MINI MCR-2-F-UI(-PT)(-C)

Frequency signal conditioner



Data sheet
108237_en_07

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1 Description

Configurable, 3-way frequency transducer with switching output and pluggable connection technology for the electrical isolation, conversion, amplification, and filtering of PWM and frequency signals (Hz/rpm).

Signals in the range from 0.002 Hz ... 200 kHz and PWM signals up to a frequency of 1 kHz can be processed on the input side.

The device is suitable for the connection of NAMUR proximity sensors, sensors with NPN and PNP outputs that generate a frequency signal, as well as general frequency and PWM signals (Hz/rpm).

Signals between 0 mA ... 21 mA and 0 V ... 10.5 V are possible on the output side.

Optionally, configure the device via DIP switches, with extended functionality via the S-PORT with the CLIPX ENGINEER DEVICE PARAMETERIZATION software (item no.: 1371665), via FDT/DTM, or wirelessly without additional accessories via the Signal Conditioner App.

The Signal Conditioner App enables communication via the Bluetooth adapter or NFC.

The device requires an active input signal (2 V DC ... 30 V DC).

Passive input signals can be connected with an additional supply (see Section Connection examples).

Features

- Configurable 3-way frequency transducer with transistor switching output
- Acquisition of NPN, PNP, NAMUR, and frequency signals (0.002 Hz ... 200 kHz)
- Freely adjustable input and output
- Conversion of PWM and frequency signals (Hz/rpm) to analog signals (0 V ... 10.5 V / 0 mA ... 21 mA)
- Sensor supply >8.2 V DC via MINI MCR-2-SPS-24-15(-PT) (Item no.: 1033202, 1033201)
- Approval for Ex zone 2 (ec)
- Screw or push-in connection available
- Reinforced insulation according to IEC 61010-1
- Supply voltage range 9.6 V DC ... 30 V DC

Observe these notes

µC NFC

This device offers the option of NFC communication.

You can use the Signal Conditioner App to configure the device and call up a DIP switch settings aid as well as 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.
Universally configurable frequency transducer for converting frequency (Hz/rpm) and PWM signals into standard signals. Sensor voltages greater than 8.2 V DC are possible in combination with MINI MCR-2-SPS 1033202. Screw connection technology.	MINI MCR-2-F-UI	2902056	1
Universally configurable frequency transducer for converting frequency (Hz/rpm) and PWM signals into standard signals. Sensor voltages greater than 8.2 V DC are possible in combination with MINI MCR-2-SPS-PT 1033201. Push-in connection technology.	MINI MCR-2-F-UI-PT	2902058	1
Universally configurable frequency transducer for converting frequency (Hz/rpm) and PWM signals into standard signals. Sensor voltages greater than 8.2 V DC are possible in combination with MINI MCR-2-SPS-PT 1033201. Push-in connection technology, order configuration.	MINI MCR-2-F-UI-PT-C	2902059	1

Accessories	Type	Item no.	Pcs./Pkt.
DIN rail bus connector (TBUS), 5-pos., for bridging the supply voltage, can be snapped onto NS 35/... DIN rail in accordance with EN 60715	ME 6,2 TBUS-2 1,5/5-ST-3,81 GY	2695439	10
DIN rail bus connector for DIN rail mounting. Universal for TBUS housing. Gold-plated contacts, 5-pos.	ME 6,2 TBUS-2 1,5/5-ST-3,81 GN	2869728	10
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

Accessories	Type	Item no.	Pcs./Pkt.
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
Programming adapter with USB interface, for programming with software. The USB driver is included in the software solutions for the products to be programmed, such as measuring transducers or motor managers.	IFS-USB-PROG-ADAPTER	2811271	1
Bluetooth adapter with micro USB and S-PORT interface for wireless communication with the MINI Analog, MINI Analog Pro, MACX Analog, Interface System Gateways, and PLC logic device series.	IFS-BT-PROG-ADAPTER	2905872	1
Near Field Communication (NFC) programming adapter with USB interface for the wireless configuration of NFC-capable products from Phoenix Contact with software. A separate USB driver is not required.	TWN4 MIFARE NFC USB ADAPTER	2909681	1
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, Sheet, 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

Accessories	Type	Item no.	Pcs./Pkt.
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
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

Accessories	Type	Item no.	Pcs./Pkt.
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
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
Constant voltage source with pluggable connection technology for the generation of a highly precise constant voltage of 15 V and for the supply of sensors without internal power supply. Screw connection technology.	MINI MCR-2-SPS-24-15	1033202	1
Constant voltage source with pluggable connection technology for the generation of a highly precise constant voltage of 15 V and for the supply of sensors without internal power supply. Push-in connection technology.	MINI MCR-2-SPS-24-15-PT	1033201	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. Screw connection technology	MINI MCR-2-PTB	2902066	1

Accessories	Type	Item no.	Pcs./Pkt.
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
Primary-switched power supply, QUINT POWER, screw connection, DIN rail mounting, supply of devices possible via the TBUS DIN rail connector, protective coating, input: single-phase, output: 24 V DC/2.5 A	QUINT4-SYS-PS/1AC/24DC/2.5/SC	2904614	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 message via N/C 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 message via N/C contact. Push-in connection technology, standard configuration	MINI MCR-2-FM-RC-PT	2904508	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 Frequency input	
Input signals	NAMUR initiators NPN/PNP transistor outputs Floating contact (dry contact) Frequency generator Incremental encoder (speed only) HTL encoders TTL rotary transducer S0 signal
Max. voltage input signal	30 V (incl. DC voltage)
Voltage measuring range	≥ 2 V
Frequency measuring range	0.002 Hz ... 200 kHz
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 ... 1000 Hz (Duty cycle 20 ... 80 %)

