

Resistance Temperature Device Pt100 M

Installation Instructions



Original Installation Instructions

Language: EN

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1. Product Description

The Resistance Temperature Device Pt100 M is a temperature sensor and is used to detect surface temperatures and to transmit the surface temperature to a display or control device.

Examples are the temperature detection of the object to be heated on the object surface or the temperature detection and monitoring of constantly heating cables, e.g. BARTEC EKL or EMK.

The Resistance Temperature Device Pt100 M is available as a Mineral insulated Resistance Temperature Device and as a Resistance Temperature Device in protective Sleeve. Both are for usage and operation inside and outside buildings.

The advantage of the Resistance Temperature Device in protective Sleeve is its small design, while the advantage of the Mineral insulated Resistance Temperature Device is its high flexibility and greater temperature stability.

The connection is made via a 3-wire connection cable, the length-dependent resistance is automatically determined by the connected display or control device, if it supports 3-wire technology.

2. Safety

The Resistance Temperature Device Pt100 M is built according to the state of the art and is safe to operate. To ensure safe operation, careful system planning, proper transportation, professional installation, commissioning and maintenance of all components used are necessary and must be implemented.

Damaged resistance thermometers must not be used and must be replaced immediately. Modifications or repairs to the product are not permitted.

Observe the applicable documents listed below. They must be observed in addition to these instructions:

Storage conditions	21-0000-7Q0001
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2.1. Intended Use

The Resistance Temperature Device Pt100 M is a temperature sensor for temperature detection and transmission to a display or control unit. The signal is transmitted via the connecting cable.

The Resistance Temperature Device Pt100 M is a passive device and simple electrical apparatus as defined by the IEC 60079-11 standard. The use of the Pt100 M as part of an intrinsically safe circuit is permitted. Compliance with the maximum permissible connected load of the intrinsically safe circuit must be ensured.

The Resistance Temperature Device Pt100 M is intended for fixed installation on surfaces, i.e. only fixed installation of the Resistance Temperature Device Pt100 M including the connecting cable is permitted.

All components of the system may only be operated as intended and within their specifications (technical data). The applicable national installation regulations must be observed.

The instructions in these Installation Instructions for the respective life phases must be observed and complied with.

2.2. Foreseeable Misuse

It is **not permitted** to use the Resistance Temperature Device Pt100 M:

- Outside its Intended Use
- with non-approved or intended components
- in potentially explosive atmospheres (exception: use as simple electrical apparatus in accordance with the IEC 60079-11 standard)
- outside its specifications (Technical Data)
- with technical modification or to opening the component
- without observing the instructions in the Installation Instructions and applicable national installation regulations

2.3. Personal Qualification

The Resistance Temperature Device Pt100 M may only be installed by trained personnel. The personnel must have a basic knowledge of electrical engineering.

The wiring for electrical connection and, if necessary, for maintenance or modifications to the installed system may only be carried out by qualified electricians.


Decommissioning and dismantling may only be carried out by an instructed person. Disposal may only be carried out by an authorized specialist company.


When used as simple electrical apparatus in accordance with the IEC 60079-11 standard:


Observe and follow the Personal Qualifikation requirements for the product life cycle phases of system planning, transport and storage, installation, operation and maintenance in accordance with IEC 60079-14. Also observe Annex A of the standard.


2.4. Symbols and Signs

The warning notices indicate dangerous situations and are intended to protect against possible personal injury and damage to property. In the Installation Instructions, the severity of possible dangers is indicated by the following symbols and signs:

	<p>DANGER!</p> <p>Indicates an immediate danger to the life and health of people. Failure to comply will result in serious injury and death.</p>
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	<p>WARNING!</p> <p>Reference to a possible danger to the life and health of people. Failure to observe this warning may result in serious injury or death.</p>
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	<p>CAUTION!</p> <p>Indication of a possible hazard. Can lead to an injury if the warning is ignored.</p>
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	<p>NOTICE!</p> <p>Note on possible material damage. Non-observance may result in damage to the device.</p>
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3. Technical Data

General

Circuit Type	3-wire circuit
Electrical Measurement Tolerances	Class F0,3 according to EN 60751
Capacity	≤ 50 pF/m (silicone cable)
Inductivity	≤ 2 μH/m (silicone cable)
Conductor Cross-Section	0,22 mm ²
min. Bending Radius	30 mm

