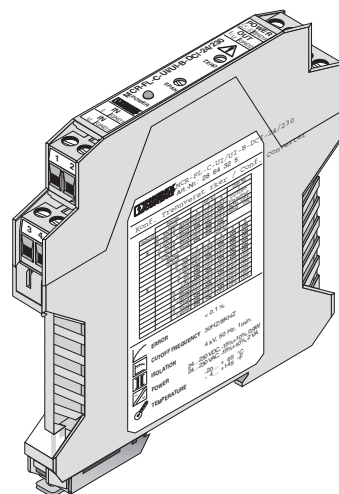


MCR-FL-C-UI/UI-B-DCI-24/230

Configurable 3-Way Isolating Amplifier in Bipolar Version, Standard Signal Range ± 20 mA or ± 10 V



INTERFACE

Data Sheet

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Description

The 3-way isolation guarantees reliable decoupling of the sensor circuit from the processing circuit and prevents linked measurement circuits from influencing each other.

This 3-way isolation amplifier is used to electrically isolate and convert the standardized current and voltage signals listed in the table on page 5.

Functioning

First the analog signal is modulated and then electrically decoupled using a transmitter. The isolated signal is then made available at the output, demodulated, filtered and amplified.



Dangerous voltage!

These tasks must only be performed by qualified electricians who are familiar with the applicable safety measures required.



Make sure that you always use the latest documentation.
It can be downloaded at www.download.phoenixcontact.com.

A conversion table is available on the Internet at
www.download.phoenixcontact.com/general/7000_en_00.pdf



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

Ordering Data

Description	Type	Order No.	Pcs./Pck.
Configurable 3-way isolating amplifier in bipolar version, standard signal range ± 20 mA or ± 10 V	MCR-FL-C-UI/UI-B-DCI-24/230	28 64 32 5	1

Technical Data

Input (Measuring Input)	Current	Voltage
Input signals	0...20 mA, 0...10 mA, 4...20 mA, 2...10 mA, ± 20 mA, ± 10 mA	0...10 V, 0...5 V, 2...10 V, 1...5 V, ± 10 V, ± 5 V
Input resistance	25 Ω , approx.	1 M Ω , approx.
Max. input signal	≤ 100 mA	≤ 30 V
Max. input signal (linear transmission)	bipolar: -110...+110% unipolar: -2...+110%	

Output (Measuring Output)	Current	Voltage
Output signals	0...20 mA, 0...10 mA, 4...20 mA, 2...10 mA, ± 20 mA, ± 10 mA	0...10 V, 0...5 V, 2...10 V, 1...5 V, ± 10 V, ± 5 V
Max. output signal	35 mA	15 V
Load	≤ 600 Ω	> 10 k Ω
Residual ripple	< 20 mV _{rms}	

General Data	
Supply voltage range	24...230 V AC/DC; 2 VA / 0,9 W
Permissible range	20.4...253 V AC/DC
Frequency	48...62 Hz
Max. operation current	60 mA (without load current)
Transmission error	$< 0.1\%$ of end value
Compensation ZERO/SPAN	$\pm 15\%$
Temperature coefficient	0.01%/K
Cut-off frequency (3 dB)	8 kHz / 30 Hz switchable
Step response (10...90%)	30 μ s at 8 kHz / 15 ms at 30 Hz
Test voltage	
Input / output	4 kV / 50 Hz / 1 min.
Input / supply	4 kV / 50 Hz / 1 min.
Output / supply	4 kV / 50 Hz / 1 min.
Protection against dangerous body currents	Acc. to DIN EN 61010-1 up to 300 V AC/DC for surge voltage category II and contamination class 2 between input, output and supply voltage
Ambient temperature range	-20°C to +65°C
Protection type	IP20
Installation position	As desired
Assembly	As desired
Type of connection	Pluggable screw terminal blocks COMBICON
Dimensions (W x H x D)	12.5 mm x 99 mm x 114.5 mm
Conductor cross section	0.2...2.5 mm ²
Type of housing	Polyamide PA non-reinforced

Safety Notes



When operating the isolating amplifier, certain parts of the module can carry dangerous voltage! Ignoring the warnings can lead to serious injury and/or cause damage!