Output data Voltage output / current output	
Number of outputs	1
Voltage output signal	0 V ... 10 V (via DIP switch) 2 V ... 10 V (via DIP switch) 0 V ... 5 V (via DIP switch) 1 V ... 5 V (via DIP switch) 0 V ... 10.5 V (can be set via software)
Max. voltage output signal	12.3 V
Current output signal	0 mA ... 20 mA (via DIP switch) 4 mA ... 20 mA (via DIP switch) 0 mA ... 10 mA (via DIP switch) 2 mA ... 10 mA (via DIP switch) 0 mA ... 21 mA (can be set via software)
Max. current output signal	24.6 mA
Configurable/programmable	Yes
Load/output load voltage output	≥ 10 kΩ
Ripple (I output)	< 20 mV_{PP} (600 Ω)
Ripple (U output)	< 20 mV_{PP} (600 Ω)
Load/output load current output	≤ 600 Ω (20 mA)

Output data Switching output	
Number of outputs	1
Contact switching type	1 N/O contact
Minimum switching voltage	1 V
Maximum switching voltage	30 V DC
Min. switching current	100 µA
Max. switching current	100 mA (30 V)

Supply	
Nominal supply voltage	24 V DC
Supply voltage range	9.6 V DC ... 30 V DC (The DIN rail connector (ME 6,2 TBUS-2 1,5/5-ST-3,81 GN, item no. 2869728) can be used to bridge the supply voltage. It can be snapped onto a 35 mm DIN rail in accordance with EN 60715)
Typical current consumption	32 mA (24 V DC) 63 mA (12 V DC)
Power consumption (I output)	≤ 1 W (at I_{OUT} = 20 mA, 9.6 V DC, 600 Ω load)

General data	
Step response (0–99%)	< 35 ms (f > 500 Hz)
Maximum transmission error	0.1 % (Frequency (Hz/rpm)) 1 % (PWM signal)
Maximum temperature coefficient	0.01 %/K
Degree of protection	IP20 (not assessed by UL)
Mounting position	any
Assembly note	The DIN rail connector can be used for bridging the supply voltage. It can be snapped onto a 35 mm EN 60715 DIN rail.
Status display	Green LED (supply voltage) Yellow LED (switching output)
Error indication	Red LED
Dimensions W/H/D	6.2 mm / 109.81 mm / 119.2 mm (MINI MCR-2-F-UI) 6.2 mm / 109.81 mm / 119.2 mm (MINI MCR-2-F-UI-PT) 6.2 mm / 109.81 mm / 119.2 mm (MINI MCR-2-F-UI-PT-C)
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	3-way isolation
Overvoltage category	II
Pollution degree	2
Input/output/power supply	
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 20 ATEX E 024 X	II 3 G Ex ec IIC T4 Gc
IECEx IECEx BVS 20.0017X	Ex ec IIC T4 Gc
CCC / China-Ex 2025122310128088	Ex ec IIC T4 Gc
UL, USA/Canada	UL 508 Listed Class I, Div. 2, Groups A, B, C, D T5 Class I, Zone 2, Group IIC T5
Shipbuilding approval DNV GL TAA000021E Rev. 1 Temperature Humidity Vibration EMC Enclosure	 B B A A Required protection according to the Rules shall be provided upon installation on board
EAC Ex BY/112 02.01 TP012 103.01 00081	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.
- There is a double isolation of 300 V_{eff} between neighboring modules of the same type oriented the same way. The device has a base isolation of 150 V_{eff} to other neighboring modules on the side with the DIP switch.
- 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.
- If EMC problems occur, increase the filter factor using the configuration software (see “Mean value” section).

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.
  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, the latching of devices onto and unlatching devices from the DIN rail connector, and the actuation of DIP switches 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.
- The configuration interface may only be used if it has been ensured that there is no potentially explosive atmosphere present.
- 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 ≤ T_{amb} ≤ +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 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.

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

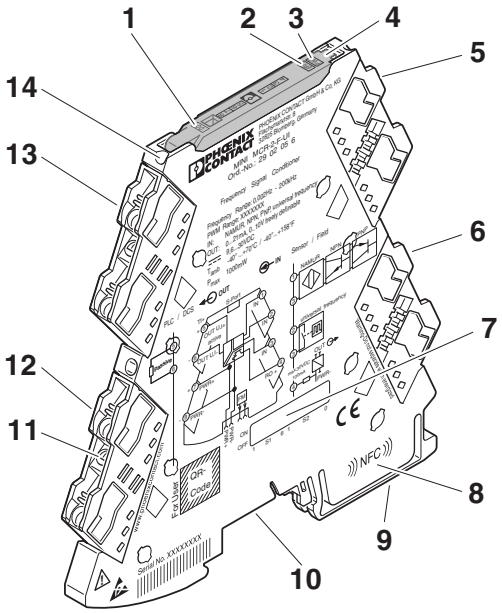
6 Installation

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

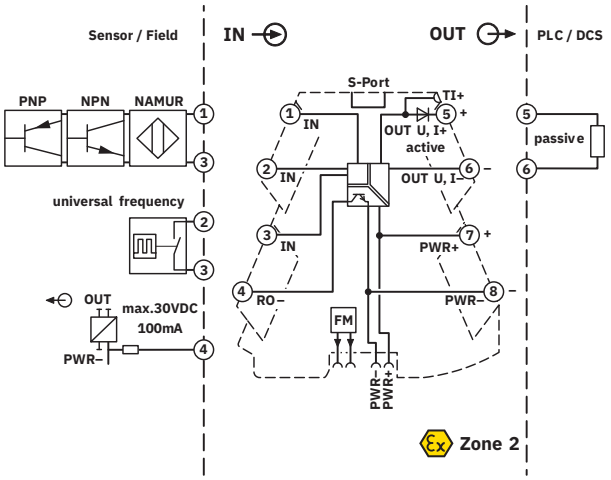
Figure 1 Structure



1 DO switch contact yellow LED
2 Error indicator "ERR" red LED
3 Green “PWR” LED, power supply
4 Cover with labeling option
5 Input: PWM and frequency signals (Hz/rpm)
6 Output: Switch contact
7 DIP switches S1, S2
8 NFC coil
9 Universal snap-on foot for EN DIN rails
10 Connection for DIN rail connector
11 Mounting screw
12 Supply voltage
13 Output: Standard and normalized signals
14 Current measuring socket

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; it is available to download at www.phoenixcontact.com/products under the item listing.

