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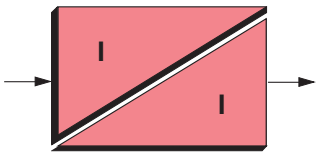
# Multi-Channel Passive Isolator
# MCR-...CLP-I/I-00

- **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.

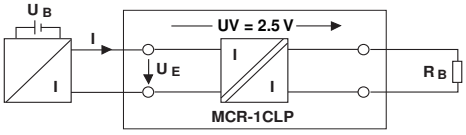
Input and output circuit do not require separate auxiliary power. The modules obtain this power from the input signal.

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:

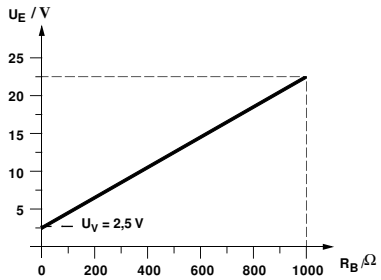
**$U_B \geq U_E = 2.5\ V + 20\ mA * R_B$**




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**

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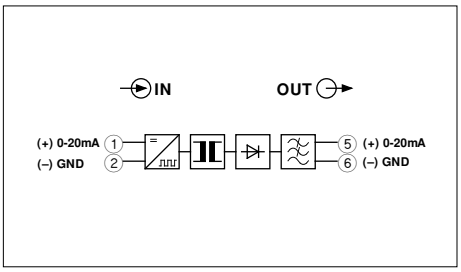
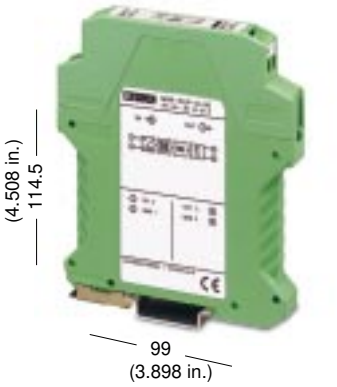
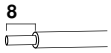
# 2. Technical Data








## MCR-1CLP-I/I-00

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

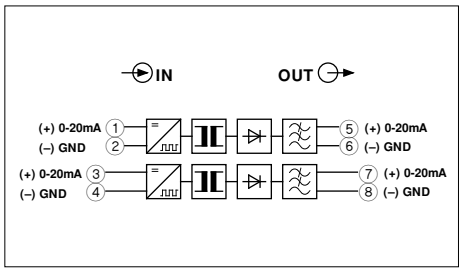
| | solid [mm²] | flexible | AWG |
|---|---|---|---|
| Connection data | 0.2-2.5 | 0.2-2.5 | 24-14 |

| 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.) |

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

**Technical Data Per Channel**

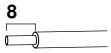
| | | |
|---|---|---|
| **Input** | | |
| Input signal | | 0(4)…20 mA |
| Power loss | | 2.5 V at I = 20 mA |
| Maximum input current/overload | | 50 mA / 100 mA |
| Maximum input voltage/overload | | 30 V / 30 V |
| Voltage limitation with zener diode | | 33 V ± 5% |
| **Output** | | |
| Output signal | | 0(4)…20 mA |
| Maximum output signal | | < 50 mA |
| Maximum load | | 1375 Ω at I = 20 mA output signal |
| Ripple | | < 5 $mV_{rms}$ |
| **General Data** | | |
| Transmission error | | 0.1% of the final value |
| Additional error every 100 Ω load | | 0.02% of the measured value |
| Temperature coefficient | | ≤ 0.002%/K of the measured value / 100 Ω load |
| Cut-off frequency (3 dB) | | < 75 Hz at I = 20 mA and maximum load |
| Response time (10-90%) | | 5 ms at 500 Ω load |
| Test voltage | Input/output | 510 V, 50 Hz, 1 minute |
| | Channel/channel | – |
| Ambient temperature range | | – 10°C to +70°C (14°F to 158°F) |
| Housing material | | Polyamide PA, unarmored |





# MCR-2CLP-I/I-00

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

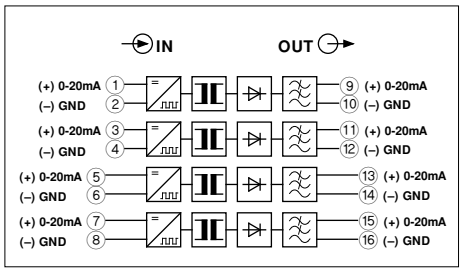

| | solid [mm²] | flexible | AWG |
|---|---|---|---|
| Connection data | 0.2-2.5 | 0.2-2.5 | 24-14 |

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

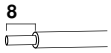
| **Type** | **Order No.** | Pcs. / Pkt. |
|---|---|---|
| **MCR-2CLP-I/I-00** | **28 14 02 9** | 1 |

