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# MINI MCR-2-U-U(-PT)



## 3-way signal conditioner



Data sheet  
106013\_en\_02

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## 1 Description

The standard signal 3-way signal conditioner with pluggable connection technology is used to electrically isolate, condition, amplify, and filter standard signals.

### Features

- 3-way signal conditioner with plug-in connection technology
- Approval for Ex-zone 2 (nA)
- Screw or push-in connection available
- Input, output signal range -10(0) ... 10 V
- Reinforced insulation according to IEC 61010-1
- Supply voltage range 9.6 ... 30 V DC



### **WARNING: Correct usage in potentially explosive areas**

The module is a category 3 item of electrical equipment. It is absolutely vital to follow the instructions provided here during installation and observe the information in the "Safety regulations and installation notes".



This device offers the option of NFC communication.

You can use the MINI Analog Pro Smartphone app to call-up comprehensive module information via the NFC interface of your Smartphone.

The MINI Analog Pro Smartphone app is available to you free.



Make sure you always use the latest documentation.

It can be downloaded from the product at [phoenixcontact.net/products](http://phoenixcontact.net/products).

This document is valid for the products listed in the "Ordering data".

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### 3 Ordering data

Description	Type	Order No.	Pcs./Pkt.
3-way signal conditioner with plug-in connection technology for the electrical isolation of unipolar and bipolar analog signals. Input signal: 0 ... 10 V/±10 V, output signal: 0 ... 10 V/±10 V, screw connection technology	MINI MCR-2-U-U	2902042	1
3-way signal conditioner with plug-in connection technology for the electrical isolation of unipolar and bipolar analog signals. Input signal: 0 ... 10 V/±10 V, output signal: 0 ... 10 V/±10 V, push-in connection technology.	MINI MCR-2-U-U-PT	2902043	1
Accessories	Type	Order No.	Pcs./Pkt.
DIN rail connector for DIN rail mounting. Universal for TBUS housing. Gold-plated contacts, 5-pos. Plug component, Number of positions: 5, Pitch: 3.81 mm	ME 6,2 TBUS-2 1,5/5-ST-3,81 GN	2869728	10
Power terminal with plug-in connection technology for delivering the supply voltage to the DIN rail connector. Monitoring of the supply voltages in combination with the fault monitoring module. Screw connection technology	MINI MCR-2-PTB	2902066	1
Power terminal with plug-in connection technology for delivering the supply voltage to the DIN rail connector. Monitoring of the supply voltages in combination with the fault monitoring module. Push-in connection technology	MINI MCR-2-PTB-PT	2902067	1
Fault monitoring module with plug-in connection technology for evaluating and reporting group errors from the FM system and for monitoring the supply voltages. Error reporting via N/O contact. Screw connection technology, standard configuration	MINI MCR-2-FM-RC	2904504	1
Fault monitoring module with plug-in connection technology for evaluating and reporting group errors from the FM system and for monitoring the supply voltages. Error reporting via N/O contact. Push-in connection technology, standard configuration	MINI MCR-2-FM-RC-PT	2904508	1
Primary-switched MINI POWER supply for DIN rail mounting, input: 1-phase, output: 24 V DC/1.5 A	MINI-SYS-PS-100-240AC/24DC/1.5	2866983	1
Electronics housing	ME 6,2 TBUS-2 1,5/5-ST-3,81 GY	2695439	10
Marker for end clamp, Sheet, white, unlabeled, can be labeled with: THERMOMARK CARD, BLUEMARK CLED, BLUEMARK LED, TOPMARK LASER, Mounting type: snapped into marker carrier, Lettering field: 30 x 5 mm	UCT-EM (30X5)	0801505	10
Marker for end clamp, can be ordered: by sheet, white, labeled according to customer specifications, Mounting type: snapped into marker carrier, Lettering field: 30 x 5 mm	UCT-EM (30X5) CUS	0801589	1
Marker for end clamp, Sheet, yellow, unlabeled, can be labeled with: THERMOMARK CARD, BLUEMARK CLED, BLUEMARK LED, TOPMARK LASER, Mounting type: snapped into marker carrier, Lettering field: 30 x 5 mm	UCT-EM (30X5) YE	0830340	10
Marker for end clamp, can be ordered: by sheet, yellow, labeled according to customer specifications, Mounting type: snapped into marker carrier, Lettering field: 30 x 5 mm	UCT-EM (30X5) YE CUS	0830348	1
Plastic label, Sheet, white, unlabeled, can be labeled with: BLUEMARK CLED, BLUEMARK LED, Plotter, Mounting type: Adhesive, Lettering field: 15 x 5 mm	UC-EMLP (15X5)	0819301	10
Plastic label, Sheet, white, unlabeled, can be labeled with: BLUEMARK CLED, BLUEMARK LED, Plotter, Mounting type: Adhesive, Lettering field: 15 x 5 mm	UC-EMLP (15X5)L	0820138	5
Plastic label, Sheet, yellow, unlabeled, can be labeled with: BLUEMARK CLED, BLUEMARK LED, Plotter, Mounting type: Adhesive, Lettering field: 15 x 5 mm	UC-EMLP (15X5) YE	0822615	10
Plastic label, can be ordered: by sheet, white, labeled according to customer specifications, Mounting type: Adhesive, Lettering field: 15 x 5 mm	UC-EMLP (15X5) CUS	0824550	1

