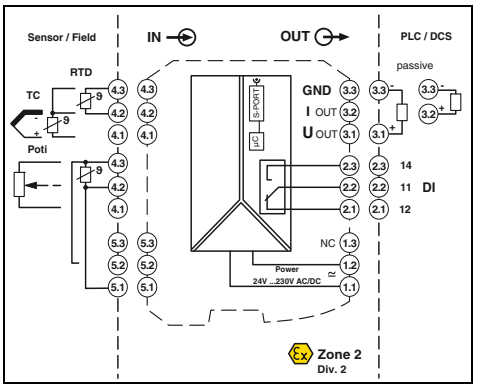
- Freely configurable user characteristic curve with 30 support points
- Output behavior in the event of a short circuit, sensor break or overrange/underrange can be freely configured or set in accordance with NE43 (standard configuration: NE43 upscale)
- Filter setting (standard configuration: 1)
- 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 transducers





Temperature transducer, universal, with switching output, wide range supply

Functional Safety
Ex:
Housing width 17.5 mm

Universal temperature transducers 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)
- 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 of 19.2 to 253 V AC/DC
- Status indicator for supply voltage, cable, sensor, and module errors
- Up to SIL 2 in accordance with 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).

For information on the programming adapter, refer to page 173

Technical data

Input data		
Resistance thermometers		Pt, Ni, Cu sensors: 2-, 3-, 4-conductor
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		-1,000 mV ... 1,000 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	In accordance with 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)	
Maximum 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 (overvoltage category II; degree of pollution 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	Typically 5% ... 95% (non-condensing)	
Inflammability class in accordance with UL 94	V0	
Housing material	PA 6.6-FR	
Dimensions W/H/D	17.5 / 99 / 114.5 mm	
Screw connection rigid / flexible / AWG	0.2 ... 2.5 mm² / 0.2 ... 2.5 mm² / 24 - 14	
Push-in connection rigid / flexible / AWG	0.2 ... 1.5 mm² / 0.2 ... 1.5 mm² / 24 - 16	
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 transducers (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 2811970 ≙ MACX MCR-T-UI-UP-SP-C	ON ≙ Active NONE ≙ Not active ON only with output range = OUT02	See below	2 ≙ 2-conductor 3 ≙ 3-conductor 4 ≙ 4-conductor	0 ≙ Off, e.g., with RTD, R, potentiometer, mV 1 ≙ On, e.g., with TC	See below	See below	C ≙ °C F ≙ °F O ≙ Ω P ≙ % V ≙ mV	OUT15 ≙ 0 ... 5 mA OUT16 ≙ 0 ... 10 mA OUT01 ≙ 0 ... 20 mA OUT15 ≙ 0 ... 5 mA OUT25 ≙ 1 ... 5 mA OUT26 ≙ 2 ... 10 mA OUT02 ≙ 4 ... 20 mA OUT05 ≙ 0 ... 5 V OUT03 ≙ 0 ... 10 V OUT06 ≙ 1 ... 5 V OUT04 ≙ 2 ... 10 V OUT13 ≙ -5 ... +5 V OUT14 ≙ -10 ... +10 V Others can be freely configured in the software	NONE ≙ Without FCC YES ≙ With FCC (a fee is charged) YESPLUS ≙ FCC with 5 measuring points (a fee is charged)

						Smallest measuring range span
Resistance temperature detector (RTD)	PT50	≙ Pt 50 IEC60751	-200	850	°C	20k
	PT100	≙ Pt 100 IEC60751	-200	850	°C	20k
	PT200	≙ Pt 200 IEC60751	-200	850	°C	20k
	PT500	≙ Pt 500 IEC60751	-200	850	°C	20k
	PT1000	≙ Pt 1000 IEC60751	-200	850	°C	20k
	PT2000	≙ Pt 2000 IEC60751	-200	850	°C	20k
	PT5000	≙ Pt 5000 IEC60751	-200	850	°C	20k
	PT50S	≙ PT50 SAMA RC21-4-1966	-200	850	°C	20k
	PT100S	≙ PT100 SAMA RC21-4-1966	-200	850	°C	20k
	PT200S	≙ PT200 SAMA RC21-4-1966	-200	850	°C	20k
	PT500S	≙ PT500 SAMA RC21-4-1966	-200	850	°C	20k
	PT1000S	≙ PT1000 SAMA RC21-4-1966	-200	850	°C	20k
	PT2000S	≙ PT2000 SAMA RC21-4-1966	-200	850	°C	20k
	PT5000S	≙ PT5000 SAMA RC21-4-1966	-200	850	°C	20k
	PT100G	≙ PT100 G GOST 6651-2009 (α=0.00391)	-200	850	°C	20k
	PT200G	≙ PT200 G GOST 6651-2009 (α=0.00391)	-200	850	°C	20k
	PT500G	≙ PT500 G GOST 6651-2009 (α=0.00391)	-200	850	°C	20k
	PT1000G	≙ PT1000 G GOST 6651-2009 (α=0.00391)	-200	850	°C	20k
	PT100J	≙ Pt 100 JIS C1604/1997	-200	850	°C	20k
	PT200J	≙ Pt 200 JIS C1604/1997	-200	850	°C	20k
	PT500J	≙ Pt 500 JIS C1604/1997	-200	850	°C	20k
	PT1000J	≙ Pt 1000 JIS C1604/1997	-200	850	°C	20k
	NI100	≙ NI100 DIN 43760	-60	250	°C	20k
	NI200	≙ NI200 DIN 43760	-60	250	°C	20k
	NI500	≙ NI500 DIN 43760	-60	250	°C	20k
	NI1000	≙ NI1000 DIN 43760	-60	250	°C	20k
	NI100S	≙ NI100 SAMA RC21-4-1966	-60	180	°C	20k
	NI200S	≙ NI200 SAMA RC21-4-1966	-60	180	°C	20k
	NI500S	≙ NI500 SAMA RC21-4-1966	-60	180	°C	20k
	NI1000S	≙ NI1000 SAMA RC21-4-1966	-60	180	°C	20k
	NI1000L	≙ NI1000 Landis&Gyr	-50	160	°C	20k
	CU10	≙ CU10 SAMA RC21-4-1966	-70	500	°C	20k
	CU50	≙ CU 50 GOST 6651-2009 (α=0.00428)	-50	200	°C	20k
	CU100	≙ CU 100 GOST 6651-2009 (α=0.00428)	-50	200	°C	20k
	CU53	≙ CU 53 GOST 6651-2009 (α=0.00426)	-50	180	°C	20k
	KTY81	≙ KTY81 KTY81-110 (Philips)	-55	150	°C	20k
	KTY84	≙ KTY81 KTY84-130 (Philips)	-40	300	°C	20k
Thermocouples (TC)	A1G	≙ A-1 GOST 8.585-2001	0	2,500	°C	50k
	A2G	≙ A-2 GOST 8.585-2001	0	1,800	°C	50k
	A3G	≙ A-3 GOST 8.585-2001	0	1,800	°C	50k
	B	≙ B IEC584-1 (Pt30Rh-Pt6Rh)	500	1,820	°C	50k
	C	≙ C ASTM E988	0	2,315	°C	50k
	D	≙ DA ASTM E988(2002)	0	2,315	°C	50k
	E	≙ E IEC584-1 (NiCr-CuNi)	-230	1,000	°C	50k
	J	≙ J IEC584-1 (Fe-CuNi)	-210	1,200	°C	50k
	K	≙ K IEC584-1(NiCr-Ni)	-250	1,372	°C	50k
	MG	≙ MG GOST 8.585-2001	-200	100	°C	50k
	N	≙ N IEC 584-1 (NiCrSi-NiSi)	-200	1,300	°C	50k
	R	≙ R IEC 584-1 (Pt13Rh-Pt)	-50	1,768	°C	50k
	S	≙ S IEC 584-1 (Pt10Rh-Pt)	-50	1,768	°C	50k
	T	≙ T IEC 584-1 (Cu-CuNi)	-200	400	°C	50k
	L	≙ L DIN 43760 (Fe-CuNi)	-200	900	°C	50k
	LG	≙ LG GOST 8.585-2001	-200	800	°C	50k
	U	≙ U DIN 43760 (Cu-CuNi)	-200	600	°C	50k
Remote resistance-type sensors (R) (2-, 3-, 4-conductor)	RES12	≙ Resistance 0…50,000 Ω For more values, visit www.phoenixcontact.com	0	50,000	Ω	10% of the selected measuring range
Potentiometers (3-conductor)	POT12	≙ Potentiometer 0…50,000 Ω For more values, visit www.phoenixcontact.com	0	50,000	Ω	10% of the selected measuring range
Voltage signals (mV)	V04	≙ Voltage -1,000 mV…+1,000 mV For more values, visit www.phoenixcontact.com	-1,000	1,000	mV	10% of nominal span

Other setting options can be configured with the IFS-CONF software:

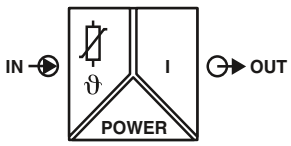
- Freely configurable user characteristic curve with 30 support points
- Output behavior in the event of a short circuit, sensor break or overrange/underrange can be freely configured or set in accordance with NE43 (standard configuration: NE43 upscale)
- Filter setting (standard configuration: 1)
- Restart after failsafe (standard configuration: ON)
- Switching behavior: switching output (limit values, times, etc.) (standard configuration: OFF)

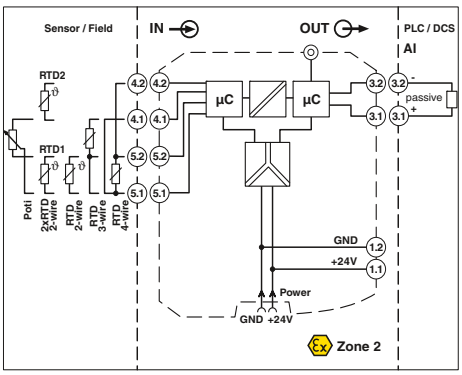
Temperature conversion guide for°C to°F:

$$T\,[°F] = \frac{9}{5} T\,[°C] + 32$$

Temperature, temperature transducers

new





Ex n

SIL IEC 61508

Temperature transducer for resistance thermometers and resistance-type sensors

Housing width 12.5 mm

Programmable temperature transducers for operating resistance thermometers and resistance-type sensors. The measured values are converted into a linear 0 to 20 mA or 4 to 20 mA signal.

- Input for resistance thermometers, potentiometers, and resistance-type sensors
- 0 to 20 mA or 4 to 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
- Installation in zone 2 permitted
- Up to SIL 2 in accordance with IEC 61508

Technical data

Input data		
Resistance thermometers		Pt, Ni, Cu sensors: 2-, 3-, 4-conductor
Resistor		0 Ω ... 50 kΩ
Potentiometer		0 Ω ... 50 kΩ
Cable resistance		≤50 Ω per cable
Sensor input current		10 µA ... 210 µA (up to 2 x 210 µA for 3-conductor)
Measuring range span		≥50 K
Output data		
Output signal		0 mA ... 20 mA / 4 mA ... 20 mA (SIL)
Load		≤600 Ω
Behavior in the event of a sensor error		As per NE 43 or can be freely defined
Output ripple		<15 μA_{PP}
General data		
Supply voltage range		19.2 V DC ... 30 V DC (24 V DC -20%...+25%)
Current draw		≤40 mA (24 V DC)
Power dissipation		≤0.74 W
Temperature coefficient		0.01%/K
Step response (0 - 99%)		Typically 1 s ≤1.7 s
Transmission error, total		0.1% x 1,000 [K]/measuring span
ZERO / SPAN adjustment		± 5% / ± 5%
Electrical isolation		
	Input/output/power supply	300 V_{rms} (rated insulation voltage (overvoltage category II; degree of pollution 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)
Ambient temperature range		-40°C ... 70°C (any mounting position)
Humidity		5% ... 95% (non-condensing)
Status indication		Green LED (supply voltage, PWR) Red LED, flashing 2.4 Hz (cable error, sensor error on input or output, ERR) Red LED, flashing 1.2 Hz (service operation, ERR) Red LED, permanently on (module error, ERR)
Inflammability class in accordance with UL 94		V0
Housing material		PA 6.6-FR
Dimensions W/H/D		12.5 / 112.5 / 114.5 mm
Screw connection rigid / flexible / AWG		0.2 ... 2.5 mm² / 0.2 ... 2.5 mm² / 24 - 14
Push-in connection rigid / flexible / AWG		0.2 ... 1.5 mm² / 0.2 ... 1.5 mm² / 24 - 16
Conformance/approvals		
Conformance		CE-compliant, additionally EN 61326
ATEX		Ex II 3(1) G Ex ec ic [ia Ga] IIC T4 Gc X
IECEx		Ex ec ic [ia Ga] IIC T4 Gc
SIL in accordance with IEC 61508		2

Ordering data

Description	Type	Order No.	Pcs./Pkt.
	MACX MCR-RTD-I	1050192	1
	MACX MCR-RTD-I-SP	1050201	1
	MACX MCR-RTD-I-C	1052472	1
	MACX MCR-RTD-I-SP-C	1052464	1

Accessories

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

Order key for MACX MCR-RTD-I-(SP)-C temperature transducers (standard configuration entered as an example)

Order No.	SIL ON/OF	Sensor type	Measuring unit	Connection technology	Measuring range: Start	Measuring range: End	Output signal	Sliding mean value	Alarm signal, short circuit	Alarm signal, sensor break	Factory calibration certificate
1052472	ON	PT100	C	4	-50	150	OUT02	1	I000	I000	NONE
1052472 ≙ MACX MCR-RTD-I-C 1052464 ≙ MACX MCR-RTD-I-SP-C	ON ≙ Active NONE ≙ Not active ON only with output range = OUT02	See below	Celsius [C] Ω [O] Millivolts [V]	2 ≙ 2-conductor 3 ≙ 3-conductor 4 ≙ 4-conductor	See below	See below	0...20 mA [OUT01] 4...20 mA [OUT02] 0...5 mA [OUT15] 0...10 mA [OUT16] 1...5 mA [OUT25] 2...10 mA [OUT26]	1 - 10	0 mA [I000] 3.5 mA [I035] 21.5 mA [I215]	0 mA [I000] 3.5 mA [I035] 21.5 mA [I215]	NONE ≙ Without FCC YES ≙ With FCC (a fee is charged) YESPLUS ≙ FCC with 5 measuring points (a fee is charged)

						Smallest measuring range span
Resistance temperature detector (RTD)	PT50	≙ Pt 50 IEC60751	°C	-200	850	20k
	PT100	≙ Pt 100 IEC60751	°C	-200	850	20k
	PT200	≙ Pt 200 IEC60751	°C	-200	850	20k
	PT500	≙ Pt 500 IEC60751	°C	-200	850	20k
	PT1000	≙ Pt 1000 IEC60751	°C	-200	850	20k
	PT2000	≙ Pt 2000 IEC60751	°C	-200	850	20k
	PT5000	≙ Pt 5000 IEC60751	°C	-200	850	20k
	PT50S	≙ PT50 SAMA RC21-4-1966	°C	-200	850	20k
	PT100S	≙ PT100 SAMA RC21-4-1966	°C	-200	850	20k
	PT200S	≙ PT200 SAMA RC21-4-1966	°C	-200	850	20k
	PT500S	≙ PT500 SAMA RC21-4-1966	°C	-200	850	20k
	PT1000S	≙ PT1000 SAMA RC21-4-1966	°C	-200	850	20k
	PT2000S	≙ PT2000 SAMA RC21-4-1966	°C	-200	850	20k
	PT5000S	≙ PT5000 SAMA RC21-4-1966	°C	-200	850	20k
	PT100G	≙ PT100 G GOST 6651-2009 (α=0.00391)	°C	-200	850	20k
	PT200G	≙ PT200 G GOST 6651-2009 (α=0.00391)	°C	-200	850	20k
	PT500G	≙ PT500 G GOST 6651-2009 (α=0.00391)	°C	-200	850	20k
	PT1000G	≙ PT1000 G GOST 6651-2009 (α=0.00391)	°C	-200	850	20k
	PT100J	≙ Pt 100 JIS C1604/1997	°C	-200	850	20k
	PT200J	≙ Pt 200 JIS C1604/1997	°C	-200	850	20k
	PT500J	≙ Pt 500 JIS C1604/1997	°C	-200	850	20k
	PT1000J	≙ Pt 1000 JIS C1604/1997	°C	-200	850	20k
	NI100	≙ NI100 DIN 43760	°C	-60	250	20k
	NI200	≙ NI200 DIN 43760	°C	-60	250	20k
	NI500	≙ NI500 DIN 43760	°C	-60	250	20k
	NI1000	≙ NI1000 DIN 43760	°C	-60	250	20k
	NI100S	≙ NI100 SAMA RC21-4-1966	°C	-60	180	20k
	NI200S	≙ NI200 SAMA RC21-4-1966	°C	-60	180	20k
	NI500S	≙ NI500 SAMA RC21-4-1966	°C	-60	180	20k
	NI1000S	≙ NI1000 SAMA RC21-4-1966	°C	-60	180	20k
	NI1000L	≙ NI1000 Landis&Gyr	°C	-50	160	20k
	CU10	≙ CU10 SAMA RC21-4-1966	°C	-70	500	100k
	CU50	≙ CU 50 GOST 6651-2009 (α=0.00428)	°C	-50	200	100k
	CU100	≙ CU 100 GOST 6651-2009 (α=0.00428)	°C	-50	200	100k
	CU53	≙ CU 53 GOST 6651-2009 (α=0.00426)	°C	-50	180	100k
	KTY81	≙ KTY81 KTY81-110 (Philips)	°C	-55	150	20k
	KTY84	≙ KTY81 KTY84-130 (Philips)	°C	-40	300	20k
Remote resistance-type sensors (R) (2-, 3-, 4-conductor)	RES02	≙ Resistance 0…75 Ω	Ω	0	75	10% of the selected measuring range
	RES03	≙ Resistance 0…150 Ω	Ω	0	150	
	RES04	≙ Resistance 0…300 Ω	Ω	0	300	
	RES05	≙ Resistance 0…600 Ω	Ω	0	600	
	RES06	≙ Resistance 0…1,200 Ω	Ω	0	1200	
	RES07	≙ Resistance 0…2,400 Ω	Ω	0	2400	
	RES08	≙ Resistance 0…4,800 Ω	Ω	0	4800	
	RES09	≙ Resistance 0…6,250 Ω	Ω	0	6250	
	RES10	≙ Resistance 0…12,500 Ω	Ω	0	12500	
	RES11	≙ Resistance 0…25,000 Ω	Ω	0	25000	
	RES12	≙ Resistance 0…50,000 Ω	Ω	0	50,000	

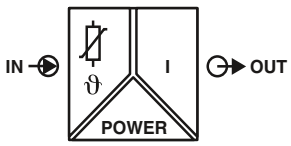
Other setting options can be configured with the IFS-CONF software:

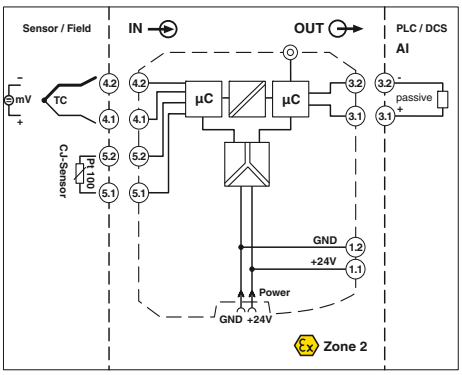
- Freely configurable user characteristic curve with 30 support points
- Output behavior in the event of a short circuit, sensor break or over-range/under-range can be freely configured or set in accordance with NE43 (standard configuration: NE43 upscale)
- Filter setting (standard configuration: 1)
- 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 transducers

new





Ex n

SIL IEC 61508

Temperature transducer for thermocouples

Housing width 12.5 mm

Programmable temperature transducers for operating thermocouples and mV sources. The measured values are converted into a linear 0 to 20 mA or 4 to 20 mA signal.

- Input for thermocouples and mV signals
- 0 to 20 mA or 4 to 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
- Installation in zone 2 permitted
- Up to SIL 2 in accordance with IEC 61508

Technical data

Input data	
Thermocouple sensors	B, E, J, K, N, R, S, T, L, U, C, D, A-1, A-2, A-3, M, Lr
Voltage	-1,000 mV ... 1,000 mV
Measuring range span	Min. 50 K with thermocouple, 10% of the nominal span of the respective range with mV sources
Output data	
Output signal	0 mA ... 20 mA / 4 mA ... 20 mA (SIL)
Load	≤600 Ω
Behavior in the event of a sensor error	As per NE 43 or can be freely defined
Output ripple	<15 μA_{PP}
General data	
Supply voltage range	19.2 V DC ... 30 V DC (24 V DC -20%...+25%)
Current consumption	<40 mA (24 V DC)
Power consumption	≤1 W
Power dissipation	≤0.74 W
Temperature coefficient	0.01%/K
Step response (0 - 99%)	Typically 700 ms ≤1,000 ms
Transmission error, total	0.1% x 600 [K]/measuring span; 0.1% >600 [K]
Cold junction errors	± 1 K
ZERO / SPAN adjustment	± 5% / ± 5%
Electrical isolation	
Input/output/power supply	300 V_{rms} (rated insulation voltage (overvoltage category II; degree of pollution 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)
Ambient temperature range	-40°C ... 70°C (any mounting position)
Humidity	5% ... 95% (non-condensing)
Inflammability class in accordance with UL 94	V0
Housing material	PA 6.6-FR
Dimensions W/H/D	12.5 / 112.5 / 114.5 mm
Screw connection rigid / flexible / AWG	0.2 ... 2.5 mm^2 / 0.2 ... 2.5 mm^2 / 24 - 14
Conformance/approvals	
SIL in accordance with IEC 61508	2

Ordering data

Description	Type	Order No.	Pcs./Pkt.
	MACX MCR-TC-I	1050228	1
	MACX MCR-TC-I-C	1052459	1

Accessories

Programming adapter for configuring modules with S-PORT interface	**IFS-USB-PROG-ADAPTER**	2811271	1
Cold junction compensation connector for thermocouples	**IOA MCR-CJC-PT100**	1085776	1

Order key for MACX MCR-TC-I-C temperature transducers (standard configuration entered as an example)

Order No.	SIL	Sensor type	Measuring unit	Cold junction compensation	Measuring range: Start	Measuring range: End	Output signal	Sliding mean value	Alarm signal, short circuit	Alarm signal, sensor break	Factory calibration certificate
1052459	ON	K	C	ON	-50	150	OUT02	1	I000	I000	NONE
1052459 ≙ MACX MCR-TC-I-C	ON ≙ Active NONE ≙ Not active ON only with output range = OUT02	See below	Celsius [C] Ω [O] Millivolts [V]	ON OFF	See below	See below	0...20 mA [OUT01] 4...20 mA [OUT02] 0...5 mA [OUT15] 0...10 mA [OUT16] 1...5 mA [OUT25] 2...10 mA [OUT26]	1 - 10	0 mA [I000] 3.5 mA [I035] 21.5 mA [I215]	0 mA [I000] 3.5 mA [I035] 21.5 mA [I215]	NONE ≙ Without FCC YES ≙ With FCC (a fee is charged) YESPLUS ≙ FCC with 5 measuring points (a fee is charged)

