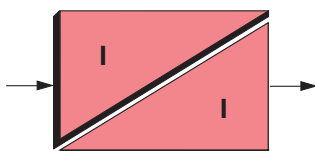


Multi-Channel Passive Isolator MCR-...CLP-I/I-00

- Electrical isolation without additional power supply
- Current signals 0(4)...20 mA
- 1-, 2- and 4-channel versions



1. Description

MCR-1,2,4CLP-I/I-00 passive isolators are used for the electrical isolation and processing of analog 0(4)... 20 mA standard current signals. The blocks provide electrical isolation between the control electronics and process I/O. In addition, interference signals above 75 Hz are effectively suppressed.

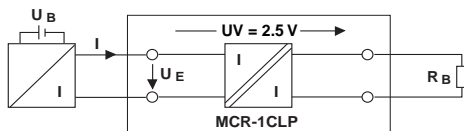
Input and output circuit do not require separate auxiliary power. The modules obtain this power from the input signal.

The modules are snapped onto symmetrical DIN rails in accordance with EN 50 022.

When using passive isolators, ensure that the current-driving voltage of the measuring transducer U_B is sufficient for driving the maximum current of 20 mA over the passive isolator with the power loss of $U_V = 2.5$ V and the load R_B .

This means:

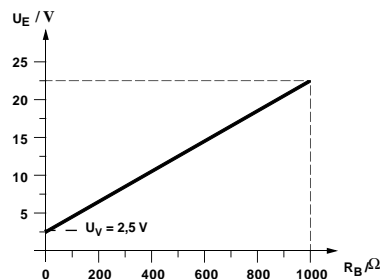
$$U_B \geq U_E = 2.5 \text{ V} + 20 \text{ mA} \cdot R_B$$



The graphic shows the input voltage of U_E dependant on the load R_B considering the power loss U_V .

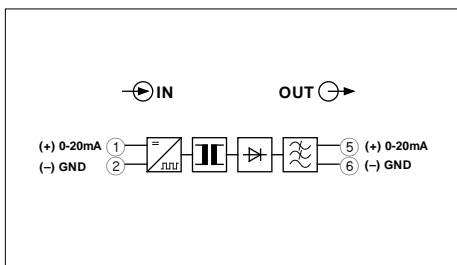
If you know your load, the lowest voltage, which the sensor should use to drive a maximum current of 20 mA via passive isolators and loads, can be read from the Y-axis.

Input voltage depending on the load at $I_A = 20$ mA



Multi-Channel Passive Isolator – MCR-...CLP-I/I-00

2. Technical Data



MCR-1CLP-I/I-00

with signal conversion: 0(4)...20 mA / 0(4)...20 mA
1-channel



M 3

8



	solid [mm ²]	flexible AWG
Connection data	0.2-2.5	0.2-2.5 24-14

Description	Output Signal	Module Width
MCR passive isolator, for electrical isolation of current signals without power supply	1-channel	12.5 mm (0.492 in.)

Technical Data Per Channel

Input

Input signal
Power loss
Maximum input current/overload
Maximum input voltage/overload
Voltage limitation with zener diode

0(4)...20 mA
2.5 V at I = 20 mA
50 mA / 100 mA
30 V / 30 V
33 V ± 5%

Output

Output signal
Maximum output signal
Maximum load
Ripple

0(4)...20 mA
< 50 mA
1375 Ω at I = 20 mA output signal
< 5 mV_{rms}

General Data

Transmission error
Additional error every 100 Ω load
Temperature coefficient
Cut-off frequency (3 dB)
Response time (10-90%)
Test voltage

0.1% of the final value
0.02% of the measured value
≤ 0.002%/K of the measured value / 100 Ω load
< 75 Hz at I = 20 mA and maximum load
5 ms at 500 Ω load
510 V, 50 Hz, 1 minute

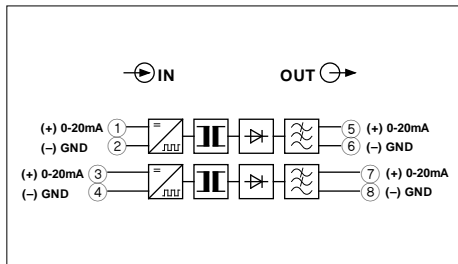
Ambient temperature range
Housing material

Input/output
Channel/channel

–
– 10°C to +70°C (14°F to 158°F)
Polyamide PA, unarmored

Type	Order No.	Pcs. Pkt.
MCR-1CLP-I/I-00	28 14 01 6	1

Multi-Channel Passive Isolator – MCR-...CLP-I/I-00



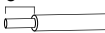
MCR-2CLP-I/I-00

with signal conversion: 0(4)...20 mA / 0(4)...20 mA
2-channel



M 3

8



	solid	flexible	
	[mm ²]	AWG	
Connection data	0.2-2.5	0.2-2.5	24-14

Description	Output Signal	Module Width
MCR passive isolator, for electrical isolation of current signals without power supply	2-channel	12.5 mm (0.492 in.)

