MINI MCR-SL-U-UI

Configurable 3-way isolating amplifier



Data sheet
101744_en_05

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1 Description

The 6.2 mm wide MINI MCR-SL-U-UI(-SP)(-NC) configurable 3-way isolating amplifier is used to electrically isolate, condition, amplify, and filter standard signals.

On the input side, 0 ... 24 V and 0 ... 30 V signals can be processed.

The standard analog signals 0 ... 20 mA, 4 ... 20 mA, 0 ... 10 V, 2 ... 10 V, 0 ... 5 V or 1 ... 5 V are available electrically isolated on the output side.

The DIP switches, which can be accessed on the side of the housing, are used to configure the input and output signal ranges.

The power supply (19.2..30 V DC) can be supplied either via connection terminal blocks "3"/"4" or "7"/"8" on the modules or in conjunction with the DIN rail connector. Please refer to the section titled "Power supply" for more information.

Features

- Configurable 3-way isolating amplifier
- Input and output signal range configurable via DIP switches
- Approval for Ex-zone 2 (nA)
- Screw or spring-cage connection can be provided
- Can be supplied configured or unconfigured

Attention: 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".

Make sure you always use the latest documentation.
It can be downloaded from the product at www.phoenixcontact.net/catalog.

This data sheet is valid for all products listed on the following page:

2 Table of contents

1 Description ... 1
2 Table of contents ... 2
3 Ordering data ... 3
3.1 Order key ... 3
4 Technical data ... 4
5 Safety regulations and installation notes ... 6
5.1 Installation notes ... 6
5.2 Installation in the Ex area (zone 2) ... 6
6 Installation ... 7
6.1 Connection notes ... 7
6.2 Structure ... 7
6.3 Block diagram ... 7
6.4 Power supply ... 7
6.5 Assembly ... 8
6.6 Connecting the wires ... 8
7 Configuration ... 9
7.1 Configuration table ... 9
8 Adjustment ... 9
9 Connection/application example ... 10

3 Ordering data

Description	Type	Order No.	Pcs. / Pkt.
MCR 3-way isolation amplifier, with configurable input/output, for electrical isolation and conversion of analog signals up to 30 V, with screw connection, order configuration	MINI MCR-SL-U-UI	2864053	1
MCR 3-way isolation amplifier, with configurable input/output, for electrical isolation and conversion of analog signals up to 30 V, with spring-cage connection, order configuration	MINI MCR-SL-U-UI-SP	2811213	1
MCR 3-way isolation amplifier, with configurable input/output, for electrical isolation and conversion of analog signals up to 30 V, with screw connection, standard configuration	MINI MCR-SL-U-UI-NC	2865007	1
MCR 3-way isolation amplifier, with configurable input/output, for electrical isolation and conversion of analog signals up to 30 V, with spring-cage connection, standard configuration	MINI MCR-SL-U-UI-SP-NC	2810078	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 GN	2869728	10
MCR power terminal block for supplying several MINI Analog modules via the DIN rail connectors, with screw connection, current consumption up to max. 2 A	MINI MCR-SL-PTB	2864134	1
MCR power terminal block for supplying several MINI-ANALOG modules via the DIN rail connectors, with spring-cage connection, current consumption up to max. 2 A	MINI MCR-SL-PTB-SP	2864147	1
Eight MINI analog signal converters with screw connection method can be connected to a control system using a system adapter and system cabling with a minimum of wiring and very low error risk.	MINI MCR-SL-V8-FLK 16-A	2811268	1
DIN rail power supply unit, primary-switched mode, slim design, output: 24 V DC / 1.5 A	MINI-SYS-PS-100-240AC/24DC/1.5	2866983	1
DIN rail power supply unit, primary-switched mode, slim design, output: 24 V DC / 1.5 A, ATEX approval	MINI-PS-100-240AC/24DC/1.5/EX	2866653	1
Label for extended marking of MINI MCR modules in connection with the MINI MCR-DKL	MINI MCR-DKL-LABEL	2810272	10
Fold up transparent cover for MINI MCR modules with additional labeling option using insert strips and flat Zack marker strip 6.2 mm	MINI MCR DKL	2308111	10

3.1 Order key

(standard configuration entered as example)

Order No.	Input	Output	Factory calibration certificate
2864053	IN39	OUT01	NONE
2864053 ≙ ...-U-UI 2811213 ≙ ...-U-UI-SP	IN38 ≙ 0 ... 24 V IN39 ≙ 0 ... 30 V	OUT01 ≙ 0 ... 20 mA OUT02 ≙ 4 ... 20 mA OUT03 ≙ 0 ... 10 V OUT04 ≙ 2 ... 10 V OUT05 ≙ 0 ... 5 V OUT06 ≙ 1 ... 5 V	NONE ≙ Without factory