Accessories	Type	Order No.	Pcs./Pkt.
Plastic label, can be ordered: by sheet, yellow, labeled according to customer specifications, Mounting type: Adhesive, Lettering field: 15 x 5 mm	UC-EMLP (15X5) YE CUS	0824551	1
Plastic label, can be ordered: by sheet, white, labeled according to customer specifications, Mounting type: Adhesive, Lettering field: 15 x 5 mm	UC-EMLP (15X5)L CUS	0824552	1
Plastic label, Sheet, yellow, unlabeled, can be labeled with: BLUEMARK CLED, BLUEMARK LED, Plotter, Mounting type: Adhesive, Lettering field: 15 x 5 mm	UC-EMLP (15X5)L YE	0825325	5
Plastic label, can be ordered: by sheet, yellow, labeled according to customer specifications, Mounting type: Adhesive, Lettering field: 15 x 5 mm	UC-EMLP (15X5)L YE CUS	0826680	1
Plastic label, Sheet, silver, unlabeled, can be labeled with: BLUEMARK CLED, BLUEMARK LED, Plotter, Mounting type: Adhesive, Lettering field: 15 x 5 mm	UC-EMLP (15X5) SR	0828095	10
Plastic label, can be ordered: by sheet, silver, labeled according to customer specifications, Mounting type: Adhesive, Lettering field: 15 x 5 mm	UC-EMLP (15X5) SR CUS	0828099	1
Plastic label, Sheet, silver, unlabeled, can be labeled with: BLUEMARK CLED, BLUEMARK LED, Plotter, Mounting type: Adhesive, Lettering field: 15 x 5 mm	UC-EMLP (15X5)L SR	0828103	5
Marker strip, Roll, white, unlabeled, can be labeled with: THERMOMARK ROLL, THERMOMARK X, THERMOMARK S1.1, THERMOMARK ROLL X1, Mounting type: Adhesive, Lettering field: continuous x 5 mm	SK 5,0 WH:REEL	0805221	1

## 4 Technical data

### Input

Number of inputs	1
Configurable/programmable	no
Voltage input signal	0 V ... 10 V -10 V ... 10 V 2 V ... 10 V
Input resistance of voltage input	approx. 1 M $\Omega$

### Output

Number of outputs	1
Voltage output signal	0 V ... 10 V -10 V ... 10 V
Max. voltage output signal	11 V
Short-circuit current	< 15 mA
Configurable/programmable	no
Load/output load voltage output	$\geq$ 10 k $\Omega$
Ripple	< 20 mV <sub>PP</sub> (at 10 k $\Omega$ )

### Supply

Nominal supply voltage	24 V DC
Supply voltage range	9.6 V DC ... 30 V DC (The DIN rail bus connector (ME 6,2 TBUS-2 1,5/5-ST-3,81 GN, Order No. 2869728) can be used to bridge the supply voltage. It can be snapped onto a 35 mm DIN rail according to EN 60715))
Typical current consumption	25 mA (24 V DC) 54 mA (12 V DC)
Power consumption	$\leq$ 200 mW (at 9.6 V DC)

### Diagnostic and status indicators

Operating voltage display	Green LED
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### General data

Limit frequency (3 dB)	approx. 30 Hz
Maximum transmission error	0.1 % (of final value)
Temperature coefficient, typical	0.01 %/K
Maximum temperature coefficient	0.01 %/K
Step response (10-90%)	approx. 10 ms
Electrical isolation	Reinforced insulation in accordance with IEC 61010-1
Overvoltage category	II
Mounting position	any
Degree of protection	IP20
Degree of pollution	2
Rated insulation voltage	300 V (effective)
Test voltage, input/output/supply	3 kV (50 Hz, 1 min.)
Dimensions W/H/D	6.2 mm / 110.5 mm / 120.5 mm
Type of housing	PBT gray

