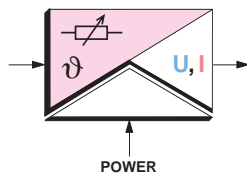


Configurable Temperature Measuring Transducers for PT 100

MCR-PT 100-...

- Temperature range can be set using DIP switches
- ZERO/SPAN adjustment
- Open-circuit detection
- Available with electrically isolated power supply



1. Description

MCR-PT-100 temperature measuring transducers convert the measured values of the PT-100 sensor (IEC 751/ EN 60 751) into electrically standardized analog signals.

The sensor is supplied from the module with a low current. The resultant voltage drop is amplified in the module and converted into a signal, which is proportional to the temperature. To linearize the resistance characteristic, the measuring signal is fed back to the input. The output circuit provides the standardized analog signal.

Devices with current output, voltage output and electrically isolated power supply are available.

The possible connection methods 2-, 3- or 4-wire connection, different temperature ranges 0...100°C (32...212°F), 0...150°C (32...302°F), 0...200°C (32...392°F), 0...300°C (32...572°F), -50...50°C (-58...122°F), -50...100 °C (-58...212°F), -50...150°C (-58...302°F), -50...250°C (-58...482°F) and the current outputs 0...20 or 4...20 mA can be changed using DIP switches.

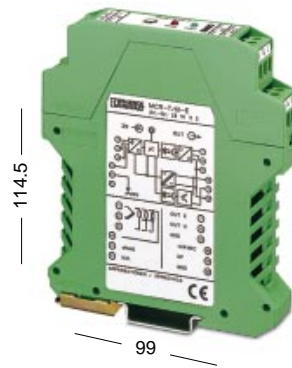
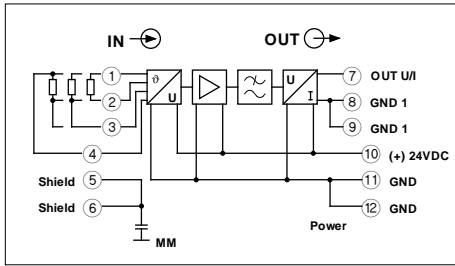
The devices are always adjusted upon delivery and must be adjusted again if any settings are changed. In addition, adjustment potentiometers, which can be accessed on the front, offer the option of carrying out a

measured distance adjustment (ZERO/SPAN).

If no specification has been made in the order key on the last page, devices are delivered with the default setting (3-wire connection, 0...100°C [32...212°F] and 0...10 V or 4...20 mA).

Modules are connected to symmetrical EN 50 022 DIN rails using plug-in COMBICON connectors.

2. Technical Data



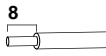
MCR-PT 100-...

with signal conversion: PT 100 / (2-, 3-, 4-wire)
 -50...+50/100/150/250°C / 0...100/150/200/300°C
 (-58...122/212/302/482°F/32...212/302/392/572°F)
 0...10 V or 0(4)...20 mA

Housing width 17.5 mm (0.689 in.)



M 3



8

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

Description	Output signal U _A /I _A
MCR temperature measuring transducer for PT 100 2-, 3-, 4-wire technology; input: 0...100°C (32...212°F), 0...150°C (32...302°F), 0...200°C (32...392°F), 0...300°C (32...572°F), -50...50°C (-58...122°F), -50...100°C (58...212°F), - 50...150°C (-58...302°F), -50...250°C (-58...482°F)	0...10 V 0(4)...20 mA

Type	Order No.	Pcs. Pkt.
MCR-PT100-U¹⁾	28 10 34 0	1
MCR-PT100-I¹⁾	28 10 35 3	1

¹⁾ Specify configuration (see order key on the last page)

Technical Data

Input

Temperature range

Supply current (PT 100)

Connection method

Output

Output signal

Maximum output signal

Load

Output signal on open circuit

General Data

Supply voltage

Maximum current consumption

Transmission error

Temperature coefficient

ZERO and SPAN adjustment

Limit frequency

Step-response (10-90%)

Test voltage:

Ambient temperature range

Supply/signal

MCR-PT100-U

PT 100 (IEC 751/EN 60 751); 2-, 3-, 4-wire technology

(0...100/150/200/300)°C (32...212/302/392/572°F)