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 (Item No. 2902066) or the MINI MCR-2-PTB-PT power terminal block (Item 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

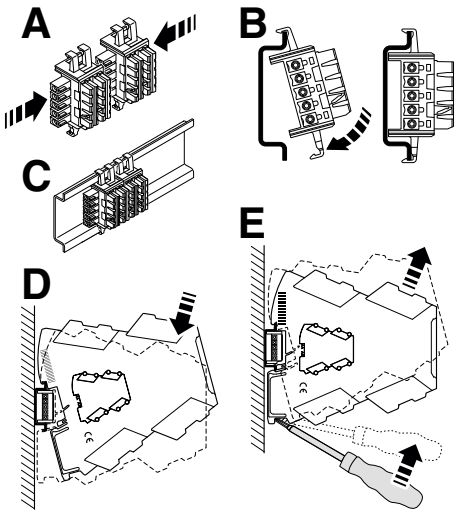
Use the QUINT4-SYS-PS/1AC/24DC/2.5/SC (Item No. 2904614) as the system power supply.

The power supply can be installed on all 35 mm DIN rails in accordance with EN 60715. The normal mounting position is horizontal (input terminals facing down). The minimum clearance to other devices is 30 mm above/below.

If you would like to supply adjacent items using the power supply, use a DIN rail bus distributor. To do so, insert the DIN rail bus adapter ME 22,5 TBUS ADAPTER KMGY (Item No.: 2201756) and the DIN rail connector ME 17,5 TBUS 1,5/ 5-ST-3,81 KMGY (Item No.: 2713645) plugged together in the DIN rail.

6.5 Mounting

Figure 3 Mounting and removing



– Mount the module on a 35 mm DIN rail in accordance with 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 Partition plate

If you want to mount Ex i and non-Ex i devices next to each other on a DIN rail, you will require the MCR-DP partition plate (item no. 1430594). The partition plate ensures that Ex i isolating distances are maintained.

The partition plate is tailored to the MINI Analog, MINI Analog Pro, and MACX Analog device series and the QUINT4 system power supply (item no. 2904614).

The partition plate is compatible with the ME … TBUS DIN rail connectors (e.g., item no. 1090049, 2695439).

6.7 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.

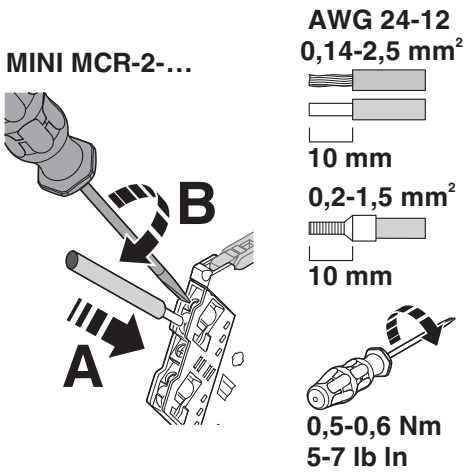
You can plug or screw the FASTCON Pro plugs onto the device directly without tools. You can use the integrated spindle screw to easily remove the plugs from the device or set the isolating position, even when the plugs are connected. For this purpose, use a screwdriver of sufficient width, e.g. SZF 1-0.6x3.5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

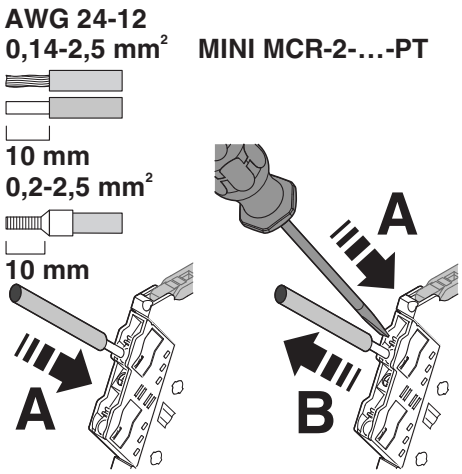
Figure 4 Screw connection



- Strip 10 mm off the wire.
- Insert the wire into the corresponding connection terminal block.
- Use a screwdriver to tighten the screw in the opening above the connection terminal block.
  Tightening torque: 0.6 Nm

Push-in connection:

Figure 5 Push-in connection



If you want to use conductors with ferrule:

- Strip the wire by approximately 10 mm and crimp ferrules to the end of the wire.
- 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.

6.8 Fault monitoring FM

A module or power supply failure is reported to the form-matched MINI MCR-2-FM-RC fault monitoring module (Item no. 2904504) or MINI MCR-2-FM-RC-PT fault monitoring module (Item no. 2904508) via the DIN rail connector. The module reports the error centrally via a 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.

For the behavior of the fault monitoring contact for the different DIP switch configurations, please refer to the corresponding table.

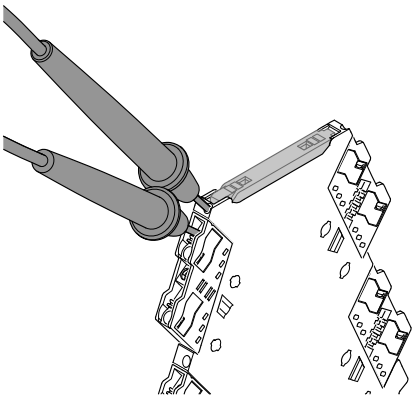
6.9 Current measurement

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.

