MINI MCR-2-I-I-ILP(-PT)



Input isolator

Data sheet
106294_en_06

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1 Description

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

The device is powered via the current loop of the sensor. Therefore, no additional power supply is necessary.

Input signal = output signal: 0(4) mA ... 20 mA

Features

- Single-channel input loop-powered 2-way isolator with plug-in connection technology
- Input and output signal range 0 mA ... 20 mA or 4 mA ... 20 mA
- Approval for Ex zone 2 (ec)
- Screw or push-in connection available
- Reinforced insulation according to IEC 61010-1

Observe these notes

This device offers the option of NFC communication.

You can use the Signal Conditioner app to call-up comprehensive module information via the NFC interface of your mobile end device.

The Signal Conditioner App is available free of charge.

Alternatively, you can use the CLIPX ENGINEER DEVICE PARAMETERIZATION software (item no.: 1371665) and the TWN4 MIFARE NFC USB ADAPTER programming adapter (item no.: 2909681).

Make sure you always use the latest documentation.
It can be downloaded from the product at phoenixcontact.com/products.

This document is valid for the products listed in the “Ordering data” chapter.

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3 Ordering data

Description	Type	Item no.	Pcs./Pkt.
1-channel input loop-powered 2-way isolator with plug-in connection technology for the electrical isolation of analog signals. Input signal = output signal: 0(4) mA ... 20 mA. Screw connection technology.	MINI MCR-2-I-I-ILP	2901994	1
1-channel input loop-powered 2-way isolator with plug-in connection technology for the electrical isolation of analog signals. Input signal = output signal: 0(4) mA ... 20 mA. Push-in connection technology.	MINI MCR-2-I-I-ILP-PT	2901995	1

Accessories	Type	Item no.	Pcs./Pkt.
The partition plate is used to maintain Ex i isolating distances when Ex i and non-Ex i devices are mounted side by side on a DIN rail.	MCR-DP	1430594	1
Universal Termination Carrier for connecting 16 MINI Analog Pro signal conditioners to digital or analog I/O cards, via D-SUB connector, 37-pos. (1:1 connection), with HART multiplexer connection	TC-D37SUB-AIO16-MP-PS-UNI	2906640	1
Universal Termination Carrier for connecting 16 MINI Analog Pro signal conditioners to digital or analog I/O cards, via D-SUB connector, 37-pos. (1:1 connection)	TC-D37SUB-ADIO16-MP-P-UNI	2906639	1
Parameterization software for Phoenix Contact devices. It includes online monitoring of current device process values, adjustment of device parameters, and logging of parameter changes. Windows installation version with online update.	CLIPX ENGINEER DEVICE PARAMETERIZATION	1371665	1
Parameterization software for Phoenix Contact devices. It includes online monitoring of current device process values, adjustment of device parameters, and logging of parameter changes. Windows version can be used straight away without online update.	CLIPX ENGINEER DEVICE PARAMETERIZATION P	1371666	1
Eight MINI Analog Pro signal conditioners and measuring transducers can be connected to a controller with minimal cabling effort and without any errors using system adapters and system cabling.	MINI MCR-2-V8-FLK 16	2901993	1
Eight MINI Analog Pro signal conditioners and measuring transducers are quickly and easily integrated into a Modbus/RTU network via a communication adapter.	MINI MCR-2-V8-MOD-RTU	2905634	1
Eight MINI Analog Pro signal conditioners and measuring transducers are quickly and easily integrated into a Modbus/TCP network via a communication adapter.	MINI MCR-2-V8-MOD-TCP	2905635	1
Eight MINI Analog Pro signal conditioners and measuring transducers are quickly and easily integrated into a PROFIBUS DP network via a communication adapter.	MINI MCR-2-V8-PB-DP	2905636	1
Eight MINI Analog Pro signal conditioners and measuring transducers can be quickly and easily integrated into a PROFINET network via a communication adapter.	MINI MCR-2-V8-PN	2905637	1