(-50...50/100/150/250)°C (-58...122/212/302/482°F)

1 mA

Plug-in screw-clamp connection

0...10 V

15 V

≥ 10 kΩ

> 11 V

0(4)...20 mA

30 mA

≤ 500 Ω

> 22 mA

20...30 V DC

20 mA

≤ 0.4% of the final value

≤ 0.02%/K

± 5%

30 Hz

11 ms

–

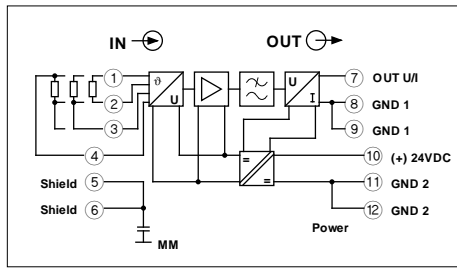
- 20°C to + 65°C (-4°F to 149°F)

20...30 V DC

45 mA

–

Configurable Temperature Measuring Transducers for PT 100 – MCR-PT100-...



MCR-PT 100-...-DC

with signal conversion: PT 100/(2-, 3-, 4-wire)
 -50...+50/100/150/250°C / 0...100/150/200/300°C
 (-58...+122/212/302/482°F/32...212/302/392/572°F)
 0...10 V or 0(4)...20 mA

Housing width 17.5 mm (0.689 in.)



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

Description	Output signal U _A /I _A
MCR temperature measuring transducer, as above. Power supply electrically isolated	0...10 V 0(4)...20 mA

Type	Order No.	Pcs. Pkt.
MCR-PT100-U-DC¹⁾	28 10 31 1	1
MCR-PT100-I-DC¹⁾	28 10 33 7	1

¹⁾ Specify configuration (see order key on the last page)

Technical Data	
Input	
Temperature range	
Supply current (PT 100)	
Connection method	
Output	
Output signal	
Maximum output signal	
Load	
Output signal at open circuit	
General Data	
Supply voltage	
Maximum current consumption	
Transmission error	
Temperature coefficient	
ZERO and SPAN adjustment	
Limit frequency	
Step-response (10-90%)	
Test voltage:	Supply/signal
Ambient temperature range	

MCR-PT100-U-DC	MCR-PT100-I-DC
PT 100 (IEC 751/EN 60 751); 2-, 3-, 4-wire technology (0...100 /150/200/300)°C (32...212/302/392/572°F) (-50...50 /100/150/250)°C (-58...122/212/302/482°F)	
1 mA Plug-in screw-clamp connection	
0...10 V	0(4)...20 mA
15 V	30 mA
≥ 10 kΩ	≤ 500 Ω
> 11 V	> 22 mA
20...30 V DC	20...30 V DC
35 mA	60 mA
≤ 0.4% of the final value	
≤ 0.02%/K	
± 5%	
30 Hz	
11 ms	
750 V AC; 50 Hz, 1 minute	
- 20°C to + 65°C (-4°F to 149°F)	



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

EMC (electromagnetic compatibility)

Noise immunity in accordance with 50082-2

- Electrostatic discharge (ESD)

- Electromagnetic HF field
 - Amplitude modulation
 - Pulse 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/supply: 2 kV/5 kHz ²⁾
EN 61000-4-5	Input/output: 2 kV/42 Ω ²⁾ Output: 0.5 kV/2 Ω ²⁾
EN 61000-4-6	Input/output/supply: 10 V ¹⁾
EN 55011	Class A

