MCR-C-UI-UI-DCI
MCR 3-Way Isolation Amplifier, Configurable

1. Short description

- **configurable inputs and outputs**
- **signal conversion/amplification**
- **3-way-isolation**
- **zero/span adjustment**
- **17.5 mm ME housing**

The MCR 3-way modules are used for electrical isolation and conversion of analog signals.
The modules guarantee electrical isolation of standard analog signals. The module input and ouput electronics are isolated by a DC/DC converter from the auxiliary supply (3-way-isolation, fig. 2).

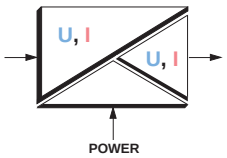


Fig. 2

The required auxiliary power supply is signalized via a green power LED. Thus it is clearly evident whether an auxiliary power supply is available.
The MCR modules ensure reliable decoupling of a sensor circuit from the processing circuit and thus also avoid cross-coupling of several sensor circuits. The 3-way isolation means that the modules can be used universally, both on site or in the vicinity of the controller for the conversion of signals and as electrical isolation, and along the transmission path to bridge apparent ohmic resistance.
Two sealed potentiometers with front access allow an adjustment between zero and span in order to perform a measuring adjustment.
The desired configuration to which the device is to be adapted (see ordering example and combination table) must be indicated when ordering. If no information is given after the ordering example provided (page 4), the devices are delivered with the standard configuration (input signal 0-10 V, output signal 0-10 V).



Fig. 1

DIP switches allow a reconfiguration of the inputs and outputs of the isolation amplifiers so that more than 200 signal variations are possible.

Signal conversion and the electrical isolation of the analog signals is carried out using an inductive transmission process. In addition, a filter downstream of the transmitter reduces interference.
The MCR 3-way modules snap onto symmetrical mounting rails according to EN 50 022. The signal lines are securely connected to the module via pluggable screw connections and are clearly marked.

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Phone +49-(0) 52 35-3-00 • Fax +49-(0) 52 35-3-4 1200 • http://www.phoenixcontact.com

MCR-C-UI-UI-DCI MCR 3-Way Isolation Amplifier, Configurable

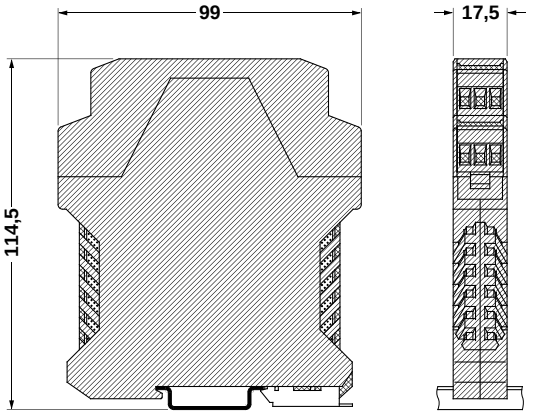


Fig. 3



Fig. 4

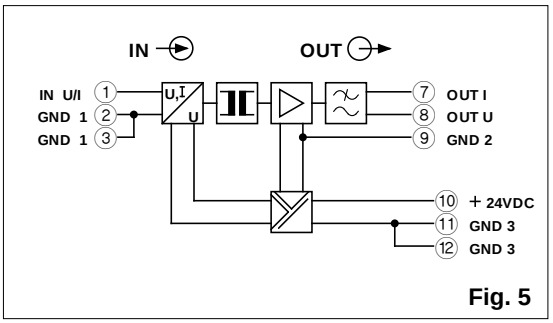


Fig. 5

MCR-C-UI-UI-DCI

with configurable input and output

(IEC) [mm²]	rigid solid	flexible rigid	AWG
Connection data	0.2-2.5	0.2-2.5	24-14

2. Description

Type	Order No.	Pcs. / Pkt.
MCR 3-way-isolator, for analog signal isolation		
MCR-C-UI-UI-DCI [1]	**28 10 91 3**	1
MCR 3-way-isolator, as above, however with a cut-off frequency of (3 dB) 450 Hz		
MCR-C-UI-UI-450-DCI [1]	**28 10 88 7**	1

