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



Frequency transducer with transistor switching output

Data sheet
108237_en_00

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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 frequency and PWM signals.

On the input side frequency signals within the range of 0.002 ... 200 kHz and PWM signals up to a frequency of 1 kHz can be processed.

The device is suitable for the connection of NAMUR proximity sensors, sensors with NPN and PNP outputs, which produce a frequency signal as well as general frequency and PWM signals.

On the output side, signals between 0 and 21 mA or 0 and 10.5 V are possible.

You can optionally configure the device using DIP switches, or with enhanced functionality via the S-PORT using the standard Analog-Conf software via FDT/DTM, or without further accessories using the Mini Analog Pro Smartphone app.

Features

- Configurable 3-way frequency transducer with transistor switching output
- Acquisition of NPN, PNP, NAMUR and frequency signals (0.002 ... 200 kHz)
- Freely adjustable input and output
- Conversion of frequency and PWM signals to analog signals (0 ... 10.5 V / 0 ... 21 mA)
- Sensor supply >8.2 V DC via MINI MCR-2-SPS-24-15(-PT) (order number: 1033202, 1033201)
- Approval for Ex-zone 2 (nA)
- Screw or push-in connection available
- 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 via the NFC interface of your Smartphone to configure the device and to call-up DIP switch setting help and comprehensive module information.

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.

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.
Universally configurable frequency transducer for converting frequency 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 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
Accessories	Type	Order No.	Pcs./Pkt.
DIN rail connector (TBUS), 5-pos., for bridging the supply voltage, can be snapped onto NS 35/... DIN rails according to EN 60715	ME 6,2 TBUS-2 1,5/5-ST-3,81 GY	2695439	10
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 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
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
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

Accessories	Type	Order No.	Pcs./Pkt.
Primary-switched power supply MINI POWER for DIN rail mounting, input: 1-phase, output: 24 V DC/1,5 A, for the potentially explosive area	MINI-PS-100-240AC/24DC/1.5/EX	2866653	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
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
Near Field Communication (NFC) programming adapter with USB interface for the wireless configuration of NFC-capable products from PHOENIX CONTACT with software. No separate USB driver is required.	TWN4 MIFARE NFC USB ADAPTER	2909681	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 can be 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 can be 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 can be quickly and easily integrated into a PROFIBUS DP network via a communication adapter.	MINI MCR-2-V8-PB-DP	2905636	1
Marker for end clamp, Sheet, white, unlabeled, can be labeled with: THERMOMARK PRIME, THERMOMARK CARD, BLUEMARK CLED, BLUEMARK LED, TOPMARK LASER, mounting type: snapped into marker carrier, lettering field size: 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 size: 30 x 5 mm	UCT-EM (30X5) CUS	0801589	1
Marker for end clamp, Sheet, yellow, unlabeled, can be labeled with: THERMOMARK PRIME, THERMOMARK CARD, BLUEMARK CLED, BLUEMARK LED, TOPMARK LASER, mounting type: snapped into marker carrier, lettering field size: 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 size: 30 x 5 mm	UCT-EM (30X5) YE CUS	0830348	1