The MCR-FL-C-UI/UI-B-DCI-24/230 modules must only be installed and put into operation by qualified staff.

Qualified personnel are persons who, because of their education, experience and instruction, and their knowledge of relevant standards, regulations, accident prevention, and service conditions, have been authorized to carry out any required operations, and who are able to recognize and avoid any possible dangers.



The isolating amplifier must not be put into operation if the housing is open.



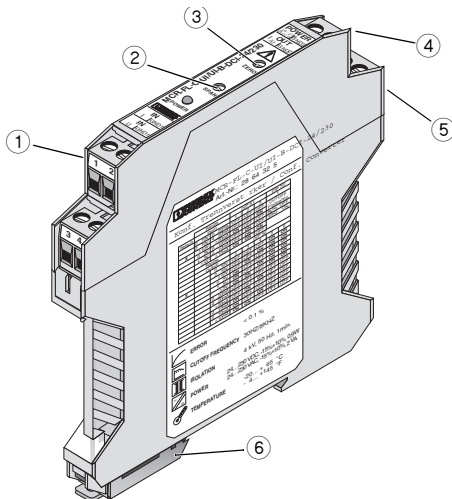
The adjustment with the potentiometer on the front must only be carried out with a screwdriver which is securely insulated against the input voltage!



In applications with high operating voltages sufficient distance and insulation as well as shock protection must be ensured.

Safe and trouble-free operation of this device can only be guaranteed if transport, storage and installation are carried out correctly and operation and maintenance are carried out with care.

Elements



- 1 Signal input: pluggable screw terminal block
- 2 ZERO potentiometer
- 3 SPAN potentiometer
- 4 Signal output: pluggable screw terminal block
- 5 Supply voltage: pluggable screw terminal block
- 6 Metal latch for fixing to the mounting rail

Figure 1 Elements

Block Diagram

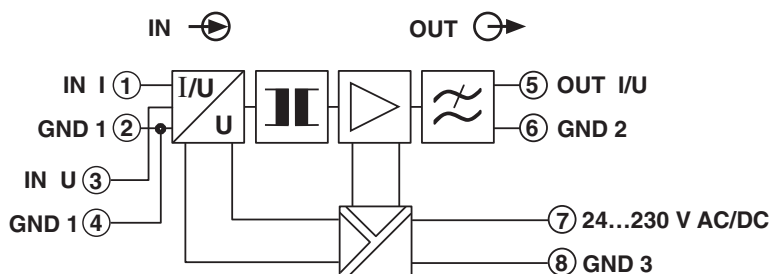


Figure 2 Block diagram

Configuration



Electrostatic Discharge!

The module contains components that can be damaged or destroyed by electrostatic discharge. When handling the module, observe the necessary safety precautions against electrostatic discharge (ESD), in accordance with EN 61340-5-1 and EN 61340-5-2, as well as IEC 61340-5-1 and IEC 61340-5-2.

Opening the Module

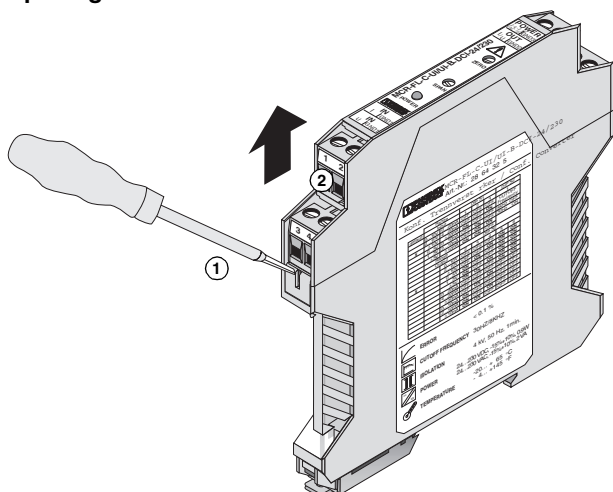


Figure 3 Opening the module

- Using a screwdriver, release the snap fittings of the upper part of the housing on both sides (1). The upper part of the housing and the electronics can now be pulled out by approximately 3 cm (2).