2.1. Technical Data

Input		
Input signal		0…10 V, indicate other setting in the order
Possible adjustment:	zero	± 2 %
	span	± 2 %
Max. input signal		30 V or 50 mA
Input resistance		1 MΩ at U-input 50 Ω at I-input
Output		
Output signal		0…10 V, indicate other setting in the order
Max. output signal		15 V or 30 mA
Load		≥ 10 kΩ at U-output ≤ 500 Ω at I-output

2.2. General Data

	MCR-C-UI-UI-DCI	MCR-C-UI-UI-450-DCI
Supply voltage	18…30 V	18…30 V
Current consumption (without load)	< 30 mA	< 30 mA
Transmission error	0.1 % of end value	0.1 % of end value
Temperature coefficient	0.0075 %/K	0.0075 %/K
Cut-off frequency (3 dB)	30 Hz	450 Hz
Ascent time (10-90 %)	11 ms	0.8 ms
Test voltage: input/output	1.5 kV, 50 Hz, 1 min.	1.5 kV, 50 Hz, 1 min.
auxiliary power supply/signal	1 kV, 50 Hz, 1 min.	1 kV, 50 Hz, 1 min.
Protection circuit	transient protection	transient protection
Ambient temperature range	-20 °C to +65 °C	-20 °C to +65 °C
Type of connection	pluggable screw terminal COMBICON	pluggable screw terminal COMBICON
Installed position / mounting	as desired	as desired
Dimensions (W / H / D)	(17.5 / 99 /114.5) mm	(17.5 / 99 /114.5) mm
Conductor diameter	0.2-2.5 mm² (AWG 24-14)	0.2-2.5 mm² (AWG 24-14)
Type of housing	polyamide PA unreinforced	polyamide PA unreinforced

[1] If no further details are given as to configuration, the device is supplied in the standard configuration (see order key, page 4)!
[2] Only MCR-C-UI-UI-DCI Order No.: 28 10 91 3

2.3. EMC Electromagnetic Compatibility

Complies with EMC guideline 89/336/EEC and low voltage directive 73/23/EEC

Immunity to interference in acc. with EN 50082-2		
• Electrostatic discharge (ESD)	EN 61000-4-2	Criterion B 8 kV discharge in air
• Electromagnetic HF field: Amplitude modulation Pulse modulation	EN 61000-4-3	Criterion A 10 V/m 10 V/m
• Fast transients (Burst)	EN 61000-4-4	Criterion B I/O/S**1)** : 2 kV/5 kHz
• Surge voltage capacities (Surge)	EN 61000-4-5	Criterion B I/O**1)** : 2 kV/42 Ω
• Conducted disturbance	EN 61000-4-6	Criterion A I/O/S**1)** : 10 V
• Noise emission in acc. with EN 50081	EN 55011	Class A

EN 61000 corresponds to IEC 1000
EN 55011 corresponds to CISPR11

1) I≙ Input / O≙Output / S≙Supply

Criterion A: Normal operating behavior within the defined limits.
Criterion B: Temporary impairment to operational behavior that is corrected by the device itself.

Class A: Area of application: industry, without special installation measures.

2.4. Connection Scheme
MCR 3-way isolation amplifier, configurable

① pluggable screw terminal blocks (supply, signal output)

② ZERO/SPAN potentiometer

③ pluggable screw terminal block (signal input)