Accessories	Type	Order No.	Pcs./Pkt.
Plastic label, Sheet, white, unlabeled, can be labeled with: BLUEMARK CLED, BLUEMARK LED, CMS-P1-PLOTTER, PLOTMARK, mounting type: adhesive, lettering field size: 15 x 5 mm	UC-EMLP (15X5)	0819301	10
Plastic label, can be ordered: by sheet, white, labeled according to customer specifications, mounting type: adhesive, lettering field size: 15 x 5 mm	UC-EMLP (15X5) CUS	0824550	1
Plastic label, Sheet, white, unlabeled, can be labeled with: BLUEMARK CLED, BLUEMARK LED, CMS-P1-PLOTTER, THERMOMARK CARD, THERMOMARK PRIME, PLOTMARK, mounting type: adhesive, lettering field size: 15 x 5 mm	UC-EMLP (15X5)L	0820138	5
Plastic label, can be ordered: by sheet, white, labeled according to customer specifications, mounting type: adhesive, lettering field size: 15 x 5 mm	UC-EMLP (15X5)L CUS	0824552	1
Plastic label, Sheet, yellow, unlabeled, can be labeled with: BLUEMARK CLED, BLUEMARK LED, CMS-P1-PLOTTER, PLOTMARK, mounting type: adhesive, lettering field size: 15 x 5 mm	UC-EMLP (15X5) YE	0822615	10
Plastic label, can be ordered: by sheet, yellow, labeled according to customer specifications, mounting type: adhesive, lettering field size: 15 x 5 mm	UC-EMLP (15X5) YE CUS	0824551	1
Plastic label, Sheet, yellow, unlabeled, can be labeled with: BLUEMARK CLED, BLUEMARK LED, CMS-P1-PLOTTER, mounting type: adhesive, lettering field size: 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 size: 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, CMS-P1-PLOTTER, PLOTMARK, mounting type: adhesive, lettering field size: 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 size: 15 x 5 mm	UC-EMLP (15X5) SR CUS	0828099	1
Plastic label, Sheet, silver, unlabeled, can be labeled with: BLUEMARK CLED, BLUEMARK LED, CMS-P1-PLOTTER, PLOTMARK, mounting type: adhesive, lettering field size: 15 x 5 mm	UC-EMLP (15X5)L SR	0828103	5
Plastic label, Card, white, unlabeled, can be labeled with: THERMOMARK PRIME, THERMOMARK CARD, mounting type: adhesive, lettering field size: 15 x 5 mm	US-EMLP (15X5)	0828790	10
Plastic label, can be ordered: By card, white, labeled according to customer specifications, mounting type: adhesive, lettering field size: 15 x 5 mm	US-EMLP (15X5) CUS	0830076	1
Plastic label, Card, yellow, unlabeled, can be labeled with: THERMOMARK PRIME, THERMOMARK CARD, mounting type: adhesive, lettering field size: 15 x 5 mm	US-EMLP (15X5) YE	0828873	10

Accessories	Type	Order No.	Pcs./Pkt.
Plastic label, can be ordered: By card, yellow, labeled according to customer specifications, mounting type: adhesive, lettering field size: 15 x 5 mm	US-EMLP (15X5) YE CUS	0830077	1
Plastic label, Card, silver, unlabeled, can be labeled with: THERMOMARK PRIME, THERMOMARK CARD, mounting type: adhesive, lettering field size: 15 x 5 mm	US-EMLP (15X5) SR	0828874	10
Plastic label, can be ordered: By card, silver, labeled according to customer specifications, mounting type: adhesive, lettering field size: 15 x 5 mm	US-EMLP (15X5) SR CUS	0830078	1
Marker strip, Roll, white, unlabeled, can be labeled with: THERMOMARK ROLL, THERMOMARK ROLL X1, THERMOMARK ROLLMASTER 300/600, THERMOMARK X1.2, THERMOMARK S1.1, mounting type: adhesive, for terminal block width: 5 mm, lettering field size: continuous x 5 mm	SK 5,0 WH:REEL	0805221	1

4 Technical data

Input	
Description of the input	Frequency input
Available input sources	NAMUR initiators NPN/PNP transistor outputs Floating contact (dry contact) Frequency generator Incremental encoder (speed only) HTL encoders
Frequency measuring range	0.002 Hz ... 200 kHz
Number of inputs	1
Max. voltage input signal	30 V (incl. DC voltage)
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	approx. 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
Load/output load voltage output	$\geq 10 \text{ k}\Omega$
Ripple	$< 20 \text{ mV}_{\text{PP}}$ (at 600Ω)
Load/output load current output	$\leq 600 \Omega$ (at 20 mA)
Output description	Switching output
Number of outputs	1
Contact 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 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	32 mA (24 V DC) 63 mA (12 V DC)	
Power consumption	≤ 1 W (at I _{OUT} = 20 mA, 9.6 V DC, 600 Ω load)	
Status and diagnostics indicators		
Status display	Yellow LED (switching output)	
Indication	Red LED	
Operating voltage display	Green LED	
General data		
Maximum transmission error	0.1 % (Frequency) 1 % (PWM signal)	
Temperature coefficient, typical	0.01 %/K	
Maximum temperature coefficient	0.01 %/K	
Step response (0–99%)	< 35 ms (f > 500 Hz)	
Electrical isolation	Reinforced insulation in accordance with IEC 61010-1	
Overvoltage category	II	
Mounting position	any	
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 ² ... 1.5 mm ²	0.14 mm ² ... 2.5 mm ²
Solid conductor cross section without ferrule	0.2 mm ² ... 2.5 mm ²	0.14 mm ² ... 2.5 mm ²
Conductor cross section, flexible	0.2 mm ² ... 1.5 mm ²	0.14 mm ² ... 2.5 mm ²
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		
Noise immunity according to EN 61000-6-2		
Noise emission according to EN 61000-6-4		