4 Technical data

Input	
Configurable/programmable	Yes, preconfigured
Voltage input signal	0 V ... 24 V 0 V ... 30 V
Max. voltage input signal	50 V DC
Input resistance of voltage input	Approx. 125 kΩ (0 ... 24 V) Approx. 155 kΩ (0 ... 30 V)
Output	
Voltage output signal	0 V ... 10 V 0 V ... 5 V 1 V ... 5 V 2 V ... 10 V
Max. voltage output signal	≤ 12.5 V
Non-load voltage	≤ 12.5 V
Current output signal	0 mA ... 20 mA 4 mA ... 20 mA
Max. current output signal	28 mA
Configurable/programmable	Yes, preconfigured
Short-circuit current	≤ 22 mA
Load/output load voltage output	> 10 kΩ
Ripple	< 20 mV_{PP} (at 500 Ω)
Load/output load current output	< 500 Ω (at 20 mA)
Supply	
Nominal supply voltage	24 V DC
Supply voltage range	19.2 V DC ... 30 V DC (to bridge the supply voltage, the DIN rail connector (ME 6,2 TBUS-2 1,5/5-ST-3,81 GN, Order No. 2869728) can be used. It can be snapped onto a 35 mm DIN rail according to EN 60715)
Max. current consumption	< 19 mA (at 24 V DC incl. load)
Power consumption	< 450 mW
General data	
Limit frequency (3 dB)	Approx. 100 Hz
Measuring principle	Signal isolator
Maximum transmission error	< 0.1 % (of final value) < 0.4 % (Without adjustment)
Temperature coefficient, typical	< 0.002 %/K
Maximum temperature coefficient	< 0.01 %/K
Step response (10-90%)	Approx. 3.5 ms
Electrical isolation	Basic insulation according to EN 61010
Surge voltage category	II
Mounting position	Any
Degree of protection	IP20
Pollution degree	2
Rated insulation voltage	50 V AC/DC
Test voltage, input/output/supply	1.5 kV (50 Hz, 1 min.)
Dimensions W / H / D	6.2 mm / 93.1 mm / 102.5 mm
Type of housing	PBT green

Connection data	Screw connection	Spring-cage conn.
Conductor cross section, solid	0.2 mm² ... 2.5 mm²	0.2 mm² ... 2.5 mm²
Conductor cross section, stranded	0.2 mm² ... 2.5 mm²	0.2 mm² ... 2.5 mm²
Stripping length	12 mm	8 mm

Ambient conditions	
Ambient temperature (operation)	-20 °C ... 65 °C
Ambient temperature (storage/transport)	-40 °C ... 85 °C

Conformance with EMC Directive 2004/108/EC
Noise immunity according to EN 61000-6-2
Noise emission according to EN 61000-6-4

Conformance / approvals	
Conformance	CE-compliant
ATEX	Ⓔx II 3 G Ex nA IIC T4 Gc X
UL, USA / Canada	UL 508 Recognized
UL, USA / Canada	Class I, Div. 2, Groups A, B, C, D T5
Shipbuilding	GL EMC 2 D

5 Safety regulations and installation notes

5.1 Installation notes

- The category 3 device is suitable for installation in the zone 2 potentially explosive area. It fulfills the requirements of EN 60079-0:2009 and EN 60079-15:2010.
- Installation, operation, and maintenance may only be carried out by qualified electricians. Follow the installation instructions described. When installing and operating the device, the applicable regulations and safety directives (including national safety directives), as well as general technical regulations, must be observed. The technical data is provided in this package slip and on the certificates (conformity assessment, additional approvals where applicable).
- It is not permissible to open or modify the device. Do not repair the device yourself but 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 60529/EN 60529) of the device is intended for use in a clean and dry environment. Do not subject the device to any load that exceeds the described limits.
- The device is not designed for use in atmospheres with a danger of dust explosions.

5.2 Installation in the Ex area (zone 2)

- Observe the specified conditions for use in potentially explosive areas.
- The device must be installed in a housing (control or distributor box) which meets the requirements of EN 60079-15 and provides at least IP54 (EN 60529) degree of protection.
- During installation and when connecting the supply and signal circuits, observe the requirements of EN 60079-14. Devices may only be connected to circuits in zone 2 if they are suitable for operation in Ex zone 2 and for the prevailing conditions at the place of use.
- 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, has been subjected to an impermissible load, has been stored incorrectly, or if it malfunctions.
- You can download the latest documents for these devices from www.phoenixcontact.net/catalog.