Accessories	Type	Item no.	Pcs./Pkt.
FASTCON Pro plug set consisting of four plugs with screw connection, one for each position on the module. Suitable for all MINI Analog Pro modules.	FASTCON PRO-SET	2906227	1
FASTCON Pro plug set consisting of four plugs with push-in connection, one for each position on the module. Suitable for all MINI Analog Pro modules.	FASTCON PRO-SET-PT	2906228	1
Marker for end clamp, Roll, white (RAL 9010), unmarked, can be labeled with: BLUEMARK E.CARD, BLUEMARK ID COLOR, BLUEMARK ID, BLUEMARK CLED, THERMOMARK PRIME 2.0, THERMOMARK PRIME, THERMOMARK CARD 2.0, THERMOMARK CARD, TOPMARK NEO, TOPMARK LASER, mounting type: latching, Number of individual labels: 24, text field height: 5 mm, text field width: 30 mm	UCT-EM (30X5)	0801505	10
Marker for end clamp, Sheet, can be ordered: by sheet, white (RAL 9010), labeled according to customer specifications, mounting type: snapped into marker carrier, Number of individual labels: 24, text field height: 5 mm, text field width: 30 mm	UCT-EM (30X5) CUS	0801589	1
Marker strip, Roll, white (RAL 9010), unmarked, can be labeled with: THERMOMARK E.300 (D)/600 (D), THERMOMARK ROLL 2.0, THERMOMARK ROLL, THERMOMARK ROLL X1, THERMOMARK ROLLMASTER 300/600, THERMOMARK X1.2, mounting type: adhesive, Number of individual labels: 10, text field height: 5 mm, text field width: 90000 mm	SK 5,0 WH:REEL	0805221	1
Plastic label, Sheet, white (RAL 9010), unmarked, can be labeled with: BLUEMARK E.CARD, BLUEMARK ID COLOR, BLUEMARK ID, BLUEMARK CLED, PLOTMARK, CMS-P1-PLOTTER, mounting type: adhesive, Number of individual labels: 10, text field height: 5 mm, text field width: 15 mm	UC-EMLP (15X5)	0819301	10
Plastic label, Sheet, yellow (RAL 1018), unmarked, can be labeled with: BLUEMARK E.CARD, BLUEMARK ID COLOR, BLUEMARK ID, BLUEMARK CLED, PLOTMARK, CMS-P1-PLOTTER, mounting type: adhesive, Number of individual labels: 10, text field height: 5 mm, text field width: 15 mm	UC-EMLP (15X5) YE	0822615	10
Plastic label, can be ordered: by sheet, white (RAL 9010), labeled according to customer specifications, mounting type: adhesive, text field height: 5 mm, text field width: 15 mm	UC-EMLP (15X5) CUS	0824550	1
Plastic label, can be ordered: by sheet, yellow (RAL 1018), labeled according to customer specifications, mounting type: adhesive, text field height: 5 mm, text field width: 15 mm	UC-EMLP (15X5) YE CUS	0824551	1

