



SIL
IEC 61508

PL
EN ISO 13849

Ex
Ex i

Signal conditioners with Functional Safety

The MACX ranges

Reliable and safe MACX signal conditioners

Maximum safety for your systems and machines: in all phases of the product lifecycle, MACX signal conditioners have been developed and produced according to standards for Functional Safety.

Concept

All safety-related functions are defined and assessed right from the creation of the product specification.

Development

Product development incorporates hazard and risk analyses as well as measures for ensuring the required safety integrity.

A solution for every type of signal

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

For more information, see page 6 onwards

Maximum explosion protection

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

For more information, see page 10 onwards

Analog signals with performance level

With MACX Safety, you can integrate analog signals easily into your safety application according to the Machinery Directive, even for intrinsically safe circuits in the hazardous area.

For more information, see page 16 onwards



Ex approvals according to ATEX, IECEx

- Ex i for intrinsically safe circuits up to zone 0 and zone 20
- Ex n for installation in zone 2





Safety lifecycle

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

Production

During production, all of the defined specifications and test instructions are consistently implemented, verified, and validated.

Device operation

Certified safety offers the highest standard of quality and reliability during device operation.



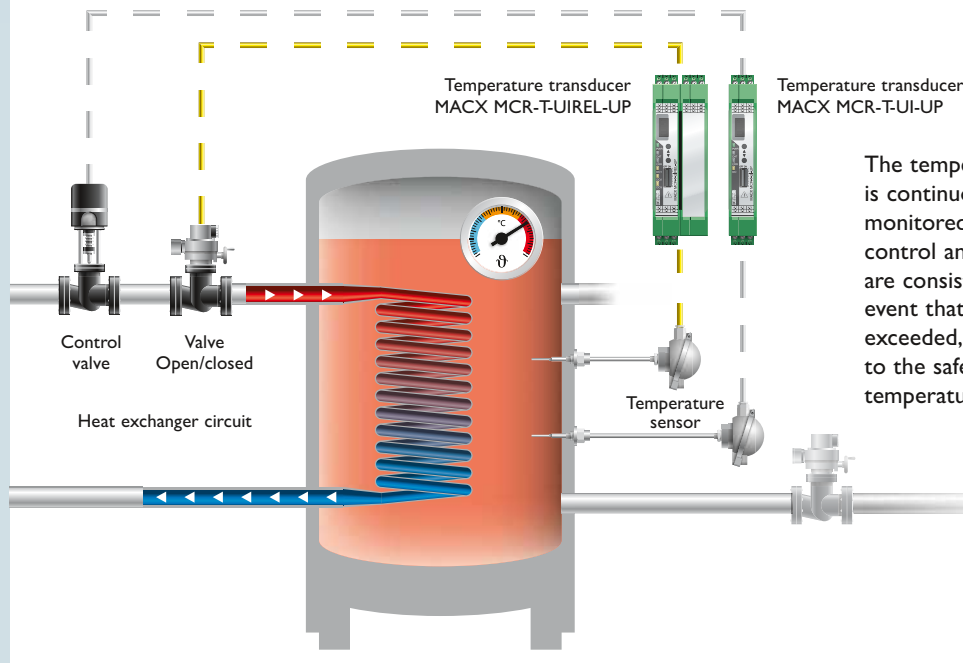
Tested quality and safety

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

www.phoenixcontact.com



Temperature control and monitoring with safe shutdown



The temperature in the tank is continuously controlled and monitored. Here, closed-loop control and the safety equipment are consistently isolated. In the event that the limit values are exceeded, the process is switched to the safe state via the additional temperature transducer.


MACX signal conditioners


Your advantages

The MACX signal conditioner ranges combine high mechanical and electronic functionality in the same housing.

Benefit from the many advantages of this consistent design.

Flexible power supply

 Versions with wide range input enable worldwide use in power supply networks.

 Easy power bridging, system expansion or module replacement during operation with the modular DIN rail connector for 24 V versions.



HART communication

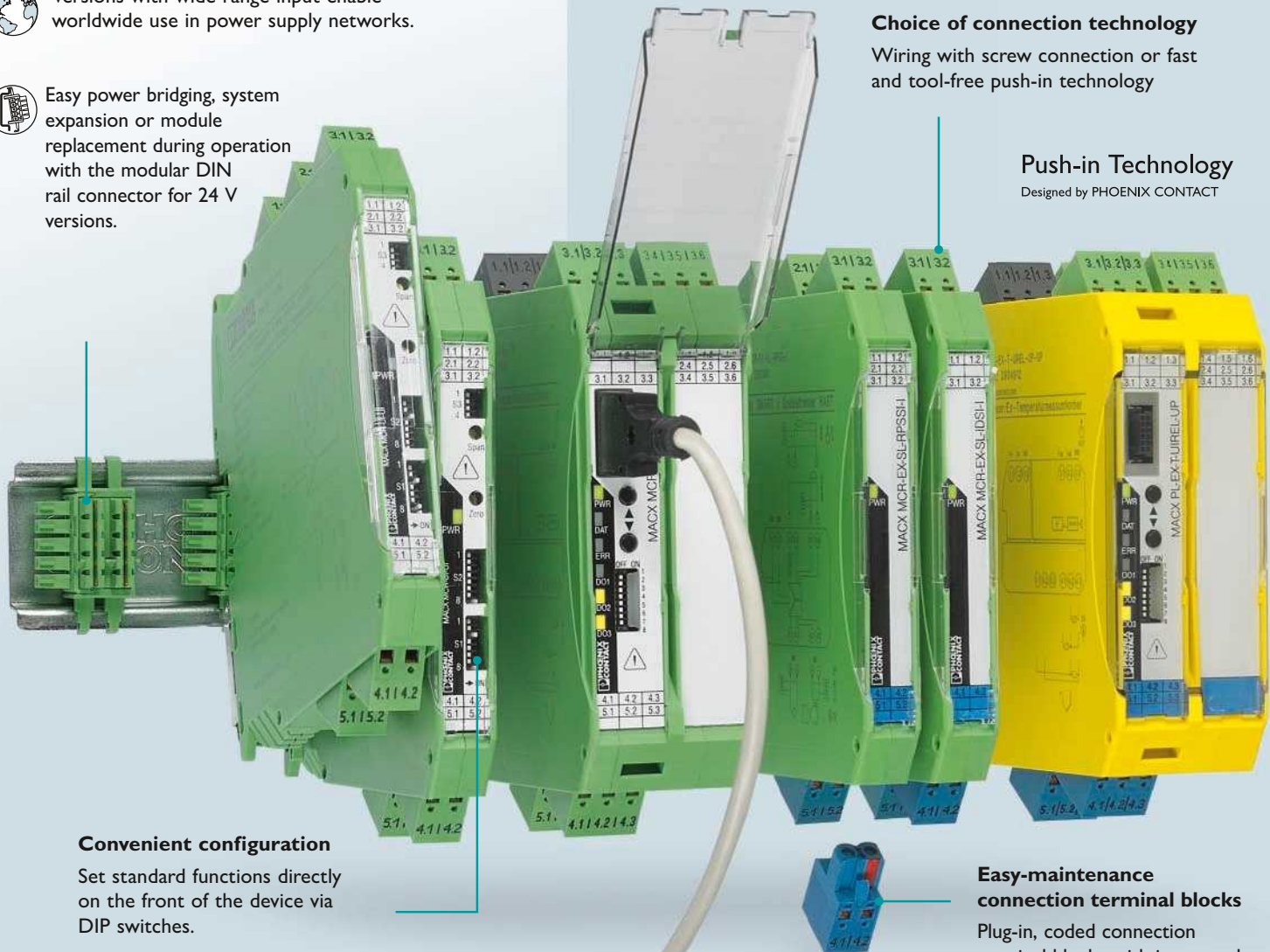
Bidirectional transmission of the HART communication signal for numerous analog IN/OUT product types.

Choice of connection technology

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

Push-in Technology

Designed by PHOENIX CONTACT

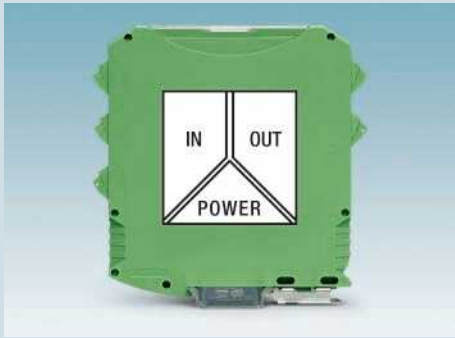


Convenient configuration

Set standard functions directly on the front of the device via DIP switches.