④ upper part of housing can be slid open to set DIP switches

⑤ Metal latch for fixing to the mounting rail

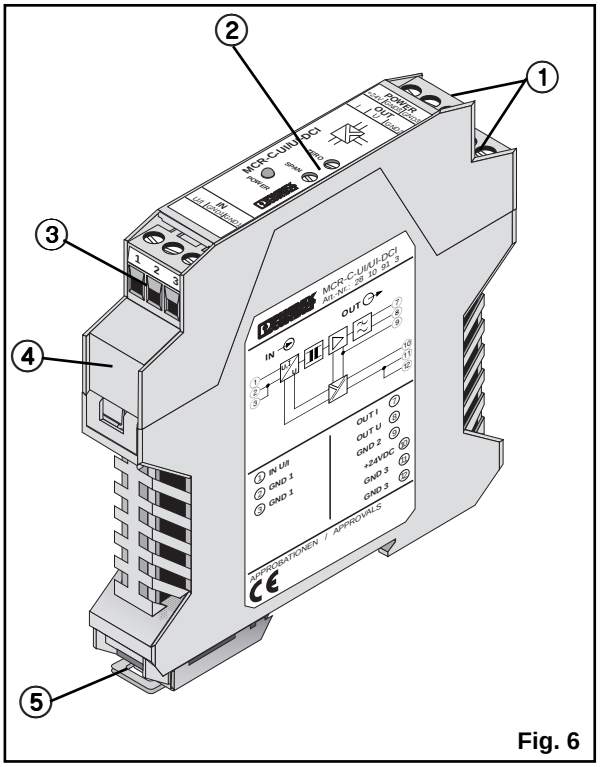


Fig. 6

3. Order key

3.1. Combination table for input and output signals

Input	Output								
	0 - 10 V	**± 10 V**	**0 - 5 V**	**± 5 V**	**1 - 5 V**	**0 - 5 mA**	**0 - 10 mA**	**0 - 20 mA**	**4 - 20 mA**
0 - 60 mV	x	x	x	x	x	x	x	x	x
0 - 100 mV	x	x	x	x	x	x	x	x	x
0 - 200 mV	x	x	x	x	x	x	x	x	x
0 - 300 mV	x	x	x	x	x	x	x	x	x
0 - 500 mV	x	x	x	x	x	x	x	x	x
0 - 1 V	x	x	x	x	x	x	x	x	x
0 - 2 V	x	x	x	x	x	x	x	x	x
0 - 2.5 V	x	x	x	x	x	x	x	x	x
0 - 5 V	x	x	x	x	x	x	x	x	x
0 - 10 V	x	x	x	x	x	x	x	x	x
0 - 20 V	x	x	x	x	x	x	x	x	x
± 60 mV	x	x	x	x			x	x	
± 100 mV	x	x	x	x			x	x	
± 200 mV	x	x	x	x			x	x	
± 300 mV	x	x	x	x			x	x	
± 500 mV	x	x	x	x			x	x	
± 1 V	x	x	x	x			x	x	
± 2 V	x	x	x	x			x	x	
± 2,5 V	x	x	x	x			x	x	
± 5 V	x	x	x	x			x	x	
± 10 V	x	x	x	x			x	x	
± 20 V	x	x	x	x			x	x	
0 - 5 mA	x	x	x	x	x	x	x	x	x
0 - 10 mA	x	x	x	x	x	x	x	x	x
0 - 20 mA	x	x	x	x	x	x	x	x	x
± 5 mA	x	x	x	x			x	x	
± 10 mA	x	x	x	x			x	x	
± 20 mA	x	x	x	x			x	x	
1 - 5 V	x	x	x	x	x		x	x	x
4 - 20 mA	x	x	x	x	x		x	x	x

Further ranges are available on request!

3.2. Order key MCR-C-UI-UI-DCI

	Input		Output
MCR-C-UI-UI-DCI	/ **0-10 V**	/	**0-10 V**
	for others, please refer to combination table		for others, please refer to combination table

4. Notes on Connection

4.1. Standard setting:
The 3-way isolation amplifier is supplied factory-adjusted, with sealed potentiometers. The set configuration is indicated in handwriting on the side label.

4.2. Configuration

4.2.1. Opening the device (Fig. 7)
The snap lock of the upper part of the housing is released on both sides with the help of a screwdriver ①. The upper part of the housing and the electronics can now be pulled out by about 3 cm.