Conformance/Approvals

Conformance

CE-compliant

ATEX

Ⓜ II 3 G Ex nA IIC T4 Gc X

Shipbuilding

GL applied for

5 Safety regulations and installation notes

5.1 Installation notes

- The category 3 device is designed for installation in zone 2 potentially explosive areas. It meets the requirements of EN 60079-0:2012+A11:2013 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 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 an overcurrent protection device ($I \leq 4 \text{ A}$) in the installation.
- There is a double isolation of $300 \text{ V}_{\text{eff}}$ between neighboring modules of the same type oriented the same way. The device has a base isolation of $150 \text{ V}_{\text{eff}}$ 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 ($> 30 \text{ V}$) 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 ($60^\circ\text{C}/75^\circ\text{C}$).
- If EMC problems occur, increase the filter factor with the configuration software (suggestion: 50).

5.2 Installation in Zone 2

- Observe the specified conditions for use in potentially explosive areas! Install the device in a suitable, approved housing that meets the requirements of IEC/EN 60079-15 and has at least IP54 protection. Also observe the requirements of IEC/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.
- In Ex zone 2, the device may only be operated when all connectors are fully plugged in.

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

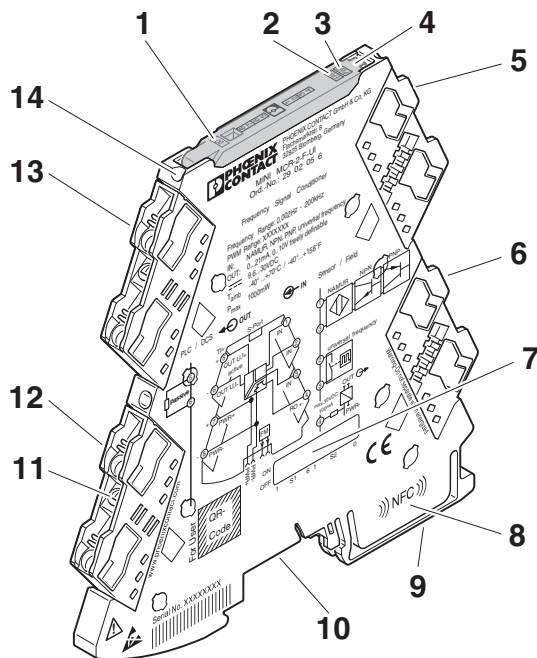


Figure 1 Structure

- 1 DO switch contact yellow LED
- 2 Error indicator "ERR" red LED
- 3 Green "PWR" LED, power supply
- 4 Cover with labeling option
- 5 Input: frequency and PWM signals
- 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

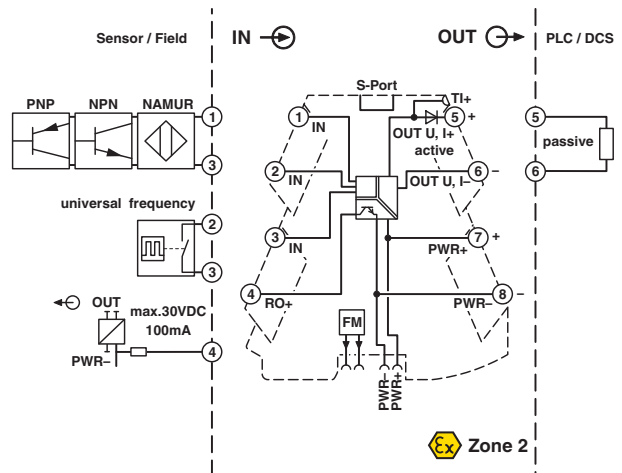


Figure 2 Block diagram

6.4 Power supply

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



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

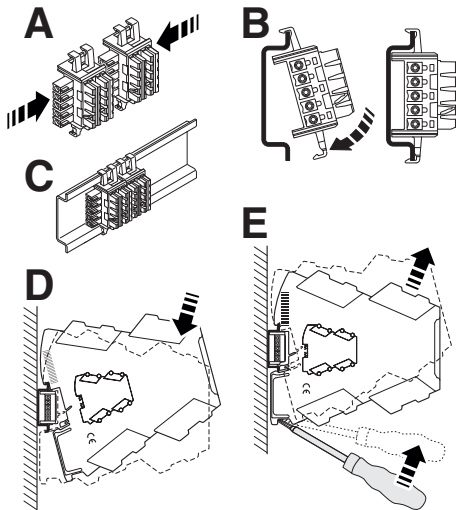


Figure 3 Mounting and removing

- 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).