Settings

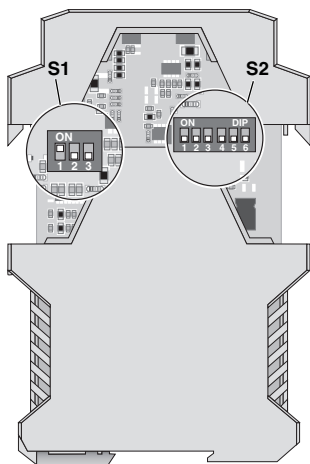


Figure 4 DIP switches

The desired input and output range can be set using DIP switch S1 and DIP switch S2 (see Figure 4) according to the table. The manufacturer's module settings are: input ± 10 V / output ± 10 V.



After each change of the DIP switch settings a ZERO/SPAN compensation ought to be executed (see page 6 and page 7).

Inut Range: Current/Voltage Signal	DIP S1			DIP S2	
	1	2	3	1	
0...10 V / 0...20 mA	off	off	off	CUTOFF frequency	
2...10 V / 4...20 mA	off	off	ON		
± 10 V / ± 20 mA	ON	off	off	8 kHz	off
0...5 V / 0...10 mA	off	ON	off	30 Hz	ON
1...5 V / 2...10 mA	off	ON	ON		
± 5 V / ± 10 mA	ON	ON	off		

Output Signal Range	DIP S2					
	2	3	4	5	6	
0...10 V	off	off	off	ON	ON	
2...10 V	off	off	ON	ON	ON	
± 10 V	off	ON	off	ON	ON	
0...5 V	ON	off	off	ON	ON	
1...5 V	ON	off	ON	ON	ON	
± 5 V	ON	ON	off	ON	ON	
0...20 mA	off	off	off	off	off	
4...20 mA	off	off	ON	off	off	
± 20 mA	off	ON	off	off	off	
0...10 mA	ON	off	off	off	off	
2...10 mA	ON	off	ON	off	off	
± 10 mA	ON	ON	off	off	off	

Compensation Instruction for Bipolar Isolation Amplifier for Bipolar Input Signals

(Example: input signal range: ± 10 V / output signal range: 0...5 V)

1. Allow a module warm-up time of approx. 2 minutes before the adjustment.
2. Set the required input range using DIP switch S1 (**Example: ± 10 V**).
3. Set the required output range using DIP switch S2 (**Example: 0...5 V**).
4. Set the lower range value and the upper range value of the input signal, using a calibration source.
(**Example: -10 V at terminal point U_{IN} (3) and GND at terminal point GND1; +10 V at terminal point U_{IN} (3) and GND at terminal point GND1**)
5. Note down the output values MW1 and MW2 measured with a digital multimeter.
(**Example: result MW1 = 0.7 V; MW2 = 4.5 V, measured between terminal point U_{OUT} (5) and terminal point GND2**)
6. Calculate the full scale compensation point A which must be set using the SPAN potentiometer.
 $A = (\text{Setpoint output span} + MW1 + MW2) / 2$
(**Example: $A = (5 \text{ V} + 0.7 \text{ V} + 4.5 \text{ V}) / 2 = 5.1 \text{ V}$**)
7. Apply your required final value on the input side at the input terminal points.
(**Example: +10 V at terminal point U_{IN} (3) and GND at terminal point GND1**)
8. Set the previously calculated full scale value A using the SPAN potentiometer.
(**Example: 5.1 V to be measured between terminal points U_{OUT} (5) and GND2**)
9. Adjust the output to your required output final value using the ZERO potentiometer.
(**Example: 5.0 V to be measured between terminal points U_{OUT} (5) and GND2**)
10. If necessary, repeat points 4. to 9.