Accessories	Type	Item no.	Pcs./Pkt.
Plastic label, Sheet, unmarked, can be labeled with: BLUEMARK E.CARD, BLUEMARK ID COLOR, BLUEMARK ID, BLUEMARK CLED, PLOTMARK, CMS-P1-PLOTTER, mounting type: adhesive, Number of individual labels: 10, text field height: 5 mm, text field width: 15 mm	UC-EMLP (15X5) SR	0828095	10
Plastic label, can be ordered: by sheet, labeled according to customer specifications, mounting type: adhesive, Number of individual labels: 10, text field height: 5 mm, text field width: 15 mm	UC-EMLP (15X5) SR CUS	0828099	1
Plastic label, Card, white (RAL 9010), unmarked, can be labeled with: BLUEMARK ID COLOR, BLUEMARK ID, THERMOMARK PRIME, THERMOMARK CARD 2.0, THERMOMARK CARD, THERMOMARK PRIME 2.0, mounting type: adhesive, Number of individual labels: 189, text field height: 5 mm, text field width: 15 mm	US-EMLP (15X5)	0828790	10
Plastic label, Card, yellow (RAL 1018), unmarked, can be labeled with: BLUEMARK ID COLOR, BLUEMARK ID, THERMOMARK PRIME, THERMOMARK CARD 2.0, THERMOMARK CARD, THERMOMARK PRIME 2.0, mounting type: adhesive, Number of individual labels: 189, text field height: 5 mm, text field width: 15 mm	US-EMLP (15X5) YE	0828873	10
Plastic label, Card, unmarked, can be labeled with: BLUEMARK ID COLOR, BLUEMARK ID, THERMOMARK PRIME, THERMOMARK CARD 2.0, THERMOMARK CARD, THERMOMARK PRIME 2.0, mounting type: adhesive, Number of individual labels: 189, text field height: 5 mm, text field width: 15 mm	US-EMLP (15X5) SR	0828874	10
Plastic label, Card, can be ordered: by card, white (RAL 9010), labeled according to customer specifications, mounting type: adhesive, Number of individual labels: 189, text field height: 5 mm, text field width: 15 mm	US-EMLP (15X5) CUS	0830076	1
Plastic label, Card, can be ordered: by card, yellow (RAL 1018), labeled according to customer specifications, mounting type: adhesive, Number of individual labels: 189, text field height: 5 mm, text field width: 15 mm	US-EMLP (15X5) YE CUS	0830077	1
Plastic label, Card, can be ordered: by card, labeled according to customer specifications, mounting type: adhesive, Number of individual labels: 189, text field height: 5 mm, text field width: 15 mm	US-EMLP (15X5) SR CUS	0830078	1

Accessories	Type	Item no.	Pcs./Pkt.
Marker for end clamp, Sheet, yellow (RAL 1018), unmarked, can be labeled with: BLUEMARK E.CARD, BLUEMARK ID COLOR, BLUEMARK ID, BLUEMARK CLED, THERMOMARK PRIME 2.0, THERMOMARK PRIME, THERMOMARK CARD 2.0, THERMOMARK CARD, TOPMARK NEO, TOPMARK LASER, mounting type: latching, Number of individual labels: 24, text field height: 5 mm, text field width: 30 mm	UCT-EM (30X5) YE	0830340	10
Marker for end clamp, Sheet, can be ordered: by sheet, yellow (RAL 1018), labeled according to customer specifications, mounting type: snapped into marker carrier, Number of individual labels: 24, text field height: 5 mm, text field width: 30 mm	UCT-EM (30X5) YE CUS	0830348	1
Actuation tool, for ST terminal blocks, insulated, also suitable for use as a bladed screwdriver, size: 0.6 x 3.5 x 100 mm, 2-component grip, with non-slip grip	SZS 0,6X3,5	1205053	10

4 Technical data

Input data Current input	
Number of inputs	1
Configurable/programmable	no
Current input signal (I1)	0 mA ... 20 mA
Current input signal (I2)	4 mA ... 20 mA
Response current	~ 200 µA (-15°C ... +70°C) ~ 350 µA (-40°C ... -15°C)
Input voltage limitation	30 V
Voltage dissipation	3.1 V (I = 20 mA)

Output data Current output	
Number of outputs	1
Current output signal	0 mA ... 20 mA 4 mA ... 20 mA
Configurable/programmable	no
Load/output load current output	< 600 Ω (at I = 20 mA output signal)

Supply	
Supply voltage range	9.6 V DC ... 30 V DC (loop-powered, no external supply necessary)
Power consumption	600 mW

General data	
Limit frequency (3 dB)	100 Hz
Maximum transmission error	≤ 0.1 % (of final value)
Signal transmission behavior	In = Out
Maximum temperature coefficient	≤ 0.002 %/K (of measured value / 100 Ω load)
Mounting position	any
Degree of protection	IP20 (not assessed by UL)
Dimensions W/H/D	6.2 mm / 109.81 mm / 119.2 mm (MINI MCR-2-I-I-ILP) 6.2 mm / 109.81 mm / 119.2 mm (MINI MCR-2-I-I-ILP-PT)
Type of housing	PBT

Ambient conditions	
Ambient temperature (operation)	-40 °C ... 70 °C
Ambient temperature (storage/transport)	-40 °C ... 85 °C
Permissible humidity (operation)	5 % ... 95 % (non-condensing)
Altitude	< 2000 m