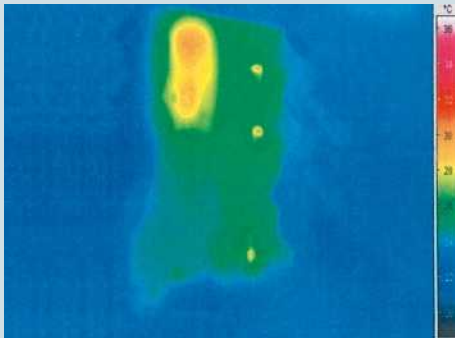
Easy-maintenance connection terminal blocks

Plug-in, coded connection terminal blocks with integrated test sockets.



Precise, interference-free signal transmission

Precise and interference-free signal transmission, thanks to the patented transmitter concept with safe electrical isolation.



Long service life and high operational reliability

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

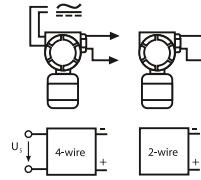


Easy configuration and monitoring

Extended configuration and monitoring can be conveniently carried out via the PC with the free ANALOG-CONF software or via FDT/DTM.

Product overview

Analog IN/ Analog OUT

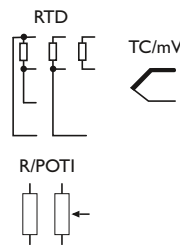


Signal conditioners

- Universal and standard 3-way isolators
- 3-way repeater power supplies (single and two-channel)
- 3-way output isolators
- 4-way signal duplicators

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Temperature

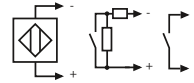


Temperature transducers

- Universal and standard measuring transducers
- 3-way measuring transducers
- 4-way measuring transducers with switching output
- Threshold value switches

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Digital IN

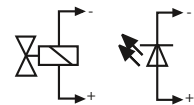


NAMUR signal conditioners

- Single and two-channel
- Relay and transistor outputs
- Signal duplicators

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Digital OUT



Solenoid drivers

- Versions with various output characteristic curves for all solenoid valves on the market
- Loop-powered versions
- Versions with logic input

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Termination Carriers

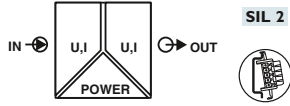
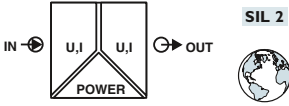
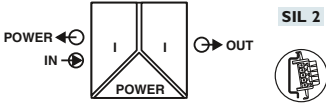
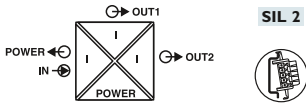
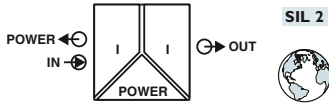
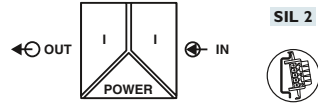
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Accessories

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- Operator interface and display unit
- Supply components
- Programming adapter
- HART multiplexer and more

MACX Analog – product overview

	Analog IN	Analog IN	Analog IN
	 <p>Universal 3-way signal conditioner, configurable</p>	 <p>Universal 3-way signal conditioner, configurable</p>	 <p>Repeater power supply and input signal conditioner, HART-compatible</p>
IN	<p>Unipolar: 0 ... 50 mV to 0 ... 100 V, 0 ... 1 mA to 0 ... 10 mA</p> <p>Bipolar: -50 ... 50 mV to -100 ... 100 V, -1 ... 1 mA to -100 ... 100 mA</p> <p>Live zero: 1 ... 5 mA, 2 ... 10 mA, 4 ... 20 mA, 1 ... 5 V, 2 ... 10 V</p> <p>Configurable via DIP switch; for additional signal combinations, see data sheet</p>	<p>Unipolar: 0 ... 50 mV to 0 ... 100 V, 0 ... 1 mA to 0 ... 10 mA</p> <p>Bipolar: -50 ... 50 mV to -100 ... 100 V, -1 ... 1 mA to -100 ... 100 mA</p> <p>Live zero: 1 ... 5 mA, 2 ... 10 mA, 4 ... 20 mA, 1 ... 5 V, 2 ... 10 V</p> <p>Configurable via DIP switch; for additional signal combinations, see data sheet</p>	<p>Input isolator operation: 4 ... 20 mA (0 ... 20 mA)</p> <p>Repeater power supply operation: 4 ... 20 mA</p> <p>Transmitter supply voltage: > 16 V (20 mA)</p>
OUT	<p>Unipolar: 0 ... 2.5 V, 0 ... 5 V, 0 ... 10 V, 0 ... 5 mA, 0 ... 10 mA, 0 ... 20 mA</p> <p>Bipolar: -2.5 ... 2.5 V, -5 ... 5 V, -10 ... 10 V, -5 ... 5 mA, -10 ... 10 mA, -20 ... 20 mA</p> <p>Live zero: 1 ... 5 mA, 2 ... 10 mA, 4 ... 20 mA, 0.5 ... 2.5 V, 1 ... 5 V, 2 ... 10 V</p> <p>Configurable via DIP switch; for additional signal combinations, see data sheet</p>	<p>Unipolar: 0 ... 2.5 V, 0 ... 5 V, 0 ... 10 V, 0 ... 5 mA, 0 ... 10 mA, 0 ... 20 mA</p> <p>Bipolar: -2.5 ... 2.5 V, -5 ... 5 V, -10 ... 10 V, -5 ... 5 mA, -10 ... 10 mA, -20 ... 20 mA</p> <p>Live zero: 1 ... 5 mA, 2 ... 10 mA, 4 ... 20 mA, 0.5 ... 2.5 V, 1 ... 5 V, 2 ... 10 V</p> <p>Configurable via DIP switch; for additional signal combinations, see data sheet</p>	<p>Input isolator operation: 4 ... 20 mA (0 ... 20 mA) active/passive</p> <p>Repeater power supply operation: 4 ... 20 mA active/passive</p>
Design width	12.5 mm	12.5 mm	12.5 mm
Screw connection	MACX MCR-UI-UI-NC 2811446	MACX MCR-UI-UI-UP-NC 2811297	MACX MCR-SL-RPSSI-I 2865955
Push-in connection	MACX MCR-UI-UI-SP-NC 2811556	MACX MCR-UI-UI-UP-SP-NC 2811569	MACX MCR-SL-RPSSI-I-SP 2924207
	Analog IN	Analog IN	Analog OUT
	 <p>Repeater power supply and input signal conditioner with two outputs, HART-compatible</p>	 <p>Repeater power supply and input signal conditioner, HART-compatible</p>	 <p>Output signal conditioner, HART-compatible</p>
IN	<p>Input isolator operation: 4 ... 20 mA (0 ... 20 mA)</p> <p>Repeater power supply operation: 4 ... 20 mA</p> <p>Transmitter supply voltage: > 16 V (20 mA)</p>	<p>Input isolator operation: 4 ... 20 mA (0 ... 20 mA)</p> <p>Repeater power supply operation: 4 ... 20 mA</p> <p>Transmitter supply voltage: > 16 V (20 mA)</p>	<p>4 ... 20 mA (0 ... 20 mA)</p> <p>With line fault detection</p>
OUT	<p>Input isolator operation: 4 ... 20 mA (0 ... 20 mA) per output, active</p> <p>Repeater power supply operation: 4 ... 20 mA per output, active</p>	<p>Input isolator operation: 4 ... 20 mA (0 ... 20 mA) active/passive, 1 ... 5 V (0 ... 5 V)</p> <p>Repeater power supply operation: 4 ... 20 mA active/passive, 1 ... 5 V</p> <p>Configurable via DIP switch</p>	<p>4 ... 20 mA (0 ... 20 mA)</p> <p>With line fault detection</p>
Design width	12.5 mm	17.5 mm	12.5 mm
Screw connection	MACX MCR-SL-RPSSI-2I 2924825	MACX MCR-SL-RPSSI-I-UP 2865968	MACX MCR-SL-IDSI-I 2865971
Push-in connection	MACX MCR-SL-RPSSI-2I-SP 2924838	MACX MCR-SL-RPSSI-I-UP-SP 2924210	MACX MCR-SL-IDSI-I-SP 2924223

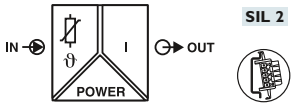
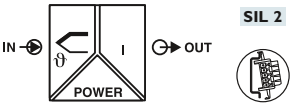
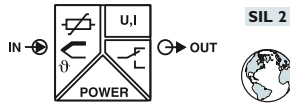
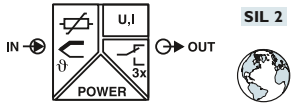


The DIN rail connector enables the modular bridging of the 24 V supply voltage.