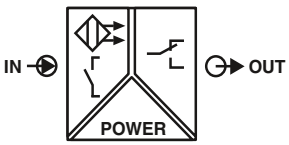
				Output signal	Sliding mean value	Alarm signal, short circuit	Smallest measuring range span
Thermocouples (TC)	A1G	≙	A-1 GOST 8.585-2001	°C	0	2,500	50k
	A2G	≙	A-2 GOST 8.585-2001	°C	0	1,800	50k
	A3G	≙	A-3 GOST 8.585-2001	°C	0	1,800	50k
	B	≙	B IEC584-1 (Pt30Rh-Pt6Rh)	°C	500	1,820	50k
	C	≙	C ASTM E988	°C	0	2,315	50k
	D	≙	DA ASTM E988(2002)	°C	0	2,315	50k
	E	≙	E IEC584-1 (NiCr-CuNi)	°C	-230	1,000	50k
	J	≙	J IEC584-1 (Fe-CuNi)	°C	-210	1,200	50k
	K	≙	K IEC584-1(NiCr-Ni)	°C	-250	1,372	50k
	MG	≙	MG GOST 8.585-2001	°C	-200	100	50k
	N	≙	N IEC 584-1 (NiCrSi-NiSi)	°C	-200	1,300	50k
	R	≙	R IEC 584-1 (Pt13Rh-Pt)	°C	-50	1,768	50k
	S	≙	S IEC 584-1 (Pt10Rh-Pt)	°C	-50	1,768	50k
	T	≙	T IEC 584-1 (Cu-CuNi)	°C	-200	400	50k
	L	≙	L DIN 43760 (Fe-CuNi)	°C	-200	900	50k
	LG	≙	LG GOST 8.585-2001	°C	-200	800	50k
	U	≙	U DIN 43760 (Cu-CuNi)	°C	-200	600	50k
Voltage signals (mV)	V04	≙	Voltage -1,000 mV…+1,000 mV	mV	-1,000	1,000	10% of nominal span
	V05	≙	Voltage -500 mV…+500 mV	mV	-500	500	
	V06	≙	Voltage -250 mV…+250 mV	mV	-250	250	
	V07	≙	Voltage -125 mV…+125 mV	mV	-125	125	
	V08	≙	Voltage -60 mV…+60 mV	mV	-60	60	
	V09	≙	Voltage -30 mV…+30 mV	mV	-30	30	
	V10	≙	Voltage -15 mV…+15 mV	mV	-15	150	

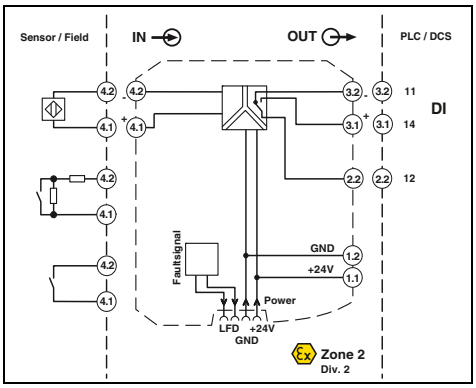
Other setting options can be configured with the IFS-CONF software:

- Freely configurable user characteristic curve with 30 support points
- Output behavior in the event of a short circuit, sensor break or over-range/under-range can be freely configured or set in accordance with 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: $T\,[°F] = \frac{9}{5} \times T\,[°C] + 32$

Digital IN
NAMUR signal conditioners





Ex n

NAMUR signal conditioner, signal output: PDT relay

DNV GL Functional Safety
Ex:
Housing width 12.5 mm

NAMUR signal conditioners 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 and deactivated, error indicated by red flashing led and de-excitation of the 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 in accordance with IEC 61508
- Installation in zone 2 permitted

Notes:

Information about the supply and error evaluation module as well as about the DIN rail connectors and marking material can be found from page 175

Information about resistance circuits is given on page 177

Information on “Plug and play” connection using system cabling can be found from page 170

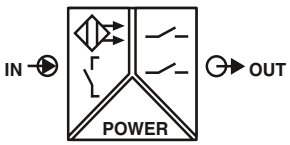
Technical data

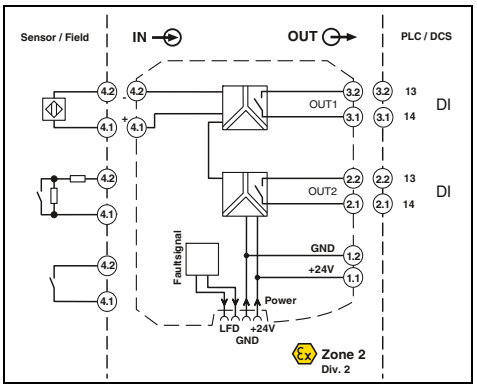
Input data	
Input signal	NAMUR proximity sensors (EN 60947-5-6) open circuit switch contacts Switch contacts with resistance circuit
No-load voltage	~ 8 V DC
Switching points	>2.1 mA (conductive) / <1.2 mA (blocking)
Switching hysteresis	<0.2 mA
Line error detection	Break 0.05 mA <IIN <0.35 mA Short 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)
Maximum 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
Maximum 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
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 (overvoltage category II; degree of pollution 2, safe isolation as per EN 61010-1)) 2.5 kV (50 Hz, 1 min., test voltage)
Output/input, supply, TBUS	300 V_{rms} (rated insulation voltage (overvoltage category III; degree of pollution 2, safe isolation as per EN 61010-1)) 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)
Inflammability class in accordance with UL 94	V0
Housing material	PA 6.6-FR
Dimensions W/H/D	12.5 / 112.5 / 114.5 mm
Screw connection rigid / flexible / AWG	0.2 ... 2.5 mm^2 / 0.2 ... 2.5 mm^2 / 24 - 14
Push-in connection rigid / flexible / AWG	0.2 ... 1.5 mm^2 / 0.2 ... 1.5 mm^2 / 24 - 16
Conformance/approvals	
Conformance	CE-compliant, additionally EN 61326-1
ATEX	II 3 G Ex nA nC IIC T4 Gc X
UL, USA/Canada	UL 508 Listed UL 61010 Listed Class I, Div. 2, Groups A, B, C, D T4 Class I, Zone 2, Group IIC T4
SIL in accordance with IEC 61508	2

Ordering data

Description	Type	Order No.	Pcs./Pkt.
NAMUR signal conditioners			
Screw connection	**MACX MCR-SL-NAM-R**	2865997	1
Push-in connection	**MACX MCR-SL-NAM-R-SP**	2924252	1

Digital IN
NAMUR signal conditioners





Ex n

SIL IEC 61508

NAMUR signal conditioner, 2 signal outputs: N/O relay

DNV GL Functional Safety
Ex:
Housing width 12.5 mm

NAMUR signal conditioners for operating proximity sensors and mechanical contacts

- Input for NAMUR proximity sensors (EN 60947-5-6), floating contacts or contacts with resistance circuit
- 2 relay signal outputs (N/O contact), output 2 can also be used as an error signal output
- Reversible direction of action (operating current or closed-circuit current behavior)
- Line fault detection (LFD) can be activated and deactivated, error indicated by red flashing led and de-excitation of the 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 in accordance with IEC 61508
- Installation in zone 2 permitted

Notes:

Information about the supply and error evaluation module as well as about the DIN rail connectors and marking material can be found from page 175

Information about resistance circuits is given on page 177

Information on “Plug and play” connection using system cabling can be found from page 170

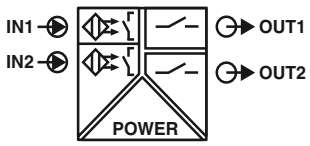
Technical data

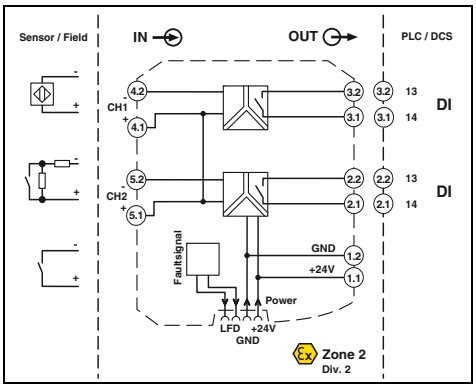
Input data	
Input signal	NAMUR proximity sensors (EN 60947-5-6) open circuit switch contacts Switch contacts with resistance circuit
No-load voltage	~ 8 V DC
Switching points	>2.1 mA (conductive) / <1.2 mA (blocking)
Switching hysteresis	<0.2 mA
Line error detection	Break 0.05 mA <IIN <0.35 mA Short 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)
Maximum 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
Maximum 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
Electrical isolation	
Input/supply, DIN rail connector	300 V_{rms} (rated insulation voltage (overvoltage category II; degree of pollution 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)
Inflammability class in accordance with UL 94	V0
Housing material	PA 6.6-FR
Dimensions W/H/D	12.5 / 112.5 / 114.5 mm
Screw connection rigid / flexible / AWG	0.2 ... 2.5 mm^2 / 0.2 ... 2.5 mm^2 / 24 - 14
Push-in connection rigid / flexible / AWG	0.2 ... 1.5 mm^2 / 0.2 ... 1.5 mm^2 / 24 - 16
Conformance/approvals	
Conformance	CE-compliant, additionally EN 61326-1
ATEX	II 3 G Ex nA nC IIC T4 Gc X
UL, USA/Canada	UL 508 Listed UL 61010 Listed Class I, Div. 2, Groups A, B, C, D T4 Class I, Zone 2, Group IIC T4
SIL in accordance with IEC 61508	2

Ordering data

Description	Type	Order No.	Pcs./Pkt.
NAMUR signal conditioners			
Screw connection	**MACX MCR-SL-NAM-2RO**	2865010	1
Push-in connection	**MACX MCR-SL-NAM-2RO-SP**	2924265	1

Digital IN
NAMUR signal conditioners





Ex n

NAMUR signal conditioner, 2-channel, output: 1 N/O contact per channel

DNV GL Functional Safety
Ex:
Housing width 12.5 mm

NAMUR signal conditioners 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 and deactivated, error indicated by red flashing led and de-excitation of the 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 in accordance with IEC 61508
- Installation in zone 2 permitted

Notes:

Information about the supply and error evaluation module as well as about the DIN rail connectors and marking material can be found from page 175

Information about resistance circuits is given on page 177

Information on “Plug and play” connection using system cabling can be found from page 170

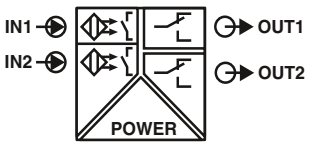
Technical data

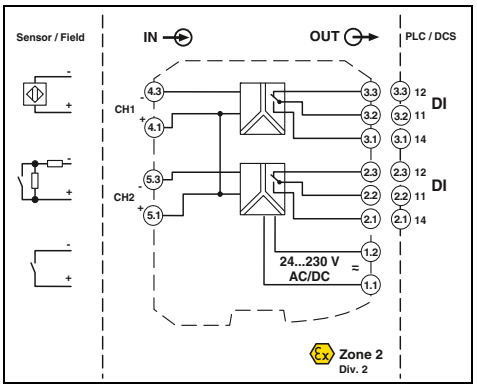
Input data	
Input signal	NAMUR proximity sensors (EN 60947-5-6) open circuit switch contacts Switch contacts with resistance circuit
No-load voltage	~ 8 V DC
Switching points	>2.1 mA (conductive) / <1.2 mA (blocking)
Switching hysteresis	<0.2 mA
Line error detection	Break 0.05 mA <IIN <0.35 mA Short 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)
Maximum 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
Maximum 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
Electrical isolation	
Input/supply, DIN rail connector	300 V_{rms} (rated insulation voltage (overvoltage category II; degree of pollution 2, safe isolation as per EN 61010-1))
Output 1/output 2/input, power supply, DIN rail connector	300 V_{rms} (rated insulation voltage (overvoltage category III; degree of pollution 2, safe isolation as per EN 61010-1))
Ambient temperature range	-20°C ... 60°C (any mounting position)
Humidity	5% ... 95% (non-condensing)
Inflammability class in accordance with UL 94	V0
Housing material	PA 6.6-FR
Dimensions W/H/D	12.5 / 112.5 / 114.5 mm
Screw connection rigid / flexible / AWG	0.2 ... 2.5 mm^2 / 0.2 ... 2.5 mm^2 / 24 - 14
Push-in connection rigid / flexible / AWG	0.2 ... 1.5 mm^2 / 0.2 ... 1.5 mm^2 / 24 - 16
Conformance/approvals	
Conformance	CE-compliant, additionally EN 61326-1
ATEX	II 3 G Ex nA nC IIC T4 Gc X
UL, USA/Canada	UL 508 Listed UL 61010 Listed Class I, Div. 2, Groups A, B, C, D T4 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 conditioners





Ex n

SIL IEC 61508

NAMUR signal conditioner, 2-channel, output: 1 N/O contact per channel, with wide range supply

Functional Safety
Ex:
Housing width 17.5 mm

NAMUR signal conditioners 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 and deactivated, error indicated by red flashing led and de-excitation of the output relay
- Wide-range power supply of 19.2 to 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 in accordance with IEC 61508
- Installation in zone 2 permitted

Notes:

Information on resistance circuits and marking material can be found on page 177

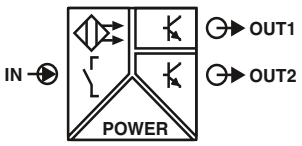
Technical data

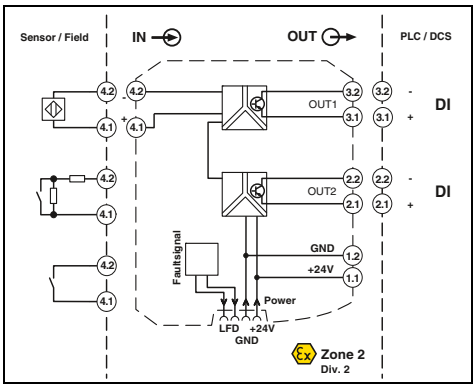
Input data		
Input signal		NAMUR proximity sensors (EN 60947-5-6) open circuit switch contacts Switch contacts with resistance circuit
No-load voltage		~ 8 V DC
Switching points		>2.1 mA (conductive) / <1.2 mA (blocking)
Switching hysteresis		<0.2 mA
Line error detection		Break 0.05 mA <IIN <0.35 mA 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)
Maximum 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
Maximum switching frequency		≤20 Hz (load-dependent)
General data		
Supply voltage range		19.2 V AC/DC ... 253 V AC/DC (24 V AC/DC ... 230 V AC/DC (-20% ... +10%, 50/60 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) 300 V_{rms} (rated insulation voltage (overvoltage category II; degree of pollution 2, safe isolation as per EN 61010-1)) 2.5 kV AC (50 Hz, 1 min., test voltage)
Ambient temperature range		-20°C ... 60°C
Humidity		10% ... 95% (non-condensing)
Inflammability class in accordance with UL 94		V0
Housing material		PA 6.6-FR
Dimensions W/H/D		17.5 / 112.5 / 114.5 mm
Screw connection rigid / flexible / AWG		0.2 ... 2.5 mm² / 0.2 ... 2.5 mm² / 24 - 14
Push-in connection rigid / flexible / AWG		0.2 ... 1.5 mm² / 0.2 ... 1.5 mm² / 24 - 16
Conformance/approvals		
Conformance		CE-compliant, additionally EN 61326-1
ATEX		II 3 G Ex nA nC IIC T4 Gc X
UL, USA/Canada		UL 508 Listed UL 61010 Listed Class I, Div. 2, Groups A, B, C, D T4 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 conditioners





Ex n

**NAMUR signal conditioner:
2 signal outputs: transistor (passive)**

DNV GL Functional Safety
Ex:
Housing width 12.5 mm

NAMUR signal conditioners 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 and deactivated, error indicated by red flashing LED and blocking the 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 in accordance with IEC 61508
- Installation in zone 2 permitted

Notes:

Information about the supply and error evaluation module as well as about the DIN rail connectors and marking material can be found from page 175

Information about resistance circuits is given on page 177

Information on “Plug and play” connection using system cabling can be found from page 170

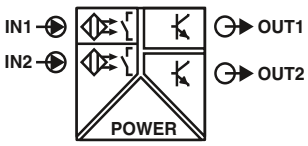
Technical data

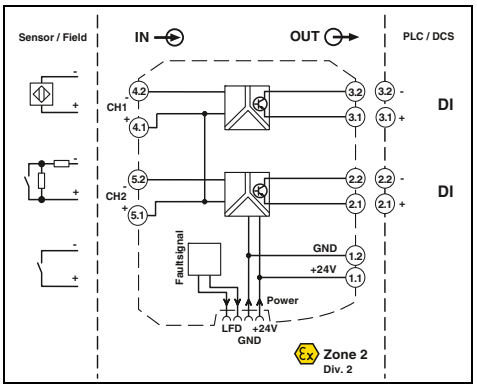
Input data	
Input signal	NAMUR proximity sensors (EN 60947-5-6) open circuit switch contacts Switch contacts with resistance circuit
No-load voltage	~ 8 V DC
Switching points	>2.1 mA (conductive) / <1.2 mA (blocking)
Line error detection	Break 0.05 mA <IIN <0.35 mA Short circuit 100 Ω <RSensor <360 Ω
Switching output	2 transistor outputs, passive
Max. switching voltage	30 V DC
Maximum switching current	50 mA (short-circuit-proof)
Drop (ΔU)	<1.4 V
Switching behavior	Can be inverted using DIP switch
Maximum 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/supply, DIN rail connector	300 V_{rms} (rated insulation voltage (overvoltage category II; degree of pollution 2, safe isolation as per EN 61010-1)) 2.5 kV (50 Hz, 1 min., test voltage)
Output 1/output 2	50 V_{rms} (rated insulation voltage (overvoltage category II; degree of pollution 2, basic insulation as per EN 61010-1)) 1 kV (50 Hz, 1 min., test voltage)
Ambient temperature range	-20°C ... 60°C (any mounting position)
Humidity	10% ... 95% (non-condensing)
Inflammability class in accordance with UL 94	V0
Housing material	PA 6.6-FR
Dimensions W/H/D	12.5 / 112.5 / 114.5 mm
Screw connection rigid / flexible / AWG	0.2 ... 2.5 mm² / 0.2 ... 2.5 mm² / 24 - 14
Push-in connection rigid / flexible / AWG	0.2 ... 1.5 mm² / 0.2 ... 1.5 mm² / 24 - 16
Conformance/approvals	
Conformance	CE-compliant, additionally EN 61326-1
ATEX	II 3 G Ex nA IIC T4 Gc X
UL, USA/Canada	UL 508 Listed UL 61010 Listed Class I, Div. 2, Groups A, B, C, D T4 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 conditioners





Ex n

NAMUR signal conditioner, 2-channel, signal output: transistor (passive)

DNV GL Functional Safety
Ex:
Housing width 12.5 mm

NAMUR signal conditioners 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 and deactivated, error indicated by red flashing LED and blocking the 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 in accordance with IEC 61508
- Installation in zone 2 permitted

Notes:

Information about the supply and error evaluation module as well as about the DIN rail connectors and marking material can be found from page 175

Information about resistance circuits is given on page 177

Information on “Plug and play” connection using system cabling can be found from page 170

Technical data

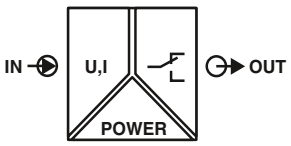
Input data	
Input signal	NAMUR proximity sensors (EN 60947-5-6) open circuit switch contacts Switch contacts with resistance circuit
No-load voltage	~ 8 V DC
Switching points	>2.1 mA (conductive) / <1.2 mA (blocking)
Line error detection	Break 0.05 mA <IIN <0.35 mA Short circuit 100 Ω <RSensor <360 Ω
Switching output	1 transistor output, passive (per channel)
Max. switching voltage	30 V DC
Maximum switching current	50 mA (short-circuit-proof)
Drop (ΔU)	<1.4 V
Switching behavior	Can be inverted using DIP switch
Maximum 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	1,000 mW
Electrical isolation	
Input/output/supply, DIN rail connector	300 V_{rms} (rated insulation voltage (overvoltage category II; degree of pollution 2, safe isolation as per EN 61010-1)) 2.5 kV (50 Hz, 1 min., test voltage)
Output 1/output 2	50 V_{rms} (rated insulation voltage (overvoltage category II; degree of pollution 2, basic insulation as per EN 61010-1)) 1 kV (50 Hz, 1 min., test voltage)
Ambient temperature range	-20°C ... 60°C (any mounting position)
Humidity	10% ... 95% (non-condensing)
Inflammability class in accordance with UL 94	V0
Housing material	PA 6.6-FR
Dimensions W/H/D	12.5 / 112.5 / 114.5 mm
Screw connection rigid / flexible / AWG	0.2 ... 2.5 mm^2 / 0.2 ... 2.5 mm^2 / 24 - 14
Push-in connection rigid / flexible / AWG	0.2 ... 1.5 mm^2 / 0.2 ... 1.5 mm^2 / 24 - 16
Conformance/approvals	
Conformance	CE-compliant, additionally EN 61326
ATEX	II 3 G Ex nA IIC T4 Gc X
UL, USA/Canada	UL 508 Listed UL 61010 Listed Class I, Div. 2, Groups A, B, C, D T4 Class I, Zone 2, Group IIC T4
SIL in accordance with IEC 61508	2

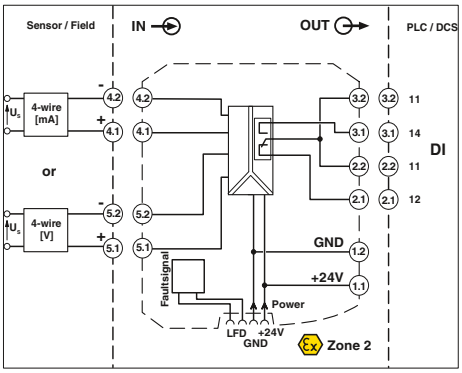
Ordering data

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

Limit values, threshold value switches

new





Ex n

Configurable, with relay PDT output

Ex:

Housing width 12.5 mm

- Input for analog standard current and voltage signals for switching analog limit values
- Safe 3-way isolation
- Configure limit values via DIP switch
- PDT relay at output
- Limiting continuous current up to 6 A
- Energy can be supplied via the DIN rail connector
- Status and error indicator LEDs
- Up to SIL 3 in accordance with IEC 61508
- PLc in accordance with ISO 13849
- Installation in zone 2 possible

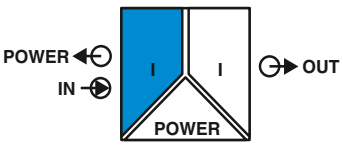
Technical data

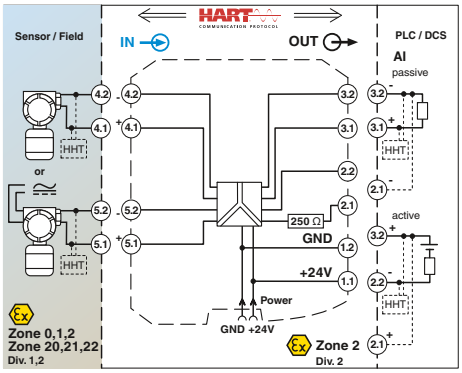
Input data		
Voltage input signal		0.1 V ... 10 V 0.1 V ... 10.5 V (maximum range)
Total error of the voltage input maximum		± 10 mV
Current input signal		0.2 mA ... 20 mA 0.18 mA ... 21 mA (maximum range)
Total error of the current input maximum		± 20 µA
Input resistance	Current/volatge input	<28 Ω / >100 kΩ
Switching points		- / configurable via DIP switch (in 1.25% increments) and potentiometer (linearly up to 2% of the switching threshold set via the DIP switch)
Switching hysteresis		Off: approx. 0.5%, on: approx. 1%
Line error detection		Break U <50 mV, I <0.1 mA Short circuit U >10.8 V, I >21.1 mA
Switching output		Relay output
Contact type		1 PDT
Maximum switching current		≤4 A AC (cos phi = 1)
Mechanical service life		≤10^7 cycles
Switching voltage		≤250 V AC ≤120 V DC
General data		
Supply voltage range		9.6 V DC ... 30 V DC (12 V DC ... 24 V DC (-20% ... +25%))
Current consumption, maximum		90 mA (10 V DC)
Current consumption, typical		38 mA (24 V DC)
Current draw		≤30 mA (30 V DC)
Power consumption		≤1.2 W
Power dissipation		<0.9 W
Temperature coefficient		0.01%/K
Step response (0 - 99%)		≤22 ms
Switching point accuracy		<0.1%
Maximum transmission error		0.1%
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 (overvoltage category II; degree of pollution 2, safe isolation as per EN 61010-1)) 2.5 kV (50 Hz, 1 min., test voltage)
Ambient temperature (operation)		-20°C ... 65°C (any mounting position)
Ambient temperature (storage/transport)		-40°C ... 85°C
Humidity		5% ... 95% (non-condensing)
Altitude		≤2,000 m
Inflammability class in accordance with UL 94		V0
Dimensions W/H/D		12.5 / 99 / 114.5 mm
Conformance/approvals		
Conformance		CE-compliant, additionally EN 61326
ATEX		II 3 G Ex ec nC IIC T4 Gc
UL, USA/Canada		UL applied for
SIL in accordance with IEC 61508		2 (single-channel) 3 (two-channel)

Ordering data

Description	Type	Order No.	Pcs./Pkt.
Screw connection	**MACX MCR-SL-UI-REL**	2906169	1
Spring-cage connection	**MACX MCR-SL-UI-REL-SP**	2906170	1

Analog IN
Repeater power supplies, Ex i





Repeater power supply and input signal conditioner

Functional Safety
Ex: EAC Ex KC-s
Housing width 12.5 mm

Repeater power supply and input signal conditioners for the operation of intrinsically safe (Ex i) 2-conductor measuring transducers, 4-conductor measuring transducers, and mA current sources installed in Ex areas.