EN 61000 corresponds to IEC 1000/
EN 55011 corresponds to CISPR11

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

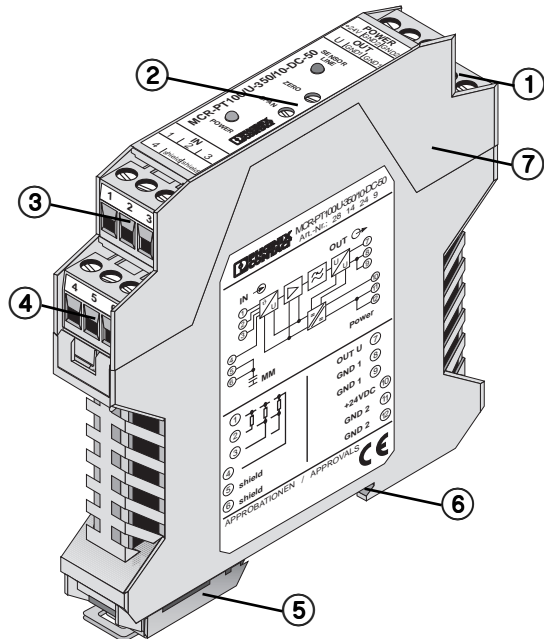
²⁾Criterion B: Temporary adverse effects on the operating characteristics, which the device corrects itself.

Class A: Industrial application without special installation measures

These results were achieved using shielded cables.

MCR-PT100-... – Temperature Measuring Transducers

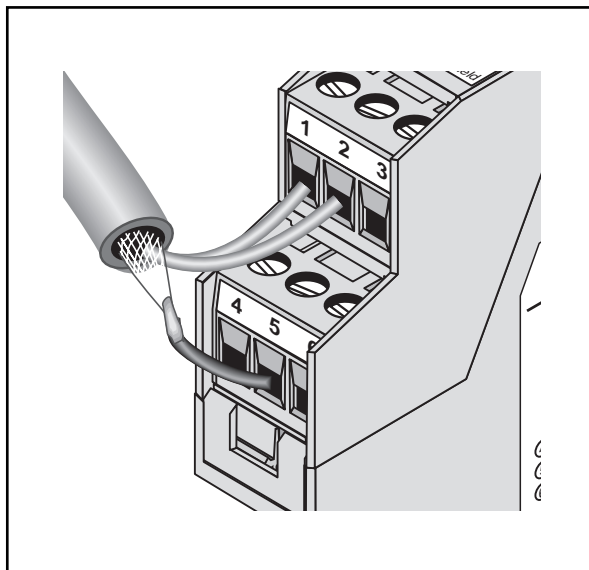
- ① Plug-in screw-clamp terminals (COMBICON)
- ② Zero/span potentiometer
- ③ Plug-in screw-clamp terminals (COMBICON)
- ④ Shield connection (on terminals 5 and 6)
- ⑤ Metal lock for fastening on the DIN rail
- ⑥ Functional earth contact
- ⑦ Housing cover, can be removed for DIP switch setting



3. Connection and Operating Instructions

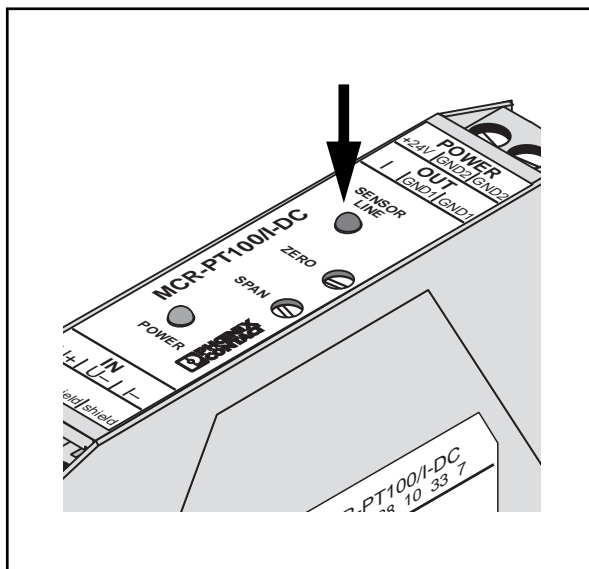
3.1. Shield Connection

Shield clamps "5" and "6" are connected with a capacitor using the function earth contact to the DIN rail which is at ground potential. Any disturbing pulses that occur are diverted.