Versions with wide range input for worldwide power supply networks (MACX MCR-...-UP).

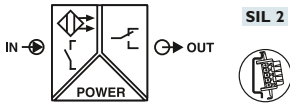
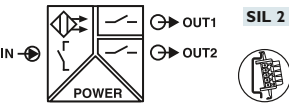
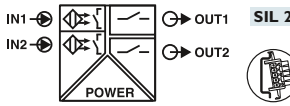
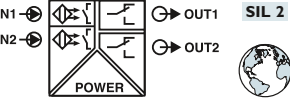
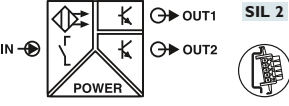
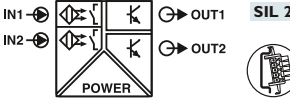
MACX Analog – product overview

	Temperature	Temperature	Temperature
	 <p>Temperature transducer for RTD sensors, configurable</p>	 <p>Temperature transducer for TC sensors, configurable</p>	 <p>Universal temperature transducer, with limit value relay, configurable</p>
IN	RTD: PT 50, PT 100, PT 200, PT 500, PT 100S, PT 500S, Ni 100, Ni 500, Cu50, Cu53 Potentiometer: 0 ... 2000 Ω Linear resistance: 0 ... 2000 Ω Configurable via ANALOG-CONF or FDT/DTM	TC: type E, J, K, N, L Voltages: -20 mV ... 70 mV Configurable via ANALOG-CONF or FDT/DTM	RTD: PT 10 ... PT 10000, Ni 10 ... Ni 10000, Cu10, Cu53, KTY TC ¹⁾ : type B, E, J, K, N, R, S, T, L, U, C, D, A-1, A-2, A-3, M, L Potentiometer: 0 ... 50 kΩ Linear resistance: 0 ... 50 kΩ ±1000 mV, ±20 mA ²⁾ Configurable via ANALOG-CONF, FDT/DTM or IFS-OP-UNIT
OUT	0 ... 20 mA, 4 ... 20 mA (functionally safe) Configurable via ANALOG-CONF or FDT/DTM	0 ... 20 mA, 4 ... 20 mA (functionally safe) Configurable via ANALOG-CONF or FDT/DTM	Analog: 0 ... 20 mA, -10 ... 10 V (freely scalable), 4 ... 20 mA (functionally safe) Digital: 1 PDT relay Configurable via ANALOG-CONF, FDT/DTM or IFS-OP-UNIT
Design width	12.5 mm	12.5 mm	17.5 mm
Screw connection	MACX MCR-SL-RTD-I-NC 2865078	MACX MCR-SL-TC-I-NC 2924346	MACX MCR-T-UI-UP 2811394
Push-in connection	MACX MCR-SL-RTD-I-SP-NC 2924320		MACX MCR-T-UI-UP-SP 2811860
	Temperature		
	 <p>Universal temperature transducer, with three limit value relays, configurable</p>		
IN	RTD: PT 10 ... PT 10000, Ni 10 ... Ni 10000, Cu10, Cu53, KTY TC ¹⁾ : type B, E, J, K, N, R, S, T, L, U, C, D, A-1, A-2, A-3, M, L Potentiometer: 0 ... 50 Ω Linear resistance: 0 ... 50 kΩ ±1000 mV, ±20 mA ²⁾ Configurable via ANALOG-CONF, FDT/DTM or IFS-OP-UNIT		
OUT	Analog: 0 ... 20 mA, -10 ... 10 V (freely scalable), 4 ... 20 mA (functionally safe) Digital: 3 relay outputs, combination of relay 2 and 3 functionally safe Configurable via ANALOG-CONF, FDT/DTM or IFS-OP-UNIT		
Design width	35.0 mm		
Screw connection	MACX MCR-T-UIREL-UP 2811378		
Push-in connection	MACX MCR-T-UIREL-UP-SP 2811828		

¹⁾ See accessory MACX MCR(-EX)-CJC

²⁾ See accessory MACX MCR(-EX)-I20

MACX Analog – product overview

	Digital IN	Digital IN	Digital IN
	 <p>NAMUR signal conditioner, PDT output</p>	 <p>NAMUR signal conditioner, two N/O contact outputs</p>	 <p>NAMUR signal conditioner, two-channel, N/O contact output</p>
IN	NAMUR proximity sensors Unused contacts or contacts with resistance circuit Line fault detection can be switched on/off	NAMUR proximity sensors Unused contacts or contacts with resistance circuit Line fault detection can be switched on/off	NAMUR proximity sensors Unused contacts or contacts with resistance circuit Line fault detection can be switched on/off
OUT	1 relay (PDT) 250 V AC (2 A), 120 VDC (0.2 A), 30 V DC (2 A) Switching behavior configurable via DIP switch	2 relays (N/O contacts) 250 V AC (2 A), 120 VDC (0.2 A), 30 VDC (2 A) Switching behavior configurable via DIP switch	1 relay (N/O contact) per channel 250 V AC (2 A), 120 V DC (0.2 A), 30 V DC (2 A) Switching behavior configurable via DIP switch
Design width	12.5 mm	12.5 mm	12.5 mm
Screw connection	MACX MCR-SL-NAM-R 2865997	MACX MCR-SL-NAM-2RO 2865010	MACX MCR-SL-2NAM-RO 2865049
Push-in connection	MACX MCR-SL-NAM-R-SP 2924252	MACX MCR-SL-NAM-2RO-SP 2924265	MACX MCR-SL-2NAM-RO-SP 2924294
	Digital IN	Digital IN	Digital IN
	 <p>NAMUR signal conditioner, two-channel, PDT output</p>	 <p>NAMUR signal conditioner, two transistor outputs</p>	 <p>NAMUR signal conditioner, two-channel, transistor output</p>
IN	NAMUR proximity sensors Unused contacts or contacts with resistance circuit Line fault detection can be switched on/off	NAMUR proximity sensors Unused contacts or contacts with resistance circuit Line fault detection can be switched on/off	NAMUR proximity sensors Unused contacts or contacts with resistance circuit Line fault detection can be switched on/off
OUT	1 relay (PDT) per channel 250 V AC (2 A), 120 V DC (0.2 A), 30 V DC (2 A) Switching behavior configurable via DIP switch	2 transistor outputs, passive Switching voltage/current: max. 30 VDC/50 mA Switching frequency: max. 5 kHz Switching behavior configurable via DIP switch	1 transistor output per channel, passive Switching voltage/current: max. 30 VDC/50 mA Switching frequency: max. 5 kHz Switching behavior configurable via DIP switch
Design width	17.5 mm	12.5 mm	12.5 mm
Screw connection	MACX MCR-SL-2NAM-R-UP 2865052	MACX MCR-SL-NAM-2T 2865023	MACX MCR-SL-2NAM-T 2865036
Push-in connection	MACX MCR-SL-2NAM-R-UP-SP 2924304	MACX MCR-SL-NAM-2T-SP 2924278	MACX MCR-SL-2NAM-T-SP 2924281



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



Versions with wide range input for worldwide power supply networks (MACX MCR-...-UP).

Maximum explosion protection MACX Analog Ex



Highly compact and leading technology: with a design width of just 12.5 mm, MACX Analog Ex offers a wide range of single and two-channel signal isolators for intrinsically safe circuits in the hazardous area. The products are type-tested by an independent NAMUR test laboratory in accordance with NE 95 and therefore satisfy the high requirements of the chemical industry.