- 0/4 to 20 mA input, [Ex ia] (powered or not powered)
- 0/4 to 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 in accordance with IEC 61508
- Installation in zone 2 permitted

Notes:

Information about the supply and error evaluation module as well as about the DIN rail connectors and marking material can be found from page 175

Test plugs for test sockets can be found on page 177

Information on "Plug and play" connection using system cabling can be found from page 170

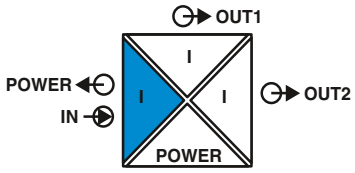
Technical data

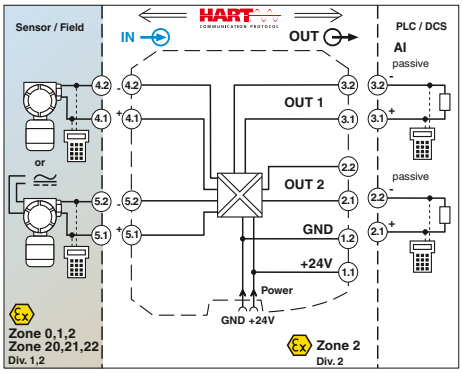
Input data		
Input signal		4 mA ... 20 mA
Transmitter supply voltage		>16 V (20 mA)
Voltage drop		<3.5 V (in input signal conditioner operation)
Output data		
Output signal		4 mA ... 20 mA (active) 4 mA ... 20 mA (14 ... 26 V ext. source voltage)
Load		<1,000 Ω (20 mA)
Output ripple		<20 mV_{rms}
General 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 / 1,000 Ω) ; <55 mA (24 V DC / 20 mA / 250 Ω)
Power dissipation		<1.1 W (24 V DC / 20 mA / 1,000 Ω) <0.95 W (24 V DC / 20 mA / 250 Ω) <1.2 W (24 V DC / 20 mA / 0 Ω)
Temperature coefficient		<0.01%/K
Step response (10-90%)		<200 µs (for jump 4 mA ... 20 mA, load 600 Ω)
Transmission error, typical		<0.05% (of final value)
Maximum transmission error		<0.1% (of final value)
Under-/overload range		In accordance with NE 43
Electrical isolation		
	Input/output/power supply	300 V_{rms} (rated insulation voltage (overvoltage category II; degree of pollution 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)
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
Inflammability class in accordance with UL 94		V0
Housing material		PA 6.6-FR
Dimensions W/H/D		12.5 / 112.5 / 114.5 mm
Screw connection rigid / flexible / AWG		0.2 ... 2.5 mm^2 / 0.2 ... 2.5 mm^2 / 24 - 14
Push-in connection rigid / flexible / AWG		0.2 ... 1.5 mm^2 / 0.2 ... 1.5 mm^2 / 24 - 16
Safety data as per ATEX		
Maximum output voltage Uo		25.2 V
Maximum output current Io		93 mA
Maximum output power Po		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 II (1) D [Ex ia Da] IIIC II 3 (1) G Ex nA [ia Ga] IIC T4 Gc I (M1) [Ex ia Ma] I
IECEx		[Ex ia Ga] IIC, [Ex ia Da] IIIC, Ex nA [ia Ga] IIC T4 Gc
UL, USA/Canada		UL 61010 Listed 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, HART®-transparent, 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 supplies, 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 conditioners for the operation of intrinsically safe (Ex i) 2-conductor measuring transducers, 4-conductor measuring transducers, and mA current sources installed in Ex areas.

- 0/4 to 20 mA input, [Ex ia] (powered or not powered)
- Two electrically isolated outputs, 0/4 to 20 mA (active)
- 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 in accordance with IEC 61508
- PL d in accordance with EN ISO 13849-1
- Installation in zone 2 permitted

Notes:

Information about the supply and error evaluation module as well as about the DIN rail connectors and marking material can be found from page 175

Test plugs for test sockets can be found on page 177

Information on “Plug and play” connection using system cabling can be found from page 170

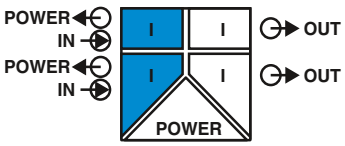
Technical data

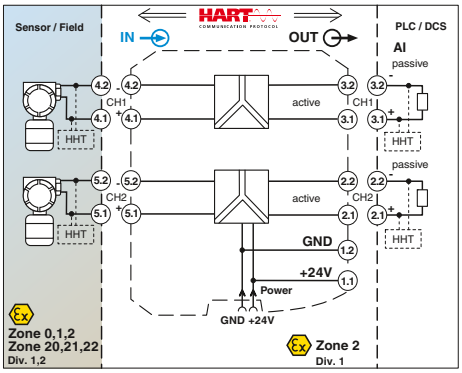
Input data		
Input signal		4 mA ... 20 mA / 0 mA ... 20 mA
Transmitter supply voltage		>16 V (20 mA)
Voltage drop		Approx. 3.9 V (in input signal conditioner operation)
Output data		
Output signal (per output)		4 mA ... 20 mA (output 1 and output 2 active)
Load		<450 Ω (20 mA)
Output ripple		<20 mV_{rms}
General data		
Supply voltage range		19.2 V DC ... 30 V DC (24 V DC -20%...+25%)
Current consumption		<75 mA (24 V DC / 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 jump 4 mA ... 20 mA, typical)
Transmission error, typical		<0.05% (of final value)
Maximum transmission error		<0.1% (of final value)
Under-/overload range		In accordance with NE 43
Electrical isolation		
	Input/output/power supply	300 V_{rms} (rated insulation voltage (overvoltage category II; degree of pollution 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 6.6-FR
Dimensions W/H/D		12.5 / 99 / 114.5 mm
Screw connection rigid / flexible / AWG		0.2 ... 2.5 mm^2 / 0.2 ... 2.5 mm^2 / 24 - 14
Push-in connection rigid / flexible / AWG		0.2 ... 1.5 mm^2 / 0.2 ... 1.5 mm^2 / 24 - 16
Safety data as per ATEX		
Maximum output voltage Uo		25.2 V
Maximum output current Io		93 mA
Maximum output power Po		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 II (1) D [Ex ia Da] IIIC II 3 (1) G Ex nA [ia Ga] IIC T4 Gc
IECEx		[Ex ia Ga] IIC, [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		2

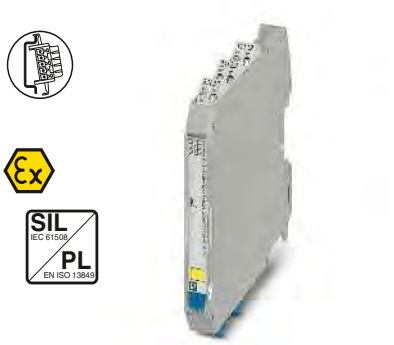
Ordering data

Description	Type	Order No.	Pcs./Pkt.
Repeater power supply, HART®-transparent, 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
With just one HART-transparent output			
Screw connection	**MACX MCR-EX-SL-RPSSI-2I-1S**	2908855	1
Push-in connection	**MACX MCR-EX-SL-RPSSI-2I-1S-SP**	2908856	1

Analog IN
Repeater power supplies, Ex i







2-channel repeater power supply

Functional Safety
Ex: EAC Ex KC-s
Housing width 12.5 mm

Repeater power supply for the operation of intrinsically safe (Ex i) 2-conductor measuring transducers installed in the Ex area.

- 2-channel
- 4 to 20 mA input, [Ex ia] (powered)
- 4 to 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 in accordance with IEC 61508
- PL d in accordance with EN ISO 13849-1
- Installation in zone 2 permitted

Notes:

Information on the supply and error evaluation module, DIN rail connectors, system cabling, and marking material can be found from page 175

Test plugs for test sockets can be found on page 177

Information on "Plug and play" connection using system cabling can be found from page 170

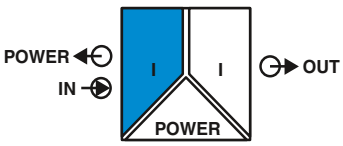
Technical data

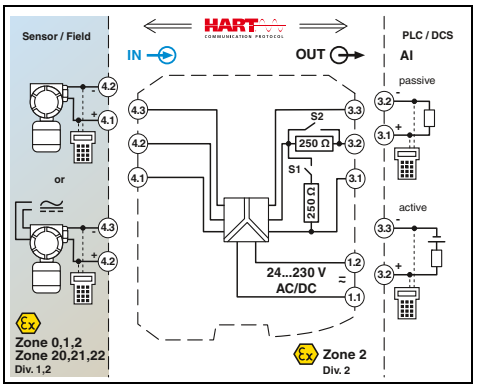
Input data		per channel
Input signal		4 mA ... 20 mA
Transmitter supply voltage		>16 V (20 mA)
Underload/overload signal range		0 mA ... 24 mA
Output data		per channel
Output signal		4 mA ... 20 mA (active)
Load		≤450 Ω (20 mA)
Underload/overload signal range		0 mA ... 24 mA
General data		
Supply voltage 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 (overvoltage category II; degree of pollution 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 6.6-FR
Dimensions W/H/D		12.5 / 99 / 114.5 mm
Screw connection rigid / flexible / AWG		0.2 ... 2.5 mm² / 0.2 ... 2.5 mm² / 24 - 14
Push-in connection rigid / flexible / AWG		0.2 ... 1.5 mm² / 0.2 ... 1.5 mm² / 24 - 16
Safety data as per ATEX		
Maximum output voltage Uo		25.2 V
Maximum output current Io		93 mA
Maximum output power Po		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 II (1) D [Ex ia Da] IIIC II 3(1) G Ex nA [ia Ga] IIC T4 Gc
IECEx		[Ex ia Ga] IIC, [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, HART®-transparent, 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 supplies 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 conditioners for the operation of intrinsically safe (Ex i) 2-conductor measuring transducers, 4-conductor measuring transducers, and mA current sources installed in Ex areas.

- 0/4 to 20 mA input, [Ex ia] (powered or not powered)
- 0/4 to 20 mA output (active or passive), 0/1 to 5 V, can be selected via 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 of 19.2 to 253 V AC/DC
- Up to SIL 2 in accordance with IEC 61508
- Installation in zone 2 permitted

Notes:

Information on marking material can be found on page 178

Test plugs for test sockets can be found on page 177

Technical data

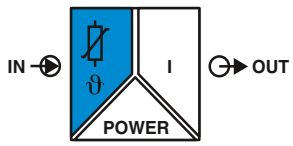
Input data		
Input signal		4 mA ... 20 mA
Transmitter supply voltage		>16 V (20 mA)
Voltage drop		<3.5 V (in input signal conditioner operation)
Output data		
Output signal (configurable using the DIP switch)		4 mA ... 20 mA (active) 4 mA ... 20 mA (14 ... 26 V ext. source voltage) 1 V ... 5 V (internal resistance, 250 Ω, 0.1%) Configurable via DIP switches
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)
Under-/overload range		In accordance with NE 43
Electrical isolation		
	Input/output/power supply	300 V_{rms} (rated insulation voltage (overvoltage category II; degree of pollution 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)
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
Inflammability class in accordance with UL 94		V0
Housing material		PA 6.6-FR
Dimensions W/H/D		17.5 / 99 / 114.5 mm
Screw connection rigid / flexible / AWG		0.2 ... 2.5 mm^2 / 0.2 ... 2.5 mm^2 / 24 - 14
Push-in connection rigid / flexible / AWG		0.2 ... 1.5 mm^2 / 0.2 ... 1.5 mm^2 / 24 - 16
Safety data as per ATEX		
Maximum output voltage Uo		25.2 V
Maximum output current Io		93 mA
Maximum output power Po		587 mW
Maximum voltage U_m		253 V AC/DC (supply terminals) 253 V AC (output terminals) 125 V DC (output terminals)
Conformance/approvals		
Conformance		CE-compliant, additionally EN 61326
ATEX		II (1) G [Ex ia Ga] IIC/IIB II (1) D [Ex ia Da] IIIC 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

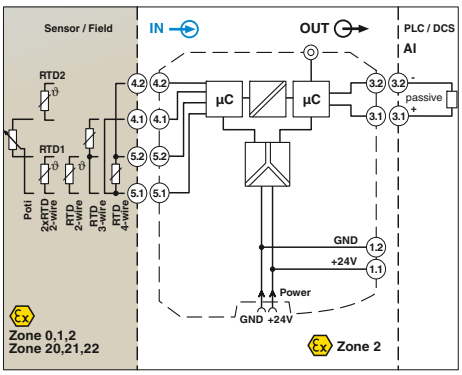
Ordering data

Description	Type	Order No.	Pcs./Pkt.
Repeater power supply, 2-channel, HART®-transparent, 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

Temperature
Temperature transducers, Ex i

new





Temperature transducer for resistance thermometers and resistance-type sensors

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 to 20 mA or 4 to 20 mA signal.

- Input for resistance thermometers and resistance-type sensors, [Ex ia]
- 0 to 20 mA or 4 to 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
- Installation in zone 2 permitted

Technical data

Input data		
Resistance thermometers		Sensors (2-, 3-, 4-conductor)
Resistor		0 Ω ... 50 kΩ
Cable resistance		≤50 Ω per cable
Sensor input current		10 µA ... 210 µA (up to 2 x 210 µA for 3-conductor)
Measuring range span		≥50 K
Output data		
Output signal		0 mA ... 20 mA / 4 mA ... 20 mA (SIL)
Load		≤600 Ω
Behavior in the event of a sensor error		As per NE 43 or can be freely defined
Output ripple		<15 μA_{PP}
General data		
Supply voltage range		19.2 V DC ... 30 V DC (24 V DC -20%...+25%)
Current draw		≤40 mA (24 V DC)
Power dissipation		≤0.74 W
Temperature coefficient		0.01%/K
Step response (0 - 99%)		Typically 1 s ≤1.7 s
Transmission error, total		0.1% x 1,000 [K]/measuring span
ZERO / SPAN adjustment		± 5% / ± 5%
Electrical isolation		
	Input/output/power supply	300 V_{rms} (rated insulation voltage (overvoltage category II; degree of pollution 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)
Ambient temperature range		-40°C ... 70°C (any mounting position)
Humidity		5% ... 95% (non-condensing)
Status indication		Green LED (supply voltage, PWR) Red LED, flashing 2.4 Hz (cable error, sensor error on input or output, ERR) Red LED, flashing 1.2 Hz (service operation, ERR) Red LED, permanently on (module error, ERR)
Inflammability class in accordance with UL 94		V0
Housing material		PA 6.6-FR
Dimensions W/H/D		12.5 / 112.5 / 114.5 mm
Screw connection rigid / flexible / AWG		0.2 ... 2.5 mm^2 / 0.2 ... 2.5 mm^2 / 24 - 14
Push-in connection rigid / flexible / AWG		0.2 ... 1.5 mm^2 / 0.2 ... 1.5 mm^2 / 24 - 16
Safety data as per ATEX		
Maximum output voltage Uo		6 V
Maximum output current Io		16.6 mA
Maximum output power Po		9.7 mW
Conformance/approvals		
Conformance		CE-compliant, additionally EN 61326
ATEX		Ex II (1) G [Ex ia Ga] IIC/IIB Ex II (1) D [Ex ia Da] IIIC Ex II 3(1) G Ex ec ic [ia Ga] IIC T4 Gc X
IECEx		[Ex ia Ga] IIC, [Ex ia Da] IIIC, Ex ec ic [ia Ga] IIC T4 Gc
UL, USA/Canada		-

Ordering data

Description	Type	Order No.	Pcs./Pkt.
Screw connection	**MACX MCR-EX-RTD-I**	1050222	1
Push-in connection	**MACX MCR-EX-RTD-I-SP**	1050252	1
Screw connection	**MACX MCR-EX-RTD-I-C**	1052463	1
Push-in connection	**MACX MCR-EX-RTD-I-SP-C**	1052652	1

Accessories

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

Order key for MACX MCR-EX-RTD-I-(SP)-C temperature transducers (standard configuration entered as an example)

Order No.	SIL ON/OF	Sensor type	Measuring unit	Connection technology	Measuring range: Start	Measuring range: End	Output signal	Sliding mean value	Alarm signal, short circuit	Alarm signal, sensor break	Factory calibration certificate
1052463	ON	PT100	C	4	-50	150	OUT02	1	I000	I000	NONE
1052463 ≙ MACX MCR-EX-RTD-I-C 1052452 ≙ MACX MCR-EX-RTD-I-SP-C	ON ≙ Active NONE ≙ Not active ON only with output range = OUT02	See below	Celsius [C] Ω [O] Millivolts [V]	2 ≙ 2-conductor 3 ≙ 3-conductor 4 ≙ 4-conductor	See below	See below	0...20 mA [OUT01] 4...20 mA [OUT02] 0...5 mA [OUT15] 0...10 mA [OUT16] 1...5 mA [OUT25] 2...10 mA [OUT26]	1 - 10	0 mA [I000] 3.5 mA [I035] 21.5 mA [I215]	0 mA [I000] 3.5 mA [I035] 21.5 mA [I215]	NONE ≙ Without FCC YES ≙ With FCC (a fee is charged) YESPLUS ≙ FCC with 5 measuring points (a fee is charged)

						Smallest measuring range span
Resistance temperature detector (RTD)	PT50	≙ Pt 50 IEC60751	°C	-200	850	20k
	PT100	≙ Pt 100 IEC60751	°C	-200	850	20k
	PT200	≙ Pt 200 IEC60751	°C	-200	850	20k
	PT500	≙ Pt 500 IEC60751	°C	-200	850	20k
	PT1000	≙ Pt 1000 IEC60751	°C	-200	850	20k
	PT2000	≙ Pt 2000 IEC60751	°C	-200	850	20k
	PT5000	≙ Pt 5000 IEC60751	°C	-200	850	20k
	PT50S	≙ PT50 SAMA RC21-4-1966	°C	-200	850	20k
	PT100S	≙ PT100 SAMA RC21-4-1966	°C	-200	850	20k
	PT200S	≙ PT200 SAMA RC21-4-1966	°C	-200	850	20k
	PT500S	≙ PT500 SAMA RC21-4-1966	°C	-200	850	20k
	PT1000S	≙ PT1000 SAMA RC21-4-1966	°C	-200	850	20k
	PT2000S	≙ PT2000 SAMA RC21-4-1966	°C	-200	850	20k
	PT5000S	≙ PT5000 SAMA RC21-4-1966	°C	-200	850	20k
	PT100G	≙ PT100 G GOST 6651-2009 (α=0.00391)	°C	-200	850	20k
	PT200G	≙ PT200 G GOST 6651-2009 (α=0.00391)	°C	-200	850	20k
	PT500G	≙ PT500 G GOST 6651-2009 (α=0.00391)	°C	-200	850	20k
	PT1000G	≙ PT1000 G GOST 6651-2009 (α=0.00391)	°C	-200	850	20k
	PT100J	≙ Pt 100 JIS C1604/1997	°C	-200	850	20k
	PT200J	≙ Pt 200 JIS C1604/1997	°C	-200	850	20k
	PT500J	≙ Pt 500 JIS C1604/1997	°C	-200	850	20k
	PT1000J	≙ Pt 1000 JIS C1604/1997	°C	-200	850	20k
	NI100	≙ NI100 DIN 43760	°C	-60	250	20k
	NI200	≙ NI200 DIN 43760	°C	-60	250	20k
	NI500	≙ NI500 DIN 43760	°C	-60	250	20k
	NI1000	≙ NI1000 DIN 43760	°C	-60	250	20k
	NI100S	≙ NI100 SAMA RC21-4-1966	°C	-60	180	20k
	NI200S	≙ NI200 SAMA RC21-4-1966	°C	-60	180	20k
	NI500S	≙ NI500 SAMA RC21-4-1966	°C	-60	180	20k
	NI1000S	≙ NI1000 SAMA RC21-4-1966	°C	-60	180	20k
	NI1000L	≙ NI1000 Landis&Gyr	°C	-50	160	20k
	CU10	≙ CU10 SAMA RC21-4-1966	°C	-70	500	100k
	CU50	≙ CU 50 GOST 6651-2009 (α=0.00428)	°C	-50	200	100k
	CU100	≙ CU 100 GOST 6651-2009 (α=0.00428)	°C	-50	200	100k
	CU53	≙ CU 53 GOST 6651-2009 (α=0.00426)	°C	-50	180	100k
	KTY81	≙ KTY81 KTY81-110 (Philips)	°C	-55	150	20k
	KTY84	≙ KTY81 KTY84-130 (Philips)	°C	-40	300	20k
Remote resistance-type sensors (R) (2-, 3-, 4-conductor)	RES02	≙ Resistance 0…75 Ω	Ω	0	75	10% of the selected measuring range
	RES03	≙ Resistance 0…150 Ω	Ω	0	150	
	RES04	≙ Resistance 0…300 Ω	Ω	0	300	
	RES05	≙ Resistance 0…600 Ω	Ω	0	600	
	RES06	≙ Resistance 0…1,200 Ω	Ω	0	1200	
	RES07	≙ Resistance 0…2,400 Ω	Ω	0	2400	
	RES08	≙ Resistance 0…4,800 Ω	Ω	0	4800	
	RES09	≙ Resistance 0…6,250 Ω	Ω	0	6250	
	RES10	≙ Resistance 0…12,500 Ω	Ω	0	12500	
	RES11	≙ Resistance 0…25,000 Ω	Ω	0	25000	
	RES12	≙ Resistance 0…50,000 Ω	Ω	0	50,000	

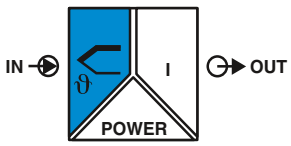
Other setting options can be configured with the IFS-CONF software:

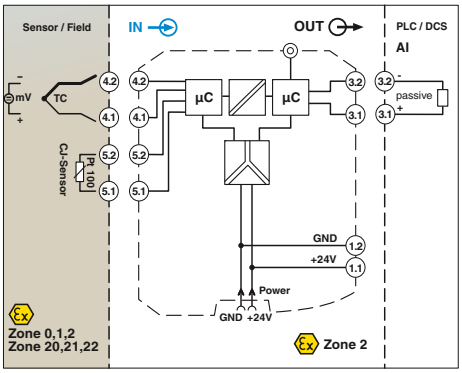
- Freely configurable user characteristic curve with 30 support points
- Output behavior in the event of a short circuit, sensor break or over-range/under-range can be freely configured or set in accordance with NE43 (standard configuration: NE43 upscale)
- Filter setting (standard configuration: 1)
- 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 transducers, Ex i

new





Temperature transducer for thermocouples

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 to 20 mA or 4 to 20 mA signal.