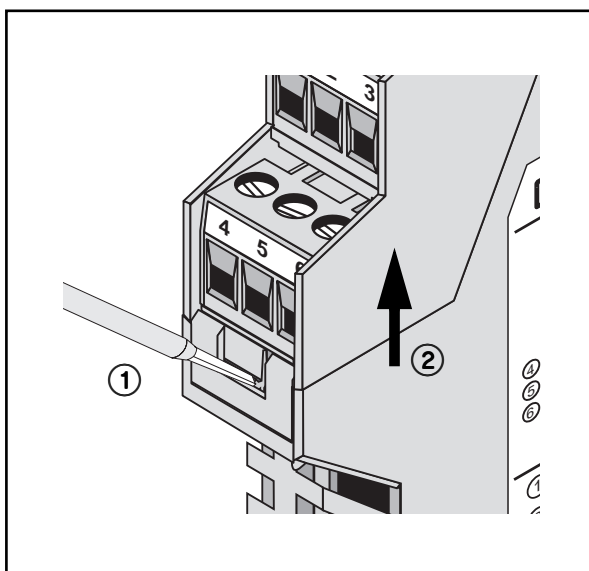
3.2. Open Circuit Indicator

If an open circuit occurs, the output is overridden and the red "Sensor Line" LED lights up.



3.3. Opening the Device (for Configuration)

The locked housing cover is released on both sides using a screwdriver ①. The housing cover and electronics can only be pulled out about 3 cm (1.181 in.) ②.



4. Circuit Technology (Can Be Set Using DIP Switches)

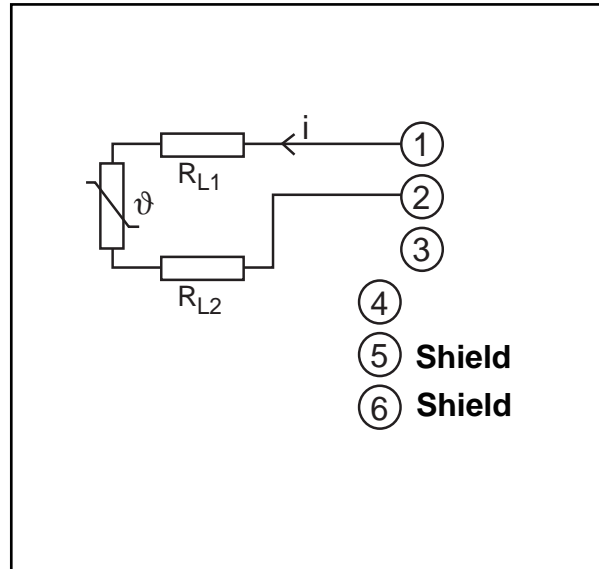
2-Wire Connection

Application:

- For short distances < 10 m (32.808 ft.)

Please note:

- The cable resistances R_{L1} and R_{L2} directly affect the measuring result and make it incorrect.



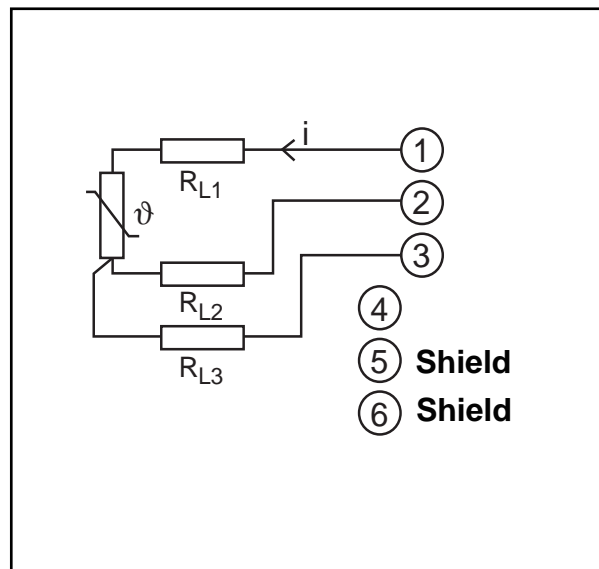
3-Wire Connection

Application:

- For longer distances between PT 100 sensor and MCR module for equal cable resistances ($R_{L1} = R_{L2} = R_{L3}$).

Please note:

- The cable resistance per wire should not exceed 50 Ω.