Suitable for all Ex zones and gas groups

All MACX Analog Ex signal conditioners are approved in accordance with the applicable ATEX and IECEx standards:

- **Ex i** – for intrinsically safe circuits up to zone 0 (gas) and zone 20 (dust)

Marking: Ex II (1) G [Ex ia Ga] IIC;
 Ex II (1) D [Ex ia Da] IIIC

- **Ex n** – for device installation in zone 2

Marking: Ex II 3(1) G Ex nA nC [ia Ga] IIC T4 Gc

Relevant national approvals such as UL and GOST are available.



HART communication

Bidirectional transmission of the HART communication signal for all analog IN and analog OUT isolators.



12.5 mm

Push-in Technology

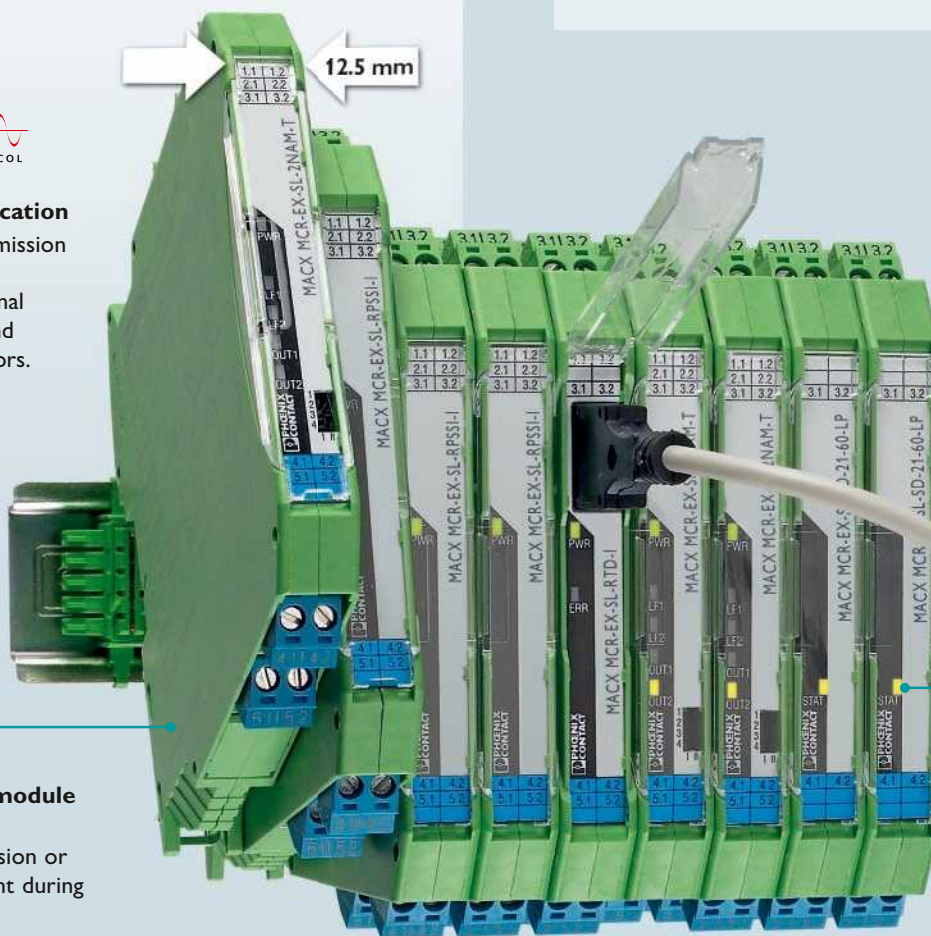
Designed by PHOENIX CONTACT

Fast diagnostics

LED indicators according to NE 44 for supply voltage, switching state, and fault.

Hot-swappable module replacement

Easy system expansion or module replacement during operation.



Easy-maintenance connection terminal blocks

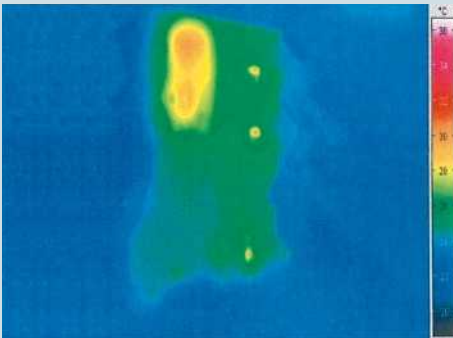
Plug-in, coded connection terminal blocks with integrated test sockets.





Precise, interference-free signal transmission

Precise and interference-free signal transmission, thanks to the patented transmitter concept with safe electrical isolation.



Long service life and high operational reliability

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



Fast and error-free signal connection

Compact Termination Carriers connect MACX Analog Ex devices to the automation system easily by means of plug and play.

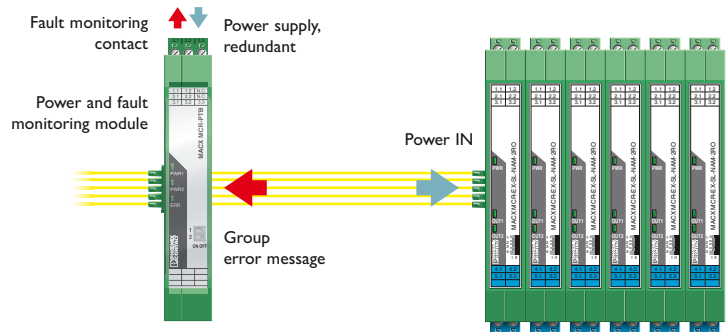
Power supply and diagnostics – flexible and easy with the DIN rail connector

Easily bridge the 24 V supply voltage using the modular DIN rail connector. This simplifies wiring and enables system expansion or module replacement even during operation.

The DIN rail connector offers two supply options:

1. Direct supply

Via any MACX Analog Ex module

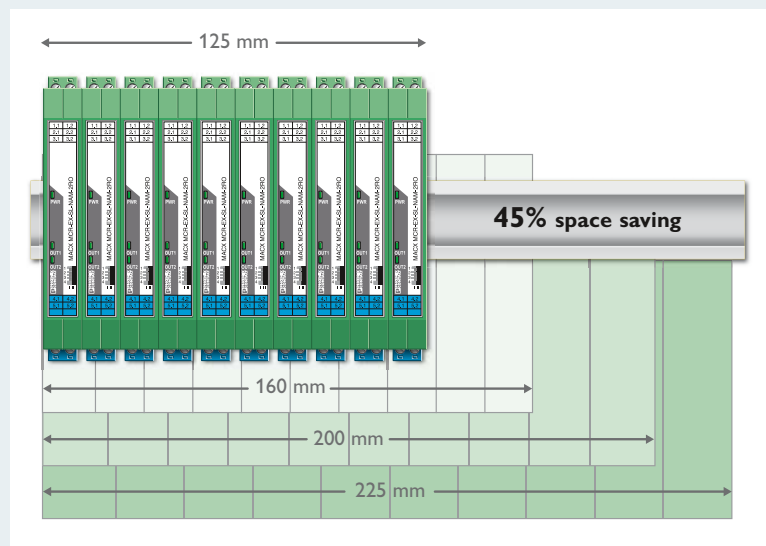


2. Via the power and fault monitoring module

- Simple or redundant supply (decoupled from diode)
- Fault monitoring output (message in the event of auxiliary voltage failure and line fault group message in the case of NAMUR signal conditioners)

Maximum explosion protection with minimum space requirements

With a housing width of just 12.5 mm for all single and two-channel 24 V devices, MACX Analog Ex offers space savings of up to 45% compared to other Ex i signal conditioners on the market.