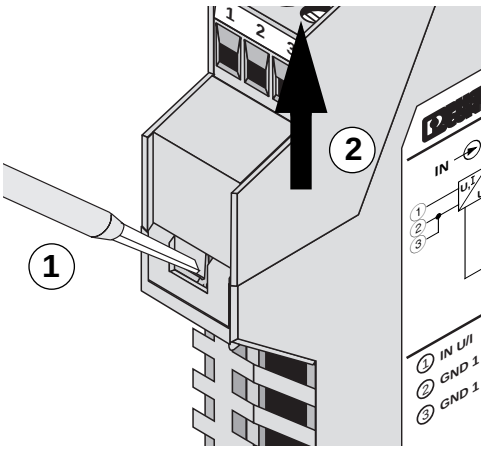


Fig. 7

4.2.2. Changing the configuration
Setting of the required **input** range by means of switch **DIP 1**, and of the **output** range by means of **DIP 2** (see Fig. 8) as indicated in the relevant table.

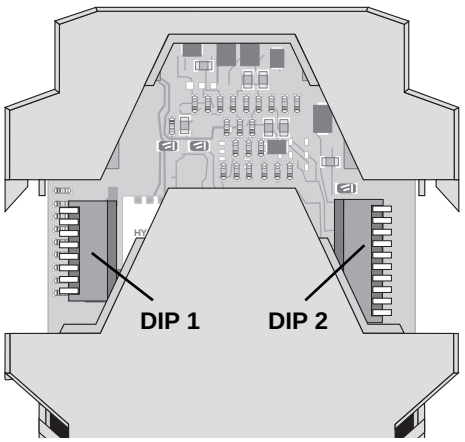


Fig. 8

4.3.Setting of the signal ranges

4.3.1.Input signal range (DIP 1)

Select one of the possible input signal ranges by configuring the switch DIP 1 according to table 1. Exception: Bipolar input signals are not allowed for the output signal ranges 4…20 mA and 1…5 V (see tables 4/6, page 9/10)!

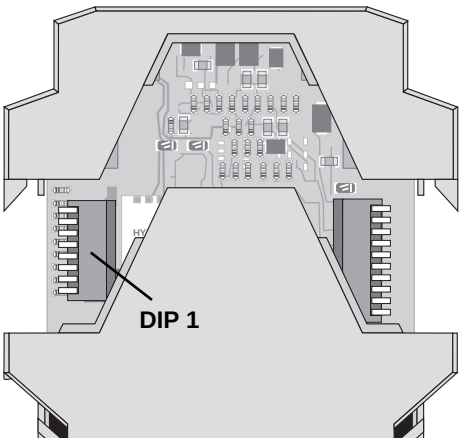


Fig. 9

Table 1 **Switch DIP 1**

Input	1	2	3	4	5	6	7	8
0… 60 mV		ON				ON	ON	ON
0…100 mV		ON					ON	
0…200 mV			ON				ON	
0…300 mV			ON			ON		ON
0…500 mV		ON				ON		
0 … 1 V			ON			ON		
0 … 2 V				ON		ON		
0 … 2.5V		ON						
0 … 5 V			ON					
0… 10 V				ON				
0… 20 V					ON			
± 60 mV		ON				ON	ON	ON
± 100 mV		ON					ON	
± 200 mV			ON				ON	
± 300 mV			ON			ON		ON
± 500 mV		ON				ON		
± 1 V			ON			ON		
± 2 V				ON		ON		
± 2.5 V		ON						
± 5 V			ON					
± 10 V				ON				
± 20 V					ON			
0… 5 mA	ON			ON		ON	ON	ON
0…10 mA	ON	ON				ON		
0…20 mA	ON		ON			ON		
± 5 mA	ON			ON		ON	ON	ON
± 10 mA	ON	ON				ON		
± 20 mA	ON		ON			ON		
1…5 V			ON					
4…20 mA	ON		ON			ON		

4.3.2. Output (DIP 2) with single adjustment (0…5 V / 0…10 V output)

Set the output range by means of switch DIP 2. Take the selected input range into account! Set the lower range value and the upper range (full-scale) value of the input signal, using a calibration source. Adjust the respective output value with a digital multimeter (see table 2).