Electrical isolation	
Electrical isolation	2-way isolation
Overvoltage category	II
Pollution degree	2
Input/output	
Standards/regulations	IEC/EN 61010-1
Rated insulation voltage	300 V_{rms}
Test voltage	3 kV AC (50 Hz, 60 s)
Insulation	Reinforced insulation

Connection data	Screw connection	Push-in connection
Conductor cross-section rigid	0.2 mm² ... 1.5 mm² (with ferrule) 0.14 mm² ... 2.5 mm² (without ferrule)	0.2 mm² ... 2.5 mm² (with ferrule) 0.14 mm² ... 2.5 mm² (without ferrule)
Conductor cross-section flexible	0.14 mm² ... 2.5 mm²	0.14 mm² ... 2.5 mm²
Conductor cross-section AWG	24 ... 12 (flexible)	24 ... 12 (flexible)
Stripping length	10 mm	10 mm
Tightening torque	0.5 Nm ... 0.6 Nm	

Conformance with EMC directive
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	
CE	
CE-compliant	
ATEX BVS 19 ATEX E 079 X	Ⓔx II 3 G Ex ec IIC T4 Gc
IECEx IECEx BVS 19.0068X	Ex ec IIC T4 Gc
CCC / China-Ex	Ex ec IIC T4 Gc
UL, USA/Canada	UL 508 Listed Class I, Div. 2, Groups A, B, C, D T6 Class I, Zone 2, Group IIC T6
EAC Ex BY/112 02.01 TP012 103.01 00079	EAC Ex 2Ex ec IIC T4 Gc

5 Safety regulations and installation notes

5.1 Installation notes

- The EPL Gc (ATEX category 3) device is suitable for installation in zone 2 potentially explosive areas. It meets the requirements of the following standards:
  IEC/EN 60079-0, IEC/EN 60079-7
  GB/T 3836.1, GB/T 3836.3
  For detailed information, please refer to the declarations of conformity.
- Installation, operation, and maintenance may only be carried out by qualified electricians. Follow the installation instructions as described.
- When installing and operating the device, observe the applicable regulations and safety directives (including national safety directives), as well as the generally recognized technical regulations.
- Observe the safety information, conditions, and limits of use specified in the product documentation. Comply with them.
- 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 degree of protection (IEC/EN 60529) specifies that the device is intended for use in a clean and dry environment. Do not subject the device to mechanical and/or thermal stress that exceeds the specified limits.
- 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 suitable housing with an appropriate degree of protection according to IEC/EN 60529.
- Provide a switch/circuit breaker close to the device, which is labeled as the disconnecting device for this device.
- Provide for a overcurrent protection device (I ≤ 4 A) in the installation.
- Thanks to its housing, the device has basic insulation to the neighboring devices, for 300 V_{eff}. 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! If the neighboring device is equipped with basic insulation, no additional insulation is necessary.
- The voltages present at the input, output and supply are extra-low voltages (ELV). Depending on the application, dangerous voltage (> 30 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.
- UL requirement: Use copper cables approved for at least 75 °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 at least IP54 protection in accordance with IEC/EN 60529 or another recognized degree of protection in accordance with IEC/EN 60079-0, Section 1, or GB/T 3836.1 and GB/T 3836.3. Ensure sufficient UV protection.
- 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, connecting and disconnecting cables and plugs in non-intrinsically safe circuits and the latching of devices onto and unlatching devices from the DIN rail connector is only permitted in a de-energized state or when the atmosphere is not potentially explosive.
- 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.
- In Ex zone 2, the device may only be operated when all connectors are fully plugged in.
- The specified ambient temperature range of $-40°C \leq T_{amb} \leq +70°C$ refers to the temperature inside the IP54 housing.

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 NFC communication and Bluetooth communication must not be used unless the area is known to be non-hazardous.

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.