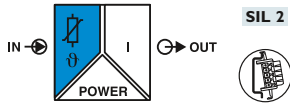
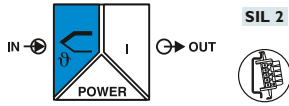
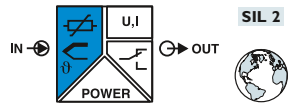
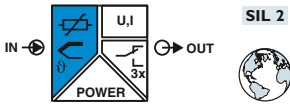


	Analog IN	Analog IN	Analog IN
	<p>Repeater power supply and input signal conditioner, HART-compatible</p>	<p>Repeater power supply and input signal conditioner with two outputs, HART-compatible</p>	<p>Repeater power supply, two-channel, HART-compatible</p>
IN	Input isolator operation: 4 ... 20 mA (0 ... 20 mA) Repeater power supply operation: 4 ... 20 mA Transmitter supply voltage: > 16 V (20 mA)	Input isolator operation: 4 ... 20 mA (0 ... 20 mA) Repeater power supply operation: 4 ... 20 mA Transmitter supply voltage: > 16 V (20 mA)	4 ... 20 mA per channel Transmitter supply voltage: > 16 V (20 mA) per channel
OUT	Input isolator operation: 4 ... 20 mA (0 ... 20 mA) active/passive Repeater power supply operation: 4 ... 20 mA active/passive	Input isolator operation: 4 ... 20 mA (0 ... 20 mA) per output, active Repeater power supply operation: 4 ... 20 mA per output, active	4 ... 20 mA per channel, active
Design width	12.5 mm	12.5 mm	12.5 mm
Screw connection	MACX MCR-EX-SL-RPSSI-I 2865340	MACX MCR-EX-SL-RPSSI-2I 2865366	MACX MCR-EX-SL-RPSS-2I-2I 2865382
Push-in connection	MACX MCR-EX-SL-RPSSI-I-SP 2924016	MACX MCR-EX-SL-RPSSI-2I-SP 2924236	MACX MCR-EX-SL-RPSS-2I-2I-SP 2924676
	Analog IN	Analog OUT	
	<p>Repeater power supply and input signal conditioner, HART-compatible</p>	<p>Output signal conditioner, HART-compatible</p>	
IN	Input isolator operation: 4...20 mA (0...20 mA) Repeater power supply operation: 4...20 mA Transmitter supply voltage: > 16 V (20 mA)	4 ... 20 mA (0 ... 20 mA) With cable break detection	
OUT	Input isolator operation: 4 ... 20 mA (0 ... 20 mA) active/passive, 1 ... 5 V (0 ... 5 V) Repeater power supply operation: 4 ... 20 mA active/passive, 1 ... 5 V Can be set via DIP switch	4 ... 20 mA (0 ... 20 mA) With cable break detection	
Design width	17.5 mm	12.5 mm	
Screw connection	MACX MCR-EX-SL-RPSSI-I-UP 2865793	MACX MCR-EX-SL-IDSI-I 2865405	
Push-in connection	MACX MCR-EX-SL-RPSSI-I-UP-SP 2924029	MACX MCR-EX-SL-IDSI-I-SP 2924032	

¹⁾ See accessory MACX MCR(-EX)-CJC

²⁾ See accessory MACX MCR(-EX)-I20



	Temperature	Temperature	Temperature
	 <p>Temperature transducer for RTD sensors, configurable</p>	 <p>Temperature transducer for TC sensors, configurable</p>	 <p>Universal temperature transducer, with limit value relay, configurable</p>
IN	RTD: PT 50, PT 100, PT 200, PT 500, PT 100S, PT 500S, Ni 100, Ni 500, Cu 50, Cu 53 Potentiometer: 0 ... 2000 Ω Linear resistance: 0 ... 2000 Ω Configurable via ANALOG-CONF or FDT/DTM	TC: type E, J, K, N, L Voltages: -20 mV ... 70 mV Configurable via ANALOG-CONF or FDT/DTM	RTD: PT 10 ... PT 10000, Ni 10 ... Ni 10000, Cu 10, Cu 53, KTY TC ¹⁾ : type B, E, J, K, N, R, S, T, L, U, C, D, A-1, A-2, A-3, M, L Potentiometer: 0 ... 50 kΩ Linear resistance: 0 ... 50 kΩ ±1000 mV, ±20 mA ²⁾ Configurable via ANALOG-CONF, FDT/DTM or IFS-OP-UNIT
OUT	0 ... 20 mA, 4 ... 20 mA Configurable via ANALOG-CONF or FDT/DTM	0 ... 20 mA, 4 ... 20 mA Configurable via ANALOG-CONF or FDT/DTM	Analog: 0 ... 20 mA, -10 ... 10 V (freely scalable), 4 ... 20 mA (functionally safe) Digital: 1 PDT relay Configurable via ANALOG-CONF, FDT/DTM or IFS-OP-UNIT
Design width	12.5 mm	12.5 mm	17.5 mm
Screw connection	MACX MCR-EX-SL-RTD-I-NC 2865573	MACX MCR-EX-SL-TC-I-NC 2865586	MACX MCR-EX-TUI-UP 2865654
Push-in connection	MACX MCR-EX-SL-RTD-I-SP-NC 2924168		MACX MCR-EX-TUI-UP-SP 2924689
	Temperature		
	 <p>Universal temperature transducer, with 3 limit value relays, configurable</p>		
IN	RTD: PT 10 ... PT 10000, Ni 10 ... Ni 10000, Cu 10, Cu 53, KTY TC ¹⁾ : type B, E, J, K, N, R, S, T, L, U, C, D, A-1, A-2, A-3, M, L Potentiometer: 0 ... 50 kΩ Linear resistance: 0 ... 50 kΩ ±1000 mV, ±20 mA ²⁾ Configurable via ANALOG-CONF, FDT/DTM or IFS-OP-UNIT		
OUT	Analog: 0 ... 20 mA, -10 ... 10 V (freely scalable), 4 ... 20 mA (functionally safe) Digital: 3 relay outputs, combination of relay 2 and 3 functionally safe Configurable via ANALOG-CONF, FDT/DTM or IFS-OP-UNIT		
Design width	35.0 mm		
Screw connection	MACX MCR-EX-TUIREL-UP 2865751		
Push-in connection	MACX MCR-TUIREL-UP-SP 2924799		



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



Versions with wide range input for worldwide power supply networks (MACX MCR-EX-....UP).



	Digital IN	Digital IN	Digital IN
	<p>NAMUR signal conditioner, PDT output</p>	<p>NAMUR signal conditioner, 2 N/O contact outputs</p>	<p>NAMUR signal conditioner, two-channel, N/O contact output</p>
IN	NAMUR proximity sensors Unused contacts or contacts with resistance circuit Line fault detection can be switched on/off	NAMUR proximity sensors Unused contacts or contacts with resistance circuit Line fault detection can be switched on/off	NAMUR proximity sensors Unused contacts or contacts with resistance circuit Line fault detection can be switched on/off
OUT	1 relay (PDT) 250 VAC (2A), 120 VDC (0.2A), 30 VDC (2A) Switching behavior configurable via DIP switch	2 relays (N/O contacts) 250 VAC (2A), 120 VDC (0.2A), 30 VDC (2A) Switching behavior configurable via DIP switch	1 relay (N/O contact) per channel 250 VAC (2A), 120 VDC (0.2A), 30 VDC (2A) Switching behavior configurable via DIP switch
Design width	12.5 mm	12.5 mm	12.5 mm
Screw connection	MACX MCR-EX-SL-NAM-R 2865434	MACX MCR-EX-SL-NAM-2RO 2865450	MACX MCR-EX-SL-2NAM-RO 2865476
Push-in connection	MACX MCR-EX-SL-NAM-R-SP 2924045	MACX MCR-SL-EX-NAM-2RO-SP 2924061	MACX MCR-EX-SL-2NAM-RO-SP 2924087
	Digital IN	Digital IN	Digital IN
	<p>NAMUR signal conditioner, two-channel, PDT output</p>	<p>NAMUR signal conditioner, single-channel, 2 transistor outputs</p>	<p>NAMUR signal conditioner, two-channel, transistor output</p>
IN	NAMUR proximity sensors Unused contacts or contacts with resistance circuit Line fault detection can be switched on/off	NAMUR proximity sensors Unused contacts or contacts with resistance circuit Line fault detection can be switched on/off	NAMUR proximity sensors Unused contacts or contacts with resistance circuit Line fault detection can be switched on/off
OUT	1 relay (PDT) per channel 250 VAC (2A), 120 VDC (0.2A), 30 VDC (2A) Switching behavior configurable via DIP switch	2 transistor outputs, passive Switching voltage/current: max. 30 VDC/50 mA Switching frequency: max. 5 kHz Switching behavior configurable via DIP switch	1 transistor output per channel, passive Switching voltage/current: max. 30 VDC/50 mA Switching frequency: max. 5 kHz Switching behavior configurable via DIP switch
Design width	17.5 mm	12.5 mm	12.5 mm
Screw connection	MACX MCR-EX-SL-2NAM-R-UP 2865984	MACX MCR-EX-SL-NAM-2T 2865463	MACX MCR-EX-SL-2NAM-T 2865489
Push-in connection	MACX MCR-EX-SL-2NAM-R-UP-SP 2924249	MACX MCR-EX-SL-NAM-2T-SP 2924074	MACX MCR-EX-SL-2NAM-T-SP 2924090