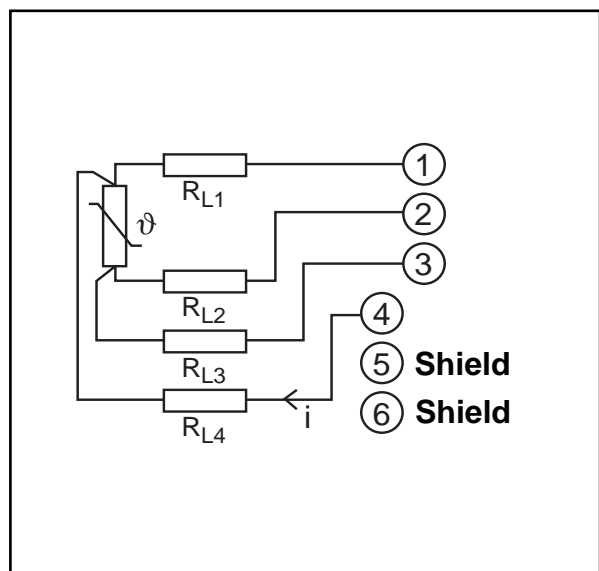
4-Wire Connection

Application:

- For long distances between PT 100 sensor and MCR module for different cable resistances ($R_{L1} \neq R_{L2} \neq R_{L3} \neq R_{L4}$).

Please note:

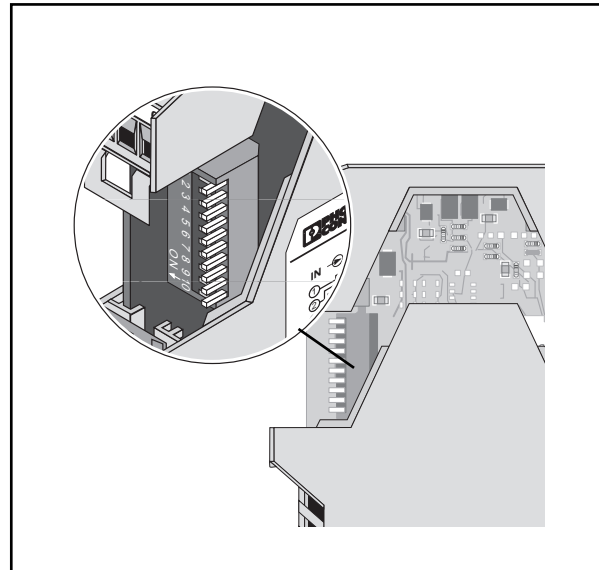
- The cable resistance per wire should not exceed 50 Ω.



5. Configuration

The basic setting of your device (connection method, temperature range, for modules with current output: analog output signal 0...20 mA or 4...20 mA) can be set using a labeled DIP switch inside the housing corresponding to the configuration table.

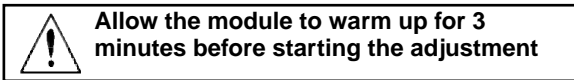
Note: Zero/span adjustment must be carried out after every input, temperature range or output change.



5.1. Zero/Span Adjustment

Default devices: PT100 simulator or resistance decade volt or amp meter

- a) Connect a 24 V supply voltage to terminals "10" and "11". The "Power" and "Sensor Line" LEDs must light up.



- b) Connect the PT100 simulator or the resistance decade according to the corresponding wiring plans in Section "2. Technical Data" and specify a temperature of 0°C (32°F) or the corresponding resistance value. The "Sensor Line" LED is no longer lit up.

c) Zero point adjustment:

- Specify a default value depending on the temperature range using the default device (see table: Zero point adjustment).
- Adjust the output signal value (U_{OUT} or I_{OUT}) using the zero potentiometer.

d) Final value adjustment

- Specify a default value depending on the temperature range using the default device (see table: Final value adjustment).
- Adjust the output signal value (U_{OUT} or I_{OUT}) using the span potentiometer.

Note: Repeat points c) and d).