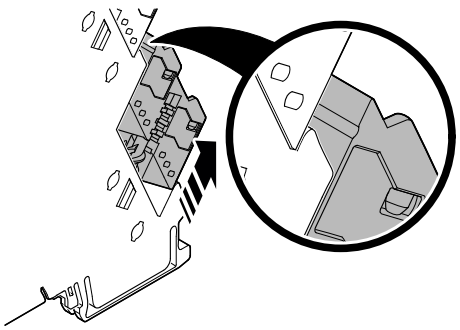
Figure 6 Test disconnect terminal block



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



6.10 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 Configuration

The device is supplied with the following standard configuration:

NAMUR sensor; mean-value generation “OFF”; signal type: frequency; 0.002 Hz ... 200 kHz frequency range; 4 mA ... 20 mA output; error evaluation according to NE 43 (downscale); fault monitoring contact responds in the event of any errors; software configurable

For configuration via Bluetooth, the supply voltage must be applied.

If using the IFS-USB-PROG-ADAPTER (Item No. 2811271) or communication via NFC, configuration is possible without supply voltage.



The module can also be configured with the supply voltage not connected.

7.1 Configuration via DIP switches

At delivery, all DIP switches are in the "OFF" position.

Configure the DIP switches according to your planned application using the adjacent table, or use the Signal Conditioner App to display the DIP switch positions for your desired configuration.

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).

7.1.1 Configuration tables

• ≙ ON		**DIP S1**					
N/A ≙ not applicable		**1**	**2**	**3**	**4**	**5**	**6**
Input	NAMUR			N/A	N/A	N/A	N/A
	NPN	•		N/A	N/A	N/A	N/A
	PNP		•	N/A	N/A	N/A	N/A
	General frequency input	•	•	N/A	N/A	N/A	N/A
Signal type	Frequency				N/A	N/A	N/A
	PWM			•	N/A	N/A	N/A
Output	0 mA ... 20 mA						
	20 mA ... 0 mA				•		
	4 mA ... 20 mA					•	
	20 mA ... 4 mA				•	•	
	0 V ... 10 V						•
	10 V ... 0 V				•		•
	0 V ... 5 V					•	•
	1 V ... 5 V				•	•	•

• ≙ ON	N/A ≙ not applicable	DIP S2							
Start frequency (recognition time)	**(DIP S1-3 = OFF)**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**
0.002 Hz	(> 8 min)			N/A	N/A	N/A	N/A	N/A	N/A
0.1 Hz	(~10 s)	•		N/A	N/A	N/A	N/A	N/A	N/A
1 Hz	(~1 s)		•	N/A	N/A	N/A	N/A	N/A	N/A
10 Hz	(~0.1 s)	•	•	N/A	N/A	N/A	N/A	N/A	N/A

End frequency in Hz		DIP S2							DIP S2					
(DIP S1-3 = OFF)		**3**	**4**	**5**	**6**	**7**	**8**	**• ≙ ON**	**3**	**4**	**5**	**6**	**7**	**8**
	200000							900						•
	100000	•						800	•					•
	50000		•					700		•				•
	40000	•	•					600	•	•				•
	30000			•				500			•			•
	20000	•		•				450	•		•			•
	19000		•	•				400		•	•			•
	18000	•	•	•				350	•	•	•			•
	17000				•			300				•		•
	16000	•			•			250	•			•		•
	15000		•		•			200		•		•		•
	14000	•	•		•			190	•	•		•		•
	13000			•	•			180			•	•		•
	12000	•		•	•			170	•		•	•		•
	11000		•	•	•			160		•	•	•		•
	10000	•	•	•	•			150	•	•	•	•		•
	9000					•		140					•	•
	8000	•				•		130	•				•	•
	7000		•			•		120		•			•	•
	6000	•	•			•		110	•	•			•	•
	5000			•		•		100			•		•	•
	4500	•		•		•		90	•		•		•	•
	4000		•	•		•		80		•	•		•	•
	3500	•	•	•		•		70	•	•	•		•	•
	3000				•	•		60				•	•	•
	2500	•			•	•		50	•			•	•	•
	2000		•		•	•		45		•		•	•	•
	1800	•	•		•	•		40	•	•		•	•	•
	1600			•	•	•		35			•	•	•	•
	1400	•		•	•	•		30	•		•	•	•	•
	1200		•	•	•	•		25		•	•	•	•	•
	1000	•	•	•	•	•		20	•	•	•	•	•	•

PWM pulse/pause ratio start/end		DIP S2					DIP S2			
(DIP S1-3 = ON)		1	2	3	4	• ≙ ON	5	6	7	8
	1 %					99%				
	2 %	•				98%	•			
	3%		•			97%		•		
	4%	•	•			96%	•	•		
	5 %			•		95 %			•	
	6 %	•		•		94 %	•		•	
	7 %		•	•		93 %		•	•	
	8 %	•	•	•		92 %	•	•	•	
	10 %				•	90 %				•
	15 %	•			•	85 %	•			•
	20 %		•		•	80 %		•		•
	25 %	•	•		•	75 %	•	•		•
	30 %			•	•	70 %			•	•
	35 %	•		•	•	65%	•		•	•
	40%		•	•	•	60%		•	•	•
	45 %	•	•	•	•	55%	•	•	•	•

• ≙ ON		DIP S2	
N/A ≙ not applicable		9	0
Not used	Not used	N/A	N/A
	Not used	N/A	N/A
Configuration	Via software		
	Via DIP switch		•

7.2 Error evaluation

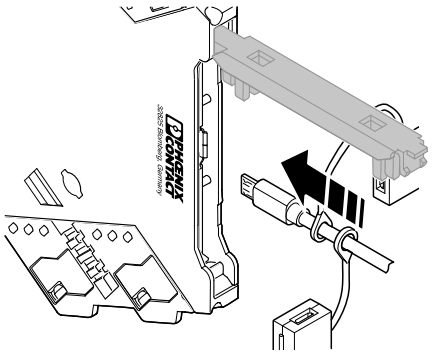
The fault behavior in accordance with NE 43 can be set in the software or app solutions.