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 insertion into the module.

Screw connection:

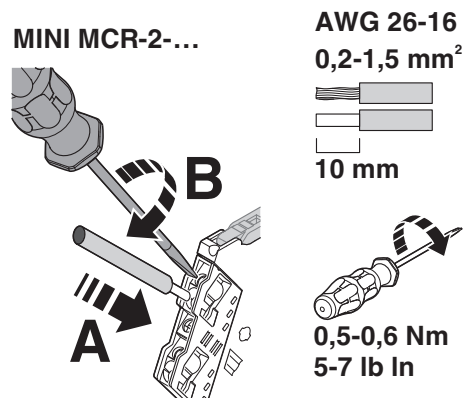


Figure 4 Screw connection

- 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:

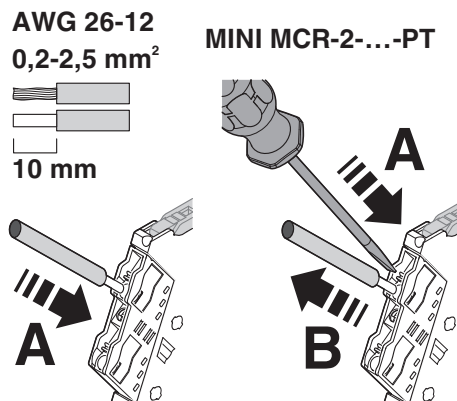


Figure 5 Push-in connection

- 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 Current measurement

The device allows current measurement without disconnection of the conductors by means of integrated test disconnect terminals.

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.

6.9 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.

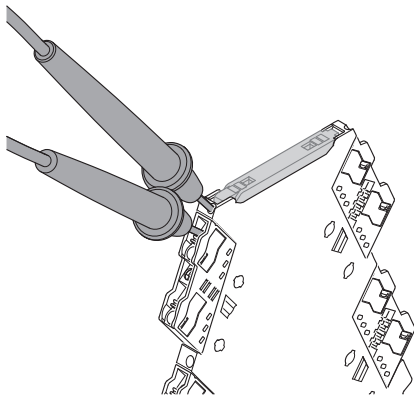


Figure 6 Test disconnect terminal block

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.

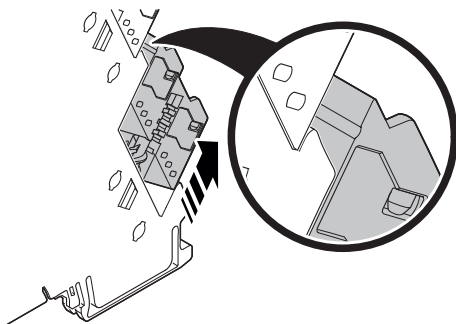


Figure 7 Disconnect position

7 Configuration

The device is supplied with the following standard configuration:

Sensor NAMUR; mean-value generation "OFF"; frequency range 0.002 Hz ... 200 kHz, output 4 mA ... 20 mA; error evaluation NE43 (downscale); fault monitoring contact reacts upon any error; software configurable

Configuration is possible for all configuration variants without supply voltage.

7.1 Configuration via DIP switches

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

Configure the DIP switches according to the planned application using the configuration tables.