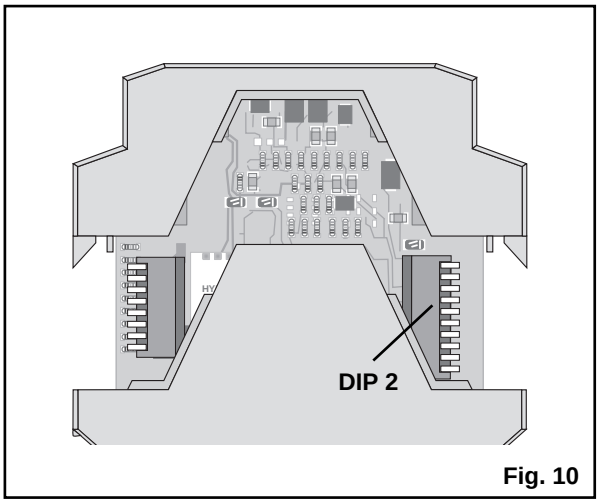


Fig. 10

Table 2

Input	Output 0…5 V Switch DIP 2 1	2	3	4	5	6	7	8	9	10
0… 60 mV			ON			ON				
0…100 mV			ON			ON				
0…200 mV			ON			ON				
0…300 mV			ON			ON				
0…500 mV			ON			ON				
0 … 1 V			ON			ON				
0 … 2 V			ON			ON				
0 … 2.5 V			ON			ON				
0 … 5 V			ON			ON				
0… 10 V			ON			ON				
0… 20 V			ON			ON				
± 60 mV		ON		ON			ON			
± 100 mV		ON		ON			ON			
± 200 mV		ON		ON			ON			
± 300 mV		ON		ON			ON			
± 500 mV		ON		ON			ON			
± 1 V		ON		ON			ON			
± 2 V		ON		ON			ON			
± 2.5 V		ON		ON			ON			
± 5 V		ON		ON			ON			
± 10 V		ON		ON			ON			
± 20 V		ON		ON			ON			
0… 5 mA			ON			ON				
0…10 mA			ON			ON				
0…20 mA			ON			ON				
± 5 mA		ON		ON			ON			
± 10 mA		ON		ON			ON			
± 20 mA		ON		ON			ON			
1…5 V								ON		
4…20 mA								ON		

Input	Output 0…10 V Switch DIP 2 1	2	3	4	5	6	7	8	9	10
0… 60 mV			ON		ON	ON				
0…100 mV			ON		ON	ON				
0…200 mV			ON		ON	ON				
0…300 mV			ON		ON	ON				
0…500 mV			ON		ON	ON				
0 … 1 V			ON		ON	ON				
0 … 2 V			ON		ON	ON				
0 … 2.5 V			ON		ON	ON				
0 … 5 V			ON		ON	ON				
0… 10 V			ON		ON	ON				
0… 20 V			ON		ON	ON				
± 60 mV		ON		ON	ON		ON			
± 100 mV		ON		ON	ON		ON			
± 200 mV		ON		ON	ON		ON			
± 300 mV		ON		ON	ON		ON			
± 500 mV		ON		ON	ON		ON			
± 1 V		ON		ON	ON		ON			
± 2 V		ON		ON	ON		ON			
± 2.5 V		ON		ON	ON		ON			
± 5 V		ON		ON	ON		ON			
± 10 V		ON		ON	ON		ON			
± 20 V		ON		ON	ON		ON			
0… 5 mA			ON		ON	ON				
0…10 mA			ON		ON	ON				
0…20 mA			ON		ON	ON				
± 5 mA		ON		ON	ON		ON			
± 10 mA		ON		ON	ON		ON			
± 20 mA		ON		ON	ON		ON			
1…5 V					ON			ON		
4…20 mA					ON			ON		

Adjustment after set value of the lower or upper range value to:	Output 0…5 V	Output 0…10 V
ZERO pot	0 V ± 0.5 mV	0 V ± 0.5 mV
SPAN pot	5 V ± 0.5 mV	10 V ± 0.5 mV

4.3.3. Output with adjustment point calculation (±5 V / ±10 V/1…5 V/0...5;10;20 mA/4…20 mA)

- Set the output range by means of switch DIP 2. Take the selected input range into account!
- Set the lower range value and the upper range (full-scale) value of the input signal, using a calibration source.
- Note down the output value measured with a digital multimeter.