Product versions

Resistance Temperature Device in protective Sleeve

Measuring Range Temperature sensor	Operating temperature connecting cable	Length of connecting cable	Diameter connecting cable	Outer material Connection cable	Length of temperature sensor	Protection class	Order No.
-50 °C to +200 °C	-50 °C to +200 °C	1500 mm	4 mm	Silicone	40 mm	IP65	03-9040-0006
-50 °C to +200 °C	-50 °C to +200 °C	5000 mm	4 mm	Silicone	40 mm	IP65	03-9040-0010
-50 °C to +400 °C	-50 °C to +400 °C	1500 mm	6 mm	Stainless steel braiding	50 mm	IP40	03-9040-0016

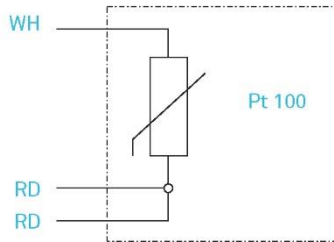
Product version

Mineral insulated Resistance Temperature Device

Measuring Range Temperature sensor/Continuous Operating Temperature	Operating temperature connecting cable	Length of connecting cable	Diameter connecting cable	Outer material Connection cable	Length of temperature sensor	Protection class	Order No.
-50 °C to +500 °C	-50 °C to +200 °C	1500 mm	4 mm	Silicone	1000 mm	IP54	03-9040-0017

Other versions available on request.

Wiring diagram

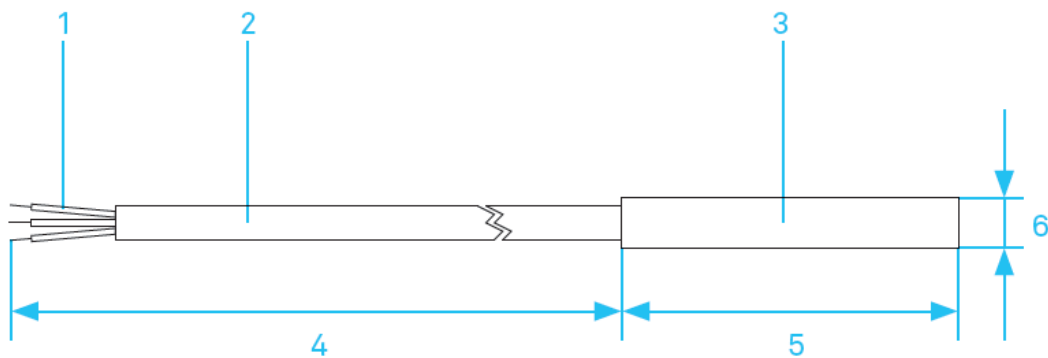


4. Device Description

4.1. Resistance Temperature Device in Protective Sleeve

The Resistance Temperature Device in protective Sleeve consists of a connection cable and a temperature sensor. For the length and material of the connection cable refer to chapter 3. 'Technical Data'.

At one end of the connection cable are stripped wires, crimped with ferrules. At the other end of the connection cable is the temperature sensor with protective sleeve located. The protective sleeve protects the platinum measuring element inside.