- Input for thermocouples and mV sources, [Ex ia]
- 0 to 20 mA or 4 to 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
- Installation in zone 2 permitted

Technical data

Input data		
Thermocouple sensors		B, E, J, K, N, R, S, T, L, U, C, D, A-1, A-2, A-3, M, Lr
Voltage		-1,000 mV ... 1,000 mV
Measuring range span		Min. 50 K with thermocouple, 10% of the nominal span of the respective range with mV sources
Output data		
Output signal		0 mA ... 20 mA / 4 mA ... 20 mA (SIL)
Load		≤600 Ω
Behavior in the event of a sensor error		As per NE 43 or can be freely defined
Output ripple		<15 μA_{PP}
General data		
Supply voltage range		19.2 V DC ... 30 V DC (24 V DC -20%...+25%)
Current consumption		<40 mA (24 V DC)
Power dissipation		≤0.74 W
Temperature coefficient		0.01%/K
Step response (0 - 99%)		Typically 700 ms ≤1,000 ms
Transmission error, total		0.1%
Cold junction errors		± 1 K
ZERO / SPAN adjustment		± 5% / ± 5%
Electrical isolation		
	Input/output/power supply	300 V_{rms} (rated insulation voltage (overvoltage category II; degree of pollution 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)
Ambient temperature range		-40°C ... 70°C (any mounting position)
Humidity		5% ... 95% (non-condensing)
Status indication		Green LED (supply voltage, PWR) Red LED, flashing 2.4 Hz (cable error, sensor error on input or output, ERR) Red LED, flashing 1.2 Hz (service operation, ERR) Red LED, permanently on (module error, ERR)
Inflammability class in accordance with UL 94		V0
Housing material		PA 6.6-FR
Dimensions W/H/D		12.5 / 112.5 / 114.5 mm
Screw connection rigid / flexible / AWG		0.2 ... 2.5 mm^2 / 0.2 ... 2.5 mm^2 / 24 - 14
Safety data as per ATEX		
Maximum output voltage Uo		6 V
Maximum output current Io		4.3 mA
Maximum output power Po		9.7 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/IIB Ex II (1) D [Ex ia Da] IIIC Ex II 3(1) G Ex ec ic [ia Ga] IIC T4 Gc X
IECEx		[Ex ia Ga] IIC, [Ex ia Da] IIIC, Ex ec ic [ia Ga] IIC T4 Gc
UL, USA/Canada		-

Ordering data

Description	Type	Order No.	Pcs./Pkt.
	MACX MCR-EX-TC-I	1050233	1
	MACX MCR-EX-TC-I-C	1052458	1

Accessories

Programming adapter for configuring modules with S-PORT interface	**IFS-USB-PROG-ADAPTER**	2811271	1
Cold junction compensation connector for thermocouples	**IOA MCR-CJC-PT100**	1085776	1

Order key for MACX MCR-EX-TC-I-C temperature transducers (standard configuration entered as an example)

Order No.	SIL	Sensor type	Measuring unit	Cold junction compensation	Measuring range: Start	Measuring range: End	Output signal	Sliding mean value	Alarm signal, short circuit	Alarm signal, sensor break	Factory calibration certificate
1052458	ON	K	C	ON	-50	150	OUT02	1	I000	I000	NONE
1052458 ≙ MACX MCR-EX-TC-I-C	ON ≙ Active NONE ≙ Not active ON only with output range = OUT02	See below	Celsius [C] Ω [O] Millivolts [V]	ON OFF	See below	See below	0...20 mA [OUT01] 4...20 mA [OUT02] 0...5 mA [OUT15] 0...10 mA [OUT16] 1...5 mA [OUT25] 2...10 mA [OUT26]	1 - 10	0 mA [I000] 3.5 mA [I035] 21.5 mA [I215]	0 mA [I000] 3.5 mA [I035] 21.5 mA [I215]	NONE ≙ Without FCC YES ≙ With FCC (a fee is charged) YESPLUS ≙ FCC with 5 measuring points (a fee is charged)

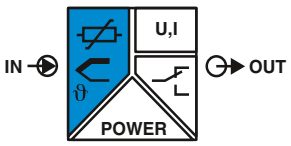
				Output signal	Sliding mean value	Alarm signal, short circuit	Smallest measuring range span
Thermocouples (TC)	A1G	≙	A-1 GOST 8.585-2001	°C	0	2,500	50k
	A2G	≙	A-2 GOST 8.585-2001	°C	0	1,800	50k
	A3G	≙	A-3 GOST 8.585-2001	°C	0	1,800	50k
	B	≙	B IEC584-1 (Pt30Rh-Pt6Rh)	°C	500	1,820	50k
	C	≙	C ASTM E988	°C	0	2,315	50k
	D	≙	DA ASTM E988(2002)	°C	0	2,315	50k
	E	≙	E IEC584-1 (NiCr-CuNi)	°C	-230	1,000	50k
	J	≙	J IEC584-1 (Fe-CuNi)	°C	-210	1,200	50k
	K	≙	K IEC584-1 (NiCr-Ni)	°C	-250	1,372	50k
	MG	≙	MG GOST 8.585-2001	°C	-200	100	50k
	N	≙	N IEC 584-1 (NiCrSi-NiSi)	°C	-200	1,300	50k
	R	≙	R IEC 584-1 (Pt13Rh-Pt)	°C	-50	1,768	50k
	S	≙	S IEC 584-1 (Pt10Rh-Pt)	°C	-50	1,768	50k
	T	≙	T IEC 584-1 (Cu-CuNi)	°C	-200	400	50k
	L	≙	L DIN 43760 (Fe-CuNi)	°C	-200	900	50k
	LG	≙	LG GOST 8.585-2001	°C	-200	800	50k
	U	≙	U DIN 43760 (Cu-CuNi)	°C	-200	600	50k
Voltage signals (mV)	V04	≙	Voltage -1,000 mV…+1,000 mV	mV	-1,000	1,000	10% of nominal span
	V05	≙	Voltage -500 mV…+500 mV	mV	-500	500	
	V06	≙	Voltage -250 mV…+250 mV	mV	-250	250	
	V07	≙	Voltage -125 mV…+125 mV	mV	-125	125	
	V08	≙	Voltage -60 mV…+60 mV	mV	-60	60	
	V09	≙	Voltage -30 mV…+30 mV	mV	-30	30	
	V10	≙	Voltage -15 mV…+15 mV	mV	-15	150	

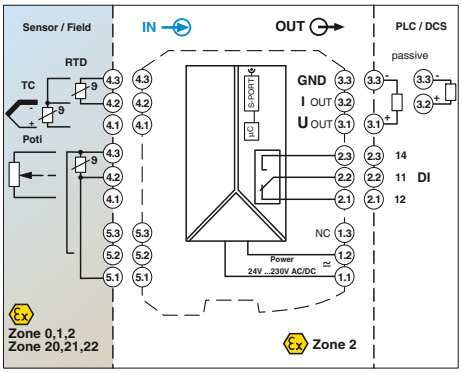
Other setting options can be configured with the IFS-CONF software:

- Freely configurable user characteristic curve with 30 support points
- Output behavior in the event of a short circuit, sensor break or overrange/underrange can be freely configured or set in accordance with 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 transducers, Ex i





Temperature transducer, universal, with switching output, wide range supply

Functional Safety
Ex: EAC Ex KC-s
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)
- 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 of 19.2 to 253 V AC/DC
- Status indicator for supply voltage, cable, sensor, and module errors
- Up to SIL 2 in accordance with IEC 61508
- PL d in accordance with EN ISO 13849-1
- 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).

For information on the programming adapter, refer to page 111

Technical data

Input data		
Resistance thermometers		Pt, Ni, Cu sensors: 2-, 3-, 4-conductor
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		-1,000 mV ... 1,000 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	In accordance with 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)	
Maximum 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 (overvoltage category II; degree of pollution 2, safe isolation as per EN 61010-1))	
Ambient temperature range	-20°C ... 65°C	
Humidity	Typically 5% ... 95% (non-condensing)	
Inflammability class in accordance with UL 94	V0	
Housing material	PA 6.6-FR	
Dimensions W/H/D	17.5 / 99 / 114.5 mm	
Screw connection rigid / flexible / AWG	0.2 ... 2.5 mm² / 0.2 ... 2.5 mm² / 24 - 14	
Push-in connection rigid / flexible / AWG	0.2 ... 1.5 mm² / 0.2 ... 1.5 mm² / 24 - 16	
Safety data as per ATEX		
Maximum output voltage Uo	6 V	
Maximum output current Io	7.4 mA	
Maximum output power Po	11 mW	
Conformance/approvals		
Conformance	CE-compliant	
ATEX	II (1) G [Ex ia Ga] IIC II (1) D [Ex ia Da] IIIC 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 transducers (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 2924692 ≙ MACX MCR-EX-T-UI-UP-SP-C	ON ≙ Active NONE ≙ Not active ON only with output range = OUT02	See below	2 ≙ 2-conductor 3 ≙ 3-conductor 4 ≙ 4-conductor	0 ≙ Off, e.g., with RTD, R, potentiometer, mV 1 ≙ On, e.g., with TC	See below	See below	C ≙ °C F ≙ °F O ≙ Ω P ≙ % V ≙ mV	OUT15 ≙ 0 ... 5 mA OUT16 ≙ 0 ... 10 mA OUT01 ≙ 0 ... 20 mA OUT15 ≙ 0 ... 5 mA OUT25 ≙ 1 ... 5 mA OUT26 ≙ 2 ... 10 mA OUT02 ≙ 4 ... 20 mA OUT05 ≙ 0 ... 5 V OUT03 ≙ 0 ... 10 V OUT06 ≙ 1 ... 5 V OUT04 ≙ 2 ... 10 V OUT13 ≙ -5 ... +5 V OUT14 ≙ -10 ... +10 V Others can be freely configured in the software	NONE ≙ Without FCC YES ≙ With FCC (a fee is charged) YESPLUS ≙ FCC with 5 measuring points (a fee is charged)

						Smallest measuring range span
Resistance temperature detector (RTD)	PT50	≙ Pt 50 IEC60751	-200	850	°C	20k
	PT100	≙ Pt 100 IEC60751	-200	850	°C	20k
	PT200	≙ Pt 200 IEC60751	-200	850	°C	20k
	PT500	≙ Pt 500 IEC60751	-200	850	°C	20k
	PT1000	≙ Pt 1000 IEC60751	-200	850	°C	20k
	PT2000	≙ Pt 2000 IEC60751	-200	850	°C	20k
	PT5000	≙ Pt 5000 IEC60751	-200	850	°C	20k
	PT50S	≙ PT50 SAMA RC21-4-1966	-200	850	°C	20k
	PT100S	≙ PT100 SAMA RC21-4-1966	-200	850	°C	20k
	PT200S	≙ PT200 SAMA RC21-4-1966	-200	850	°C	20k
	PT500S	≙ PT500 SAMA RC21-4-1966	-200	850	°C	20k
	PT1000S	≙ PT1000 SAMA RC21-4-1966	-200	850	°C	20k
	PT2000S	≙ PT2000 SAMA RC21-4-1966	-200	850	°C	20k
	PT5000S	≙ PT5000 SAMA RC21-4-1966	-200	850	°C	20k
	PT100G	≙ PT100 G GOST 6651-2009 (α=0.00391)	-200	850	°C	20k
	PT200G	≙ PT200 G GOST 6651-2009 (α=0.00391)	-200	850	°C	20k
	PT500G	≙ PT500 G GOST 6651-2009 (α=0.00391)	-200	850	°C	20k
	PT1000G	≙ PT1000 G GOST 6651-2009 (α=0.00391)	-200	850	°C	20k
	PT100J	≙ Pt 100 JIS C1604/1997	-200	850	°C	20k
	PT200J	≙ Pt 200 JIS C1604/1997	-200	850	°C	20k
	PT500J	≙ Pt 500 JIS C1604/1997	-200	850	°C	20k
	PT1000J	≙ Pt 1000 JIS C1604/1997	-200	850	°C	20k
	NI100	≙ NI100 DIN 43760	-60	250	°C	20k
	NI200	≙ NI200 DIN 43760	-60	250	°C	20k
	NI500	≙ NI500 DIN 43760	-60	250	°C	20k
	NI1000	≙ NI1000 DIN 43760	-60	250	°C	20k
	NI100S	≙ NI100 SAMA RC21-4-1966	-60	180	°C	20k
	NI200S	≙ NI200 SAMA RC21-4-1966	-60	180	°C	20k
	NI500S	≙ NI500 SAMA RC21-4-1966	-60	180	°C	20k
	NI1000S	≙ NI1000 SAMA RC21-4-1966	-60	180	°C	20k
	NI1000L	≙ NI1000 Landis&Gyr	-50	160	°C	20k
	CU10	≙ CU10 SAMA RC21-4-1966	-70	500	°C	20k
	CU50	≙ CU 50 GOST 6651-2009 (α=0.00428)	-50	200	°C	20k
	CU100	≙ CU 100 GOST 6651-2009 (α=0.00428)	-50	200	°C	20k
	CU53	≙ CU 53 GOST 6651-2009 (α=0.00426)	-50	180	°C	20k
	KTY81	≙ KTY81 KTY81-110 (Philips)	-55	150	°C	20k
	KTY84	≙ KTY81 KTY84-130 (Philips)	-40	300	°C	20k
Thermocouples (TC)	A1G	≙ A-1 GOST 8.585-2001	0	2,500	°C	50k
	A2G	≙ A-2 GOST 8.585-2001	0	1,800	°C	50k
	A3G	≙ A-3 GOST 8.585-2001	0	1,800	°C	50k
	B	≙ B IEC584-1 (Pt30Rh-Pt6Rh)	500	1,820	°C	50k
	C	≙ C ASTM E988	0	2,315	°C	50k
	D	≙ DA ASTM E988(2002)	0	2,315	°C	50k
	E	≙ E IEC584-1 (NiCr-CuNi)	-230	1,000	°C	50k
	J	≙ J IEC584-1 (Fe-CuNi)	-210	1,200	°C	50k
	K	≙ K IEC584-1 (NiCr-Ni)	-250	1,372	°C	50k
	MG	≙ MG GOST 8.585-2001	-200	100	°C	50k
	N	≙ N IEC 584-1 (NiCrSi-NiSi)	-200	1,300	°C	50k
	R	≙ R IEC 584-1 (Pt13Rh-Pt)	-50	1,768	°C	50k
	S	≙ S IEC 584-1 (Pt10Rh-Pt)	-50	1,768	°C	50k
	T	≙ T IEC 584-1 (Cu-CuNi)	-200	400	°C	50k
	L	≙ L DIN 43760 (Fe-CuNi)	-200	900	°C	50k
	LG	≙ LG GOST 8.585-2001	-200	800	°C	50k
	U	≙ U DIN 43760 (Cu-CuNi)	-200	600	°C	50k
Remote resistance-type sensors (R) (2-, 3-, 4-conductor)	RES12	≙ Resistance 0…50,000 Ω For more values, visit www.phoenixcontact.com	0	50,000	Ω	10% of the selected measuring range
Potentiometers (3-conductor)	POT12	≙ Potentiometer 0…50,000 Ω For more values, visit www.phoenixcontact.com	0	50,000	Ω	10% of the selected measuring range
Voltage signals (mV)	V04	≙ Voltage -1,000 mV…+1,000 mV For more values, visit www.phoenixcontact.com	-1,000	1,000	mV	10% of nominal span

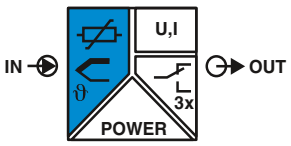
Other setting options can be configured with the IFS-CONF software:

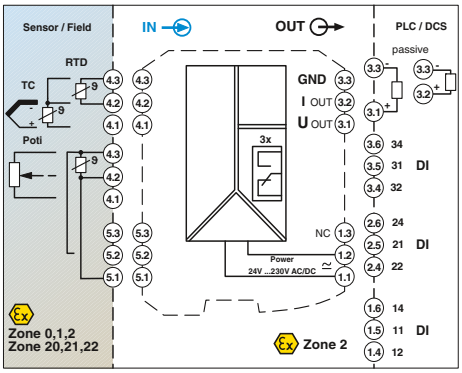
- Freely configurable user characteristic curve with 30 support points
- Output behavior in the event of a short circuit, sensor break or overrange/underrange can be freely configured or set in accordance with NE43 (standard configuration: NE43 upscale)
- Filter setting (standard configuration: 1)
- 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 transducers, Ex i





Temperature transducer, universal, with three limit value relays, wide range supply

Functional Safety
Ex: EAC 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)
- 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 of 19.2 to 253 V AC/DC
- Status indicator for supply voltage, cable, sensor, and module errors
- Up to SIL 2 in accordance with IEC 61508
- PL d in accordance with EN ISO 13849-1
- Installation in zone 2 permitted

Notes:

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

For information on the programming adapter, refer to page 173

Technical data

Input data		
Resistance thermometers		Pt, Ni, Cu sensors: 2-, 3-, 4-conductor
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		-1,000 mV ... 1,000 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	In accordance with 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)	
Maximum 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 (overvoltage category II; degree of pollution 2, safe isolation as per EN 61010-1))	
Ambient temperature range	-20°C ... 65°C	
Humidity	Typically 5% ... 95% (non-condensing)	
Inflammability class in accordance with UL 94	V0	
Housing material	PA 6.6-FR	
Dimensions W/H/D	35 / 99 / 114.5 mm	
Screw connection rigid / flexible / AWG	0.2 ... 2.5 mm² / 0.2 ... 2.5 mm² / 24 - 14	
Push-in connection rigid / flexible / AWG	0.2 ... 1.5 mm² / 0.2 ... 1.5 mm² / 24 - 16	
Safety data as per ATEX		
Maximum output voltage Uo	6 V	
Maximum output current Io	7.4 mA	
Maximum output power Po	11 mW	
Conformance/approvals		
Conformance	CE-compliant	
ATEX	II (1) G [Ex ia Ga] IIC II (1) D [Ex ia Da] IIIC 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
Order configuration	Screw connection	**MACX MCR-EX-T-UIREL-UP-C**	2865722	1
Order configuration	Push-in connection	**MACX MCR-EX-T-UIREL-UP-SP-C**	2924809	1

Accessories

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

Order key for MACX MCR-EX-T-UIREL-UP(-SP)-C temperature transducers (standard configuration entered as an example)

Order No.	SIL	Measuring unit	Sensor type	Connection technology	Measuring range: Start	Measuring range: End	Output signal	Switching function 1	Lower switching point 1	Upper switching point 1	Switching function 2	Lower switching point 2	Upper switching point 2	Factory calibration certificate
2865722	ON	C	PT100	4	-50	150	OUT02	0	99999	99999	0	99999	99999	NONE
2865722 ≙ MACX MCR-EX-T-UIREL-UP-C 2924809 ≙ MACX MCR-EX-T-UIREL-UP-SP-C	ON ≙ Active NONE ≙ Not active ON only with output range = OUT02	Celsius [C] Ω [O] Millivolts [V]	See below	2 ≙ 2-conductor 3 ≙ 3-conductor 4 ≙ 4-conductor	See below	See below	0...20 mA [OUT01] 4...20 mA [OUT02] 0...10 V [OUT03] 2...10 V [OUT04] 0...5 V [OUT05] 1...5 V [OUT06] -5...+5 V [OUT13] -10...+10 V [OUT14] 0...5 mA [OUT15] 0...10 mA [OUT16] 1...5 mA [OUT25] 2...10 mA [OUT26]	L [0] H [1] L → SPH → H [2] H → SPH → L [3] L → SPH → H → SPL → L [4] H → SPH → L → SPL → H [5] L → SPL → H → SPH → L [6] H → SPL → L → SPH → H [7]	Free input, see web site for more	Free input, see web site for more		Free input, see web site for more	Free input, see web site for more	NONE ≙ Without FCC YES ≙ With FCC (a fee is charged) YESPLUS ≙ FCC with 5 measuring points (a fee is charged)

					Smallest measuring range span
Resistance temperature detector (RTD)	°C	PT50 ≙ Pt 50 IEC60751	-200	850	20k
	°C	PT100 ≙ Pt 100 IEC60751	-200	850	20k
	°C	PT200 ≙ Pt 200 IEC60751	-200	850	20k
	°C	PT500 ≙ Pt 500 IEC60751	-200	850	20k
	°C	PT1000 ≙ Pt 1000 IEC60751	-200	850	20k
	°C	PT2000 ≙ Pt 2000 IEC60751	-200	850	20k
	°C	PT5000 ≙ Pt 5000 IEC60751	-200	850	20k
	°C	PT50S ≙ PT50 SAMA RC21-4-1966	-200	850	20k
	°C	PT100S ≙ PT100 SAMA RC21-4-1966	-200	850	20k
	°C	PT200S ≙ PT200 SAMA RC21-4-1966	-200	850	20k
	°C	PT500S ≙ PT500 SAMA RC21-4-1966	-200	850	20k
	°C	PT1000S ≙ PT1000 SAMA RC21-4-1966	-200	850	20k
	°C	PT2000S ≙ PT2000 SAMA RC21-4-1966	-200	850	20k
	°C	PT5000S ≙ PT5000 SAMA RC21-4-1966	-200	850	20k
	°C	PT100G ≙ PT100 G GOST 6651-2009 (α=0,00391)	-200	850	20k
	°C	PT200G ≙ PT200 G GOST 6651-2009 (α=0,00391)	-200	850	20k
	°C	PT500G ≙ PT500 G GOST 6651-2009 (α=0,00391)	-200	850	20k
	°C	PT1000G ≙ PT1000 G GOST 6651-2009 (α=0,00391)	-200	850	20k
	°C	PT100J ≙ Pt 100 JIS C1604/1997	-200	850	20k
	°C	PT200J ≙ Pt 200 JIS C1604/1997	-200	850	20k
	°C	PT500J ≙ Pt 500 JIS C1604/1997	-200	850	20k
	°C	PT1000J ≙ Pt 1000 JIS C1604/1997	-200	850	20k
	°C	NI100 ≙ NI100 DIN 43760	-60	250	20k
	°C	NI200 ≙ NI200 DIN 43760	-60	250	20k
	°C	NI500 ≙ NI500 DIN 43760	-60	250	20k
	°C	NI1000 ≙ NI1000 DIN 43760	-60	250	20k
	°C	NI100S ≙ NI100 SAMA RC21-4-1966	-60	180	20k
	°C	NI200S ≙ NI200 SAMA RC21-4-1966	-60	180	20k
	°C	NI500S ≙ NI500 SAMA RC21-4-1966	-60	180	20k
	°C	NI1000S ≙ NI1000 SAMA RC21-4-1966	-60	180	20k
	°C	NI1000L ≙ NI1000 Landis&Gyr	-50	160	20k
	°C	CU10 ≙ CU10 SAMA RC21-4-1966	-70	500	20k
	°C	CU50 ≙ CU 50 GOST 6651-2009 (α=0,00428)	-50	200	20k
	°C	CU100 ≙ CU 100 GOST 6651-2009 (α=0,00428)	-50	200	20k
	°C	CU53 ≙ CU 53 GOST 6651-2009 (α=0,00426)	-50	180	20k
	°C	KTY81 ≙ KTY81 KTY81-110 (Philips)	-55	150	20k
	°C	KTY84 ≙ KTY81 KTY84-130 (Philips)	-40	300	20k
Thermocouples (TC)	°C	A1G ≙ A-1 GOST 8.585-2001	0	2,500	50k
	°C	A2G ≙ A-2 GOST 8.585-2001	0	1,800	50k
	°C	A3G ≙ A-3 GOST 8.585-2001	0	1,800	50k
	°C	B ≙ B IEC584-1 (Pt30Rh-Pt6Rh)	500	1,820	50k
	°C	C ≙ C ASTM E988	0	2,315	50k
	°C	D ≙ DA ASTM E988(2002)	0	2,315	50k
	°C	E ≙ E IEC584-1 (NiCr-CuNi)	-230	1,000	50k
	°C	J ≙ J IEC584-1 (Fe-CuNi)	-210	1,200	50k
	°C	K ≙ K IEC584-1 (NiCr-Ni)	-250	1,372	50k
	°C	MG ≙ MG GOST 8.585-2001	-200	100	50k
	°C	N ≙ N IEC 584-1 (NiCrSi-NiSi)	-200	1,300	50k
	°C	R ≙ R IEC 584-1 (Pt13Rh-Pt)	-50	1,768	50k
	°C	S ≙ S IEC 584-1 (Pt10Rh-Pt)	-50	1,768	50k
	°C	T ≙ T IEC 584-1 (Cu-CuNi)	-200	400	50k
	°C	L ≙ L DIN 43760 (Fe-CuNi)	-200	900	50k
	°C	LG ≙ LG GOST 8.585-2001	-200	800	50k
	°C	U ≙ U DIN 43760 (Cu-CuNi)	-200	600	50k
Remote resistance-type sensors (R) (2-, 3-, 4-conductor)	Ω	RES12 ≙ Resistance 0…50,000 Ω For more values, visit www.phoenixcontact.com	0	50,000	10% of the selected measuring range
Potentiometers (3-conductor)	Ω	POT12 ≙ Potentiometer 0…50,000 Ω For more values, visit www.phoenixcontact.com	0	50,000	10% of the selected measuring range
Voltage signals (mV)	mV	V04 ≙ Voltage -1,000 mV…+1,000 mV For more values, visit www.phoenixcontact.com	-1,000	1,000	10% of nominal span