Output signal range:

± 5 V, ± 10 V,1…5 V, 4…20 mA,		0…20 mA	
Set value (input)	Measured value (output)	Set value (input)	Measured value (output)
Lower range value	MW 1	Lower range value +10% of the range	MW 1
Upper range (full scale) value	MW 2	Upper range (full scale) value	MW 2

• Calculation of the F.S. adjustment point A

$$A = \frac{\text{MW 2} \bullet \text{constant}}{\text{MW2 - MW 1}}$$

Refer to the following tables 3-5, page 8-9 for the values for the constant, the output upper range value and adjustment tolerance!

Adjustment:

- Set the upper range (full-scale) value of the input signal range using a calibration source.
- SPAN pot: FS adjustment point A ± adjustment tolerance
- ZERO pot: output upper range (full-scale) ± adjustment tolerance

Table 3

	Output ± 5 V										Output ± 10 V									
Input	1	2	3	4	5	6	7	8	9	10	**Input**	1	2	3	4	5	6	7	8	9	10
0… 60 mV	ON		ON					ON	ON	ON	0… 60 mV	ON		ON		ON			ON	ON	ON
0…100 mV	ON		ON					ON	ON	ON	0…100 mV	ON		ON		ON			ON	ON	ON
0…200 mV	ON		ON					ON	ON	ON	0…200 mV	ON		ON		ON			ON	ON	ON
0…300 mV	ON		ON					ON	ON	ON	0…300 mV	ON		ON		ON			ON	ON	ON
0…500 mV	ON		ON					ON	ON	ON	0…500 mV	ON		ON		ON			ON	ON	ON
0 … 1 V	ON		ON					ON	ON	ON	0 … 1 V	ON		ON		ON			ON	ON	ON
0 … 2 V	ON		ON					ON	ON	ON	0 … 2 V	ON		ON		ON			ON	ON	ON
0 … 2.5 V	ON		ON					ON	ON	ON	0 … 2.5 V	ON		ON		ON			ON	ON	ON
0 … 5 V	ON		ON					ON	ON	ON	0 … 5 V	ON		ON		ON			ON	ON	ON
0… 10 V	ON		ON					ON	ON	ON	0… 10 V	ON		ON		ON			ON	ON	ON
0… 20 V	ON		ON					ON	ON	ON	0… 20 V	ON		ON		ON			ON	ON	ON
± 60 mV			ON			ON					± 60 mV			ON		ON	ON				
± 100 mV			ON			ON					± 100 mV			ON		ON	ON				
± 200 mV			ON			ON					± 200 mV			ON		ON	ON				
± 300 mV			ON			ON					± 300 mV			ON		ON	ON				
± 500 mV			ON			ON					± 500 mV			ON		ON	ON				
± 1 V			ON			ON					± 1 V			ON		ON	ON				
± 2 V			ON			ON					± 2 V			ON		ON	ON				
± 2.5 V			ON			ON					± 2.5 V			ON		ON	ON				
± 5 V			ON			ON					± 5 V			ON		ON	ON				
± 10 V			ON			ON					± 10 V			ON		ON	ON				
± 20 V			ON			ON					± 20 V			ON		ON	ON				
0… 5 mA	ON		ON					ON	ON	ON	0… 5 mA	ON		ON		ON			ON	ON	ON
0…10 mA	ON		ON					ON	ON	ON	0…10 mA	ON		ON		ON			ON	ON	ON
0…20 mA	ON		ON					ON	ON	ON	0…20 mA	ON		ON		ON			ON	ON	ON
± 5 mA			ON			ON					± 5 mA			ON		ON	ON				
± 10 mA			ON			ON					± 10 mA			ON		ON	ON				
± 20 mA			ON			ON					± 20 mA			ON		ON	ON				
1…5 V	ON							ON	ON		1…5 V	ON				ON			ON	ON	
4…20 mA	ON							ON	ON		4…20 mA	ON				ON			ON	ON	

	Output ±5 V	Output ±10 V
Constant	10 V	20 V
Output upper range v.	5 V	10 V
Adjustment tolerance	± 0.5 mV	± 0.5 mV