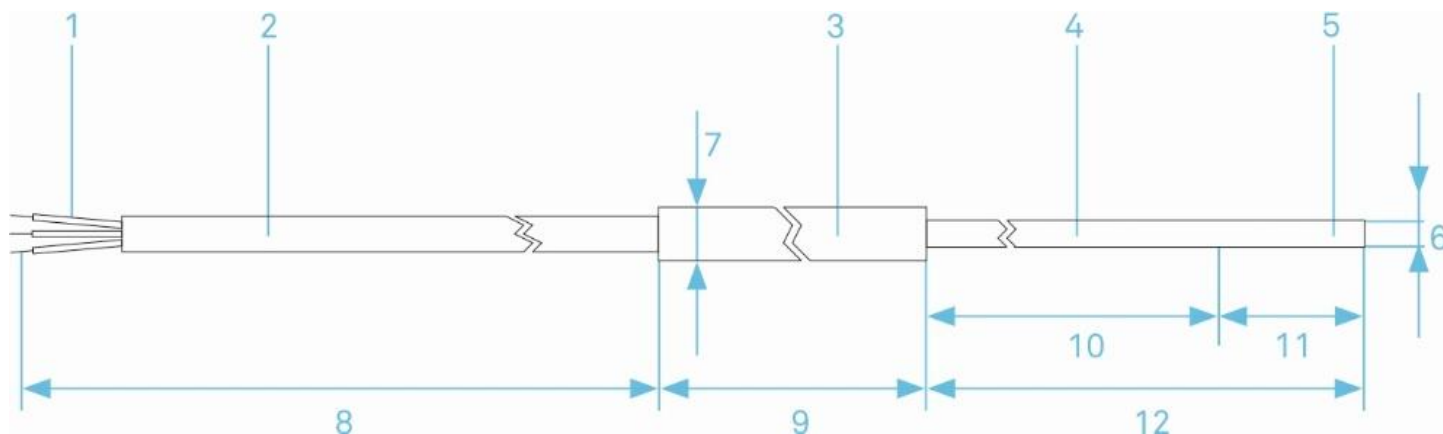
Legende

1	Stripped wires with ferrules
2	3-wire connection cable
3	Temperature sensor in protective sleeve
4	Connection cable length
5	Temperature sensor length
6	Temperature sensor diameter

4.2. Mineral Insulated Resistance Temperature Device

The Mineral Insulated Resistance Temperature Device consists of a connection cable, a connection sleeve and a sensor cable. For the length and material of the connection cable refer to chapter 3. 'Technical Data'.

At one end of the connection cable are stripped wires, crimped with ferrules. At the other end of the connection cable is the connection sleeve located. It is the connection to the sensor cable. The sensor cable consists of a flexible mineral insulated cable and the temperature sensor. The flexible mineral insulated cable is filled with magnesium oxide. The temperature sensor is not flexible.



Legende

1	Stripped wires with ferrules
2	3-wire connection cable
3	Connection sleeve
4	Flexible mineral insulated cable
5	Temperature sensor
6	Temperature sensor diameter
7	Connection sleeve diameter
8	Connection cable length
9	Connection sleeve length
10	Flexible mineral insulated cable length
11	Temperature sensor length
12	Sensor cable length

5. Function Description

The Resistance Temperature Device Pt100 M uses the property of metals (e.g. platinum) that increase their electrical resistance with rising temperature. This provides an accurate temperature reading of the measuring point, which can be visualized and used by the connected display- or control device.

The Resistance Temperature Device Pt100 M has a resistance of 100 Ohm at 0 °C.

Please also refer to the Pt100 M resistance table in the appendix.

6. Transport and Storage

In order to operate the Resistance Temperature Device Pt100 M and the entire system reliably and safely, the device must be transported and stored properly.

The product may only be transported by qualified personnel.

The BARTEC storage conditions must be observed for storage of the Pt100 M. See 'Applicable documents' in chapter 2. 'Safety'.

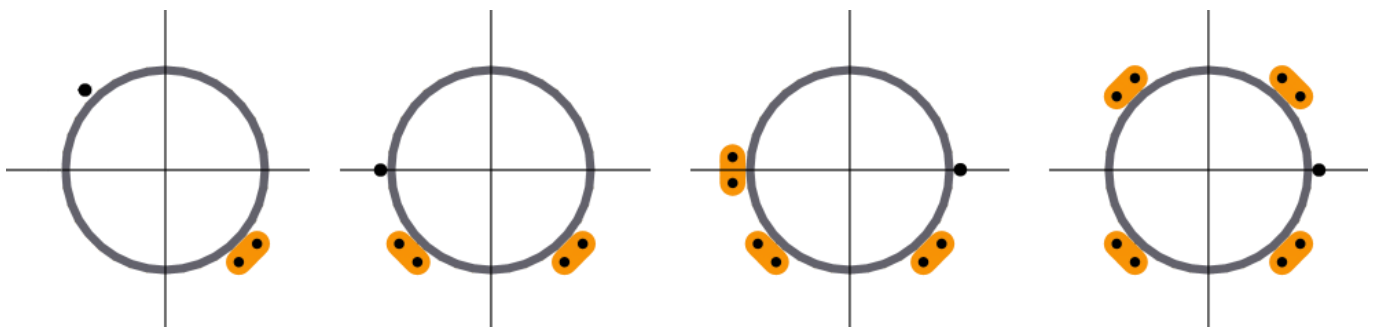
7. Installation

Installation must be carried out carefully and in accordance with the information provided by the system planning, the applicable national standards, regulations and approvals, the technical data of the individual components and these Installation Instructions. Please also observe the installation and connection instructions for the respective display or control unit.