**Technical Data per Channel**

| | | |
|---|---|---|
| **Input** | | |
| Input signal | | 0(4)…20 mA |
| Power loss | | 2.5 V at I = 20 mA |
| Maximum input current/overload | | 50 mA / 100 mA |
| Maximum input voltage/overload | | 30 V / 30 V |
| Voltage limitation with zener diode | | 33 V ± 5% |
| **Output** | | |
| Output signal | | 0(4)…20 mA |
| Maximum output signal | | < 50 mA |
| Maximum load | | 1375 Ω at I = 20 mA output signal |
| Ripple | | < 5 $mV_{rms}$ |
| **General Data** | | |
| Transmission error | | 0.1% of the final value |
| Additional error every 100 Ω load | | 0.02% of the measured value |
| Temperature coefficient | | ≤ 0.002%/K of the measured value / 100 Ω load |
| Cut-off frequency (3 dB) | | < 75 Hz at I = 20 mA and maximum load |
| Response time (10-90%) | | 5 ms at 500 Ω load |
| Test voltage | Input/output | 510 V, 50 Hz, 1 minute |
| | Channel/channel | 2 kV, 50 Hz, 1 minute |
| Ambient temperature range | | – 10°C to +70°C (14°F to 158°F) |
| Housing material | | Polyamide PA, unarmored |






# MCR-4CLP-I/I-00

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

| | solid [mm²] | 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.) |

| Type | Order No. | Pcs. Pkt. |
|---|---|---|
| **MCR-4CLP-I/I-00** | **28 14 04 5** | 1 |

**Technical Data per Channel**

| | | |
|---|---|---|
| **Input** | | |
| Input signal | | 0(4)…20 mA |
| Power loss | | 2.5 V at I = 20 mA |
| Maximum input current/overload | | 50 mA / 100 mA |
| Maximum input voltage/overload | | 30 V / 30 V |
| Voltage limitation with zener diode | | 33 V ± 5% |
| **Output** | | |
| Output signal | | 0(4)…20 mA |
| Maximum output signal | | < 50 mA |
| Maximum load | | 1375 Ω at I = 20 mA output signal |
| Ripple | | < 5 $mV_{rms}$ |
| **General Data** | | |
| Transmission error | | 0.1% of the final value |
| Additional error every 100 Ω load | | 0.02% of the measured value |
| Temperature coefficient | | ≤ 0.002%/K of the measured value / 100 Ω load |
| Cut-off frequency (3 dB) | | < 75 Hz at I = 20 mA and maximum load |
| Response time (10-90%) | | 5 ms at 500 Ω load |
| Test voltage | Input/output | 510 V, 50 Hz, 1 minute |
| | Channel/channel | 2 kV, 50 Hz, 1 minute |
| Ambient temperature range | | – 10°C to +70°C (14°F to 158°F) |
| Housing material | | Polyamide PA, unarmored |

CE

**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<br>• Electrostatic discharge (ESD) | EN 61000-4-2 | 8 kV air discharge[2)] |
| • Electromagnetic HF field<br>Amplitude modulation<br>Pulsed modulation | EN 61000-4-3 | 10 V/m[1)]<br>10 V/m[1)] |
| • Fast transients (burst) | EN 61000-4-4 | Input/output 2 kV/5 kHz [2)] |
| • Surge current load (surge) | EN 61000-4-5 | Input/output: 2 kV/42 Ω[2)] |
| • Conducted interference | EN 61000-4-6 | Input/output<br>10 V [1)] |
| Noise emission in accordance with EN 50081-2 | 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 UE of the passive isolator.

**Calculation:**

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

$U_E = U_T + U_B = 2.5\ V + 20\ mA * R_B$

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

$U_E$ = Input voltage at passive isolator

$U_T$ = Voltage drop at passive isolator

$U_B$ = Voltage drop at output load

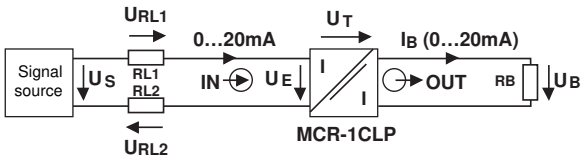
$U_{RL}$ = Voltage drop via both incoming cables

A = Conductor cross-section in $mm^2$

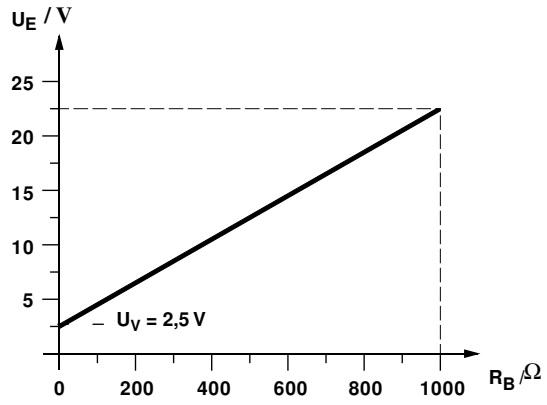
l = Line length between signal source and passive isolator

$\gamma$ = Electr. conductivity [Cu = 56 m/Ω* $mm^2$]

$R_B$ = Load impedance




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



## 4. Application Example: Flow Rate Measurement