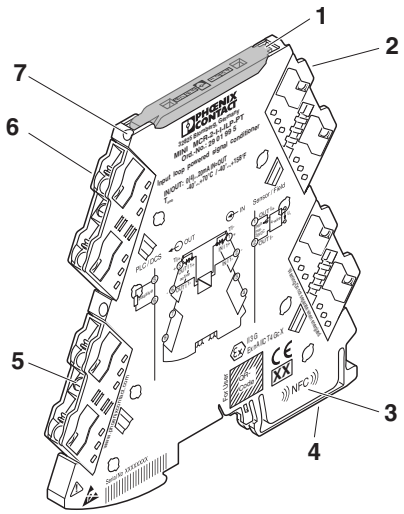
6 Installation

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 EN 61340-5-2.

6.2 Structure

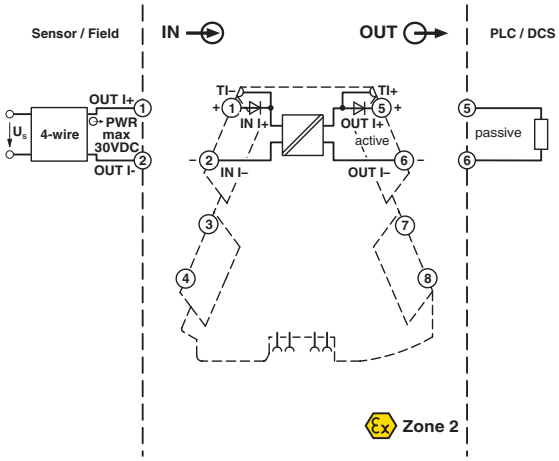
Figure 1 Single-channel



1 Cover with labeling option
2 Current input
3 NFC coil
4 Universal snap-on foot for EN DIN rails
5 Spindle screw
6 Current output
7 Current measuring socket

6.3 Block diagram

Figure 2 Single-channel

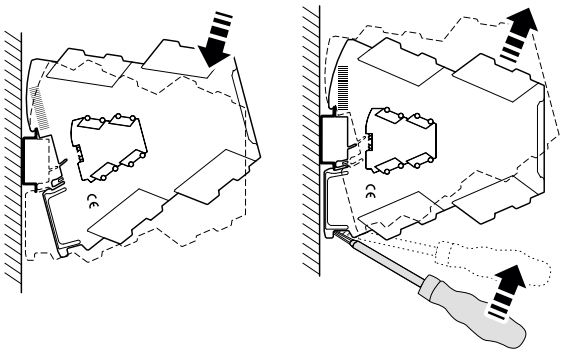


6.4 Power supply

The device is powered via the current loop of the sensor. Therefore, no additional power supply is necessary.

6.5 Mounting

Figure 3 Mounting and removing



– Mount the module on a 35 mm DIN rail in accordance with EN 60715.

An ME 6,2 TBUS-2 DIN rail connector (Item No. 2869728) is used to supply active devices. A DIN rail connector is not required to operate this passive device.

This device can be snapped onto a DIN rail connector - an electrically conductive connection is not established. This means that you do not need to disconnect an existing DIN rail connector element connection.

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.

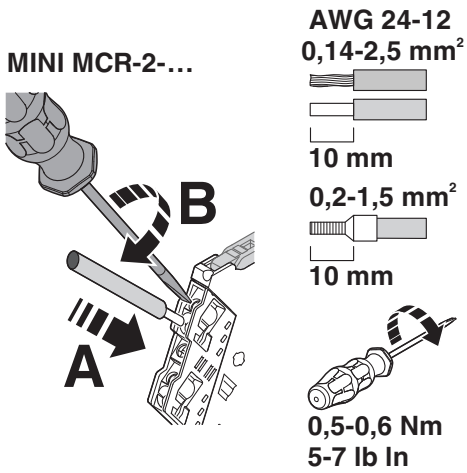
You can plug or screw the FASTCON Pro plugs onto the device directly without tools. You can use the integrated spindle screw to easily remove the plugs from the device or set the isolating position, even when the plugs are connected. For this purpose, use a screwdriver of sufficient width, e.g. SZF 1-0.6x3.5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

The spindle screw will turn by itself when the FASTCON Pro plugs are connected. There is no need for you to fix the spindle screw in place as well.

4-way coding prevents incorrect connection to the device.