	Failure mode	Error description		Output current
Compliant with NE 43	Upscale	Measuring range overrange and underrange, cable break, short circuit	=	21.5 mA
	Downscale	Measuring range overrange and underrange, cable break, short circuit	=	3.5 mA
	Upscale/downscale	Cable break, short circuit	=	3.5 mA
		Measuring range overrange or underrange	=	21.5 mA
Other failure modes	Freely definable	Measuring range overrange and underrange, cable break, short circuit	=	0 mA ... 21.5 mA
	0 mA	Measuring range overrange and underrange, cable break, short circuit	=	0 mA
	Limiting	Measuring range overrange and underrange, cable break, short circuit	=	Output is limited to range start or end value

7.3 Configuration via software

Use the IFS-USB-PROG-ADAPTER (Item No. 2811271), TWN4 MIFARE NFC USB ADAPTER (Item No. 2909681) or IFS-BT-PROG-ADAPTER (Item No. 2905872) programming adapter to connect the device and PC.

Figure 8 Programming connection



In addition to DIP switch settings, software configuration offers enhanced setting options and a monitoring function for maintenance purposes.

The following free software solutions are available for you to download from the Internet.

– CLIPX ENGINEER DEVICE PARAMETERIZATION software (item no.: 1371665)
– Portable version: CLIPX ENGINEER DEVICE PARAMETERIZATION P software (item no.: 1371666)
– FDT/DTM solutions: FDT frame application and DTM packets

7.4 Configuration via Signal Conditioner app

NOTE

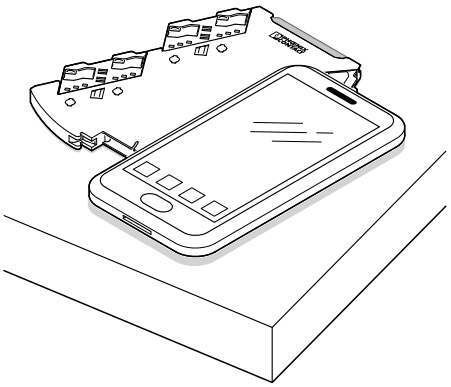
Only configure the device via NFC when the power is disconnected. The data is not saved while power is connected.

In addition to DIP switch settings, app configuration offers enhanced setting options.

Using the Signal Conditioner app via the NFC interface of your smartphone you can configure the module without an additional programming adapter or cables.

Alternatively, you can use the Bluetooth programming adapter (Item No. 2905872).

Figure 9 Configuration



8 Function description

8.1 Digital switching output

The digital potential-free switching output is an N/O transistor output that can be used as a threshold value output.

You can define up to 2 switching points for a characteristic curve.

Switching points

The switching points are set finitely and in the selected unit (Hz, %) and relate to the measuring input.

The up to two switching points can be configured within the input signal range as follows.

The smallest measuring span depends on the frequency range in which these points are located.

If you adjust the start value of the measuring range, the greatest possible difference between the start and final value depends on the final value previously specified.

If you adjust the final value of the measuring range, the smallest possible difference between the start and final value depends on the start value previously specified.

Adjust start value

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

Adjust final value

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

Switching behavior

You can configure eight different switching behaviors.

Switching behavior	Number of switching points	Normal function of the switching output
0	0	Permanently inactive (not connected through)
1	0	Permanently active (connected through)
2	1	Active after the switching point is exceeded
3	1	Inactive after the switching point is exceeded
4	Two switching points with hysteresis	Active after the upper switching point is exceeded, inactive after the lower switching point is undershot. If the input variable assigned to the switching output lies between the two switching points when the module is switched on, the switching output is inactive.
5	Two switching points with hysteresis	Inactive after the upper switching point is exceeded, active after the lower switching point is undershot. If the input variable assigned to the switching output lies between the two switching points when the module is switched on, the switching output is active.
6	2	Active between the two switching points
7	2	Inactive between the two switching points

You can only set the switching behavior in the event of a short circuit/wire break for NAMUR signals at the signal input.

You can set the relay switch-on/switch-off delay in increments of 0.1 s from 0 s ... 10 s.

If an error is detected, the delay time is not taken into account.

8.2 Analog switching output

If you configure the device using one of the software or app solutions, this additional function is available. It allows you to implement a threshold value switch without having to integrate an extra switching output or use a separate threshold value switch.

The analog output can be used as an analog switching output. A low level or high level is signaled at the analog output. The low level or high level can be freely adjusted within the analog output range of 0 mA ... 20 mA or 0 V ... 10 V. The minimum distance between the two levels must be 1 mA or 0.5 V. The high level must be greater than the low level.

Switching points

The switching points are set finitely and in the selected unit (Hz, %) and relate to the measuring input.

The smallest measuring span depends on the frequency range in which these points are located.

If you adjust the start value of the measuring range, the greatest possible difference between the start and final value depends on the final value previously specified.

If you adjust the final value of the measuring range, the smallest possible difference between the start and final value depends on the start value previously specified.

Switching behavior

Function of the switching output: signal high level after the switching point is exceeded; before this signal low level.

8.3 Monitoring

A monitoring function can be used with the software or app solutions. This means that you can display and note down current measured values via the software interface.

8.4 Limiting behavior of the analog output

In some applications it is important that the standard signal at the output remains within its limits. In the case of a 4 mA ... 20 mA signal, for example, this means that the signal does not drop below 4 mA or exceed 20 mA.

You can set this behavior under “Analog output > Error signaling > Limitation”. The best way to do this is via the software or app solutions.

8.5 Diagnostic functions and error messages

Errors such as a wire break, short circuit, measuring value overrange, measuring value underrange, and device errors are detected by the devices. The errors are signaled via the analog outputs of the device and/or the fault monitoring and/or via a switching output, if present. At the same time, the set fault signaling is indicated via a red LED.

The respective error displays are removed when the error is eliminated.

The software and app solutions allow you to freely select and adjust all signaling variants.

Analog input

Wire-break detection is possible at the NAMUR input. A signal is defined as a wire break when it is less than 1.2 mA.