Connection data	Screw connection	Push-in connection
Solid conductor cross section with ferrule	0.2 mm <sup>2</sup> ... 1.5 mm <sup>2</sup>	0.14 mm <sup>2</sup> ... 2.5 mm <sup>2</sup>
Solid conductor cross section without ferrule	0.2 mm <sup>2</sup> ... 2.5 mm <sup>2</sup>	0.14 mm <sup>2</sup> ... 2.5 mm <sup>2</sup>
Conductor cross section, flexible	0.2 mm <sup>2</sup> ... 1.5 mm <sup>2</sup>	0.14 mm <sup>2</sup> ... 2.5 mm <sup>2</sup>
Conductor cross section AWG	24 ... 12	24 ... 12
Stripping length	10 mm	10 mm

### Ambient conditions

Ambient temperature (operation)	-40 °C ... 70 °C
Ambient temperature (storage/transport)	-40 °C ... 85 °C
Permissible humidity (operation)	5 % ... 95 % (non-condensing)

### Conformance with EMC Directive 2004/108/EC (valid until 19.04.2016) / 2014/30/EU (valid from 20.04.2016)

Noise immunity according to EN 61000-6-2  
When being exposed to interference, there may be minimal deviations.

Noise emission according to EN 61000-6-4

### Conformance / approvals

Conformance	CE-compliant
ATEX	Ⓜ II 3 G Ex nA IIC T4 Gc X
UL, USA / Canada	UL 508 Listed
UL, USA / Canada	Class I, Div. 2, Groups A, B, C, D T6
UL, USA / Canada	Class I, Zone 2, Group IIC T6
Shipbuilding DNV GL 14445-15HH	C, EMC2

## 5 Safety regulations and installation notes

### 5.1 Installation notes

- The category 3 device is suitable for installation in potentially explosive area zone 2. It fulfills the requirements of EN 60079-0:2012 and EN 60079-15:2010.
- Installation, operation, and maintenance may only be carried out by qualified electricians. Follow the installation instructions as described. When installing and operating the device, the applicable regulations and safety directives (including national safety directives), as well as generally approved technical regulations, must be observed. The safety data is provided in this package slip and on the certificates (conformity assessment, additional approvals where applicable).
- While the devices are in operation, contact-dangerous voltages may be present on the control elements. For this reason parameterization, conductor connection, and opening of the module lid are allowed only when devices are in a de-energized state unless the connected circuits are exclusively SELV or PELV circuits.
- The device must not be opened or modified. Do not repair the device yourself, replace it with an equivalent device. Repairs may only be carried out by the manufacturer. The manufacturer is not liable for damage resulting from violation.
- The IP20 protection (IEC 60529/EN 60529) of the device is intended for use in a clean and dry environment. The device must not be subject to mechanical strain and/or thermal loads, which exceed the limits described.
- The device is not designed for use in atmospheres with a danger of dust explosions.
- The device complies with the EMC regulations for industrial areas (EMC class A). When using the device in residential areas, it may cause radio interference.
- If the device is not used as described in the documentation, the intended protection can be negatively affected.
- To protect the device against mechanical or electrical damage, install it in a suitable housing with appropriate degree of protection as per IEC 60529.
- Provide a switch/circuit breaker close to the device, which is labeled as the disconnecting device for this device.
- Provide for an overcurrent protection device ( $I \leq 4 \text{ A}$ ) in the installation.
- Thanks to its housing, the device has basic insulation to the neighboring devices, for 150 Veff. If several devices are installed next to each other, this has to be taken into account, and additional insulation has to be installed if necessary!
- The voltages present at the input, output and supply are extra-low voltages (ELV). Depending on the application, dangerous voltage ( $> 30 \text{ V}$ ) against ground could occur. For this event, safe electrical isolation from the other connections has been implemented.
- The device must be stopped if it is damaged, has been subjected to an impermissible load, stored incorrectly, or if it malfunctions.
- Only use copper connecting cables providing the permitted temperature range ( $60^\circ\text{C}/75^\circ\text{C}$ ).