Table 4

Input	Output 1…5 V Switch DIP 2 1	2	3	4	5	6	7	8	9	10
0… 60 mV	ON			ON						
0…100 mV	ON			ON						
0…200 mV	ON			ON						
0…300 mV	ON			ON						
0…500 mV	ON			ON						
0 … 1 V	ON			ON						
0 … 2 V	ON			ON						
0 … 2.5 V	ON			ON						
0 … 5 V	ON			ON						
0… 10 V	ON			ON						
0… 20 V	ON			ON						
0… 5 mA	ON			ON						
0…10 mA	ON			ON						
0…20 mA	ON			ON						
4…20 mA			ON			ON				
1…5 V			ON			ON				

	Output 1 ...5 V
Constant	4 V
Output upper range v.	5 V
Adjustment tolerance	± 1 mV

Table 5

Input	Output 0…5 mA Switch DIP 2 1	2	3	4	5	6	7	8	9	10
0… 60 mV		ON		ON		ON				
0…100 mV		ON		ON		ON				
0…200 mV		ON		ON		ON				
0…300 mV		ON		ON		ON				
0…500 mV		ON		ON		ON				
0 … 1 V		ON		ON		ON				
0 … 2 V		ON		ON		ON				
0 … 2.5 V		ON		ON		ON				
0 … 5 V		ON		ON		ON				
0… 10 V		ON		ON		ON				
0… 20 V		ON		ON		ON				
0… 5 mA		ON		ON		ON				
0…10 mA		ON		ON		ON				
0…20 mA		ON		ON		ON				

Table 5

Input	Output 0…10 mA Switch DIP 2 1	2	3	4	5	6	7	8	9	10
0… 60 mV			ON			ON				
0…100 mV			ON			ON				
0…200 mV			ON			ON				
0…300 mV			ON			ON				
0…500 mV			ON			ON				
0 … 1 V			ON			ON				
0 … 2 V			ON			ON				
0 … 2.5 V			ON			ON				
0 … 5 V			ON			ON				
0… 10 V			ON			ON				
0… 20 V			ON			ON				
± 60 mV		ON		ON			ON			
± 100 mV		ON		ON			ON			
± 200 mV		ON		ON			ON			
± 300 mV		ON		ON			ON			
± 500 mV		ON		ON			ON			
± 1 V		ON		ON			ON			
± 2 V		ON		ON			ON			
± 2.5 V		ON		ON			ON			
± 5 V		ON		ON			ON			
± 10 V		ON		ON			ON			
± 20 V		ON		ON			ON			
0… 5 mA			ON			ON				
0…10 mA			ON			ON				
0…20 mA			ON			ON				
± 5 mA		ON		ON			ON			
± 10 mA		ON		ON			ON			
± 20 mA		ON		ON			ON			
1…5 V								ON		
4…20 mA								ON		

Table 6

Input	Output 0…20 mA Switch DIP 2 1	2	3	4	5	6	7	8	9	10
0… 60 mV			ON		ON	ON				
0…100 mV			ON		ON	ON				
0…200 mV			ON		ON	ON				
0…300 mV			ON		ON	ON				
0…500 mV			ON		ON	ON				
0 … 1 V			ON		ON	ON				
0 … 2 V			ON		ON	ON				
0 … 2.5 V			ON		ON	ON				
0 … 5 V			ON		ON	ON				
0… 10 V			ON		ON	ON				
0… 20 V			ON		ON	ON				
± 60 mV		ON		ON	ON		ON			
± 100 mV		ON		ON	ON		ON			
± 200 mV		ON		ON	ON		ON			
± 300 mV		ON		ON	ON		ON			
± 500 mV		ON		ON	ON		ON			
± 1 V		ON		ON	ON		ON			
± 2 V		ON		ON	ON		ON			
± 2.5 V		ON		ON	ON		ON			
± 5 V		ON		ON	ON		ON			
± 10 V		ON		ON	ON		ON			
± 20 V		ON		ON	ON		ON			
0… 5 mA			ON		ON	ON				
0…10 mA			ON		ON	ON				
0…20 mA			ON		ON	ON				
± 5 mA		ON		ON	ON		ON			
± 10 mA		ON		ON	ON		ON			
± 20 mA		ON		ON	ON		ON			
1…5 V					ON			ON		
4…20 mA					ON			ON		