The Resistance Temperature Device Pt100 M is intended for fixed installation on surfaces. The connecting cable, the temperature sensor and, if present, the connection sleeve must be attached to the corresponding surface and, if necessary, to other attachment points several times.

Installation Notes

- Do not install resistance thermometers near to a heating cable.
Exception: The temperature of the heating cable should be recorded and monitored, if necessary observe IEC 60079-30-1 for installation as a hotspot
- Do not place the measuring point near to heat radiating components such as fittings, pumps, flanges, pipe bearings...
Exception: These areas should be monitored.
Install at least 2 m away from these components
- For single or multiple heating cables on a surface:
Optimal mounting position for Pt100 M is shown in the following sketch (sectional view):



- Fix the Pt100 M at several points with suitable material to ensure safe operation and the most precise measurement results possible
- Use of BARTEC stainless steel cable ties recommended for surface temperatures above 180°C
- If necessary, observe different temperature resistances of the temperature sensor in protective sleeve/sensor cable and the connection cable
- Avoid damage to the connection cable of the Pt100 M or the heating cable due to excessive tensioning of the mounting material
- Apply the temperature sensor on the mounting object surface with aluminum adhesive tape; it improves the heat transfer and prevents the penetration of insulating material between the resistance thermometer and the pipeline
- Further use of heat-conducting paste or cement on the mounting object surface can improve heat transfer
- If necessary, use Insulating Bushing IEB to lead the connecting cable of the Pt100 M out of the pipe insulation (see chapter 11.2. ‚Accessories, Spare Parts‘)

For Mineral Insulated Resistance Temperature Device:

- Observe the minimum bending radius for the flexible mineralinsulated cable (see chapter 3. ‚Technical Data‘)
- Note: The temperature sensor is not flexible. It will be destroyed by the application of bending force, for example.

Electrical connection

The electrical connection of the Resistance Temperature Device Pt100 M is made at the corresponding terminal points of the display or control unit.

Observe the connection diagram (see chapter 3. ‚Technical Data‘)

8. Operation

The Resistance Temperature Device Pt100 M is suitable for permanent use and is maintenance-free.

Recommended as part of the regular inspection, in the case of faults and if necessary:

- Dry or damp cleaning of components that are located outside the pipe insulation, if installed
- Visual inspection for damage, oxidation or embrittlement of parts located outside the installed pipe insulation, if applicable

9. Maintenance, Troubleshooting

When troubleshooting the technical system or damage to the Resistance Temperature Device Pt100 M, a function check can be done by measuring the resistance of the Pt100 M.

Steps for resistance measurement:

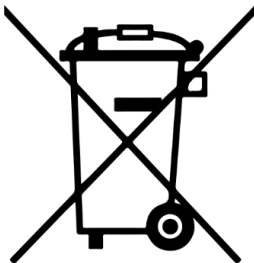
1. De-energize the display or control unit
2. Open the display or control unit, if necessary
3. Disconnect the wires of the 3-wire connection cable of the Pt100 M
4. Check compensation path for continuity; observe Wiring diagram' in chapter 3. 'Technical Data'
5. Measure the resistance value of the Pt100 M with a multimeter or resistance measuring bridge
6. Assign the measured resistance value to the corresponding temperature using the 'Resistance Table Pt100 M' in chapter 11.1
7. Measure the actual temperature on the mounting object surface of the Pt100 M; use another suitable thermometer for this purpose
8. Compare the temperature value of the 'Resistance Table Pt100 M' with the measured value of the additional thermometer. If the values are the same or almost the same, there is no fault with the Resistance Temperature Device Pt100 M. If the values differ significantly, the Resistance Temperature Device Pt100 M is faulty. It should be replaced or, if necessary, shortened at an existing break in the connecting cable. After connecting the wires of the 3-wire connection cable to the display or control unit, the length-dependent resistance can be determined automatically.

10. Dismantling, Disposal

Observe the following steps for dismantling:

1. De-energize the display or control unit
2. Open the display or control unit
3. Disconnect the wires of the 3-wire connection cable of the Pt100 M
4. Remove the pipe insulation if necessary
5. Remove the Pt100 M from the mounting object surface

The Resistance Temperature Device Pt100 M must be disposed of in a professional and environmentally friendly way and all local disposal regulations must be observed. The Pt100 M must not be disposed of with household waste. Use local collection points for electronic waste.