### 5.2 Installation in Zone 2

- Observe the specified conditions for use in potentially explosive areas! Install the device in a suitable approved housing (with a minimum of IP54 protection) that meets the requirements of EN 60079-15. Observe the requirements of EN 60079-14.
- Only devices which are designed for operation in Ex zone 2 and are suitable for the conditions at the installation location may be connected to the circuits in the Ex zone.
- In potentially explosive areas, terminals may only be snapped onto or off the DIN rail connector and wires may only be connected or disconnected when the power is switched off.
- The device must be stopped and immediately removed from the Ex area if it is damaged, was subject to an impermissible load, stored incorrectly or if it malfunctions.

### 5.3 UL Notes

#### INDUSTRIAL CONTROL EQUIPMENT FOR HAZARDOUS LOCATIONS 45FP

- 1 Suitable for use in class 1, division 2, groups A, B, C and D hazardous locations, or nonhazardous locations only.
- 2 **WARNING - EXPLOSION HAZARD:** Do not disconnect equipment unless power has been removed or the area is known to be non-hazardous.
- 3 **WARNING - EXPLOSION HAZARD:** Substitution of any components may impair suitability for Class I, Division 2.
- 4 This device is open-type and is required to be installed in an enclosure suitable for the environment and can only be accessed with the use of a tool or key.



## 6 Installation

### 6.1 Connection notes



The device contains components that can be damaged or destroyed by electrostatic discharge. When handling the device, observe the necessary safety precautions against electrostatic discharge (ESD) according to EN 61340-5-1 and IEC 61340-5-1.

### 6.2 Structure

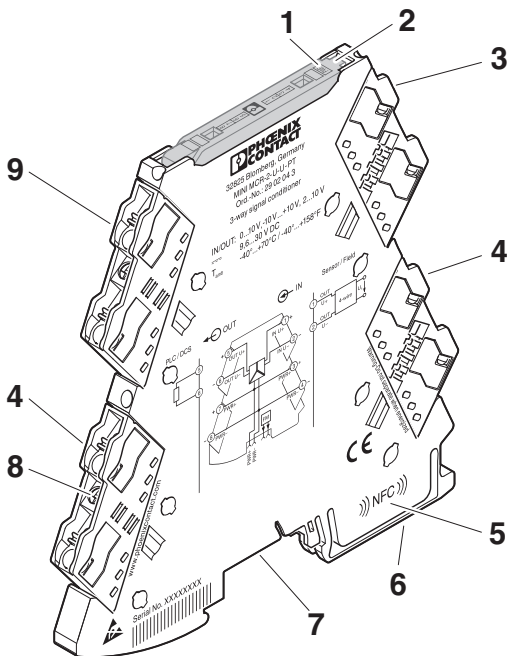


Figure 1 Structure

- 1 Green "PWR" LED, power supply
- 2 Cover with labeling option
- 3 Input: Standard signals
- 4 Supply voltage
- 5 NFC coil
- 6 Universal snap-on foot for EN DIN rails
- 7 Connection for DIN rail connector
- 8 Spindle screw
- 9 Output: Standard signals

### 6.3 Block diagram

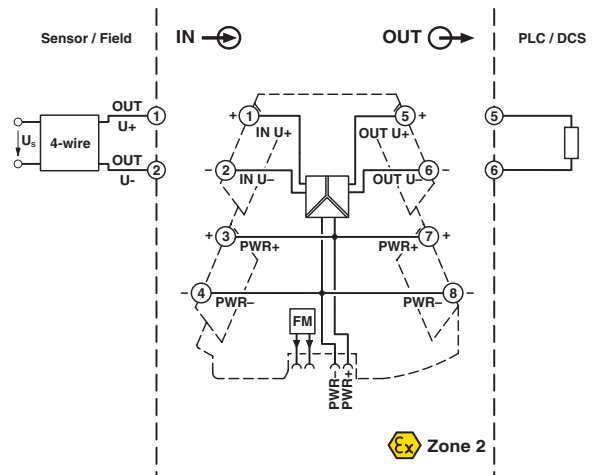


Figure 2 Block diagram

### 6.4 Power supply

You must refer to the MACX and MINI Analog power manual for the design of the power supply.



#### NOTE

**Never connect the supply voltage directly to the DIN rail connector. Drawing power from individual devices is not permitted!**

#### Supply via the module

Where the total current consumption of the aligned modules does not exceed 400 mA, the power can be supplied directly at the connection terminal blocks of the module.

We recommend connecting a 630 mA fuse (normal-blow or slow-blow) upstream.

#### Supply via a power terminal block

The MINI MCR-2-PTB power terminal block (Order No. 2902066) or the MINI MCR-2-PTB-PT power terminal block (Order No. 2902067) of the same shape is used to supply the supply voltage to the DIN rail connector.