Table: Configuration

DIP Switch	S1	S2	S3	S4	S5	S6	S7	S8	S9	S10
Connection	2-wire	ON	OFF	ON						
	3-wire	ON	ON	OFF						
	4-wire	OFF	OFF	OFF						
Temperature range	-50 ... 50 °C (-58 ... 122 °F)			ON	OFF	OFF	OFF	OFF		
	-50 ... 100 °C (-58 ... 212 °F)			ON	OFF	OFF	ON	OFF		
	-50 ... 150 °C (-58 ... 302 °F)			ON	OFF	ON	ON	OFF		
	-50 ... 250 °C (-58 ... 482 °F)			ON	OFF	ON	OFF	ON		
	0 ... 100 °C (32 ... 212 °F)			OFF	ON	OFF	OFF	OFF		
	0 ... 150 °C (32 ... 302 °F)			OFF	ON	OFF	ON	OFF		
	0 ... 200 °C (32 ... 392 °F)			OFF	ON	ON	ON	OFF		
0 ... 300 °C (32 ... 572 °F)			OFF	ON	ON	OFF	ON			
Module with U output	0 ... 10 V								OFF	OFF
Module with I output	0 ... 20 mA								OFF	ON
	4 ... 20 mA								ON	OFF

Table: Zero point adjustment

Temperature Range	U Output Module		I Output Module		
	0 ... 10 V		0 ... 20 mA		
	Default value	U_{OUT} (± 3 mV)	Default value	I_{OUT} (± 5 µA)	I_{OUT} (± 5 µA)
-50 ... 50 °C (-58 ... 122 °F)				200 µA	4160 µA
-50 ... 100 °C (-58 ... 212 °F)	-50°C (-58°F) (80.31 Ω)	0 mV	-49°C (56.2°F) (80.70 Ω)	133 µA	4107 µA
-50 ... 150 °C (-58 ... 302 °F)				100 µA	4080 µA
-50 ... 250 °C (-58 ... 482 °F)				67 µA	4053 µA
0 ... 100 °C (32 ... 212 °F)				200 µA	4160 µA
0 ... 150 °C (32 ... 302 °F)	0°C (32°F) (100 Ω)	0 mV	1°C (33.8°F) (100.39 Ω)	133 µA	4107 µA
0 ... 200 °C (32 ... 392 °F)				100 µA	4080 µA
0 ... 300 °C (32 ... 572 °F)				67 µA	4053 µA

Table: Final value adjustment

Temperature Range	Default Value	U Output 0 ... 10 V U_{OUT} (± 3 mV)	I Output 0(4) ... 20 mA I_{OUT} (± 5 µA)
-50 ... 50 °C (-58 ... 122 °F)	50°C (122°F) (119.40 Ω)		
-50 ... 100 °C (-58 ... 212 °F)	100°C (212°F) (138.50 Ω)		
-50 ... 150 °C (-58 ... 302 °F)	150°C (302°F) (157.31 Ω)	10000 V	20000 mA
-50 ... 250 °C (-58 ... 482 °F)	250°C (482°F) (194.07 Ω)		
0 ... 100 °C (32 ... 212 °F)	100°C (212°F) (138.50 Ω)		
0 ... 150 °C (32 ... 302 °F)	150°C (302°F) (157.31 Ω)		
0 ... 200 °C (32 ... 392 °F)	200°C (392°F) (175.84 Ω)	10000 V	20000 mA
0 ... 300 °C (32 ... 572 °F)	300 °C (572°F) (212.02 Ω)		

6. Order Key for the Temperature Measuring Transducers MCR-PT100-...

Standard configuration	Connection method ²⁾	Temperature range ²⁾	Output signal ²⁾
MCR-PT100-I	3	5	2
MCR-PT100-U... MCR-PT100-U-DC MCR-PT100-I MCR-PT100-I-DC	2 ≙ 2-wire 3 ≙ 3-wire 4 ≙ 4-wire	1 ≙ -50...+ 50 °C (-58...+122°F) 2 ≙ -50...+100°C (-58...212°F) 3 ≙ -50...+150°C (-58...+302°F) 4 ≙ -50...+250°C (-58...+482°F) 5 ≙ 0...100°C (31...212°F) 6 ≙ 0...150°C (32...302°F) 7 ≙ 0...200°C (32...392°F) 8 ≙ 0...300°C (32...572°F)	1 ≙ 0-20 mA 2 ≙ 4 - 20 mA

²⁾ If no specification is given, the devices are delivered with the standard configuration (3-wire connection, 0-100°C (32...212°F) and 0-10 V or 4-20 mA).

7. Application Example