	Digital IN	Digital OUT	Digital OUT
	<p>NAMUR signal conditioner, output with resistive behavior, with line fault transparency</p>	<p>Solenoid driver, with logic input and line fault detection, current limitation at 48 mA</p>	<p>Solenoid driver, loop-powered, current limitation at 25 mA</p>
IN	NAMUR proximity sensors Unused contacts or contacts with resistance circuit Line fault detection can be switched on/off	Switching level 0 signal ("L"): 0 ... 5 VDC Switching level 1 signal ("H"): 15 ... 30 VDC	20 ... 30 VDC, 10 ... 70 mA DC (45 mA at $U_e = 24$ VDC)
OUT	Resistive behavior according to EN 60947-5-6 Switching voltage: 8.2 V DC Switching frequency: max. 5 kHz Switching behavior configurable via DIP switch	9.5 V DC (at 48 mA) Current limitation: 48 mA Off-load voltage: 23 V DC Internal resistance: 269 Ω With line fault transparency and additional fault monitoring output	5.5 V DC (at 25 mA) Current limitation: 25 mA Off-load voltage: 21.9 V DC Internal resistance: 641 Ω
Design width	12.5 mm	12.5 mm	12.5 mm
Screw connection	MACX MCR-EX-SL-NAM-NAM 2866006	MACX MCR-EX-SL-SD-23-48-LFD 2924867	MACX MCR-EX-SL-SD-21-25-LP 2865492
Push-in connection	MACX MCR-EX-SL-NAM-NAM-SP 2924883	MACX MCR-EX-SL-SD-23-48-LFD-SP 2924870	MACX MCR-EX-SL-SD-21-25-LP-SP 2924113
	Digital OUT	Digital OUT	Digital OUT
	<p>Solenoid driver, loop-powered, current limitation at 40 mA</p>	<p>Solenoid driver, loop-powered, current limitation at 48 mA</p>	<p>Solenoid driver, loop-powered, current limitation at 58 mA</p>
IN	20 ... 30 VDC, 10 ... 95 mA DC (65 mA at $U_e = 24$ VDC)	20 ... 30 VDC, 10 ... 95 mA DC (75 mA at $U_e = 24$ VDC)	20 ... 30 VDC, 10 ... 105 mA DC (95 mA at $U_e = 24$ VDC)
OUT	10 V DC (at 40 mA) Current limitation: 40 mA Off-load voltage: 21.9 V DC Internal resistance: 287 Ω	10.5 V DC (at 48 mA) Current limitation: 48 mA Off-load voltage: 24 V DC Internal resistance: 276 Ω	12.9 V DC (at 58 mA) Current limitation: 58 mA Off-load voltage: 21.9 V DC Internal resistance: 133 Ω
Design width	12.5 mm	12.5 mm	12.5 mm
Screw connection	MACX MCR-EX-SL-SD-21-40-LP 2865764	MACX MCR-EX-SL-SD-24-48-LP 2865609	MACX MCR-EX-SL-SD-21-60-LP 2865515
Push-in connection	MACX MCR-EX-SL-SD-21-40-LP-SP 2924139	MACX MCR-EX-SL-SD-24-48-LP-SP 2924126	MACX MCR-EX-SL-SD-21-60-LP-SP 2924100



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



Versions with wide range input for worldwide power supply networks (MACX MCR-EX-....UP).

Analog signals with performance level MACX Safety



Integrate analog signals easily into your safety application according to the Machinery Directive. The MACX Safety analog signal conditioners are certified according to EN ISO 13849-1 with performance level PL d.

MACX Safety Ex also supports the safe processing of analog, intrinsically safe Ex signals.

MACX Safety and MACX Safety Ex offer the following advantages:

- Easy integration of analog signals into the safety chain, thanks to the performance level, PL d
- Direct, safe switching of limit values possible without an additional safety controller
- Easy planning of the safety application via SISTEMA
- Easy to combine active or passive analog signals with other safety modules
- Safe processing of intrinsically safe Ex signals with MACX Safety Ex [Ex ia]



Ex approvals according to ATEX, IECEx

- Ex i for intrinsically safe circuits up to zone 0 and zone 20
- Ex n for installation in zone 2

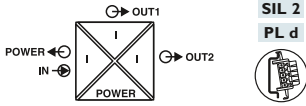
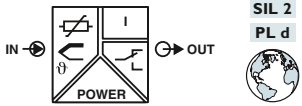
Push-in Technology
Designed by PHOENIX CONTACT

Easy-maintenance connection terminal blocks

Plug-in, coded connection terminal blocks with integrated test sockets.

MACX Safety – product overview

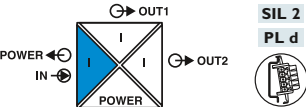
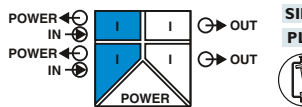
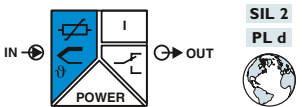
PL
EN ISO 13849

	Analog IN	Temperature	
	 <p>SIL 2 PL d</p> <p>Repeater power supply and input signal conditioner with two outputs, HART-compatible</p>	 <p>SIL 2 PL d</p> <p>Universal temperature transducer, with limit value relay, configurable</p>	
IN	<p>Input isolator operation: 4...20 mA</p> <p>Repeater power supply operation: 4...20 mA</p> <p>Transmitter supply voltage: > 16 V (20 mA)</p>	<p>RTD: PT 10...PT 10000, Ni 10...Ni 10000, Cu10, Cu53, KTY</p> <p>TC ¹⁾: type B, E, J, K, N, R, S, T, L, U, C, D, A-1, A-2, A-3, M, L</p> <p>Potentiometer: 0...50 kΩ</p> <p>Linear resistance: 0...50 kΩ</p> <p>±1000 mV, ±20 mA²⁾</p> <p>Configurable via ANALOG-CONF or FDT/DTM</p>	
OUT	<p>Input isolator operation: 4...20 mA per output, active</p> <p>Repeater power supply operation: 4...20 mA per output, active</p>	<p>Analog: 4...20 mA, active</p> <p>Digital: Combination of relay 2 and 3, functionally safe, 1 additional relay output</p> <p>Configurable via ANALOG-CONF or FDT/DTM</p>	
Design width	12.5 mm	35.0 mm	
Screw connection	MACX PL-RPSSI-2I 2904961	MACX PL-TUIREL-UP 2904901	
Push-in connection	MACX PL-RPSSI-2I-SP 2904962	MACX PL-TUIREL-UP 2904903	

MACX Safety Ex – product overview

PL
EN ISO 13849



	Analog IN	Analog IN	Temperature
	 <p>SIL 2 PL d</p> <p>Repeater power supply and input signal conditioner with two outputs, HART-compatible</p>	 <p>SIL 3 PL d</p> <p>Repeater power supply, two-channel, HART-compatible</p>	 <p>SIL 2 PL d</p> <p>Universal temperature transducer, with limit value relay, configurable</p>
IN	<p>Input isolator operation: 4...20 mA</p> <p>Repeater power supply operation: 4...20 mA</p> <p>Transmitter supply voltage: > 16 V (20 mA)</p>	<p>Repeater power supply operation: 4...20 mA per channel</p> <p>Transmitter supply voltage: > 16 V (20 mA) per channel</p>	<p>RTD: PT 10...PT 10000, Ni 10...Ni 10000, Cu10, Cu53, KTY</p> <p>TC ¹⁾: type B, E, J, K, N, R, S, T, L, U, C, D, A-1, A-2, A-3, M, L</p> <p>Potentiometer: 0...50 kΩ</p> <p>Linear resistance: 0...50 kΩ</p> <p>±1000 mV, ±20 mA²⁾</p> <p>Configurable via ANALOG-CONF or FDT/DTM</p>
OUT	<p>Input isolator operation: 4...20 mA per output, active</p> <p>Repeater power supply operation: 4...20 mA per output, active</p>	<p>Repeater power supply operation: 4...20 mA per channel, active</p>	<p>Analog: 4...20 mA, active</p> <p>Digital: Combination of relay 2 and 3, functionally safe, 1 additional relay output</p> <p>Configurable via ANALOG-CONF or FDT/DTM</p>
Design width	12.5 mm	12.5 mm	35.0 mm
Screw connection	MACX PL-EX-RPSSI-2I 2904959	MACX PL-EX-RPSS-2I-2I 2904963	MACX PL-EX-TUIREL-UP 2904910
Push-in connection	MACX PL-EX-RPSSI-2I-SP 2904960	MACX PL-EX-RPSS-2I-2I-SP 2904964	MACX PL-EX-TUIREL-UP-SP 2904912

¹⁾ See accessory MACX MCR(-EX)-CJC

²⁾ See accessory MACX MCR(-EX)-I20



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



Versions with wide range input for worldwide power supply networks (MACX MCR-EX-...-UP).