Input	Output 4…20 mA Switch DIP 2 1	2	3	4	5	6	7	8	9	10
0… 60 mV	ON			ON	ON					
0…100 mV	ON			ON	ON					
0…200 mV	ON			ON	ON					
0…300 mV	ON			ON	ON					
0…500 mV	ON			ON	ON					
0 … 1 V	ON			ON	ON					
0 … 2 V	ON			ON	ON					
0 … 2.5 V	ON			ON	ON					
0 … 5 V	ON			ON	ON					
0… 10 V	ON			ON	ON					
0… 20 V	ON			ON	ON					
± 60 mV										
± 100 mV										
± 200 mV										
± 300 mV										
± 500 mV										
± 1 V										
± 2 V										
± 2.5 V										
± 5 V										
± 10 V										
± 20 V										
0… 5 mA	ON			ON	ON					
0…10 mA	ON			ON	ON					
0…20 mA	ON			ON	ON					
± 5 mA										
± 10 mA										
± 20 mA										
1…5 V			ON		ON	ON				
4…20 mA			ON		ON	ON				

	Output 0…20 mA	Output 4…20 mA
Constant	18 mA	16 mA
Output upper range v.	20 mA	20 mA
Adjustment tolerance	± 1 µA	± 1 µA

4.4. Adjustment

Adjustment of the module by means of two potentiometers (see Fig. 11)

- ZERO pot: 0-point adjustment
- SPAN pot: upper range (full-scale) adjustment

Allow a module warm-up time of 2 minutes before the adjustment!

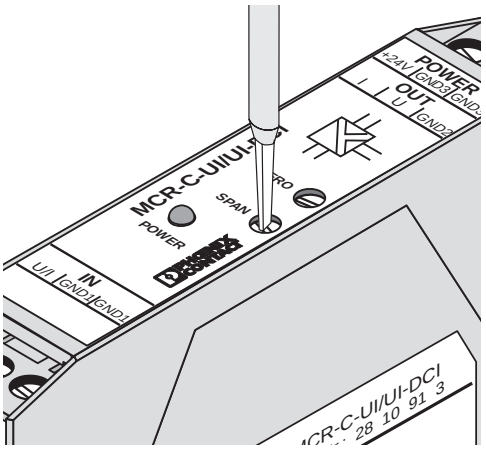


Fig. 11

5. Application example:

PH measurement of a liquid (Fig. 12)

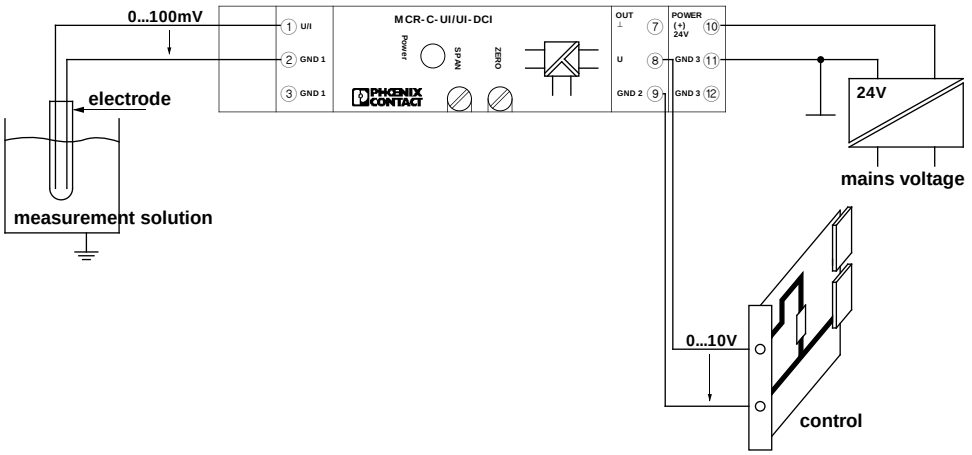


Fig. 12

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