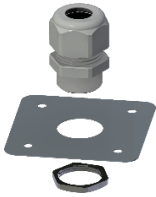



11. Appendix

11.1. Resistance Table Pt100 M

Temperature in °C	Resistance in Ω	Temperature in °C	Resistance in Ω	Temperature in °C	Resistance in Ω	Temperature in °C	Resistance in Ω	Temperature in °C	Resistance in Ω
500	280,90	320	219,12	140	153,58	44	117,08	-28	89,01
495	279,23	315	217,35	135	151,70	42	116,31	-30	88,22
490	277,56	310	215,57	130	149,82	40	115,54	-35	86,25
485	275,89	305	213,80	125	147,94	38	114,77	-40	84,27
480	274,22	300	212,02	120	146,06	36	113,99	-45	82,29
475	272,54	295	210,24	115	144,17	34	113,22	-50	80,31
470	270,86	290	208,45	110	142,29	32	112,45	-55	78,32
465	269,18	285	206,67	105	140,39	30	111,67	-60	76,33
460	267,49	280	204,88	100	138,50	28	110,90	-65	74,33
455	265,80	275	203,08	98	137,74	26	110,12	-70	72,33
450	264,11	270	201,29	96	136,98	24	109,35	-75	70,33
445	262,42	265	199,49	94	136,22	22	108,57	-80	68,33
440	260,72	260	197,69	92	135,46	20	107,79	-85	66,31
435	259,02	255	195,88	90	134,70	18	107,02	-90	64,30
430	257,32	250	194,07	88	133,94	16	106,24	-95	62,28
425	255,61	245	192,26	86	133,18	14	105,46	-100	60,25
420	253,90	240	190,45	84	132,42	12	104,68	-105	58,22
415	252,19	235	188,63	82	131,66	10	103,90	-110	56,19
410	250,48	230	186,82	80	130,89	8	103,12	-115	54,15
405	248,76	225	184,99	78	130,13	6	102,34	-120	52,11
400	247,04	220	183,17	76	129,37	4	101,56	-125	50,06
395	245,31	215	181,34	74	128,60	2	100,78	-130	48,00
390	243,59	210	179,51	72	127,84	0	100,00	-135	45,94
385	241,86	205	177,68	70	127,07	-2	99,22	-140	43,87
380	240,13	200	175,84	68	126,31	-4	98,44	-145	41,79
375	238,39	195	174,00	66	125,54	-6	97,65	-150	39,71
370	236,65	190	172,16	64	124,77	-8	96,87	-155	37,63
365	234,91	185	170,31	62	124,01	-10	96,09	-160	35,53
360	233,17	180	168,46	60	123,24	-12	95,30	-165	33,43
355	231,42	175	166,61	58	122,47	-14	94,52	-170	31,32
350	229,67	170	164,76	56	121,70	-16	93,73	-175	29,20
345	227,92	165	162,90	54	120,93	-18	92,95	-180	27,08
340	226,17	160	161,04	52	120,16	-20	92,16	-185	24,94
335	224,41	155	159,18	50	119,40	-22	91,37	-190	22,80
330	222,65	150	157,31	48	118,62	-24	90,59	-195	20,65
325	220,88	145	155,45	46	117,85	-26	89,80	-200	18,49

11.2. Accessories, Spare Parts

	<p>Insulation entry bushing</p> <p>for protection of trace heaters or sensor cables at the point where they pass through the thermal insulation outer cladding</p>	<p><i>for PSB trace heaters:</i> Catalog No.: IEB-P Part No.: 05-0020-0472</p> <p><i>for MSB and HSB trace heaters:</i> Catalog No.: IEB-H Part No.: 05-0020-0091</p> <p><i>for HSB+ and HTSB trace heaters:</i> Catalog No.: IEB-B Part No.: 05-0020-0524</p> <p><i>for Pt100 M sensor:</i> Catalog No.: IEB-PT Part No.: 05-0020-0262</p>
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	<p>Enclosure for Pt100 M</p> <p>Enclosure for single or double use with Pt100 M in ordinary locations. Integrated terminal block with 8 or 16 clamping points, 2.5 mm².</p> <p><i>Cable gland for signal line: M25 (clamping range 10 mm to 17 mm)</i></p> <p><i>Cable gland for Pt100 M: M16 (clamping range 4,5 mm to 9 mm)</i></p>	<p><i>Single entry Pt100 M:</i> Part No.: 07-5177-9082</p> <p><i>Double entry Pt100 M:</i> Part No.: 07-5177-9083</p>
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11.3. Service Address

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