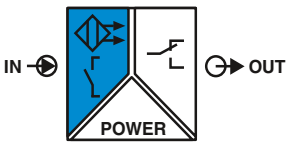
Other setting options can be configured with the IFS-CONF software:

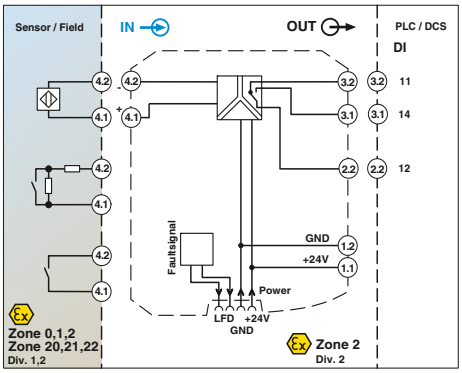
- Freely configurable user characteristic curve with 30 support points
- Output behavior in the event of a short circuit, sensor break or overrange/underrange can be freely configured or set in accordance with NE43 (standard configuration: NE43 upscale)
- Filter setting (standard configuration: 1)
- Restart after failsafe (standard configuration: ON)
- Switching behavior: switching output (limit values, times, etc.) (standard configuration: OFF)

Temperature conversion guide for°C to°F:

$$T\,[°F] = \frac{9}{5} T\,[°C] + 32$$

Digital IN
NAMUR signal conditioners, Ex i





NAMUR signal conditioner, signal output: PDT relay

DNV GL Functional Safety
Ex: EAC Ex IECEx KC-s
Housing width 12.5 mm

NAMUR signal conditioners 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 and deactivated, error indicated by red flashing led and de-excitation of the 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 in accordance with IEC 61508
- Installation in zone 2 permitted

Notes:

Information about the supply and error evaluation module as well as about the DIN rail connectors and marking material can be found from page 175

Information about resistance circuits is given on page 177

Information on “Plug and play” connection using system cabling can be found from page 170

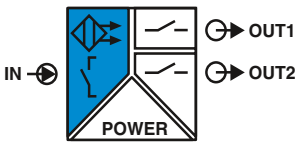
Technical data

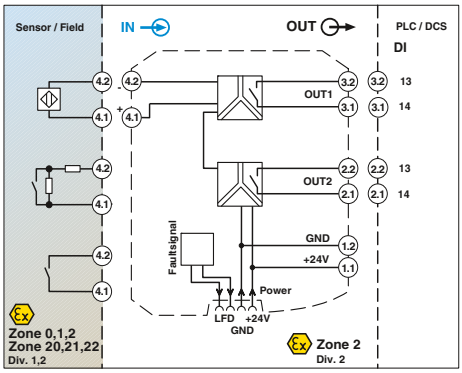
Input data	
Input signal	NAMUR proximity sensors (IEC/EN 60947-5-6) Floating switch contacts Switch contacts with resistance circuit
No-load voltage	~ 8 V DC
Switching points	>2.1 mA (conductive) / <1.2 mA (blocking)
Switching hysteresis	<0.2 mA
Line error detection	Break 0.05 mA <IIN <0.35 mA Short 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)
Maximum 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
Maximum 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 (overvoltage category II; degree of pollution 2, safe isolation as per EN 61010-1)) 2.5 kV (50 Hz, 1 min., test voltage)
Output/input, supply, TBUS	300 V_{rms} (rated insulation voltage (overvoltage category III; degree of pollution 2, safe isolation as per EN 61010-1)) 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) LED yellow (switching state) Red LED (line errors)
Inflammability class in accordance with UL 94	V0
Dimensions W/H/D	12.5 / 99 / 114.5 mm
Screw connection rigid / flexible / AWG	0.2 ... 2.5 mm^2 / 0.2 ... 2.5 mm^2 / 24 - 14
Push-in connection rigid / flexible / AWG	0.2 ... 1.5 mm^2 / 0.2 ... 1.5 mm^2 / 24 - 16
Safety data as per ATEX	
Maximum output voltage Uo	9.6 V
Maximum output current Io	10 mA
Maximum output power Po	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 II (1) D [Ex ia Da] IIIC II 3 (1) G Ex nA nC [ia Ga] IIC T4 Gc
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 UL 61010 Listed
SIL in accordance with IEC 61508	2

Ordering data

Description	Type	Order No.	Pcs./Pkt.
NAMUR signal conditioner, 1-channel, input intrinsically safe, 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 conditioners, Ex i





NAMUR signal conditioner: 2 signal outputs: N/O relay

DNV GL Functional Safety
Ex: EAC Ex KC-s
Housing width 12.5 mm

NAMUR signal conditioners 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 relay signal outputs (N/O contact), output 2 can also be used as an error signal output
- Reversible direction of action (operating current or closed-circuit current behavior)
- Line fault detection (LFD) can be activated and deactivated, error indicated by red flashing led and de-excitation of the 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 in accordance with IEC 61508
- Installation in zone 2 permitted

Notes:

Information about the supply and error evaluation module as well as about the DIN rail connectors and marking material can be found from page 175

Information about resistance circuits is given on page 177

Information on “Plug and play” connection using system cabling can be found from page 170

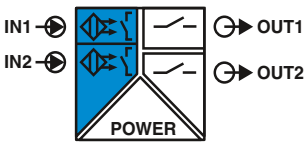
Technical data

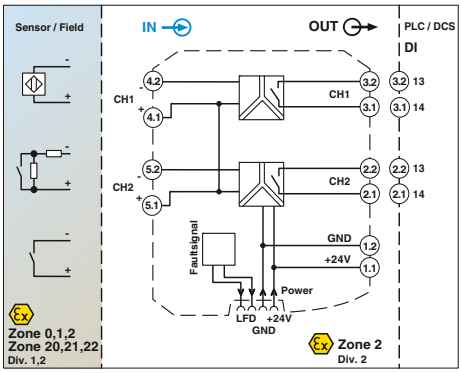
Input data	
Input signal	NAMUR proximity sensors (EN 60947-5-6) Floating switch contacts Switch contacts with resistance circuit
No-load voltage	~ 8 V DC
Switching points	>2.1 mA (conductive) / <1.2 mA (blocking)
Switching hysteresis	<0.2 mA
Line error detection	Break 0.05 mA <IIN <0.35 mA Short circuit 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)
Maximum 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
Maximum 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
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) 300 V_{rms} (rated insulation voltage (overvoltage category II; degree of pollution 2, safe isolation as per EN 61010-1))
Output 1/output 2/input, power supply, DIN rail connector	300 V_{rms} (rated insulation voltage (overvoltage category III; degree of pollution 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) LED yellow (switching state) Red LED (line errors)
Inflammability class in accordance with UL 94	V0
Dimensions W/H/D	12.5 / 99 / 114.5 mm
Screw connection rigid / flexible / AWG	0.2 ... 2.5 mm^2 / 0.2 ... 2.5 mm^2 / 24 - 14
Push-in connection rigid / flexible / AWG	0.2 ... 1.5 mm^2 / 0.2 ... 1.5 mm^2 / 24 - 16
Safety data as per ATEX	
Maximum output voltage Uo	9.6 V
Maximum output current Io	10 mA
Maximum output power Po	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 II (1) D [Ex ia Da] IIIC II 3 (1) G Ex nA nC [ia Ga] IIC T4 Gc
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 UL 61010 Listed
SIL in accordance with IEC 61508	2

Ordering data

Description	Type	Order No.	Pcs./Pkt.
NAMUR signal conditioner, 1-channel, input intrinsically safe, 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 conditioners, Ex i





NAMUR signal conditioner, 2-channel, signal output: N/O relay

DNV GL Functional Safety
Ex: EAC Ex IECEx KC-s
Housing width 12.5 mm

NAMUR signal conditioners 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 and deactivated, error indicated by red flashing led and de-excitation of the 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 in accordance with IEC 61508
- Installation in zone 2 permitted

Notes:

Information about the supply and error evaluation module as well as about the DIN rail connectors and marking material can be found from page 175

Information about resistance circuits is given on page 177

Information on “Plug and play” connection using system cabling can be found from page 170

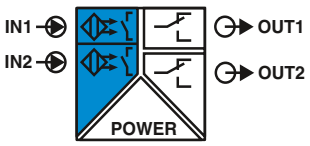
Technical data

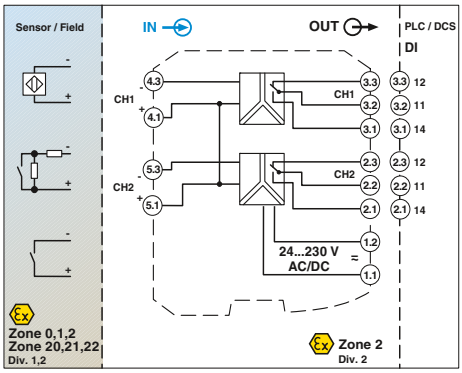
Input data	
Input signal	NAMUR proximity sensors (IEC/EN 60947-5-6) Floating switch contacts Switch contacts with resistance circuit
No-load voltage	~ 8 V DC
Switching points	>2.1 mA (conductive) / <1.2 mA (blocking)
Switching hysteresis	<0.2 mA
Line error detection	Break 0.05 mA <IIN <0.35 mA Short 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)
Maximum 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
Maximum 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
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) 300 V_{rms} (rated insulation voltage (overvoltage category II; degree of pollution 2, safe isolation as per EN 61010-1))
Output 1/output 2/input, power supply, DIN rail connector	300 V_{rms} (rated insulation voltage (overvoltage category III; degree of pollution 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) LED yellow (switching state) Red LED (line errors)
Inflammability class in accordance with UL 94	V0
Dimensions W/H/D	12.5 / 99 / 114.5 mm
Screw connection rigid / flexible / AWG	0.2 ... 2.5 mm² / 0.2 ... 2.5 mm² / 24 - 14
Push-in connection rigid / flexible / AWG	0.2 ... 1.5 mm² / 0.2 ... 1.5 mm² / 24 - 16
Safety data as per ATEX	
Maximum output voltage Uo	9.6 V
Maximum output current Io	10 mA
Maximum output power Po	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 II (1) D [Ex ia Da] IIIC II 3 (1) G Ex nA nC [ia Ga] IIC T4 Gc
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 UL 61010 Listed
SIL in accordance with IEC 61508	2

Ordering data

Description	Type	Order No.	Pcs./Pkt.
NAMUR signal conditioner, 2-channel, input intrinsically safe, 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 conditioners, Ex i





NAMUR signal conditioner, 2–channel, signal output: PDT relay, wide range supply

Functional Safety
Ex: EAC Ex
Housing width 17.5 mm

NAMUR signal conditioners 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 and deactivated, error indicated by red flashing led and de-excitation of the output relay
- Wide-range power supply of 19.2 to 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 in accordance with IEC 61508
- Installation in zone 2 permitted

Notes:

Information on resistance circuits and marking material can be found on page 177

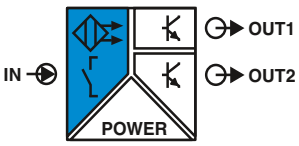
Technical data

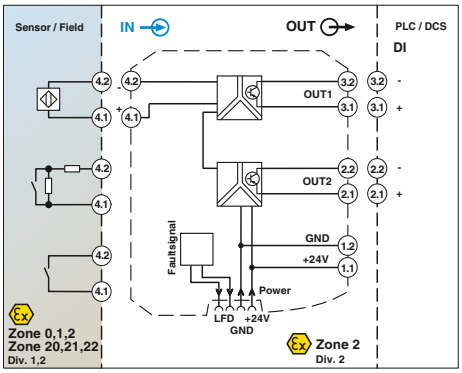
Input data	
Input signal	NAMUR proximity sensors (EN 60947-5-6) Open circuit switch contacts Switch contacts with resistance circuit
No-load voltage	~ 8 V DC
Switching points	>2.1 mA (conductive) / <1.2 mA (blocking)
Switching hysteresis	<0.2 mA
Line error detection	Break 0.05 mA <IIN <0.35 mA Short 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)
Maximum 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
Maximum 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) 300 V_{rms} (rated insulation voltage (overvoltage category II; degree of pollution 2, safe isolation as per EN 61010-1)) 2.5 kV AC (50 Hz, 1 min., test voltage)
Output 1/output 2/input, power supply	300 V_{rms} (rated insulation voltage (overvoltage category III; degree of pollution 2, safe isolation as per EN 61010-1)) 2.5 kV (50 Hz, 1 min., test voltage)
Ambient temperature range	-20°C ... 60°C
Humidity	10% ... 95% (non-condensing)
Inflammability class in accordance with UL 94	V0
Housing material	PA 6.6-FR
Dimensions W/H/D	17.5 / 99 / 114.5 mm
Screw connection rigid / flexible / AWG	0.2 ... 2.5 mm^2 / 0.2 ... 2.5 mm^2 / 24 - 14
Push-in connection rigid / flexible / AWG	0.2 ... 1.5 mm^2 / 0.2 ... 1.5 mm^2 / 24 - 16
Safety data as per ATEX	
Maximum output voltage Uo	9.56 V
Maximum output current Io	10.3 mA
Maximum output power Po	25 mW
Maximum voltage U_m	253 V AC/DC (supply terminals) 250 V AC (output terminals) 120 V DC (output terminals)
Conformance/approvals	
Conformance	CE-compliant, additionally EN 61326
ATEX	II (1) G [Ex ia Ga] IIC II (1) D [Ex ia Da] IIIC 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, input intrinsically safe, output: Changeover contact			
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 conditioners, Ex i





**NAMUR signal conditioner:
2 signal outputs: transistor (passive)**

DNV GL Functional Safety
Ex: EAC Ex
Housing width 12.5 mm

NAMUR signal conditioners 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 and deactivated, error indicated by red flashing LED and blocking the 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 in accordance with IEC 61508
- Installation in zone 2 permitted

Notes:

Information about the supply and error evaluation module as well as about the DIN rail connectors and marking material can be found from page 175

Information about resistance circuits is given on page 177

Information on “Plug and play” connection using system cabling can be found from page 170

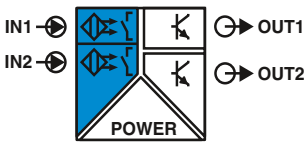
Technical data

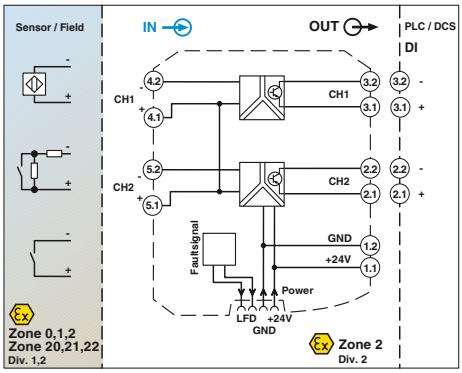
Input data	
Input signal	NAMUR proximity sensors (EN 60947-5-6) Floating switch contacts Switch contacts with resistance circuit
No-load voltage	~ 8 V DC
Switching points	>2.1 mA (conductive) / <1.2 mA (blocking)
Line error detection	Break 0.05 mA <IIN <0.35 mA Short circuit 100 Ω <RSensor <360 Ω
Switching output	2 transistor outputs, passive
Max. switching voltage	30 V DC
Maximum switching current	50 mA (short-circuit-proof)
Drop (ΔU)	<1.4 V
Switching behavior	Can be inverted using DIP switch
Maximum 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 insulation voltage (overvoltage category II; degree of pollution 2, safe isolation as per EN 61010-1)) 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 (overvoltage category II; degree of pollution 2, basic insulation as per EN 61010-1)) 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) LED yellow (switching state) Red LED (line errors)
Inflammability class in accordance with UL 94	V0
Housing material	PA 6.6-FR
Dimensions W/H/D	12.5 / 99 / 114.5 mm
Screw connection rigid / flexible / AWG	0.2 ... 2.5 mm² / 0.2 ... 2.5 mm² / 24 - 14
Push-in connection rigid / flexible / AWG	0.2 ... 1.5 mm² / 0.2 ... 1.5 mm² / 24 - 16
Safety data as per ATEX	
Maximum output voltage Uo	9.6 V
Maximum output current Io	10 mA
Maximum output power Po	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 II (1) D [Ex ia Da] IIIC II 3 (1) G Ex nA [ia Ga] IIC T4 Gc
IECEx	[Ex ia Ga] IIC, [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	2

Ordering data

Description	Type	Order No.	Pcs./Pkt.
NAMUR signal conditioner, input intrinsically safe, 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 conditioners, Ex i





NAMUR signal conditioner, 2-channel, signal output: transistor (passive)

DNV GL Functional Safety
Ex: EAC Ex
Housing width 12.5 mm

NAMUR signal conditioners 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 and deactivated, error indicated by red flashing LED and blocking the 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 in accordance with IEC 61508
- Installation in zone 2 permitted

Notes:

Information about the supply and error evaluation module as well as about the DIN rail connectors and marking material can be found from page 175

Information about resistance circuits is given on page 177

Information on “Plug and play” connection using system cabling can be found from page 170

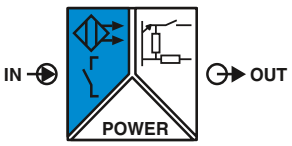
Technical data

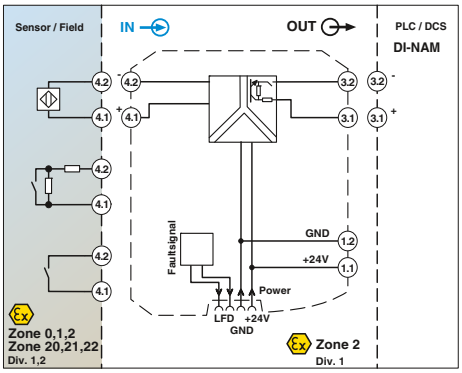
Input data	
Input signal	NAMUR proximity sensors (EN 60947-5-6) Floating switch contacts Switch contacts with resistance circuit
No-load voltage	~ 8 V DC
Switching points	>2.1 mA (conductive) / <1.2 mA (blocking)
Line error detection	Break 0.05 mA <IIN <0.35 mA Short circuit 100 Ω <RSensor <360 Ω
Switching output	1 transistor output, passive (per channel)
Max. switching voltage	30 V DC
Maximum switching current	50 mA (short-circuit-proof)
Drop (ΔU)	<1.4 V
Switching behavior	Can be inverted using DIP switch
Maximum 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	≤1,000 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 (overvoltage category II; degree of pollution 2, safe isolation as per EN 61010-1)) 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 (overvoltage category II; degree of pollution 2, basic insulation as per EN 61010-1)) 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) LED yellow (switching state) Red LED (line errors)
Inflammability class in accordance with UL 94	V0
Housing material	PA 6.6-FR
Dimensions W/H/D	12.5 / 99 / 114.5 mm
Screw connection rigid / flexible / AWG	0.2 ... 2.5 mm² / 0.2 ... 2.5 mm² / 24 - 14
Push-in connection rigid / flexible / AWG	0.2 ... 1.5 mm² / 0.2 ... 1.5 mm² / 24 - 16
Safety data as per ATEX	
Maximum output voltage Uo	9.6 V
Maximum output current Io	10 mA
Maximum output power Po	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 II (1) D [Ex ia Da] IIIC II 3 (1) G Ex nA [ia Ga] IIC T4 Gc
IECEx	[Ex ia Ga] IIC, [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	2

Ordering data

Description	Type	Order No.	Pcs./Pkt.
NAMUR signal conditioner, 2-channel, input intrinsically safe, 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 conditioners, Ex i





NAMUR signal conditioner, with line fault transparency

Functional Safety
Ex: EAC Ex
Housing width 12.5 mm

NAMUR signal conditioners 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 error message 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 and deactivated
- Power supply and error indication possible via the DIN rail connector
- LED indicators for supply voltage, status, and fault in accordance with NAMUR NE 44
- Plug-in screw or Push-in connection technology
- Safe 3-way electrical isolation
- Up to SIL 2 in accordance with IEC 61508
- Installation in zone 2 permitted

Notes:

Information on the supply and error evaluation module, DIN rail connectors, system cabling, and marking material can be found from page 175

Information about resistance circuits is given on page 177

Technical data

Input data	
Input signal	NAMUR proximity sensors (EN 60947-5-6) Open circuit switch contacts Switch contacts with resistance circuit
No-load voltage	8 V DC ±10%
Switching points	>2.1 mA (conductive) / <1.2 mA (blocking)
Line error detection	Break 0.05 mA <IIN <0.35 mA Short circuit 100 Ω <RSensor <360 Ω
Switching output	Resistive (transistor, passive)
Switching voltage	8.2 V DC ±10% (in accordance with 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	9.6 V DC ... 30 V DC (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 (overvoltage category II; degree of pollution 2, safe isolation as per EN 61010-1)) 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) LED yellow (switching state) Red LED (line errors)
Inflammability class in accordance with UL 94	V0
Housing material	PA 6.6-FR
Dimensions W/H/D	12.5 / 99 / 114.5 mm
Screw connection rigid / flexible / AWG	0.2 ... 2.5 mm² / 0.2 ... 2.5 mm² / 24 - 14
Push-in connection rigid / flexible / AWG	0.2 ... 1.5 mm² / 0.2 ... 1.5 mm² / 24 - 16
Safety data as per ATEX	
Maximum output voltage Uo	9.6 V
Maximum output current Io	10 mA
Maximum output power Po	25 mW
Maximum voltage U_m	253 V AC/DC
Conformance/approvals	
Conformance	CE-compliant, additionally EN 61326
ATEX	II (1) G [Ex ia Ga] IIC II (1) D [Ex ia Da] IIIC 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
Specifically for Yokogawa systems			
Screw connection	**MACX MCR-EX-SL-NAM-YO**	**2905723**	1
Push-in connection	**MACX MCR-EX-SL-NAM-YO-SP**	**2905724**	1
Specifically for Honeywell systems			
Screw connection	**MACX MCR-EX-SL-NAM-HO**	**2907404**	1
Push-in connection	**MACX MCR-EX-SL-NAM-HO-SP**	**2907405**	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:

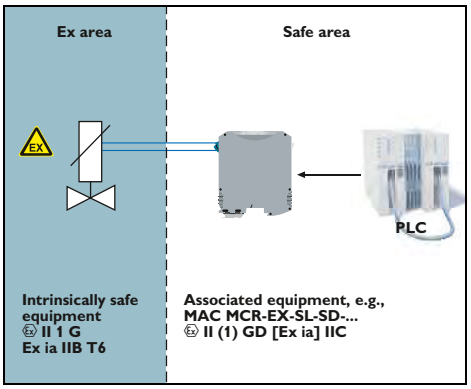
– Valve
– Cable with corresponding resistance
– Solenoid driver

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:
phoenixcontact.net/products

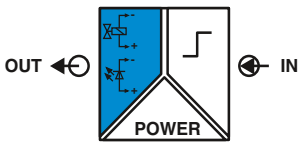
Example circuit

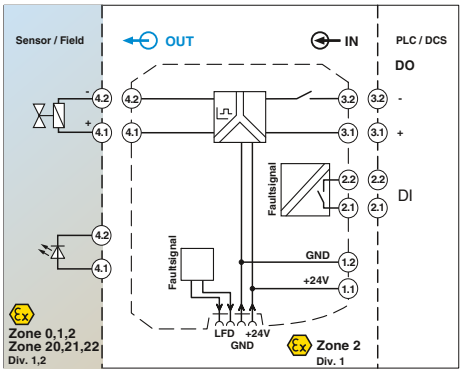


Valves overview

Manufacturer	Type Description		Ex certificate	Condition	MACX Analog Ex solenoid drivers			
					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	1,000 mW / 40°C		✓	✓	
	Coil	G1 642735, high-resistance	PTB 01 ATEX 2173	1,000 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 drivers, Ex i





Solenoid driver, 48 mA current limitation with line fault detection

Functional Safety
Ex: EAC Ex KC-s
Housing width 12.5 mm

Solenoid drivers 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 and 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 in accordance with NAMUR NE 44
- Plug-in screw or Push-in connection technology
- Safe 3-way electrical isolation
- Up to SIL 2 in accordance with IEC 61508
- Installation in zone 2 permitted

Notes:

Information on the supply and error evaluation module, DIN rail connectors, system cabling, and marking material can be found from page 175

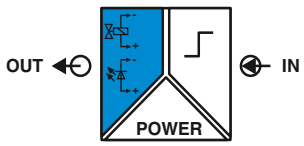
Technical data

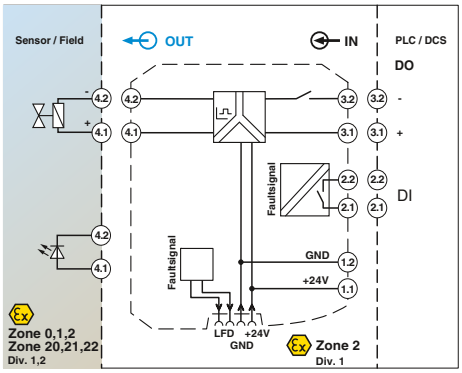
Input data	
Switching level 0 signal (“L”)	0 V DC ... 5 V DC (open)
Switching level 1 signal (“H”)	15 V DC ... 30 V DC
Current input signal	<12 mA
Input impedance in the event of a line fault at the output	3 MΩ (high resistance (Mega Ω))
Transparent for test pulses	Yes
Output data	
Output voltage	≥9.36 V DC (at 48 mA)
Current limitation	>48 mA (with cable error detection)
No-load voltage	>22.5 V DC
Internal resistance	≥269.3 Ω (internal resistance R_i)
Immunity to short-circuiting	Yes
Response time t_A	<30 ms
Line error detection	<50 Ω (short circuit on the line) >10 kΩ (line break)
Error message output	
Switch contact	N/O contact
Max. switching voltage	30 V DC
Maximum 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 (24 V DC)
Power dissipation	<1.8 W
Electrical isolation	
Output/input, error message output	375 V (peak value in accordance with EN 60079-11) 300 V_{rms} (rated insulation voltage (overvoltage category II; degree of pollution 2, safe isolation as per EN 61010-1)) 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) LED yellow (switching state) Red LED (line errors)
Degree of protection	IP20
Inflammability class in accordance with UL 94	V0
Housing material	PA 6.6-FR
Dimensions W/H/D	12.5 / 112.5 / 114.5 mm
Screw connection rigid / flexible / AWG	0.2 ... 2.5 mm² / 0.2 ... 2.5 mm² / 24 - 14
Push-in connection rigid / flexible / AWG	0.2 ... 1.5 mm² / 0.2 ... 1.5 mm² / 24 - 16
Safety data as per ATEX	
Maximum output voltage Uo	25.3 V
Maximum output current Io	94 mA
Maximum output power Po	595 mW
Maximum voltage U_m	253 V AC/DC
Conformance/approvals	
Conformance	CE-compliant, additionally EN 61326
ATEX	II (1) G [Ex ia Ga] IIC II (1) D [Ex ia Da] IIIC II 3(1) G Ex nA [ia Ga] IIC T4 Gc X
IECEx	[Ex ia Ga] IIC, [Ex ia Da] IIIC, Ex nA [ia Ga] IIC T4 Gc
SIL in accordance with IEC 61508	3

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 drivers, Ex i





Solenoid driver, 25.1 mA current limitation with line fault detection

Functional Safety
Ex:
Housing width 12.5 mm

Solenoid drivers 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: 25.1 mA current limitation at 4.64 V, [Ex ia]
- Line fault detection (can be activated and 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 in accordance with NAMUR NE 44
- Plug-in screw or Push-in connection technology
- Safe 3-way electrical isolation
- Up to SIL 3 in accordance with IEC/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 178

Information on “Plug and play” connection using system cabling can be found from page 170

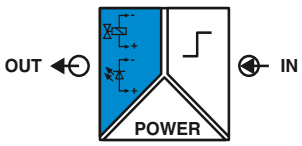
Technical data

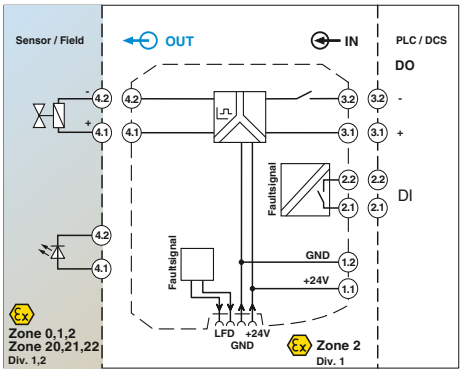
Input data	
Switching level 0 signal (“L”)	0 V DC ... 5 V DC (open)
Switching level 1 signal (“H”)	15 V DC ... 30 V DC
Current input signal	<12 mA
Input impedance in the event of a line fault at the output	3 MΩ (high resistance (Mega Ω))
Transparent for test pulses	Yes
Output data	
Output voltage	≥4.64 V DC (at 25.1 mA)
Current limitation	>25.1 mA (with cable error detection)
No-load voltage	>21.1 V DC
Internal resistance	≥641 Ω (internal resistance R_i)
Immunity to short-circuiting	Yes
Response time t_A	<30 ms
Line error detection	<50 Ω (short circuit on the line) >10 kΩ (line break)
Error message output	
Switch contact	N/O contact
Max. switching voltage	30 V DC
Maximum 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	<50 mA (24 V DC)
Power dissipation	<0.8 W
Electrical isolation	
Output/input, error message output	375 V (peak value in accordance with EN 60079-11) 300 V_{rms} (rated insulation voltage (overvoltage category II; degree of pollution 2, safe isolation as per EN 61010-1)) 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) LED yellow (switching state) Red LED (line errors)
Degree of protection	IP20
Inflammability class in accordance with UL 94	V0
Housing material	PA 6.6-FR
Dimensions W/H/D	12.5 / 112.5 / 114.5 mm
Screw connection rigid / flexible / AWG	0.2 ... 2.5 mm² / 0.2 ... 2.5 mm² / 24 - 14
Push-in connection rigid / flexible / AWG	0.2 ... 1.5 mm² / 0.2 ... 1.5 mm² / 24 - 16
Safety data as per ATEX	
Maximum output voltage Uo	23.98 V
Maximum output current Io	37.4 mA
Maximum output power Po	224 mW
Maximum voltage U_m	253 V AC/DC
Conformance/approvals	
Conformance	CE-compliant, additionally EN 61326
ATEX	II (1) G [Ex ia Ga] IIC II (1) D [Ex ia Da] IIIC II 3(1) G Ex nA [ia Ga] IIC T4 Gc X
IECEx	[Ex ia Ga] IIC, [Ex ia Da] IIIC, Ex nA [ia Ga] IIC T4 Gc
SIL in accordance with IEC 61508	3

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-21-25-LFD**	2905669	1
Push-in connection	**MACX MCR-EX-SL-SD-21-25-LFD-SP**	2905674	1

Digital OUT
Solenoid drivers, Ex i





Solenoid driver, 48 mA current limitation with line fault detection

Functional Safety
Ex:
Housing width 12.5 mm

Solenoid drivers 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 9.7 V, [Ex ia]
- Line fault detection (can be activated and 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 in accordance with NAMUR NE 44
- Plug-in screw or Push-in connection technology
- Safe 3-way electrical isolation
- Up to SIL 3 in accordance with IEC/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 178

Information on “Plug and play” connection using system cabling can be found from page 170

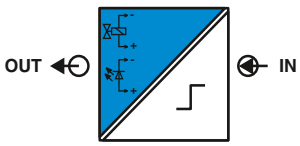
Technical data

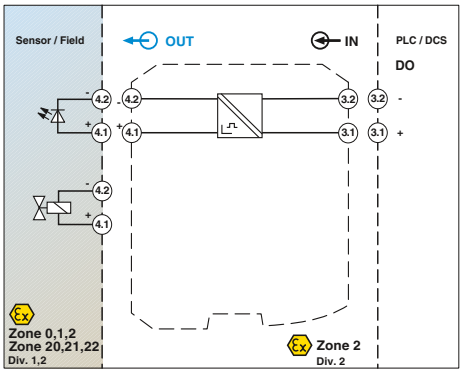
Input data	
Switching level 0 signal (“L”)	0 V DC ... 5 V DC (open)
Switching level 1 signal (“H”)	15 V DC ... 30 V DC
Current input signal	<12 mA
Input impedance in the event of a line fault at the output	3 MΩ (high resistance (Mega Ω))
Transparent for test pulses	Yes
Output data	
Output voltage	≥9.7 V DC (at 48 mA)
Current limitation	>48 mA (with cable error detection)
No-load voltage	>24.3 V DC
Internal resistance	≥297 Ω (internal resistance R_i)
Immunity to short-circuiting	Yes
Response time t_A	<30 ms
Line error detection	<50 Ω (short circuit on the line) >10 kΩ (line break)
Error message output	
Switch contact	N/O contact
Max. switching voltage	30 V DC
Maximum 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 (24 V DC)
Power dissipation	<1.62 W
Electrical isolation	
Output/input, error message output	375 V (peak value in accordance with EN 60079-11) 300 V_{rms} (rated insulation voltage (overvoltage category II; degree of pollution 2, safe isolation as per EN 61010-1)) 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) LED yellow (switching state) Red LED (line errors)
Degree of protection	IP20
Inflammability class in accordance with UL 94	V0
Housing material	PA 6.6-FR
Dimensions W/H/D	12.5 / 112.5 / 114.5 mm
Screw connection rigid / flexible / AWG	0.2 ... 2.5 mm² / 0.2 ... 2.5 mm² / 24 - 14
Push-in connection rigid / flexible / AWG	0.2 ... 1.5 mm² / 0.2 ... 1.5 mm² / 24 - 16
Safety data as per ATEX	
Maximum output voltage Uo	27.06 V
Maximum output current Io	91.11 mA
Maximum output power Po	616 mW
Maximum voltage U_m	253 V AC/DC
Conformance/approvals	
Conformance	CE-compliant, additionally EN 61326
ATEX	II (1) G [Ex ia Ga] IIC II (1) D [Ex ia Da] IIIC II 3(1) G Ex nA [ia Ga] IIC T4 Gc X
IECEx	[Ex ia Ga] IIC, [Ex ia Da] IIIC, Ex nA [ia Ga] IIC T4 Gc
SIL in accordance with IEC 61508	3

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-24-48-LFD**	2906155	1
Push-in connection	**MACX MCR-EX-SL-SD-24-48-LFD-SP**	2906156	1

Digital OUT
Solenoid drivers, Ex i





Solenoid driver, current limitation 25 mA

Functional Safety
Ex: EAC Ex
Housing width 12.5 mm

Solenoid drivers for controlling intrinsically safe solenoid valves, alarm transmitters, and indicators installed in Ex areas.

- 20 to 30 V DC input
- Output [Ex ia]
- Various output characteristic curves compatible with the commercial solenoid valves
- Loop-powered: The required power is supplied via the control signal on the input side
- Mechanically compatible with DIN rail connector
- Galvanic 2-way isolation
- Up to SIL 3 in accordance with IEC 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 178

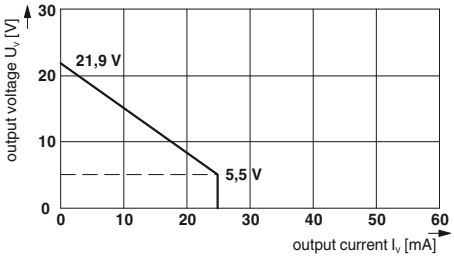
Information on “Plug and play” connection using system cabling can be found from page 170

Technical data

Input data		
Voltage input signal		19.2 V DC ... 30 V DC (24 V DC -20%...+25%)
Current input signal		45 mA (at 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		641.1 Ω (internal resistance R_i)
Immunity to short-circuiting		Yes
Response time t_A		20 ms
General data		
Power dissipation		<0.845 W
Temperature coefficient		0.01%/K
Electrical isolation		
	Output/input	375 V (peak value in accordance with EN 60079-11) 300 V_{rms} (rated insulation voltage (overvoltage category II; degree of pollution 2, safe isolation as per EN 61010-1)) 2.5 kV (50 Hz, 1 min., test voltage)
Ambient temperature range		-40°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 accordance with UL 94		V0
Dimensions W/H/D		12.5 / 99 / 114.5 mm
Screw connection rigid / flexible / AWG		0.2 ... 2.5 mm² / 0.2 ... 2.5 mm² / 24 - 14
Push-in connection rigid / flexible / AWG		0.2 ... 1.5 mm² / 0.2 ... 1.5 mm² / 24 - 16
Safety data as per ATEX		
Maximum output voltage Uo		25.1 V
Maximum output current Io		39 mA
Maximum output power Po		245 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/IIA II (1) D [Ex ia Da] IIIC II 3 (1)G Ex nA [ia IIC Ga] IIC T4 Gc X
IECEx		[Ex ia Ga] IIC/IIB/IIA, [Ex ia Da] IIIC, Ex nA [ia IIC 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.
Solenoid driver, loop-powered, output intrinsically safe			
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



Solenoid driver, current limitation 40 mA

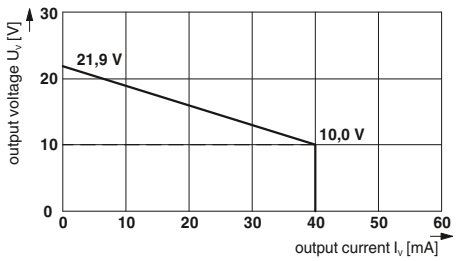
Functional Safety
Ex: EAC Ex
Housing width 12.5 mm

Technical data

19.2 V DC ... 30 V DC (24 V DC -20%...+25%)
65 mA (at 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
<1.055 W
0.01%/K
375 V (peak value in accordance with EN 60079-11) 300 V_{rms} (rated insulation voltage (overvoltage category II; degree of pollution 2, safe isolation as per EN 61010-1)) 2.5 kV (50 Hz, 1 min., test voltage)
-40°C ... 60°C (any mounting position, pay attention to the derating curve in the data sheet)
Yellow LED (switching state / status, lights up when output circuit is active)
IP20
V0
12.5 / 99 / 114.5 mm
0.2 ... 2.5 mm² / 0.2 ... 2.5 mm² / 24 - 14
0.2 ... 1.5 mm² / 0.2 ... 1.5 mm² / 24 - 16
25.1 V
87 mA
550 mW
253 V AC (125 V DC)
CE-compliant, additionally EN 61326
Ex II (1) G [Ex ia Ga] IIC/IIB/IIA
Ex II (1) D [Ex ia Da] IIIC
Ex II 3 (1)G Ex nA [ia IIC Ga] IIC T4 Gc X
[Ex ia Ga] IIC/IIB/IIA
Class I Div 2; IS for Class I, II, III Div 1
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



Solenoid driver, current limitation 48 mA

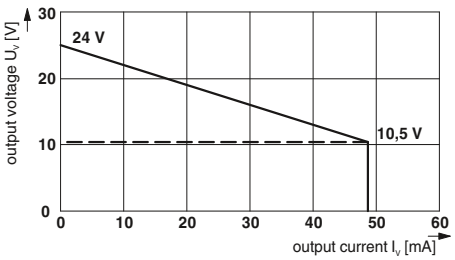
Functional Safety
Ex: EAC Ex
Housing width 12.5 mm

Technical data

19.2 V DC ... 30 V DC (24 V DC -20%...+25%)
85 mA (at U_e = 24 V DC)
10.5 V DC (at 48 mA)
48 mA
24 V DC
275.7 Ω (internal resistance R_i)
Yes
20 ms
<1.41 W
0.01%/K
375 V (peak value in accordance with EN 60079-11) 300 V_{rms} (rated insulation voltage (overvoltage category II; degree of pollution 2, safe isolation as per EN 61010-1)) 2.5 kV (50 Hz, 1 min., test voltage)
-40°C ... 60°C (any mounting position, pay attention to the derating curve in the data sheet)
Yellow LED (switching state / status, lights up when output circuit is active)
IP20
V0
12.5 / 99 / 114.5 mm
0.2 ... 2.5 mm² / 0.2 ... 2.5 mm² / 24 - 14
0.2 ... 1.5 mm² / 0.2 ... 1.5 mm² / 24 - 16
27.7 V
101 mA
697 mW
253 V AC (125 V DC)
CE-compliant, additionally EN 61326
Ex II (1) G [Ex ia Ga] IIC/IIB/IIA
Ex II (1) D [Ex ia Da] IIIC
Ex II 3 (1)G Ex nA [ia IIC Ga] IIC T4 Gc X
[Ex ia Ga] IIC/IIB/IIA
Class I Div 2; IS for Class I, II, III Div 1
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



Solenoid driver, current limitation 58 mA, [Ex ia] IIB

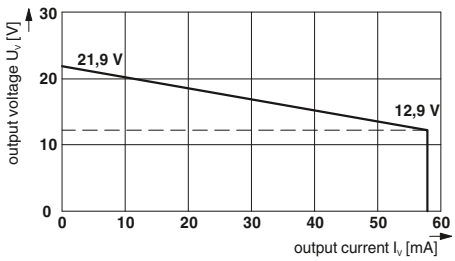
Functional Safety
Ex: EAC Ex
Housing width 12.5 mm

Technical data

19.2 V DC ... 30 V DC (24 V DC -20%...+25%)
95 mA (at U_e = 24 V DC)
12.9 V DC (at 58 mA)
58 mA
21.9 V DC
133.4 Ω (internal resistance R_i)
Yes
20 ms
<1.325 W
0.01%/K
375 V (peak value in accordance with EN 60079-11) 300 V_{rms} (rated insulation voltage (overvoltage category II; degree of pollution 2, safe isolation as per EN 61010-1)) 2.5 kV (50 Hz, 1 min., test voltage)
-40°C ... 60°C (any mounting position, pay attention to the derating curve in the data sheet)
Yellow LED (switching state / status, lights up when output circuit is active)
IP20
V0
12.5 / 99 / 114.5 mm
0.2 ... 2.5 mm² / 0.2 ... 2.5 mm² / 24 - 14
0.2 ... 1.5 mm² / 0.2 ... 1.5 mm² / 24 - 16
25.1 V
188 mA
1.18 W
253 V AC (125 V DC)
CE-compliant, additionally EN 61326
Ex II (1) G [Ex ia Ga] IIB/IIA
Ex II (1) D [Ex ia Da] IIIC
Ex II 3 (1)G Ex nA [ia IIB Ga] IIC T4 Gc X
[Ex ia Ga] IIB/IIA
Class I Div 2; IS for Class I, II, III Div 1
3

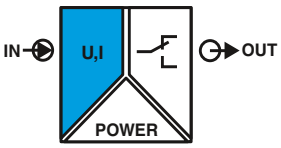
Ordering data

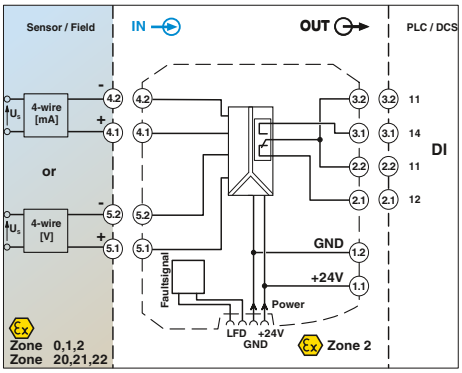
Type	Order No.	Pcs./Pkt.
MACX MCR-EX-SL-SD-21-60-LP	2865515	1
MACX MCR-EX-SL-SD-21-60-LP-SP	2924100	1



Limit values, threshold value switches

new





Configurable, with relay PDT output

Ex:

Housing width 12.5 mm

Limit switch with unlimited configurable limit values

- Input [Ex ia] for analog standard current and voltage signals from Ex area for switching analog limit values
- Safe 3-way isolation
- Configure limit values via DIP switch
- PDT relay at output
- Limiting continuous current up to 6 A
- Energy can be supplied via the DIN rail connector
- Status and error indicator LEDs
- Up to SIL 3 in accordance with IEC 61508
- PLc in accordance with ISO 13849
- Installation in zone 2 possible

Technical data

Input data		
Voltage input signal		0.1 V ... 10 V 0.1 V ... 10.5 V (maximum range)
Total error of the voltage input maximum		± 10 mV
Current input signal		0.2 mA ... 20 mA 0.18 mA ... 21 mA (maximum range)
Total error of the current input maximum		± 20 µA
Input resistance	Current/volatge input	<28 Ω / >100 kΩ
Switching points		- / configurable via DIP switch (in 1.25% increments) and potentiometer (linearly up to 2% of the switching threshold set via the DIP switch)
Switching hysteresis		off: approx. 0.5%, on: approx. 1%
Line error detection		Break U <50 mV, I <0.1 mA Short circuit U >10.8 V, I >21.1 mA
Switching output		**Relay output**
Contact type		1 PDT
Maximum switching current		≤4 A AC (cos phi = 1)
Mechanical service life		≤10^7 cycles
Switching voltage		≤250 V AC ≤120 V DC
General data		
Supply voltage range		9.6 V DC ... 30 V DC (12 V DC ... 24 V DC (-20% ... +25%))
Current consumption, maximum		90 mA (10 V DC)
Current consumption, typical		38 mA (24 V DC)
Current draw		≤30 mA (30 V DC)
Power consumption		≤1.2 W
Power dissipation		<0.9 W
Temperature coefficient		0.01%/K
Step response (0 - 99%)		≤22 ms
Switching point accuracy		<0.1%
Maximum transmission error		0.1%
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 (overvoltage category II; degree of pollution 2, safe isolation as per EN 61010-1)) 2.5 kV (50 Hz, 1 min., test voltage)
Ambient temperature (operation)		-20°C ... 65°C (any mounting position)
Ambient temperature (storage/transport)		-40°C ... 85°C
Humidity		5% ... 95% (non-condensing)
Altitude		≤2,000 m
Inflammability class in accordance with UL 94		V0
Dimensions W/H/D		12.5 / 99 / 114.5 mm
Conformance/approvals		
Conformance		CE-compliant, additionally EN 61326
ATEX		II (1) G [Ex ia Ga] IIC II (1) D [Ex ia Da] IIIC II 3(1) G Ex ec nC [ia Ga] IIC T4 Gc
UL, USA/Canada		UL applied for
SIL in accordance with IEC 61508		2 (single-channel) 3 (two-channel)

Ordering data

Description	Type	Order No.	Pcs./Pkt.
Screw connection	**MACX MCR-EX-SL-UI-REL**	2906164	1
Spring-cage connection	**MACX MCR-EX-SL-UI-REL-SP**	2906165	1

Termination Carriers for MACX Analog signal conditioners

TC... Termination Carriers are compact solutions for quickly and smoothly connecting DIN rail devices from the MACX Analog series to input and 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.