Technical Data per Channel

Input

Input signal
Power loss
Maximum input current/overload
Maximum input voltage/overload
Voltage limitation with zener diode

Type

0(4)...20 mA
2.5 V at I = 20 mA
50 mA / 100 mA
30 V / 30 V
33 V ± 5%

Order No.

28 14 02 9

Pcs. Pkt.

1

Output

Output signal
Maximum output signal
Maximum load
Ripple

0(4)...20 mA
< 50 mA
1375 Ω at I = 20 mA output signal
< 5 mV_{rms}

General Data

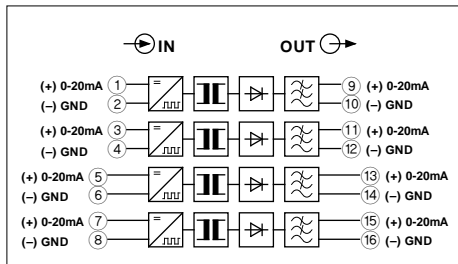
Transmission error
Additional error every 100 Ω load
Temperature coefficient
Cut-off frequency (3 dB)
Response time (10-90%)
Test voltage

Input/output
Channel/channel

0.1% of the final value
0.02% of the measured value
≤ 0.002%/K of the measured value / 100 Ω load
< 75 Hz at I = 20 mA and maximum load
5 ms at 500 Ω load
510 V, 50 Hz, 1 minute
2 kV, 50 Hz, 1 minute
- 10°C to +70°C (14°F to 158°F)
Polyamide PA, unarmored

Ambient temperature range
Housing material

Multi-Channel Passive Isolator – MCR...CLP-I/I-00



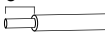
MCR-4CLP-I/I-00

with signal conversion: 0(4)...20 mA / 0(4)...20 mA
4-channel



M 3

8



	solid [mm ²]	flexible AWG
Connection data	0.2-2.5	0.2-2.5 24-14

Description	Output Signal	Module Width
MCR passive isolator, for electrical isolation of current signals without power supply	4-channel	22.5 mm (0.886 in.)

Technical Data per Channel

Input

Input signal
Power loss
Maximum input current/overload
Maximum input voltage/overload
Voltage limitation with zener diode

0(4)...20 mA
2.5 V at I = 20 mA
50 mA / 100 mA
30 V / 30 V
33 V ± 5%

Output

Output signal
Maximum output signal
Maximum load
Ripple

0(4)...20 mA
< 50 mA
1375 Ω at I = 20 mA output signal
< 5 mV_{rms}

General Data

Transmission error
Additional error every 100 Ω load
Temperature coefficient
Cut-off frequency (3 dB)
Response time (10-90%)
Test voltage

Input/output
Channel/channel

0.1% of the final value
0.02% of the measured value
≤ 0.002%/K of the measured value / 100 Ω load
< 75 Hz at I = 20 mA and maximum load
5 ms at 500 Ω load
510 V, 50 Hz, 1 minute
2 kV, 50 Hz, 1 minute
- 10°C to +70°C (14°F to 158°F)
Polyamide PA, unarmored

Ambient temperature range
Housing material

Multi-Channel Passive Isolator – MCR-...CLP-I/I-00



Conforms to the EMC Directive 89/336/EEC and the Low Voltage Directive 73/23/EEC

EMC (Electromagnetic Compatibility)

Noise immunity in accordance with EN 50082-2

- Electrostatic discharge (ESD)

- Electromagnetic HF field
Amplitude modulation
Pulsed modulation

- Fast transients (burst)

- Surge current load (surge)

- Conducted interference

Noise emission in accordance with EN 50081-2

EN 61000-4-2	8 kV air discharge ²⁾
EN 61000-4-3	10 V/m ¹⁾ 10 V/m ¹⁾
EN 61000-4-4	Input/output 2 kV/5 kHz ²⁾
EN 61000-4-5	Input/output: 2 kV/42 Ω ²⁾
EN 61000-4-6	Input/output 10 V ¹⁾
EN 55022	Class B

EN 61000 corresponds to IEC 1000/
EN 55022 corresponds to CISPR22

¹⁾Criterion A: Normal operating characteristics within the specified limits.