Configuration tables

		• ≙ ON					
		DIP S1					
		1	2	3	4	5	6
Input	NAMUR						
	NPN	•					
	PNP		•				
	Universal frequency	•	•				
Signal type	Frequency						
	PWM		•				
Output	0 ... 20 mA						
	20 ... 0 mA				•		
	4 ... 20 mA					•	
	20 ... 4 mA				•	•	
	0 ... 10 V						•
	10 ... 0 V				•		•
	0 ... 5 V					•	•
	1 ... 5 V				•	•	•

		• ≙ ON							
		DIP S2							
		1	2	3	4	5	6	7	8
Start frequency (recognition time)									
(DIP S1-3 = OFF)									
0.002 Hz	(> 8 min)								
0.1 Hz	(~10 s)	•							
1 Hz	(~1 s)		•						
10 Hz	(~0.1 s)	•	•						

• ≙ ON End frequency (DIP S1-3 = OFF)	DIP S2						DIP S2					
	3	4	5	6	7	8	3	4	5	6	7	8
200000 Hz												
100000 Hz	•											•
50000 Hz		•										•
40000 Hz	•	•										•
30000 Hz			•									•
20 000 Hz	•		•									•
19000 Hz		•	•									•
18000 Hz	•	•	•									•
17000 Hz				•								•
16000 Hz	•			•								•
15000 Hz		•		•								•
14000 Hz	•	•		•								•
13000 Hz			•	•								•
12000 Hz	•		•	•								•
11000 Hz		•	•	•								•
10000 Hz	•	•	•	•								•
9000 Hz					•							•
8000 Hz	•				•							•
7000 Hz		•			•							•
6000 Hz	•	•			•							•
5000 Hz			•		•							•
4500 Hz	•		•		•							•
4000 Hz		•	•		•							•
3500 Hz	•	•	•		•							•
3000 Hz				•	•							•
2500 Hz	•			•	•							•
2000 Hz		•		•	•							•
1800 Hz	•	•		•	•							•
1600 Hz			•	•	•							•
1400 Hz	•		•	•	•							•
1200 Hz		•	•	•	•							•
1000 Hz	•	•	•	•	•							•
900 Hz												•
800 Hz	•											•
700 Hz		•										•
600 Hz	•	•										•
500 Hz			•									•
450 Hz	•		•									•
400 Hz		•	•									•
350 Hz	•	•	•									•
300 Hz				•								•
250 Hz	•			•								•
200 Hz		•		•								•
190 Hz	•	•		•								•
180 Hz		•	•	•								•
170 Hz	•		•	•								•
160 Hz		•	•	•								•
150 Hz	•	•	•	•								•
140 Hz					•							•
130 Hz	•				•							•
120 Hz		•			•							•
110 Hz	•	•			•							•
100 Hz			•		•							•
90 Hz	•		•		•							•
80 Hz		•	•		•							•
70 Hz	•	•	•		•							•
60 Hz				•	•							•
50 Hz	•			•	•							•
45 Hz		•		•	•							•
40 Hz	•	•		•	•							•
35 Hz			•	•	•							•
30 Hz	•		•	•	•							•
25 Hz		•	•	•	•							•
20 Hz	•	•	•	•	•							•

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

• ≙ ON		DIP S2	
		9	0
Not used	Not used		
	Not used		
Configuration	via software		
	via DIP switch		•

7.2 Configuration via software



Use the IFS-USB-PROG-ADAPTER programming adapter (Order No.: 2811271), the NFC-USB-PROG-ADAPTER (Order No.: 2900013), or the IFS-BT-PROG-ADAPTER (Order No.: 2905872) for connection of the device and PC.

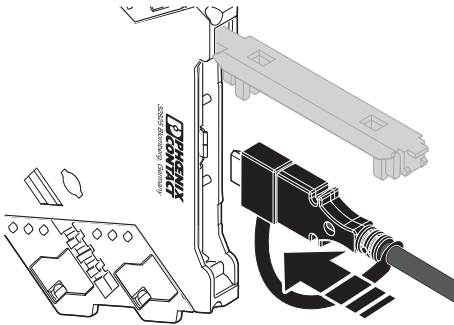


Figure 8 Programming connection

7.3 Configuration via MINI Analog Pro app

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

Using the MINI Analog Pro Smartphone 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 (Order No. 2905872).

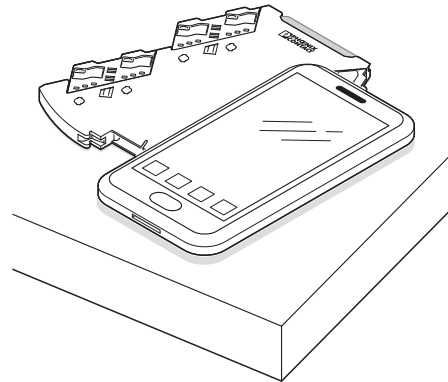


Figure 9 Configuration

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/open circuit for NAMUR signals at the signal input.