Screw connection:

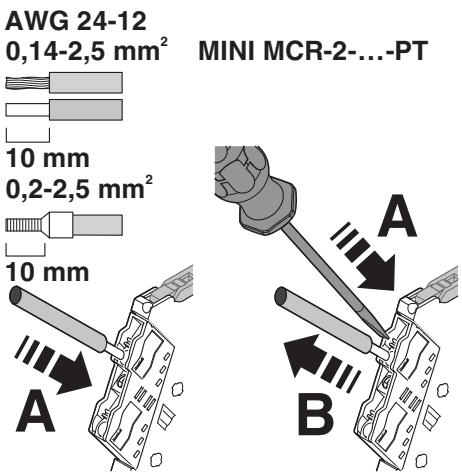
Figure 4 Screw connection



- 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



If you want to use conductors with ferrule:

- Push the pushbutton in with a screwdriver.
- Insert the wire into the corresponding connection terminal block.
- Push in the pushbutton with a screwdriver to release.

If you want to use conductors without ferrule:

- Push the pushbutton in with a screwdriver.
- Insert the wire into the corresponding connection terminal block.
- Push in the pushbutton with a screwdriver to release.

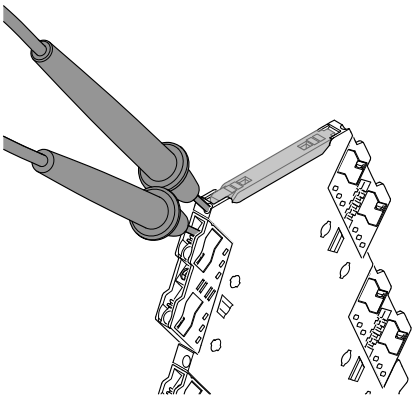
6.7 Current measurement

Thanks to integrated measurement diodes, the device enables the current to be measured without disconnecting the conductors.

Test sockets which support current measurement are marked TI+ or TI-.

For the current measurement, use 2 mm probe tips of the type Fluke TL75-1 or probe tips with a comparable tip shape.

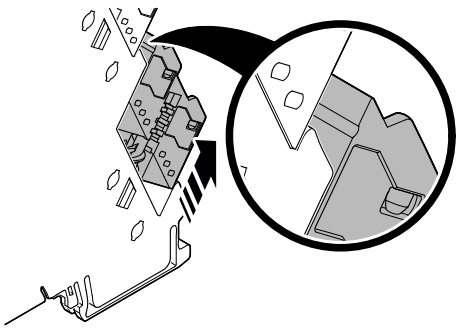
Figure 6 Test disconnect terminal block



Furthermore, individual circuits can be specifically disconnected, e.g. for commissioning.

You can set the isolating position by turning the integrated spindle screw through 180°. The isolating position is indicated by the marking on the plugs.

Figure 7 Disconnect position



6.8 Marking

UCT-EM... or UC-EMLP... standard marking labels are available for marking the devices and can be printed according to customer requirements. In addition, the covers provide enough space for the use of freely chosen marking strips such as SK 5.0 WH:REEL (item no.: 0805221) without concealing the LED diagnostic indicators.

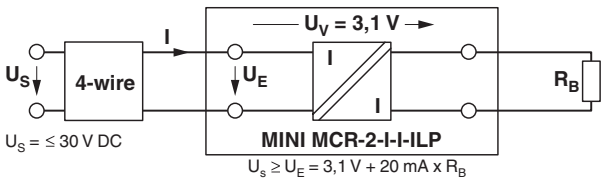
7 Method of operation

The input isolator draws the power required for isolation from the input signal.

When using passive isolators, make sure that the current sourcing voltage of the measuring transducer U_S is sufficient to drive the maximum current of 20 mA via the passive isolator with a voltage drop U_V = 3.1 V and load R_B. This means:

$U_S \geq U_E = 3.1\ V + 20\ mA \times R_B$

Figure 8 Example application



8 Digital nameplate

The digital nameplate provides the option of obtaining product-specific data related to a specific serial number.

If you scan the QR code (digital nameplate) on the device, you can, for example, retrieve documents on the production status as well as clearly identify the hardware and firmware status of the device at hand.