Consistent interface solutions for system technology Termination Carrier

Using the compact Termination Carriers, you can connect MACX Analog devices to your automation system quickly and without any errors. You can establish the signal connection with standardized system cables by means of plug and play.

The following standard DIN rail devices are available for safe signal conditioning:

- Signal conditioners for Ex i circuits and SIL applications
- Highly compact signal conditioners for non-Ex i circuits
- Safe coupling relays for process automation

The Termination Carrier concept

- Stable aluminum profile without pitch markings with integrated DIN rail contour for accommodating standard interfaces
- PCB protected in the profile, mechanically decoupled
- Integrated DIN rail mounting with end bracket
- Module connection by means of plug-in and coded cable sets
- Cover with marking options

Your consistent interface solution for system technology

1. Select a standard module

Select the appropriate functions for signal conditioning from a wide range of standard DIN rail devices.



2. Termination Carrier

Snap standard modules onto the integrated DIN rail contour in the profile. Connection to the Termination Carrier PCB is quick and safe with plug-in and coded cable sets.





Compact

For high packing density

- Space savings of up to 30 %, thanks to the compact design
- Space-saving arrangement of connection points
- Integrated end brackets

Robust

For high system availability

- Stable and vibration-resistant aluminum carrier profile
- Mechanically decoupled termination PCB
- Passive PCB without active components
- Redundant supply and monitoring electronics in a separate DIN rail device

Easy maintenance

For simplified documentation and startup

- Use of standard DIN rail devices
- Easily accessible connection points
- Module replacement during operation (hot swappable)
- Pre-assembled system cabling with front adapter

Flexible

For optimum adaptation

- Profile sections without pitch markings for controller-specific number of I/Os
- Different system plug types, including redundant
- Horizontal and vertical mounting



3. Front adapter with system cable

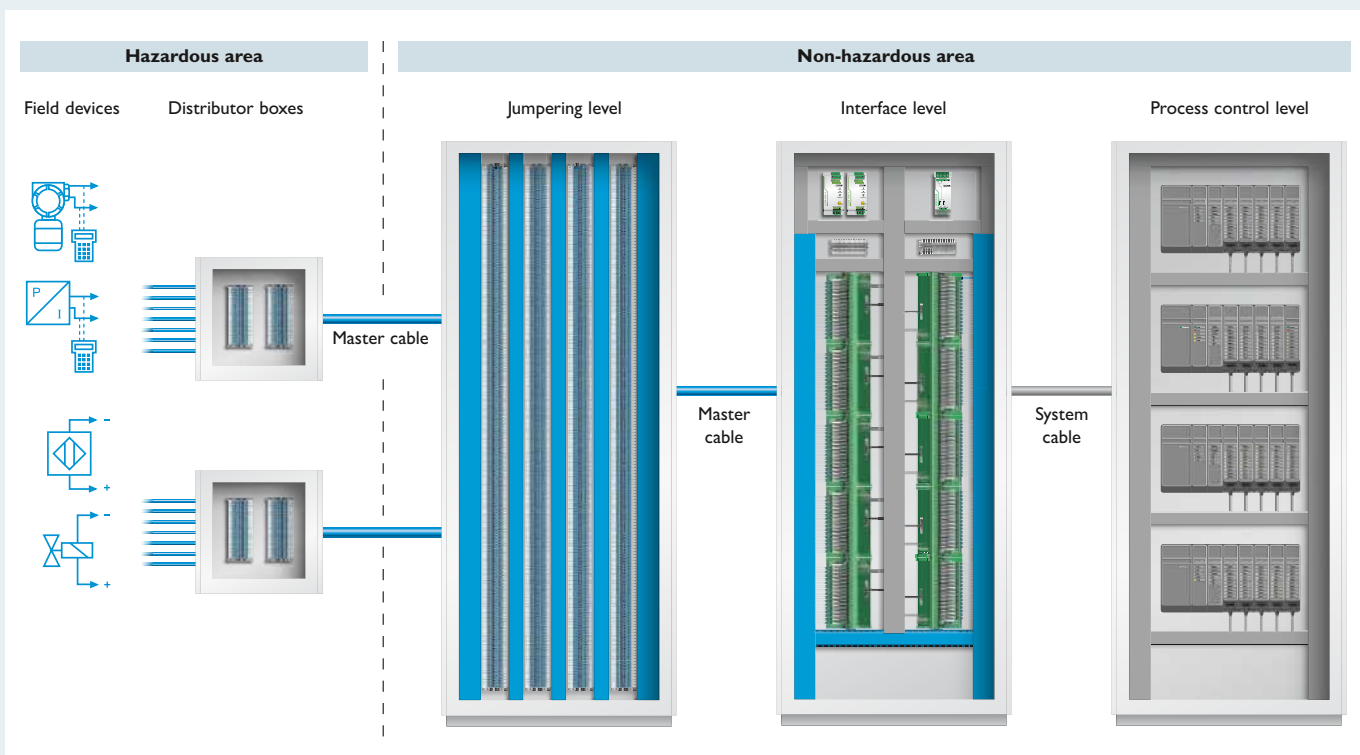
The devices are connected to controller-specific I/O modules via high-position system cables. These cables have standardized or controller-specific system connections.

ABB
Emerson
Honeywell
Invensys
Siemens
Yokogawa

and others



Diagram of a typical system with point-to-point wiring



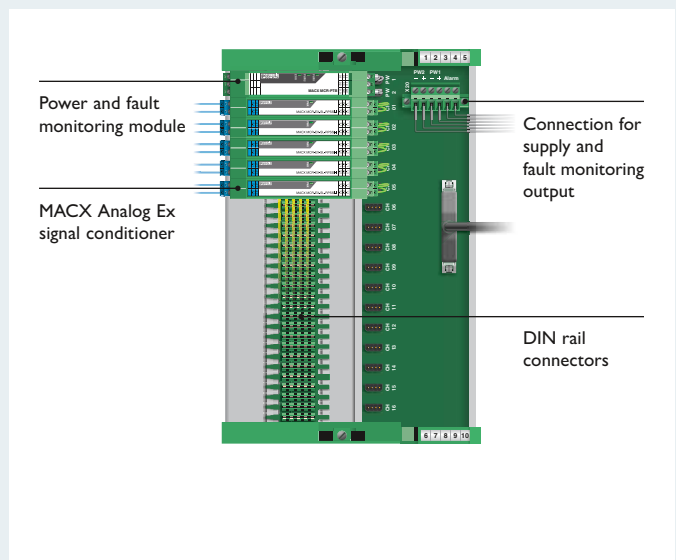
In the hazardous area, cables from intrinsically safe field devices are grouped together via distributor boxes to form multi-strand master cables. In the non-hazardous area, they are then routed to the interface level via marshalling distributors. From here the signal

conditioners are individually wired to the relevant I/O cards. The significant amount of time needed for installation and startup is greatly reduced by the Termination Carrier and the use of plug and play system cables.

Modular power concept for high availability

The signal conditioners are connected to a power and fault monitoring module via the integrated DIN rail connectors. This enables redundant supply and monitoring electronics in a separate device.

The termination PCB is therefore passive. It does not contain any active components whose failure would require the Termination Carrier to be replaced.