You can set the 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 open circuit, short circuit, overrange, underrange, and module errors are detected by the modules. The errors are signaled via the analog output and/or the fault monitoring and/or, if present, via a switching output. At the same time, the error signaling is displayed by means of 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

Open circuit detection at the NAMUR input is possible. A signal is defined as an open circuit 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 open circuits. 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.

The ANALOG-CONF and FDT/DTM software solutions allow you to simulate analog signals at the output.

You can set this behavior via "Service > Force analog output". It can be specified as a percentage in relation to the set input or as an absolute value of the output signal range.

8.7 Frequency input threshold

For universal frequency input a measuring threshold must be employed.

The measuring threshold should be in the center of the frequency signal's amplitude.

When measuring, ensure that all negative components of the signal are cut. You must therefore place the measuring threshold exactly in the center of the positive part of the amplitude.

Example 1

Input signal

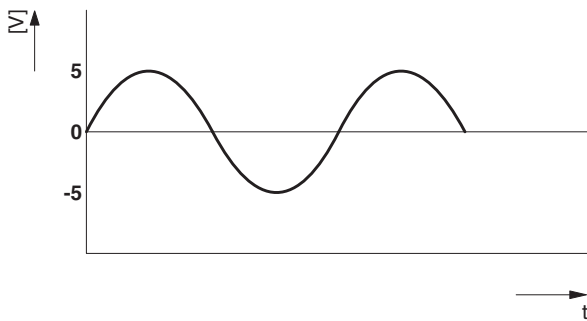


Figure 10 Input signal

Signal prepared for measurement

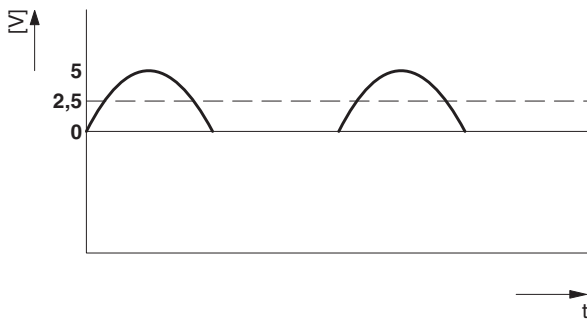


Figure 11 Signal prepared for measurement

Measuring threshold 2.5 V

Example 2

Input signal

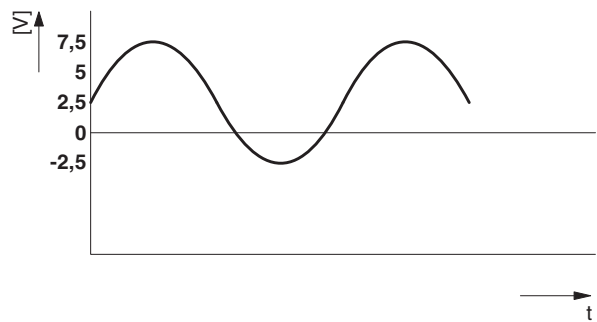


Figure 12 Input signal

Signal prepared for measurement

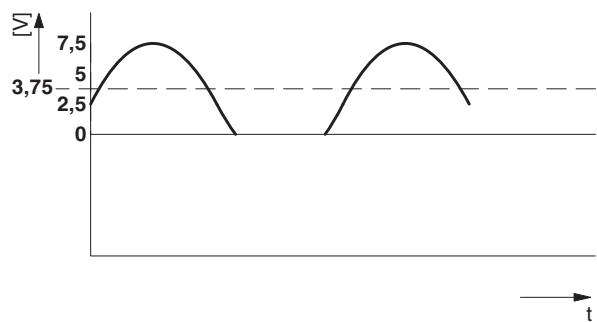


Figure 13 Signal prepared for measurement

Measuring threshold 3.75 V

8.8 Sensor supply

You can use the MINI MCR-2-SPS-24-15(-PT) (order number: 1033202, 1033201) constant voltage source if you require a sensor supply >8.2 V DC.

This product provides a constant voltage of 15 V DC at a maximum current of 30 mA.

For additional information, please refer to the corresponding data sheet at phoenixcontact.net/products.

9 Diagnostics and status indicators

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