Termination carriers are also available for MINI Analog Pro and PSR safety devices.

Compact

– Saves up to 30% of space due to compact design

Rugged 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

Select standard DIN rail device

Select module carrier

Select controller-specific front adapter and system cable

Termination Carriers for MACX Analog signal conditioners

The **TC-D37SUB-ADIO16-EX-P-UNI** universal Termination Carrier is a compact solution for connecting signal conditioners from the MACX Analog series to analog or binary input and 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-compatible field devices and a management system.

The **TC-D37SUB-ADIO16-2EX-P-UNI** universal Termination Carrier is a compact solution for connecting two-channel signal conditioners from the MACX Analog series to analog or binary input and output cards of automation systems.

– 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:

You will find information about signal conditioners from the MACX Analog product range in the INTERFACE catalog or at phoenixcontact.com.

You can find information about available system cables for D-SUB connectors in the INTERFACE catalog or at phoenixcontact.com.

Contact us: specific Termination Carriers designs for I/O modules of various automation systems are available, planned or can be implemented in accordance with your specification.

Ex:
Housing width 242 mm

Technical data

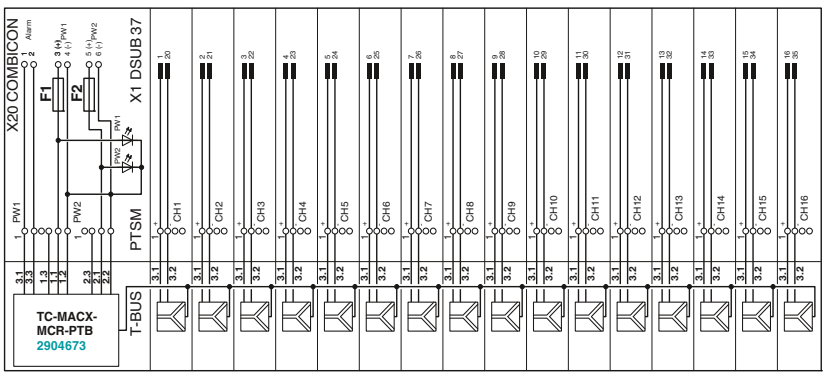
General data	
Connection to the control system level	D-SUB pin strip
No. of pos.	37
Maximum operating voltage	<30 V DC (per signal/channel)
Maximum permissible current	1 A (signal/channel)
Rated insulation voltage	50 V (basic insulation)
Rated surge voltage	0.5 kV
Degree of pollution	2
Overvoltage category	II
Air clearances and creepage distances	DIN EN 50178 (basic insulation)
Ambient temperature range	-20°C ... 60°C (please observe module specifications)
Shock	15g, in accordance with IEC 60068-2-27
Vibration (operation)	2g, in accordance with IEC 60068-2-6
Dimensions W/H/D	242 / 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	1x red LED (error) 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 single-channel MACX MCR isolators			
	TC-D37SUB-ADIO16-EX-P-UNI	2924854	1
- With connection for multiplexer	**TC-D37SUB-AIO16-EX-PS-UNI**	2902932	1
Universal Termination Carrier for 16 two-channel MACX MCR isolators			
	TC-2D37SUB-ADIO32-2EX-P-UNI	2904684	1

Accessories

Power and fault signaling module	**TC-MACX-MCR-PTB**	2904673	1
HART multiplexer, 32-channel	**MACX MCR-S-MUX**	2865599	1

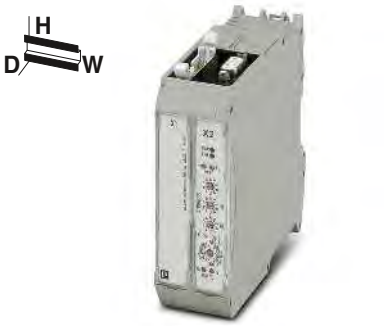


TC-D37SUB-ADIO16-EX-P-UNI and TC-D37SUB-AIO16-EX-PS-UNI connection scheme

Multiplexers for HART signals

Multiplexers for digital connection of HART-compatible field devices (such as measuring transducers or control valves) to a PC or management system.

- Supports online configuration and diagnostics for the connected HART-compatibles 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



HART multiplexer, 32-channel

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 female connector
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)
Galvanic isolation of HART signal/RS-485	350 V AC
Galvanic isolation of HART signals between each other	100 V DC (capacitive)
Galvanic isolation of HART signal/supply	350 V AC
Galvanic isolation of RS-485/supply	350 V AC
Error monitoring	Processor error: The “PWR” LED flashes; error in the HART communication: the “ERR” LED flashes
Ambient temperature range	-20°C ... 60°C
Humidity	≤95% (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-conductor flat-ribbon cable	**MACX MCR-S-MUX**	2865599	1

Accessories

Universal Termination Carrier for 16 single-channel MACX MCR isolators - With connection for multiplexer	**TC-D37SUB-AIO16-EX-PS-UNI**	2902932	1
Module carrier for 16 MINI Analog channels, power and feed-through module - 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	**PSM-ME-RS232/RS485-P**	2744416	1
Repeater, for electrical isolation and increased range	**PSM-ME-RS485/RS485-P**	2744429	1

Accessories

Programming adapters

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 the MACX Analog, MINI Analog Pro, and MINI Analog.

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

ME 6,2 TBUS... DIN rail connectors

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

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

Accessories

Dummy – MACX MCR-EX-DUMMY-ISOLATOR

Dummy module with no function for connecting unused intrinsically safe signal cables, with plug-in connection terminal blocks.

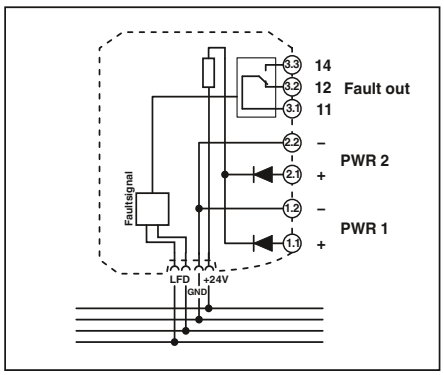
Description	Ordering data		
	Type	Order No.	Pcs./Pkt.
Dummy module with no function			
with screw connection	**MACX MCR-EX-DUMMY-ISOLATOR**	2904970	1
with Push-in connection	**MACX MCR-EX-DUMMY-ISOLATOR-SP**	2905846	1

Accessories

Power and error message modules

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 n

H
D
W

DNV GL
Ex:
Housing width 17.5 mm

Technical data

Input data	
Voltage 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 (2 A) / 30 V DC (2 A) / 50 V DC (0.22 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) 2 x green LEDs (PWR1 and PWR2)
Inflammability class in accordance with UL 94	V0
Housing material	Polyamide (PA 6.6)
Dimensions W/H/D	17.5 / 99 / 114.5 mm
Screw connection rigid / flexible / AWG	0.2 ... 2.5 mm² / 0.2 ... 2.5 mm² / 24 - 14
Push-in connection rigid / flexible / AWG	0.2 ... 1.5 mm² / 0.2 ... 1.5 mm² / 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 Class I, Div. 2, Groups A, B, C, D T5 Class I, Zone 2, Group IIC

Ordering data

Description	Type	Order No.	Pcs./Pkt.
Supply and error message module, including the relevant DIN rail connector ME 17,5 TBUS 1,5/5-ST-3,81 GN			
Screw connection	**MACX MCR-PTB**	2865625	1
Push-in connection	**MACX MCR-PTB-SP**	2924184	1

Accessories

Power and error message modules

Power and fault signaling module for supplying the 24 V supply voltage to the DIN rail connectors of the MACX Analog Termination Carriers and signaling line faults and energy supply failures.

– One-time or redundant supply, decoupled from diode, protected against polarization
– Feed-in current up to 2 A protected by Termination Carrier PCB
– 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
– Installation in zone 2 possible

Ex:

Housing width 17.5 mm

Technical data

Input data	
Voltage input signal	19.2 V DC ... 30 V DC
Redundant supply	Yes, decoupled from diodes
Polarization and surge protection	Yes
Output data	
Maximum output signal	2 A (redundancy range)
Output voltage	Input voltage - 0.7 V
Switching output	Relay
Contact type	1 PDT
Contact material	Gold (Au)
Max. switching voltage	50 V AC/DC (33 V AC (2 A) / 50 V DC (0.3 A) / 30 V DC (2 A))
General data	
Ambient temperature range	-20°C ... 60°C (only on Termination Carrier)
Humidity	5% ... 95% (non-condensing)
Status indication	1 x red LED (error) 2 x green LEDs (PWR1 and PWR2)
Inflammability class in accordance with UL 94	V0
Housing material	Polyamide (PA 6.6)
Dimensions W/H/D	17.5 / 99 / 114.5 mm
Screw connection rigid / flexible / AWG	0.2 ... 2.5 mm² / 0.2 ... 2.5 mm² / 24 - 14
Push-in connection rigid / flexible / AWG	0.2 ... 2.5 mm² / 0.2 ... 2.5 mm² / 24 - 14
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 Class I, Div. 2, Groups A, B, C, D T5 Class I, Zone 2, Group IIC

Ordering data

Description		Type	Order No.	Pcs./Pkt.
Power and fault signaling module without integrated fuse	Screw connection	**TC-MACX-MCR-PTB**	2904673	1

Accessories

Resistance circuits

Double-level terminal block with resistance circuit in accordance with 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 preassembled resistors				
with screw connection	gray	**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 plugs

		Ordering data		
Description	Color	Type	Order No.	Pcs./Pkt.
Test plug, consisting of:				
Metal part for 2.3 mm Ø socket hole and	gray	**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

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 in accordance with customer specifications** For ordering details, see Catalog 3 or phoenixcontact.net/product.				
10-part, lettering field size: 11 x 9 mm	white	**UC-EMLP (11X9) CUS**	0824547	1

The Field Analog process indicators allow you to monitor and display analog and temperature signals as well as control them via digital and analog inputs and outputs.

Further advantages:

– 2-conductor sensors are powered by the integrated measuring transducer supply
– International use, thanks to UL and CSA approvals

Universal use

Field Analog process indicators are available for field and control panel installation. The universal inputs allow you to record current, voltage, RTDs, and TCs.

Everything at a glance

Real-time process values are easy to read on the five-digit backlit displays. The bar graph also provides you with a quick overview. You can recognize alarm statuses easily from a distance by their changing color.

Easy installation and startup

Thanks to the standardized housing dimensions and plug-in connection terminal blocks, the indicators are easy to install. The devices are easy to configure via the keyboard on the front or via FDT/DTM software.

Intrinsic safety zone 0, zone 20

Also for intrinsically safe circuits in the Ex area: versions with ATEX, CSA, and FM approval.

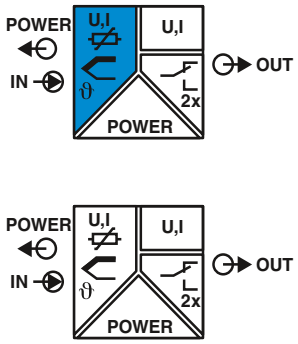
Distributed control cabinet installation

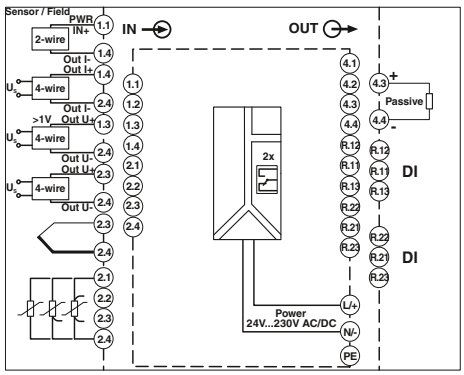
Measurement and control temperature transducer for resistance thermometers, thermocouples, resistance-type sensors, and voltage sensors are also available for control cabinet installation.

Head-mounted transducer

With head-mounted transducers you can record temperatures directly in the field and convert them into standard signals.

Multifunctional process indicators





Block diagram FA-MCR-D-TUI-UI-2REL-UP

Multifunctional process indicator
for installation in the control cabinet

Housing width 96 mm

For installation in the control cabinet

- Multifunctional process indicator, in control panel component housing for monitoring and displaying analog measurement data
- Supply of 2-conductor sensors
- Safe 4-way isolation
- Configurable via software or hardware keyboard on the front
- Universal inputs for connection of current, voltage, RTDs, and TCs
- Limit value monitoring with two relay outputs
- Process signal transmission via analog output
- Display changes color in the event of an error

Notes:

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

Technical data

Input data	U input	I input
Input signal	0 V ... 10 V 2 V ... 10 V 0 V ... 5 V 0 V ... 1 V 1 V ... 5 V -1 V ... 1 V -10 V ... 10 V -30 V ... 30 V -100 mV ... 100 mV	0 mA ... 20 mA +10% 4 mA ... 20 mA +10%
Input data	RTD	TC
Sensor types that can be used	Pt, Ni, Cu sensors	J, K, T, N, B, S, R, U. L, C, D
Connection method	2-, 3-, 4-conductor	-
Measuring rate	200 ms	200 ms
Temperature measuring range	-200°C ... 1,100°C (range depends on sensor type, adjustable)	-200°C ... 2,495°C (range depends on sensor type, adjustable)
Input resistance	-	10 Ω
Output data	U output	I output
Output signal	0 V ... 10 V 2 V ... 10 V 0 V ... 5 V 1 V ... 5 V	0 mA ... 20 mA 4 mA ... 20 mA
Display	7-segment LC display, with backlight, dot matrix for text/bar graph	
Number of the displayed positions	5	
Switching output	Transistor output, active Open collector output	
Number of outputs	1	
Switching output	Relay output	
Contact type	2 PDT	
Max. switching voltage	30 V DC (3 A) / 230 V AC (3 A)	
Maximum switching current	3 A	
Minimum switching current	10 mA	
General data		
Supply voltage range	24 V DC ... 230 V DC	
Degree of protection	IP65 from the front	
Ambient temperature (operation)	-20°C ... 60°C	
Housing material	PC-GF10	
Dimensions W/H/D	96 / 48 / 151.8 mm	
Control panel cutout	92 x 45 mm	
Screw connection rigid / flexible / AWG	0.14 ... 1.5 mm² / 0.14 ... 1.5 mm² / 26 - 16	
Conformance/approvals	FA MCR-D-TUI-UI-2REL-UP	FA MCR-EX-D-TUI-UI-2REL-UP
Conformance	CE-compliant	CE-compliant
ATEX	-	Ex II (1) G [Ex ia Ga] IIC
UL, USA/Canada	UL 61010 Recognized	UL 61010 Recognized
FM approval	-	AIS, NI/I/2/ABCDEFG/T4
CSA	CSA GP	AIS, NI/I/2/ABCDEFG/T4
GL	GL EMC 1 C	EMC1 C

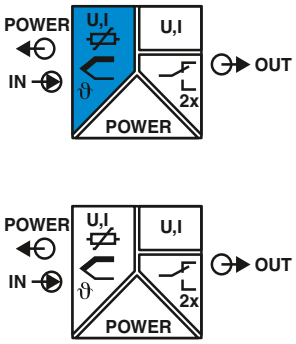
Ordering data

Description	Type	Order No.	Pcs./Pkt.
	FA MCR-EX-D-TUI-UI-2REL-UP	**2907216**	1
	FA MCR-D-TUI-UI-2REL-UP	**2907064**	1

Accessories

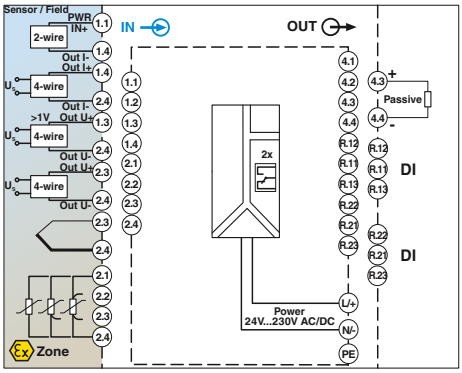
Programming adapter for configuring modules with T-PORT interface	**MCR-PAC-T-USB**	**2309000**	1
DIN rail adapters for displays	**FA MCR-D-RM**	**1032996**	1

Multifunctional process indicators



Field housing

- Multifunctional process indicator, in control panel component housing for monitoring and displaying analog measurement data
- Supply of 2-conductor sensors
- Safe 4-way isolation
- Configurable via software or hardware keyboard on the front
- Universal inputs for connection of current, voltage, RTDs, and TCs
- Limit value monitoring with two relay outputs
- Process signal transmission via analog output
- Display changes color in the event of an error



Block diagram FA MCR-EX-FD-TUI-UI-2REL-UP

Ex:
Housing width 199 mm

Technical data

Input data	U input	I input
Input signal	0 V ... 10 V 2 V ... 10 V 0 V ... 5 V 0 V ... 1 V 1 V ... 5 V -1 V ... 1 V -10 V ... 10 V -30 V ... 30 V -100 mV ... 100 mV	0 mA ... 20 mA +10% 4 mA ... 20 mA +10%
Input data	RTD	TC
Sensor types that can be used	Pt, Ni, Cu sensors	J, K, T, N, B, S, R, U. L, C, D
Connection method	2-, 3-, 4-conductor	-
Measuring rate	200 ms	200 ms
Temperature measuring range	-200°C ... 1,100°C (range depends on sensor type, adjustable)	-200°C ... 2,495°C (range depends on sensor type, adjustable)
Input resistance	-	10 Ω
Output data	U output	I output
Output signal	0 V ... 10 V 2 V ... 10 V 0 V ... 5 V 1 V ... 5 V	0 mA ... 20 mA 4 mA ... 20 mA
Display	7-segment LC display, with backlight, dot matrix for text/bar graph	
Number of the displayed positions	5	
Switching output	Transistor output, active	
	Open collector output	
Number of outputs	1	
Switching output	Relay output	
Contact type	2 PDT	
Max. switching voltage	30 V DC (3 A) / 230 V AC (3 A)	
Maximum switching current	3 A	
Minimum switching current	10 mA	
General data		
Supply voltage range	24 V DC ... 230 V DC	
Degree of protection	IP67	
Ambient temperature (operation)	-40°C ... 50°C (The readability of the display is no longer guaranteed at temperatures below -30°C (-22°F).)	
Housing material	PBT GF30	
Dimensions W/H/D	199 / 160 / 96 mm	
Screw connection rigid / flexible / AWG	0.2 ... 2.5 mm² / 0.2 ... 2.5 mm² / 24 - 14	
Conformance/approvals	FA MCR-EX-FD-TUI-UI-2REL-UP	FA MCR-FD-TUI-UI-2REL-UP
Conformance	CE-compliant	CE-compliant
ATEX	II (1) G [Ex ia Ga] IIC	-
UL, USA/Canada	UL 61010 Recognized	UL 61010 Recognized
FM approval	AIS / I / 1 / ABCDEFG	-
CSA	Associated Apparatus	CSA GP

Ordering data

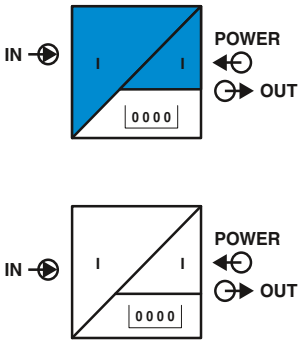
Description	Type	Order No.	Pcs./Pkt.
	FA MCR-EX-FD-TUI-UI-2REL-UP	2907781	1
	FA MCR-FD-TUI-UI-2REL-UP	2907780	1

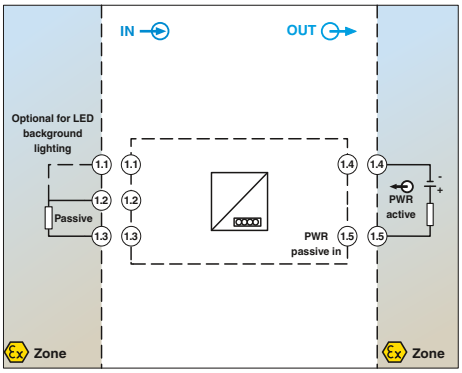
Accessories

Programming adapter for configuring modules with T-PORT interface	**MCR-PAC-T-USB**	2309000	1
Pipe or wall mounting set, for use with multi-functional process indicator in field housing	**FA MCR-FD-PM**	2908739	1

Loop-powered process indicators

new





Block diagram FA MCR-EX-DS-I-I-OLP

Loop-powered process indicator with HART communication for installation in the control cabinet

Ex:

Housing width 96 mm

For installation in the control cabinet

- Loop-powered
- Display of 4 to 20 mA or HART signals
- Low voltage drop
- 5-digit 7-segment display
- Display value can be scaled
- Low installation depth
- Configurable via front keyboard
- SIL-impact-free in accordance with EN61508
- Can be installed in zone 1

Technical data

	I	HART
Input data		
Input signal	4 mA ... 20 mA	up to 4x HART signals
Maximum input signal	200 mA	-
Voltage drop	≤1 V	≤1.9 V
	≤3.9 V (with display lighting)	≤4.8 V (with display lighting)
Input impedance	Approx. 50 Ω	R_x = 40 Ω / C_x = 2.3 nF
Output data		
Display	7-segment LC display, with backlight, dot matrix for text/bar graph	
Number of the displayed positions	5	
General data		
Supply voltage range	Loop-powered, no external supply necessary	
Resolution A/D	>13 bit	
Degree of protection	IP65 (front) IP20 (on the rear)	
Ambient temperature (operation)	-40°C ... 60°C	
Housing material	Aluminum / polycarbonate	
Dimensions W/H/D	96 / 48 / 41.5 mm	
Control panel cutout	92 x 45 mm	
Screw connection rigid / flexible / AWG	0.14 ... 1.5 mm² / 0.14 ... 1.5 mm² / 26 - 16	
Conformance/approvals		
Conformance	CE-compliant	CE-compliant
ATEX	II 2G Ex ib IIC T6 Gb	-
UL, USA/Canada	UL 61010 Listed	UL 61010 Listed
FM approval	-	-
CSA	-	-

Ordering data

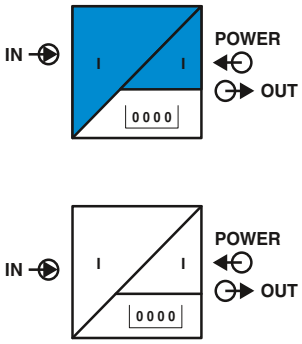
Description	Type	Order No.	Pcs./Pkt.
Output loop-powered process indicator inside the control panel housing for representing current or HART signals			
	FA MCR-EX-DS-I-I-OLP	2908800	1
	FA MCR-DS-I-I-OLP	2908781	1