Short-circuit detection is possible at the NAMUR input. A signal is defined as a short circuit when it is less than 6 mA.

Analog output

The current output can also be monitored for wire breaks.

You can activate or deactivate the function in the “Analog output” tab of the software or app solutions.

8.6 Simulation mode/force

During startup it must be possible to specify analog values without a pending sensor signal from the field.

Analog signals can be simulated at the output with the software solutions.

You can set this behavior via ‘Online operation > Force outputs’.

8.7 Mean value

The filter factor generates a mean value from the measured input signal and is based on 2 ... 100 values.

Possible repercussions on the output signal due to negative EMC influences can therefore be prevented.

You can configure the filter factor via the software.

The value is set to 1 in the delivery state.

8.8 Minimum clearance for frequency input

The distance between the minimum and maximum amplitude value must be at least 2 V.

8.9 Voltage level

In the delivery state, the upper voltage level is set at 30 V when using the general frequency input. If you use sensors with a maximum voltage level of < 18 V, you have to adjust the voltage level with the standard ANALOG-CONF software or wirelessly in the smartphone app. You may freely select the lower and upper voltage levels in this case.

9 Diagnostics and status indicators

Name	Color/status	Description
PWR	Green	Supply voltage
	Lit	Supply voltage present
ERR	Red	Fault display or simulation mode
	Flashing fast (2.8 Hz)	Sensor fault or invalid DIP switch configuration
	Flashing slowly (1.4 Hz)	Simulation mode
	Lit	Internal device error
DO	Yellow	Switch contact
	Lit	Switch contact activated

10 Connection examples

You can use the MINI MCR-2-SPS-24-15(-PT) (Item no.: 1033202, 1033201) constant voltage source if you require a sensor supply >8.2 V DC.

10.1 2-conductor DC

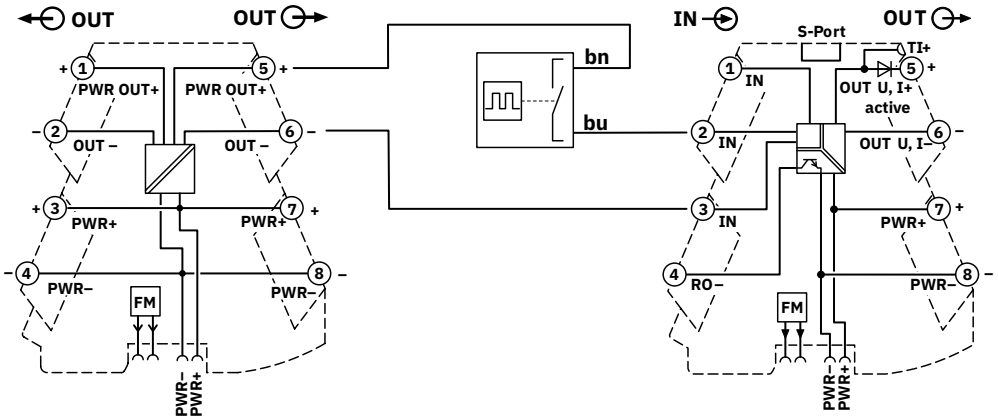
Mechanical contact

As an illustration, only the terminals 5 (PWR OUT+) und 6 (PWR OUT-) will be used with the MINI MCR-2-SPS-24-15.

The terminals 1 and 5 and the terminals 2 and 6 are connected internally such that you can use both terminals.

Configure the input signal.

Select the setting "General frequency input" via the software/DIP switch.



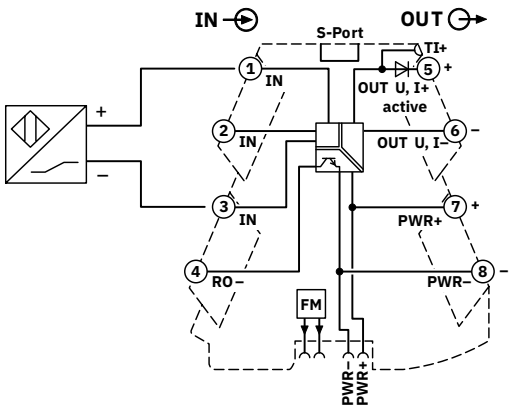
MINI MCR-2-SPS-24-15

MINI MCR-2-F-UI

NAMUR sensor

Configure the input signal.

Select the setting "NAMUR" via the software/DIP switch.

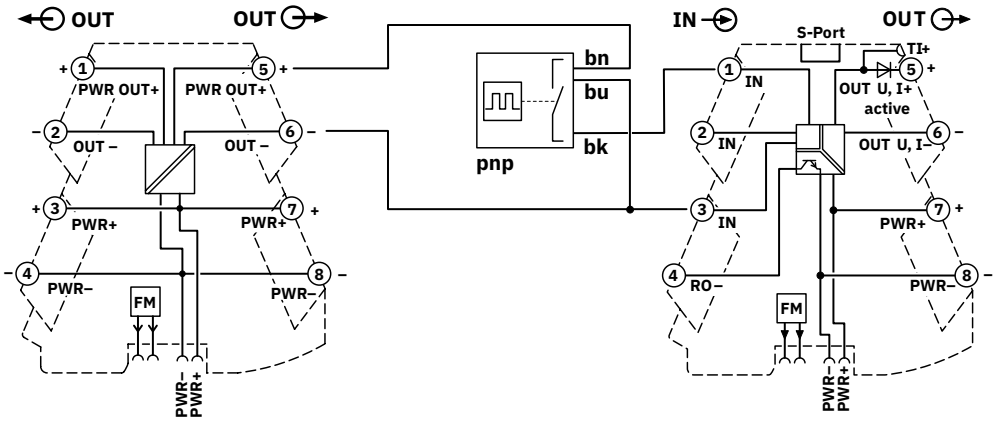


10.2 3- conductor DC

PNP transistor output

Configure the input signal.

Select the setting "PNP" via the software/DIP switch.