6 Installation

6.1 Connection notes

Attention: Electrostatic discharge!

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

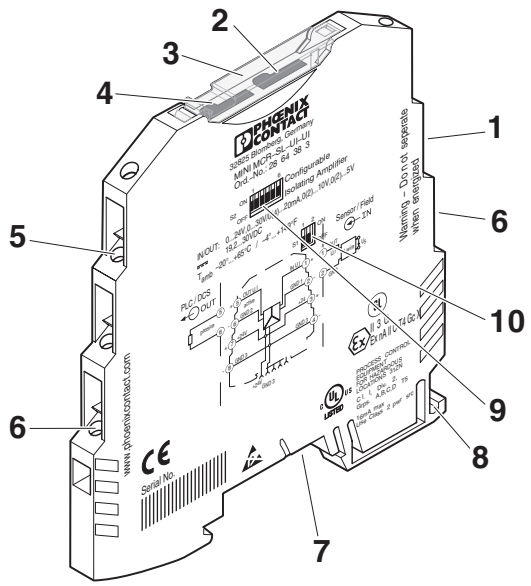


Figure 1 Structure

1. Input
2. Cover
3. Potentiometer for adjustment
4. Groove for ZBF 6 zack marker strip
5. Output: Standard signals
6. Supply voltage
7. Connection option for DIN rail connector
8. Universal snap-on foot for EN DIN rails
9. DIP switch S2
10. DIP switch S1

6.3 Block diagram

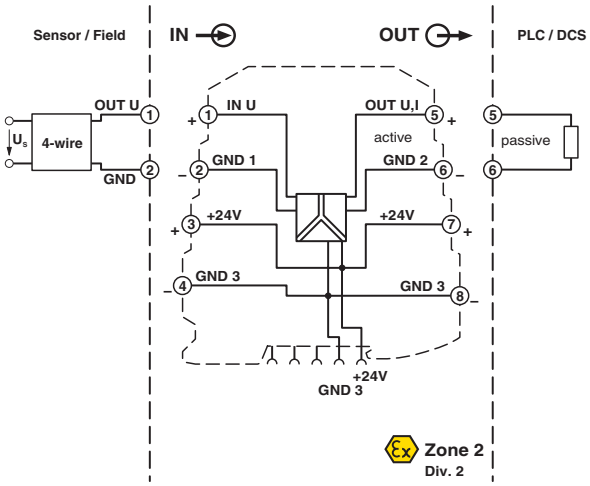


Figure 2 Block diagram

6.4 Power supply

ATTENTION:

Never connect the supply voltage directly to the DIN rail connector. It is not permitted to draw power from the DIN rail connector or from individual modules.

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.

A 400 mA fuse should be connected upstream.

Supply via a power terminal block

The MINI MCR-SL-PTB power terminal block (Order No. 2864134) or the MINI MCR-SL-PTB-SP power terminal block (Order No. 2864147), which are the same shape, are used to feed the supply voltage to the DIN rail connector.

A 2 A fuse should be connected 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 therefore 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

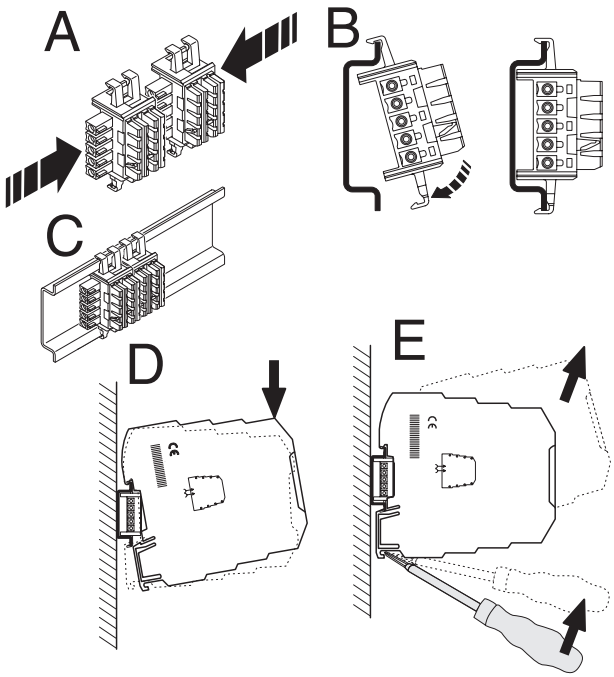


Figure 3 Mounting and removing

– 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 Connecting the wires

The MINI MCR-SL-U-UI... is available with two types of connection:

– Screw terminal blocks (MINI MCR-SL-U-UI)
– Spring-cage terminal blocks (MINI MCR-SL-U-UI-SP)

Screw connection:

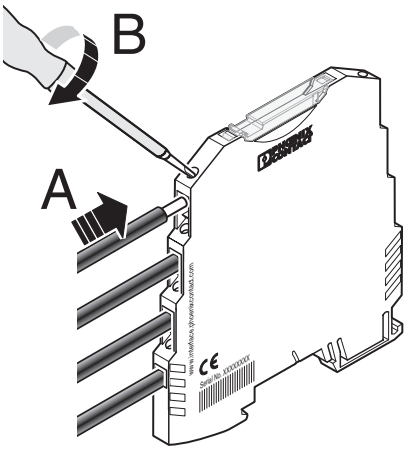


Figure 4 Screw connection

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

Spring-cage connection:

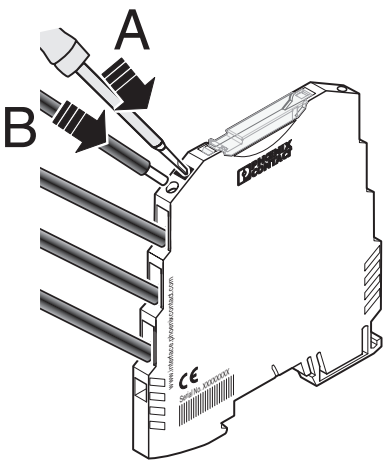


Figure 5 Spring-cage connection

- Insert a screwdriver into the opening above the connection terminal block.
- Insert the wire into the corresponding connection terminal block.

7 Configuration

NC version

The MINI MCR-SL-U-UI-NC and MINI MCR-SL-U-UI-SP-NC modules feature the default configuration:

– Input 0...30 V

– Output 0...20 mA

(All DIP switches are set to the "off" position, transmission error < 0.1 %.)

DIP switches

DIP switches S1 and S2 are used to specify the combination of input and output standard signal ranges (see "Configuration table").

7.1 Configuration table

		DIP S2						DIP S1	
IN	**OUT**	**1**	**2**	**3**	**4**	**5**	**6**	**1**	**2**
0 ... 30 V	0...20 mA	off	off	off	off	off	off	off	off
	4...20 mA	off	off	off	off	off	**ON**	off	off
	0...10 V	**ON**	off	**ON**	off	off	off	off	off
	2...10 V	**ON**	off	**ON**	off	off	**ON**	off	off
	0...5 V	**ON**	**ON**	off	off	off	off	off	off
	1...5 V	**ON**	**ON**	off	off	off	**ON**	off	off
0 ... 24 V	0...20 mA	off	off	off	off	off	off	**ON**	off
	4...20 mA	off	off	off	off	off	**ON**	**ON**	off
	0...10 V	**ON**	off	**ON**	off	off	off	**ON**	off
	2...10 V	**ON**	off	**ON**	off	off	**ON**	**ON**	off
	0...5 V	**ON**	**ON**	off	off	off	off	**ON**	off
	1...5 V	**ON**	**ON**	off	off	off	**ON**	**ON**	off

8 Adjustment

A potentiometer is located underneath the cover; this is used for fine adjustment of the analog signals once the configuration of the DIP switches has been modified.



Once the configuration of the DIP switches has been modified, the potentiometer allows the accuracy to be increased from < 0.4% to < 0.1%.

The module is adjusted via its output final value:

- Connect the calibration source to the input of the isolating amplifier and specify the final value of the set input signal.
- Use the potentiometer to set the exact final value of the set output signal.

9 Connection/application example

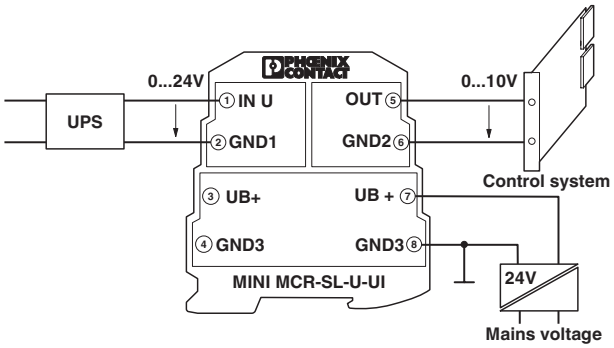


Figure 6 Example application