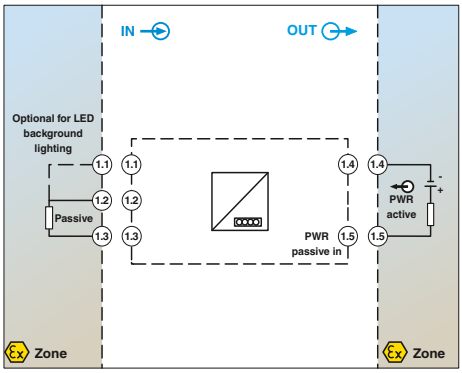
Accessories

DIN rail adapters for displays	**FA MCR-D-RM**	1032996	1

Loop-powered process indicators

new





FA MCR-EX-FDS-I-I-OLP

Ex:
Housing width 131 mm

Field housing

– Loop-powered
– Display of 4 to 20 mA or HART signals
– Low voltage drop
– 5-digit 7-segment display
– Display value can be scaled
– Low installation depth
– Configurable via front keyboard
– SIL-impact-free in accordance with EN61508
– Can be installed in zone 1

Technical data

Input data	I	HART
Input signal	4 mA ... 20 mA	up to 4x HART signals
Maximum input signal	200 mA	-
Voltage drop	≤1 V	≤1.9 V
	≤3.9 V (with display lighting)	≤4.8 V (with display lighting)
Input impedance	Approx. 50 Ω	R_x = 40 Ω / C_x = 2.3 nF
Output data		
Display	7-segment LC display, with backlight, dot matrix for text/bar graph	
Number of the displayed positions	5	
General data		
Supply voltage range	Loop-powered, no external supply necessary	
Resolution A/D	>13 bit	
Degree of protection	IP66/IP67 NEMA 4X	
Ambient temperature (operation)	-40°C ... 60°C	
Housing material	Aluminum	
Dimensions W/H/D	131 / 81.5 / 55.5 mm	
Screw connection rigid / flexible / AWG	0.14 ... 1.5 mm² / 0.14 ... 1.5 mm² / 26 - 16	
Conformance/approvals		
Conformance	CE-compliant	CE-compliant
ATEX	II 2G Ex ib IIC T6 Gb	-
UL, USA/Canada	UL 61010 Listed	UL 61010 Listed
FM approval	-	-
CSA	-	-

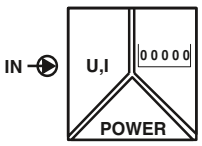
Ordering data

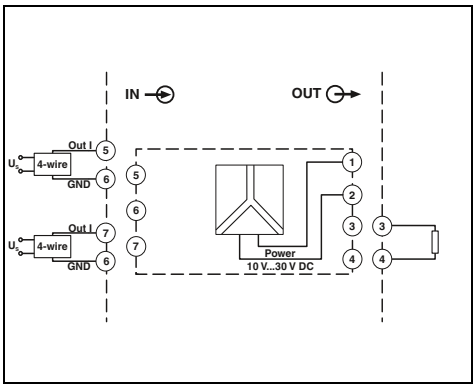
Description	Type	Order No.	Pcs./Pkt.
Output loop-powered process indicator inside field housing for representing current or HART signals	**FA MCR-EX-FDS-I-I-OLP**	2908801	1
	FA MCR-FDS-I-I-OLP	2908782	1

Accessories

Pipe or wall mounting set, for use with output loop-powered process indicator in field housing	**FA MCR-FDS-PM**	2908783	1

Displays
Standard signals





Block diagram MCR-SL-S-U-I

For analog standard signals, configurable

For installation in the control cabinet

- For 0 to 10 V and 0(4) to 20 mA standard analog signals
- Configurable
- 5 positions displayed
- 8 mm LED, 7-segment
- Galvanically isolated
- Minimum/maximum value storage
- Latch/hold function for storing the display value
- Display 48 x 24 mm
- Totalizing counter

Housing width 48 mm

Technical data

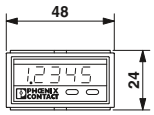
Input data		U input	I input
Input signal		0 ... 10 V / 2 ... 10 V	0 ... 20 mA / 4 ... 20 mA
Maximum input signal		30 V DC	50 mA
Input resistance		>1 MΩ	Approx. 100 Ω with 5 mA / approx. 70 Ω with 20 mA
Resolution		1 mV	2 µA
Measuring rate		$0.1s^{-1}$ / $0.5s^{-1}$	
Input latch signal		Display stop	
Switching level	1 signal (“H”)	4 V DC ... 30 V DC	
	0 signal (“L”)	0 V DC ... 2 V DC	
Output data			
Display		7-segment LED; 8 mm; red	
Number of the displayed positions		5	
Accuracy		<0.1% ±1 digit (at an ambient temperature of 20°C)	
General data			
Supply voltage range		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)		-20°C ... 65°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 rigid / flexible / AWG		0.14 ... 1.5 mm^2 / 0.14 ... 1.5 mm^2 / 26 - 16	
Conformance/approvals			
Conformance		CE-compliant	
UL, USA/Canada		UL 863	

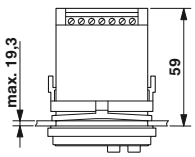
Ordering data

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

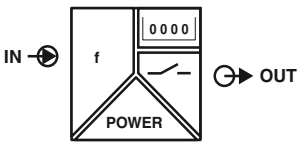
Accessories

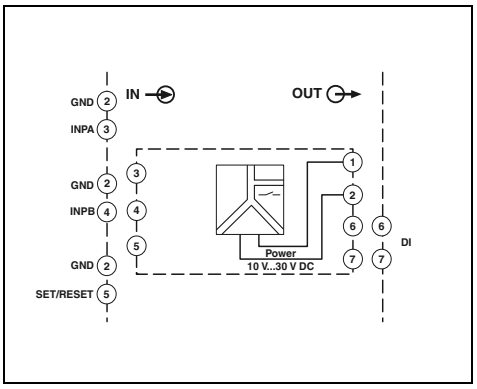
MCR DIN rail adapter for digital displays in a 24 x 48 mm housing	**MCR-SL-D-RA**	2810081	1





Displays
Frequency





Block diagram MCR-SL-D-FIT

Programmable digital display for frequencies, pulses and times

Housing width 48 mm

For installation in the control cabinet
- For frequency signals up to max. 60 kHz
- Configurable
- 6 positions displayed
- LED 8 mm, 7 segment
- 48 x 24 mm display

Technical data

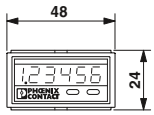
Input data		
Maximum input signal		60 kHz
Input resistance		10 kΩ
Switching level	1 signal ("H")	4 V DC ... 30 V DC
	0 signal ("L")	0 V DC ... 2 V DC
Output data		
Display		7-segment LED; 8 mm; red
Number of the displayed positions		6
Switching output		1 NPN optocoupler
Max. switching voltage		30 V DC
Maximum switching current		10 mA
General data		
Supply voltage range		10 V DC ... 30 V DC
Current consumption		max. 40 mA
Mass storage		EEPROM 1 mil. memory cycles or 10 years
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		22(+0.6)x45(+0.8) mm
Screw connection rigid / flexible / AWG		0.14 ... 1 mm² / 0.14 ... 1.5 mm² / 26 - 16
Conformance/approvals		
Conformance		CE-compliant
UL, USA/Canada		UL 863

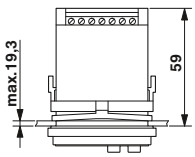
Ordering data

Description	Type	Order No.	Pcs./Pkt.
MCR digital display, for measurement and display of frequencies, pulses and times	**MCR-SL-D-FIT**	2864024	1

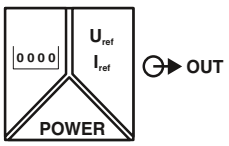
Accessories

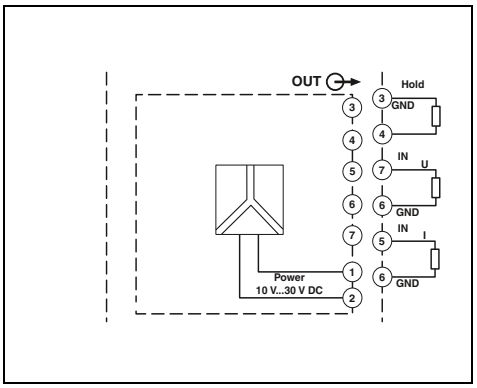
MCR DIN rail adapter for digital displays in a 24 x 48 mm housing	**MCR-SL-D-RA**	2810081	1





Displays
Setpoint adjusters





Block diagram MCR-SL-D-SPA-UI

With manual and automatic ramp function

For installation in the control cabinet

- Manual setpoint definition with step width setting
- Manual setpoint definition via direct input
- Automatic setpoint definition with hold function and 20 support points
- Flexible, adjustable signal ranges of 0 to 12 V or 0 to 24 mA
- Data backup in case of a power failure
- Display value configuration
- Electrical isolation between output and supply

Housing width 48 mm

Technical data

Input data		
Display		7-segment, 8 mm, red
Number of the displayed positions		4
Switching level	1 signal (“H”)	4 V DC ... 30 V DC
	0 signal (“L”)	0 V DC ... 2 V DC
Output data	U output	I output
Output signal	0 ... 12 V	0 ... 24 mA
Length of step	10 mV	10 µA
Load R_B	≥2 kΩ	≤500 Ω (up to 20 mA) ≤400 Ω (>20 mA)
Ripple	≤10 mV_{PP}	
General data		
Supply voltage range	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 rigid / flexible / AWG	0.14 ... 1.5 mm^2 / 0.14 ... 1.5 mm^2 / 26 - 16	
Conformance/approvals		
Conformance	CE-compliant	
UL, USA/Canada	UL 863	

Ordering data

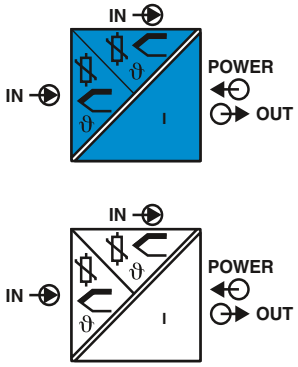
Description	Type	Order No.	Pcs./Pkt.
MCR digital setpoint encoder, for presetting current and voltage signals	**MCR-SL-D-SPA-UI**	2710314	1

Accessories

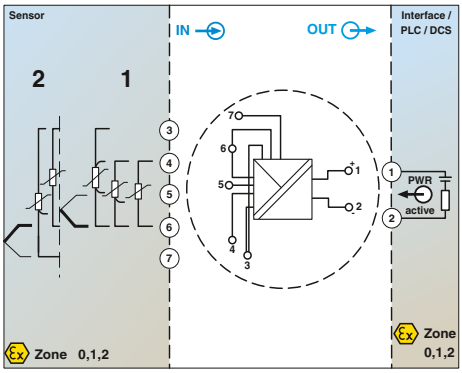
MCR DIN rail adapter for digital displays in a 24 x 48 mm housing	**MCR-SL-D-RA**	2810081	1

Temperature, temperature head-mounted transducers

new



- Output loop-powered temperature head-mounted transducers
- 2 universal inputs for RTD, TC, resistance-type sensors and voltage sensors (mV), Ex ia IIC
- 4 to 20 mA output
- HART communication
- Freely configurable
- SIL 2/3
- For mounting in the connecting head, form B
- Can be installed in zone 0



Block diagram for FA MCR-EX-HT-TS-I-OLP-PT

Loop-powered temperature head-mounted transducer

Functional Safety

Ex:

Technical data

Input data		
Resistance thermometers		Pt, Ni, Cu sensors: 2-, 3-, 4-conductor: -
Thermocouple sensors		A, B, C, D, E, J, K, L, N, R, S, T, U
Resistor		10 Ω ... 2,000 Ω (minimum measuring span: 10 Ω)
Input voltage range		-20 mV ... 100 mV
Output data		
Output signal		4 ... 20 mA, HART / 20 ... 4 mA
Maximum output signal		23 mA
Load R_B		(U_L - 11 V) / 0.023 A
Switch-on delay		Approx. 10 s (HART) Approx. 28 s (measured value)
General data		
Supply voltage range		11 V DC ... 42 V DC
Current consumption		23.5 mA
Step response (0 - 99%)		0.8 s (TC)
Electrical isolation		
	Input/output	2 kV AC
Degree of protection		IP33 (upon installation in field housing IP66/67, NEMA 4X)
Ambient temperature (operation)		-40°C ... 85°C
Screw connection rigid / flexible / AWG		0.2 ... 1.5 mm² / 0.2 ... 1.5 mm² / 24 - 16
Conformance/approvals		
Conformance		CE-compliant
ATEX		II 1G Ex ia IIC T6...T4 Ga
UL, USA/Canada		UL 61010 Recognized
FM approval		NI / Class I / Div. 1, 2 / Group ABCD T6/T5/T4
CSA		Exia / Class I / Group ABCD T6/T5/T4
Conformance		CE-compliant
ATEX		II 3G Ex nA IIC T6...T4 Gc
UL, USA/Canada		UL 61010 Recognized
FM approval		NI / Class I / Div. 1, 2 / Group ABCD T6/T5/T4
CSA		NI, Class I, Div. 2, Groups A, B, C, D

Ordering data

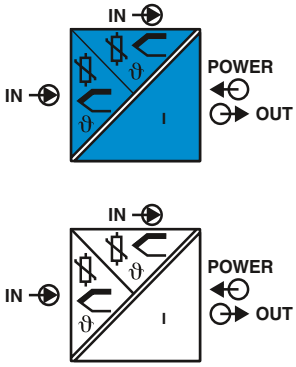
Description	Type	Order No.	Pcs./Pkt.
Output loop-powered temperature transducer, for RTD, TC, resistance-type sensors and voltage sensors (mV)			
	FA MCR-EX-HT-TS-I-OLP-PT	2908743	1
	FA MCR-HT-TS-I-OLP-PT	2908742	1

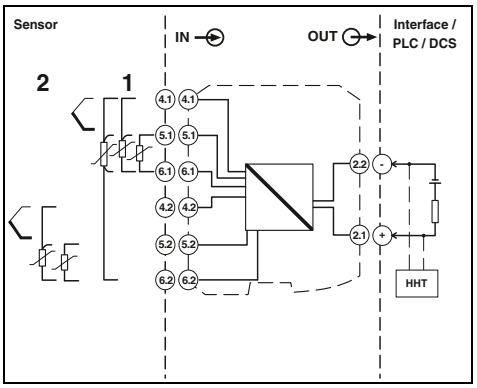
Accessories

Programming adapter for configuring modules with T-PORT interface	**MCR-PAC-T-USB**	2309000	1
Display unit for plugging directly into the FA MCR-... head-mounted transducer	**FA MCR-HT-D**	2908735	1
Adapter for control cabinet installation of head-mounted transducers	**MCR-DIN-RAIL-ADAPTER HT**	2864671	1
Field housing for head-mounted transducers, with display window and two cable entries	**FA MCR-HT-FH**	2908736	1
Wall fastening for FA MCR-HT-FH field housing	**FA MCR-HT-FH-WM**	2908737	1
Adapter cable, 1 m long, with USB connection, for HART configuration	**GW HART USB MODEM**	1003824	1

Temperature, temperature transducers

new





Output loop-powered temperature transducer

- Loop-powered temperature transducer
- 2 universal inputs for RTD, TC, resistance-type sensors and voltage sensors (mV), Ex ia IIC
- 4 to 20 mA output
- HART communication
- Freely configurable
- SIL 2/3
- For DIN rail mounting
- Can be installed in zone 0

Functional Safety
Ex:
Housing width 12.5 mm

Technical data

Input data	
Input signal (can be configured using DIP switches)	Pt, Ni, Cu sensors: 2-, 3-, 4-conductor: -
Input signal (can be configured using DIP switches)	A, B, C, D, E, J, K, L, N, R, S, T, U
Temperature range	-250°C ... 2,500°C (range depending on the sensor type)
Linear resistance measuring range	10 Ω ... 2,000 Ω (minimum measuring span: 10 Ω)
Input voltage range	-20 mV ... 100 mV
Output data	
Output signal	4 ... 20 mA / 20 ... 4 mA
Maximum output signal	23 mA
Load R_B	(U_L - 11 V) / 0.023 A
General data	
Supply voltage range	12 V DC ... 42 V DC
Current consumption	≤23 mA
Step response (0 - 99%)	0.8 s (TC)
Electrical isolation of input/output	2 kV AC
Ambient temperature (operation)	-40°C ... 85°C
Altitude	≤4,000 m (above sea level)
Dimensions W/H/D	12.5 / 99 / 114.5 mm
Push-in connection rigid / flexible / AWG	0.2 ... 1.5 mm² / 0.2 ... 1.5 mm² / 24 - 16
Screw connection rigid / flexible / AWG	0.2 ... 2.5 mm² / 0.2 ... 2.5 mm² / 24 - 14
Conformance/approvals	
Conformance	CE-compliant
ATEX	II 3G Ex nA IIC T6...T4 Gc
UL, USA/Canada	UL 61010 Recognized
FM approval	NI, Class I, Div. 2, Groups A, B, C, D
CSA	NI / Class I / Div. 2 / ABCD T6/T5/T4

Conformance/approvals	
Conformance	CE-compliant
ATEX	II 3G Ex nA IIC T6...T4 Gc
UL, USA/Canada	UL 61010 Recognized
FM approval	NI, Class I, Div. 2, Groups A, B, C, D
CSA	NI / Class I / Div. 2 / ABCD T6/T5/T4

Ordering data

Description	Type	Order No.	Pcs./Pkt.
Output loop-powered temperature transducer, for RTD, TC, resistance-type sensors and voltage sensors (mV)			
Screw connection	**MACX MCR-TS-I-OLP**	2908662	1
Push-in connection	**MACX MCR-TS-I-OLP-SP**	2908664	1
Screw connection	**MACX MCR-TS-I-OLP-C**	1012249	1
Screw connection	**MACX MCR-EX-TS-I-OLP**	2908660	1
Push-in connection	**MACX MCR-EX-TS-I-OLP-SP**	2908661	1

Accessories

Programming adapter for configuring modules with T-PORT interface	**MCR-PAC-T-USB**	2309000	1

Order key for MACX MCR-TS-I-OLP-C output loop-powered temperature transducers (standard configuration entered as an example)

Order No.	Safety Integrity Level	Input			Measuring range			Output
		Measuring unit	Sensor type	Connection technology	Start	End	Error	
1012249	**ON**	**C**	**PT100**	**3**	**-200**	**850**	**MIN**	**3.58**
1012249 ≙ MACX MCR-TS-I-OLP-C	ON ≙ SIL ON OFF ≙ SIL OFF	C ≙ Celsius F ≙ Fahrenheit O ≙ Ω V ≙ Millivolts K ≙ Kelvin R ≙ Rankine	PT100 ≙ PT100 IEC 751 PT200 ≙ PT200 IEC 751 PT500 ≙ PT500 IEC 751 PT1000 ≙ PT1000 IEC 751 PT100J ≙ PT100 JIS C1604 NI100 ≙ NI100 DIN 43760 NI120 ≙ NI120 DIN 43760 NI100G ≙ NI100 OIML/GOST 6651-09 NI120G ≙ NI120 OIML/GOST 6651-09 PT50G ≙ PT50 G GOST 6651 (α=0.00391) PT100G ≙ PT100 G GOST 6651 (α=0.00391) CU50 ≙ CU 50 GOST (α=0.00428) CU50G ≙ CU 50 GOST (α=0.00426) CU100 ≙ CU 100 GOST (α=0.00428) A1G ≙ A-1 GOST 8.585-2001 B ≙ B IEC584-1 (Pt30Rh-Pt6Rh) C ≙ C ASTM E988 DA ≙ DA ASTM E988(2002) E ≙ E IEC584-1 (NiCr-CuNi) J ≙ J IEC584-1 (Fe-CuNi) K ≙ K IEC584-1 (NiCr-Ni) N ≙ N IEC 584-1 (NiCrSi-NiSi) R ≙ R IEC 584-1 (Pt13Rh-Pt) S ≙ S IEC 584-1 (Pt10Rh-Pt) T ≙ T IEC 584-1 (Cu-CuNi) L ≙ L DIN 43760 (Fe-CuNi) LG ≙ LG GOST 8.585-2001 U ≙ U DIN 43760 (Cu-CuNi) RES13 ≙ PT100 IEC751 RES14 ≙ PT100 IEC751 V11 ≙ PT100 IEC751	2 ≙ 2-conductor 3 ≙ 3-conductor 4 ≙ 4-conductor	Freely selectable between -250°C ... 2,500°C (measuring range limits depend on sensor type) Measurement range signal span of at least 10°K for RTD sensors/50°K for TC sensors	Freely selectable between -250°C ... 2,500°C (measuring range limits depend on sensor type)	MIN ≙ 3.58 mA MAX ≙ freely selectable between 21.5...23 mA	3.58 ≙ 3.58 mA Freely selectable between 21.5 ... 23 mA

Accessories for head-mounted transducers

– 2 cable entries
– Aluminum with polyester coating
– For use with head-mounted transducers
– Display window in cover

Field housing for head-mounted transducers

Technical data

General data	
Housing material	Aluminum

Ordering data

Description	Type	Order No.	Pcs./Pkt.
Field housing for head-mounted transducers, with display window and two cable entries	**FA MCR-HT-FH**	2908736	1

Accessories

Wall fastening for FA MCR-HT-FH field housing	**FA MCR-HT-FH-WM**	2908737	1
Pipe fastening for FA MCR-HT-FH field housing	**FA MCR-HT-FH-PM**	2908738	1

Accessories for head-mounted transducers

– For snapping onto the DIN rail
– For control cabinet installation of head-mounted transducers
– Display unit for plugging directly into FA MCR-... head-mounted transducers
– Separately configurable
– Direct process value readout

Display unit for plugging directly into head-mounted transducers

Adapter for DIN rail mounting of head-mounted transducers

Ordering data

Description	Type	Order No.	Pcs./Pkt.
Display unit for plugging directly into the FA MCR-... head-mounted transducer	**FA MCR-HT-D**	2908735	1

Ordering data

Description	Type	Order No.	Pcs./Pkt.
Adapter for control cabinet installation of head-mounted transducers	**MCR-DIN-RAIL-ADAPTER HT**	2864671	1

Accessories for displays

new

- HART® communication resistor, 250 Ω, in combination with digital display FA MCR-(EX)-(F)DS-I-I-OLP
- DIN rail adapter for mounting on a 35 mm DIN rail in combination with digital display FA MCR-(EX)-D-TUI-UI-2REL-UP, FA MCR-(-EX)-(F)DS-I-I-OLP See web site for more.

HART communication resistor

new

DIN rail adapter for displays

Description	Ordering data			Ordering data		
	Type	Order No.	Pcs./Pkt.	Type	Order No.	Pcs./Pkt.
HART communication resistor	**FA MCR-FDS-R250**	2908802	1			
DIN rail adapters for displays				**FA MCR-D-RM**	1032996	1

Accessories
Programming adapters

- Programming adapters with USB and T port interface, 2.4 m for programming FA MCR-..., MCR-...-LP-..., and MCR-...-HT-... modules
- HART USB modem for configuring MACX MCR-TS-I-OLP-..., MACX MCR-EX-TS-I-OLP-..., FA MCR-HT-TS-I-OLP-... and FA MCR-EX-HT-TS-I-OLP-... using the HART protocol

Programming adapter

HART USB MODEM

Description	Ordering data			Ordering data		
	Type	Order No.	Pcs./Pkt.	Type	Order No.	Pcs./Pkt.
Programming adapter for configuring modules with T-PORT interface	**MCR-PAC-T-USB**	2309000	1			
HART USB modem, for configuring modules with HART communication				**GW HART USB MODEM**	1003824	1