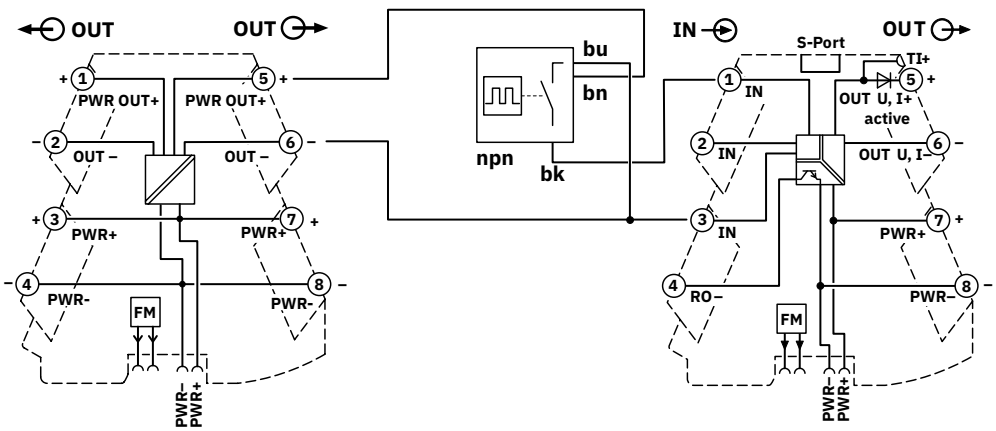


MINI MCR-2-SPS-24-15 MINI MCR-2-F-UI

NPN transistor output

Configure the input signal.

Select the setting "NPN" via the software/DIP switch.



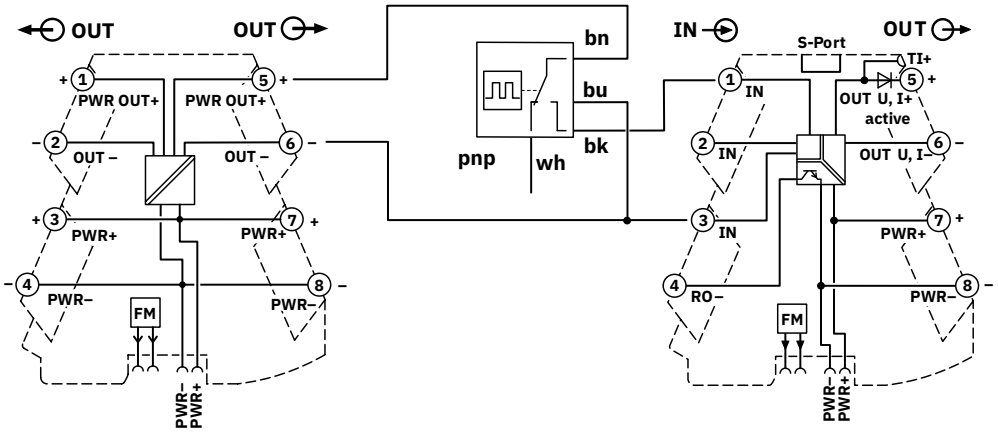
MINI MCR-2-SPS-24-15 MINI MCR-2-F-UI

10.3 4- conductor DC

PNP transistor output

Configure the input signal.

Select the setting "PNP" via the software/DIP switch.

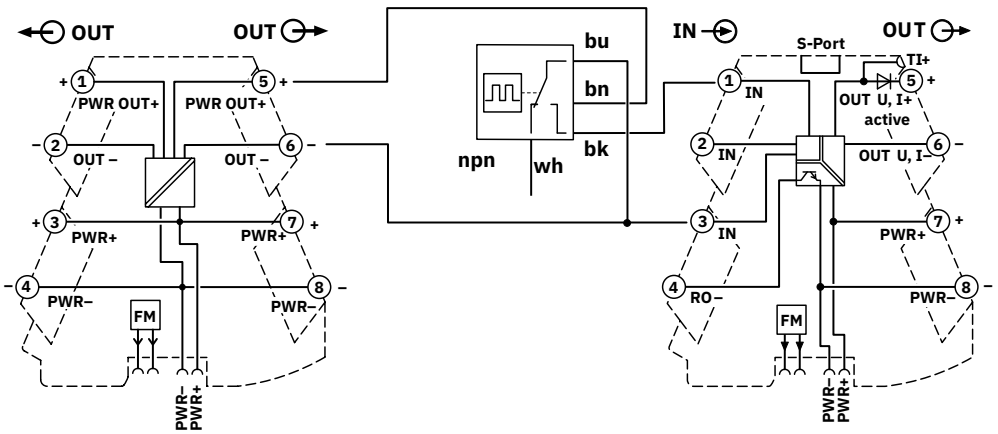


MINI MCR-2-SPS-24-15 MINI MCR-2-F-UI

NPN transistor output

Configure the input signal.

Select the setting "NPN" via the software/DIP switch.



MINI MCR-2-SPS-24-15 MINI MCR-2-F-UI

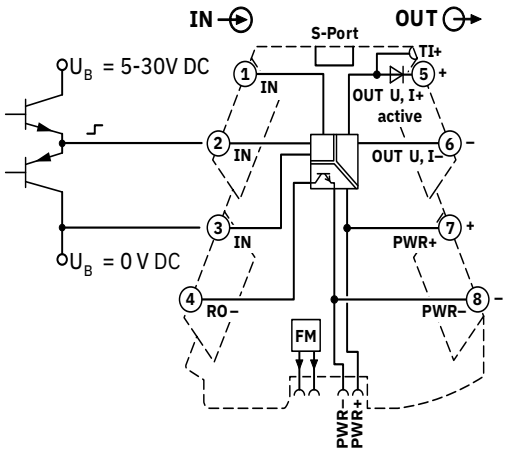
10.4 Incremental rotary transducer with push-pull

External signal generator supply

Configure the input signal.

Select the setting "General frequency input" via the software/DIP switch.