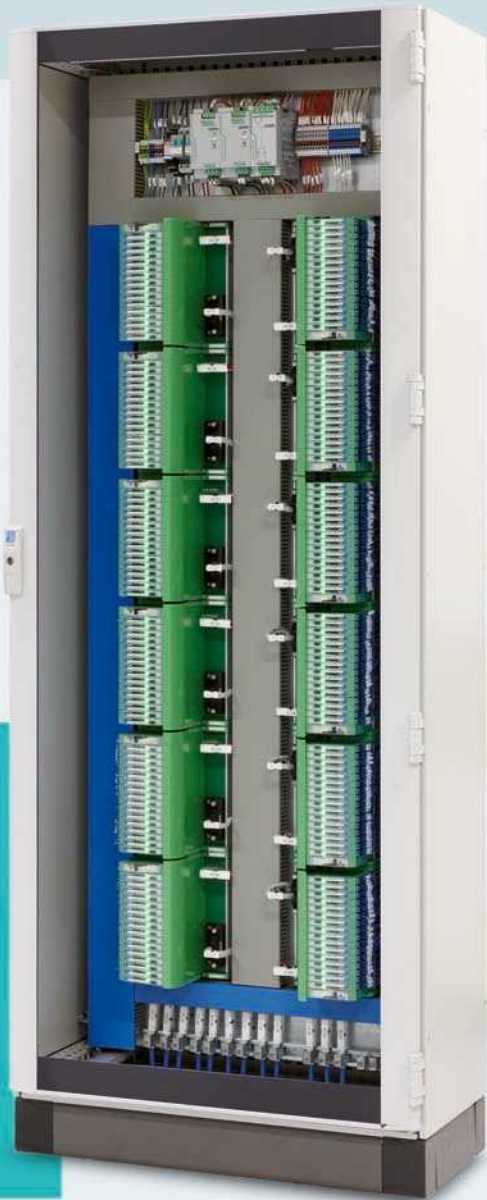
Efficient signal connection with MACX Analog Ex

In areas of process technology where potentially explosive atmospheres may occur, measuring and control circuits are usually designed with intrinsic safety protection type (Ex i). MACX Analog Ex i signal conditioners and measuring transducers isolate intrinsically safe circuits from non-intrinsically safe circuits at the interface level and safely limit the energy supplied to the hazardous area. Furthermore, they handle extensive signal conditioning tasks.

Space-saving and fast installation

The compact Termination Carrier solution enables you to integrate up to 384 signals in an 80 x 200 cm control cabinet when using two-channel MACX Analog Ex devices.

Mounting and startup can be carried out quickly and without any errors using pre-assembled system cables.



Termination Carriers



TC-D37SUB-ADIO16-EX-P-UNI
Order No. 2924854

Universal Termination Carrier for 16 MACX MCR(-EX) isolators.



TC-D37SUB-AIO16-EX-PS-UNI
Order No. 2902932

Universal Termination Carrier for 16 MACX MCR(-EX) isolators with connection for HART multiplexer.



In addition to universal Termination Carriers, numerous versions are available which are tailored to the I/O modules of various automation systems.

Please contact us for more information.

ABB
Emerson
Honeywell

Invensys
Siemens
Yokogawa

and others



Accessories for MACX Analog



Operator interface

IFS-OP-UNIT

Order No. 2811899

For process value display and parameterization, can be plugged directly onto 35 mm devices and the IFS-OP-CRADLE cradle unit.

IFS-OP-CRADLE

Order No. 2811886

Cradle for IF-OP-UNIT for connection to 17.5 mm/35 mm modules and use as a remote display unit.

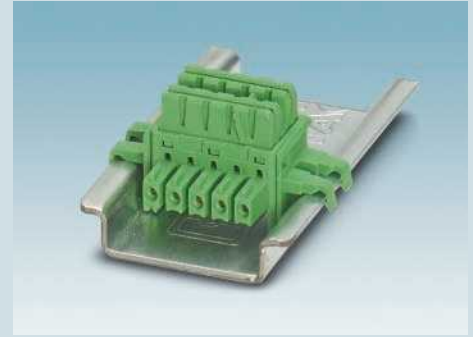


Programming adapter

MACX-USB-PROG-ADAPTER

Order No. 2811271

For programming the multifunctional devices with the ANALOG-CONF software or via FDT/DTM.



DIN rail connector

ME 6,2 TBUS-2 1,5/5-ST-3.81 GN

Order No. 2869728

For direct supply via any MACX Analog device or for supply via a power and fault monitoring module of the same shape.



Power and fault monitoring module

MACX MCR-PTB

Order No. 2865625 (screw connection)

MACX MCR-PTB-SP

Order No. 2924184 (push-in connection)

- Input voltage
 U_{IN} : 19.2 ... 30 VDC
- Output voltage
 U_{OUT} : U_{IN} - max. 0.8 V, at 3.75 A
- Error message - PDT relay



Dummy module

MACX MCR-EX-DUMMY-ISOLATOR

Order No. 2904970 (screw connection)

MACX MCR-EX-DUMMY-ISOLATOR-SP

Order No. 2905846 (push-in connection)

Intrinsically safe dummy module with no electrical function for connecting unused signal cables.



Function plug

MACX MCR-CJC Order No. 2924993

MACX MCR-EX-CJC Order No. 2925002

Plug for cold junction compensation for thermocouples, in combination with MACX...-(EX)-T-UI... temperature transducers.

MACX MCR-I20 Order No. 2905680

MACX MCR-EX-I20 Order No. 2905679

Connection terminal block for current signals (± 20 mA) for safe switching of limit values, in combination with MACX...-(EX)-T-UI... temperature transducers.

Accessories for MACX Analog



Multiplexer for HART signals

MACX MCR-S-MUX

Order No. 2865599

Multiplexer for the digital connection of HART-compatible field devices, such as measuring transducers or control valves, to a PC or a management system, 32-channel, including 14-wire flat-ribbon cable.



HART transfer board

MACX MCR-S-MUX-TB

Order No. 2308124

Transfer board for connecting HART field devices to the HART multiplexer.

PSM-ME-RS232/RS485-P

Order No. 2744416

Electrically isolated interface converter for converting from RS-232 (V.24) to RS-485. Automatic data direction changeover or via RTS/CTS.



Shield fast connection

SSA 3-6 (for Ø 3 - 6 mm)

Order No. 2839295

SSA 5-10 (Ø 5 - 10 mm)

Order No. 2839512

For connecting cable shielding to cable terminal points, can be connected to PLUGTRAB PT.



Marking material

UC-EMLP (11X9) (white)

Order No. 0819291

Self-adhesive plastic labels for device marking: UniCard, 10-section, lettering field size: 11 x 9 mm.

UC-EMLP (11X9) CUS (white)

Order No. 0824547

As above, plus marked according to your specifications. For details, visit www.phoenixcontact.com.



Test plug

MPS-MT

Order No. 0201744

MPS-IH BK (black)

Order No. 0201731

MPS-IH GY (gray)

Order No. 0201728

MPS-IH GN (green)

Order No. 0201702

MPS-IH YE (yellow)

Order No. 0201692

MPS-IH BU (blue)

Order No. 0201689

MPS-IH RD (red)

Order No. 0201676

MPS-IH WH (white)

Order No. 0201336

Test plug for 2.3 mm Ø socket hole, consisting of MPS-MT metal part and MPS-IH... color insulating sleeve.



Resistance circuit

UKK 5-2R/NAMUR

Order No. 2941662

D-UKK 3/5 (gray)

Order No. 2770024

D-UKK 3/5 BU (blue)

Order No. 2770105

Double-level terminal block with resistance circuit according to NAMUR for line fault detection in the case of mechanical contacts.

Important: for intrinsically safe circuits, only in combination with D-UKK 3/5... cover.



Always up-to-date, always available to you. Here you'll find everything on our products, solutions and service:

phoenixcontact.com

Product range

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- Electronics housing
- Electronic switchgear and motor control
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- Functional safety
- HMIs and industrial PCs
- I/O systems
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- Industrial Ethernet
- Installation and mounting material
- Lighting and signaling
- Marking and labeling
- Measurement and control technology
- Modular terminal blocks
- Monitoring
- PCB terminal blocks and PCB connectors
- Power supply units and UPS
- Protective devices
- Relay modules
- Sensor/actuator cabling
- Software
- Surge protection and interference filters
- System cabling for controllers
- Tools
- Wireless data communication

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