Graphical Presentation of the ZERO/SPAN Compensation for Bipolar Input Signals Using an Example

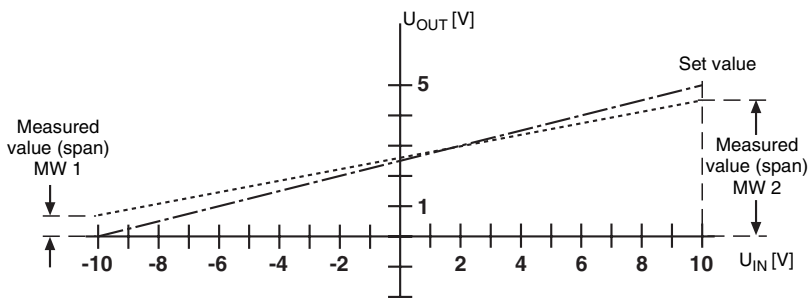


Figure 5 Measured values

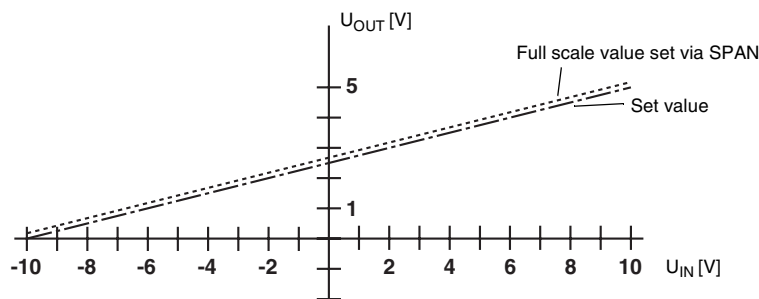


Figure 6 SPAN setting to full scale value A

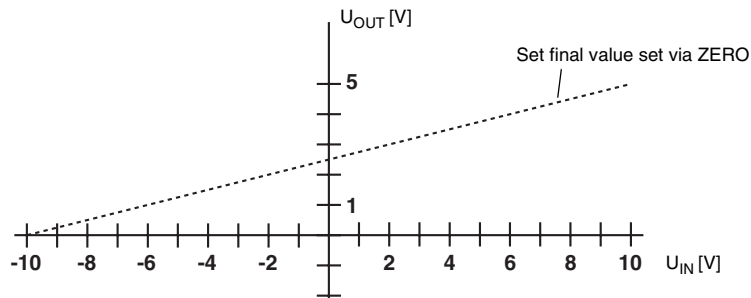


Figure 7 ZERO compensation to required set value

Compensation Instructions for Bipolar Isolation Amplifier for Unipolar Input Signals

1. Allow a module warm-up time of approx. 2 minutes before the adjustment.
2. Set your required input range using DIP switch S1 (**Example: 2...10 V**).
3. Set your required output range using DIP switch S2 (**Example: 2...10 V**).
4. Set the lower range value of the input signal range using the calibration source.
(Example: +2 V at terminal point U_{IN} (3) and GND at terminal point GND1)
5. Adjust the output to your required input value using the ZERO potentiometer.
(Example: 2 V to be measured between terminal point U_{OUT} (5) and GND2)
6. Set the upper range (full scale) value of the input signal range using the calibration source.
(Example: +10 V and terminal point U_{IN} (3) and GND at terminal point GND1)
7. Adjust the output to your required output final value using the SPAN potentiometer.
(Example: 10 V to be measured between terminal points U_{OUT} (5) and GND2)
8. If necessary, repeat points 4. to 7.

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