Adjust the upper voltage level to suit the input voltage.

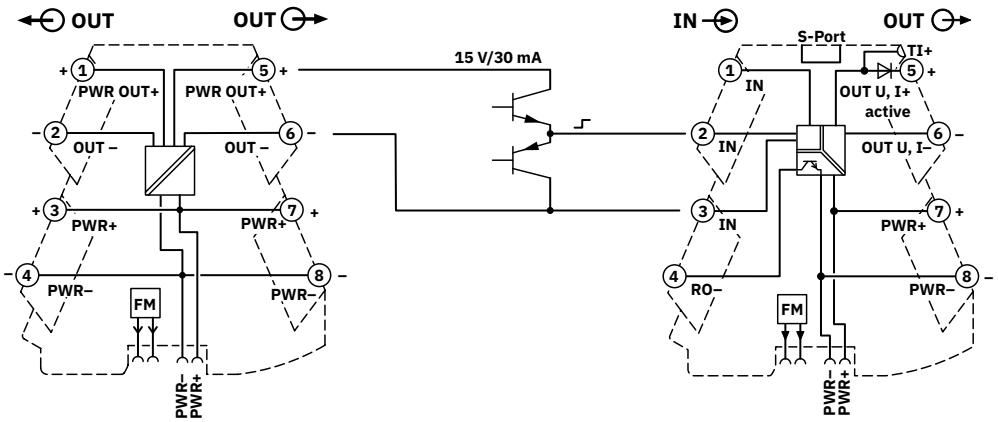


Separate signal generator supply

Configure the input signal.

Select the setting "General frequency input" via the software/DIP switch.

Adjust the upper voltage level to suit the 15 V input voltage.



MINI MCR-2-SPS-24-15

MINI MCR-2-F-UI

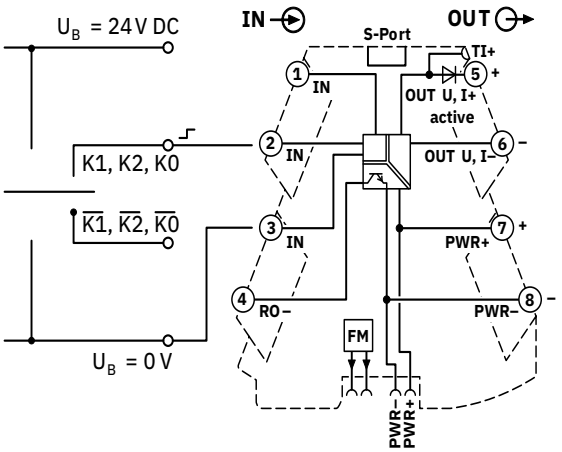
10.5 Incremental rotary transducer with HTL logic

External signal generator supply

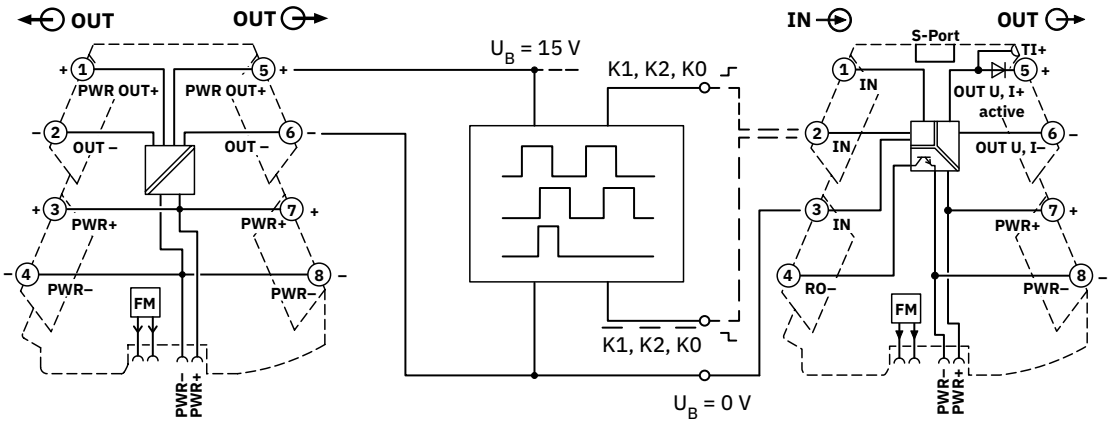
Configure the input signal.

Select the setting "General frequency input" via the software/DIP switch.

Adjust the upper voltage level to suit the input voltage.



Signal generator supplied from the module



MINI MCR-2-SPS-24-15

MINI MCR-2-F-UI

10.6 24 V control signal via transistor output RO+

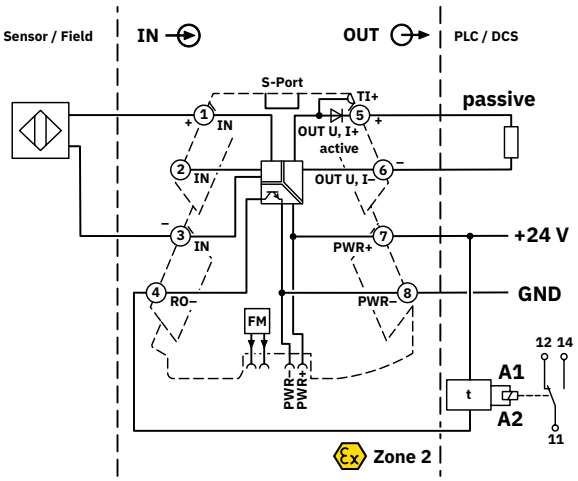
You must use an additional relay to connect a 24 V control signal with the contacts.

The 24 V supply voltage is fed from the system supply to the controller.

The relay input A1 is connected directly to the terminal 7 or the 24 V supply voltage.

The relay input A2 is connected to the terminal 4 RO+.

The maximum switching current is 100 mA.
The maximum switching voltage is 30 V DC.



11 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.