²⁾Criterion B: Temporary adverse effects on the operating characteristics that the device corrects independently.

Class B: Industrial and domestic applications

3. Connection Notes

To ensure problem-free operation, the signal source for the passive isolator must supply a sufficiently high voltage:

$$U_S \geq U_{RL} + U_E = U_{RL1} + U_{RL2} + U_T + U_B$$

The maximum load to be driven depends on the input voltage U_E of the passive isolator.

Calculation:

$$U_{RL} = U_{RL1} + U_{RL2} = 20 \text{ mA} \cdot R_L$$

$$U_E = U_T + U_B = 2.5 \text{ V} + 20 \text{ mA} \cdot R_B$$

$$R_L = \frac{2 \cdot l}{\gamma \cdot A}$$

U_E = Input voltage at passive isolator

U_T = Voltage drop at passive isolator

U_B = Voltage drop at output load

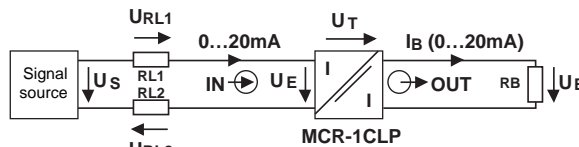
U_{RL} = Voltage drop via both incoming cables

A = Conductor cross-section in mm^2

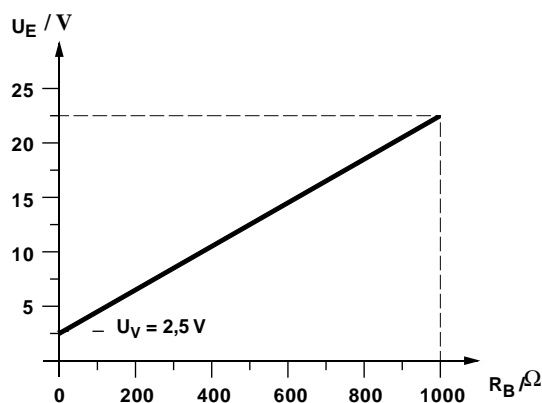
l = Line length between signal source and passive isolator

γ = Electr. conductivity [$\text{Cu} = 56 \text{ m}/\Omega \cdot \text{mm}^2$]

R_B = Load impedance

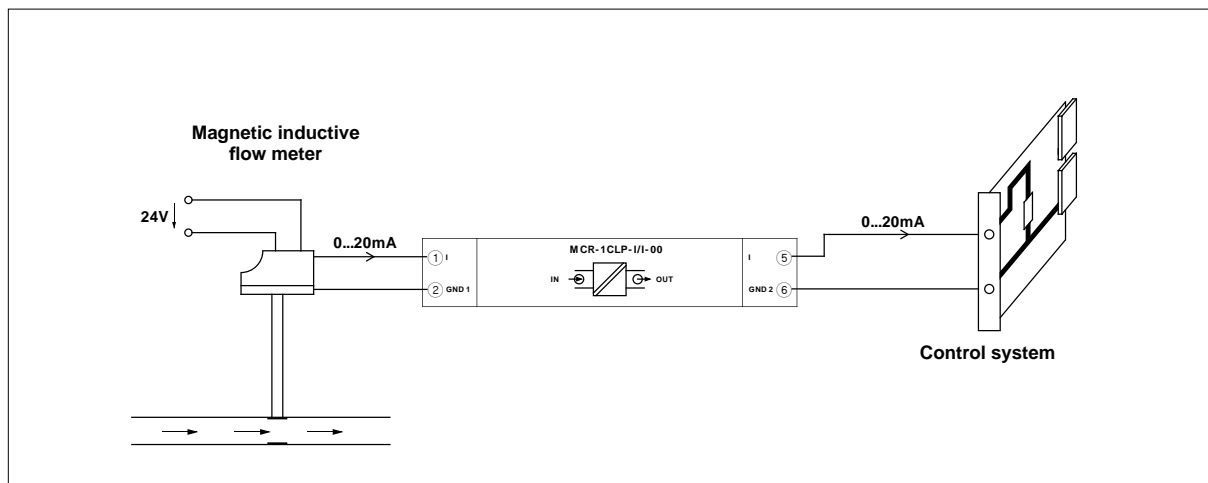


Input voltage depending on the load at $I_A = 20 \text{ mA}$



Multi-Channel Passive Isolator – MCR-...CLP-I/I-00

4. Application Example: Flow Rate Measurement





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