We recommend connecting a 4 A fuse upstream.

### Supply via a system power supply unit

The system power supply unit with 1.5 A output current connects the DIN rail connector to the supply voltage and can thus be used to supply several modules from the mains.

- MINI-SYS-PS-100-240AC/24DC/1.5 (Order No. 2866983)
- Potentially explosive areas:  
MINI-PS-100-240AC/24DC/1.5/EX (Order No. 2866653)

### 6.5 Assembly

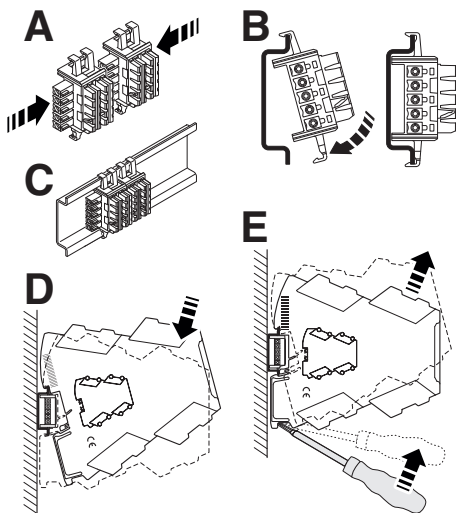


Figure 3 Mounting and removing

- Mount the module on a 35 mm DIN rail according to EN 60715.
- When using the DIN rail connector, first place it into the DIN rail (see A – C). It is used to bridge the power supply. It is also absolutely vital that you snap the module and the DIN rail connector into position in the correct direction: the snap-on foot should be at the bottom and the connector on the left.

### 6.6 FASTCON Pro plugs

The device has pluggable connection terminals with an integrated test disconnect terminal block, with either push-in or screw-in connection technology.

You can plug or screw the FASTCON Pro plugs onto the device directly without tools. You can use the integrated spindle screw to easily remove the plugs from the module or set the isolating position, even when the plugs are connected. For this purpose, use a screwdriver of sufficient width, e.g. SZF 1-0.6x3.5 (order number: 1204517). 4-way coding prevents incorrect insertion into the module.

#### Screw connection:

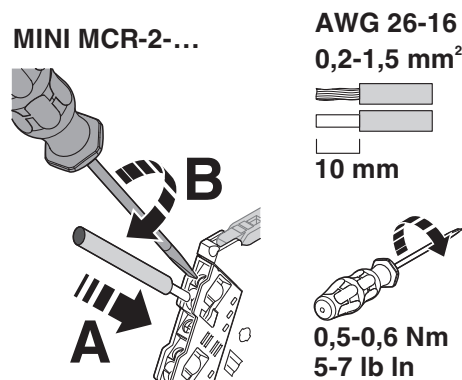


Figure 4 Screw connection

- Insert the wire into the corresponding connection terminal block.
- Use a screwdriver to tighten the screw in the opening above the connection terminal block.

#### Push-in connection:

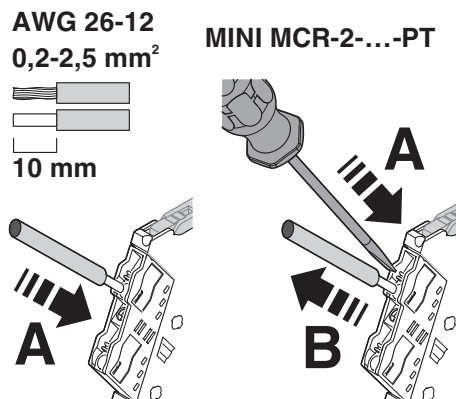


Figure 5 Push-in connection

- Insert the wire into the corresponding connection terminal block.

### 6.7 Fault monitoring FM

A module or power supply failure is reported to the form-matched MINI MCR-2-FM-RC fault monitoring module (order number 2904504) or MINI MCR-2-FM-RC-PT fault monitoring module (order number 2904508) via the DIN rail connector. The module reports the error centrally via an N/C contact.

A fault monitoring module is only required once in a group. There is no need for individual evaluation of up to 115 connected Mini Analog Pro signal conditioners.

### 6.8 Marking

Standard UCT-EM... or UC-EMLP tags are available for marking the devices and can be printed as per customer requirements. In addition, the covers provide enough space for the use of freely chosen sticky labels such as SK 5.0 WH:REEL without concealing the LED diagnostic indicators.

## 7 Status indicator

Green LED	<b>PWR</b>	Supply voltage
	Lit	Supply voltage present