

User Manual

Screw-in probe with steel immersion sleeve

Article no.803016 1011



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1. General

- The temperature probe described in the operating instructions is manufactured according to the current state of the art. All components are subject to strict quality and environmental criteria during manufacture. Our management systems are certified according to ISO 9001 and ISO 14001. The general terms and conditions in the sales documents apply, subject to technical changes.
- These operating instructions are an important part of the product. It must be available to qualified personnel and must be carefully read and understood before starting any work. Please be sure to comply with all the safety and handling instructions given. In particular, observe the local accident prevention regulations and general safety regulations applicable to the area of use of the product.
- The manufacturers liability expires in the event of damage caused by improper use, non-observance of the instructions, use of insufficiently qualified personnel and unauthorised modifications to the product.

1.1. Security

WARNING! Before installation, commissioning and operation, please make absolutely sure that the correct temperature probe has been selected with regard to design and specific measuring conditions. Failure to do so may result in serious personal injury and/or damage to property.

- The selection of the products and, in particular, the determination of their suitability for a specific purpose are the sole responsibility of the purchaser, who must also ensure that incorrect planning, operation or installation does not cause any further damage and that compliance with the relevant construction and safety guidelines is observed and guaranteed.
- No liability or warranty is expressly accepted for damage caused by incorrect planning, operation, installation or malfunction of the products.
- The technical data and connection conditions in the supplied installation and operating instructions apply exclusively. Changes are possible in the interests of technical progress and the continuous improvement of our products.

1.2. Intended use

- For the intended use of the probe, please refer to the technical data and the commissioning instructions in the operating instructions. The product is designed and built exclusively for the intended use described there and may only be used accordingly. The technical specifications must be observed. Claims due to improper use are excluded.
- This product must not be used for safety-relevant tasks, such as monitoring or protecting persons against danger or injury, as an emergency stop switch on systems or machines, etc.
- This type of temperature probe has been developed, qualified and manufactured to the highest quality standards. Application-specific environmental or stress conditions can influence the behaviour and lead to deviations from the specifications in the data sheet. To avoid this, we recommend application-specific advice.

Application-specific environmental or stress conditions can be in particular:

- Ingress of humidity, which can lead to falsification of measured values
- Vibration, which causes high acceleration forces
- UV irradiation, which can lead to embrittlement of the cable insulation
- Tensile forces acting on the cable, which can damage the probes internal structure
- Insufficient thermal coupling to the measured medium, with increased response times as a result
- impact with excessively high temperatures, which can change or destroy the built-in measuring resistor or electronic components
- corrosion at the cable ends or the connector contacts, so that measured value falsifications can occur

1.3. Personnel qualification

WARNING! - Risk of injury due to insufficient professional qualification! Improper handling can lead to considerable personal injury and damage to property.

- The activities described in these operating instructions may only be carried out by adequately qualified personnel. Special operating conditions may require additional, appropriate knowledge, e.g. about aggressive media, possible dangers or country-specific regulations, standards or guidelines. Please keep unqualified personnel away from the danger areas.

1.4. Signage, safety labels, type plate

Products are labelled as follows. (Exemplary representation)

Label for temperature probes with housing/head



Label for cable probes (attached to the cable as a flag)



2. Transport, packaging and storage

Transport: Please inspect the product for any transport damage immediately after delivery. Please notify us immediately of any obvious damage.

Packaging: Please remove the packaging only immediately before assembly and keep it, as the packaging provides optimum protection during transport.

Storage: The permissible storage temperature is -20 ... +70 °C and the ambient humidity conditions at the storage location should preferably be approx. 20% ... 85% relative humidity; condensation should be avoided.

The following influences should be avoided:

- Direct sunlight or proximity to hot objects
- Mechanical vibration, mechanical shock (hard impact)
- Exposure to soot, steam, dust or corrosive gases
- Explosive environment, flammable atmospheres

Original packaging: Please store the product in the original packaging in a place that meets the conditions listed above. If the original packaging is not available, please pack and store the product as follows:

- Wrap the product in an antistatic plastic sheet.
- Place the product with the insulation material in the packaging.
- For longer storage (more than 30 days), add a bag of desiccant to the packaging.

3. Commisioning

3.1. Assambly

- The products may only be connected in a de-energised state, only to safety extra-low voltages and only by suitably qualified personnel.
- Please observe the safety regulations of the VDE, the federal states, their monitoring bodies, the TÜV and the local EVU. The installation instructions in the data sheet must be observed.
- Please observe EMC guidelines to prevent damage, faults on the product or measured value deviations.

3.2. Requirements for achieving the protection class (IP 65)

- Only use the cable gland in the specified clamping range (select the cable Ø to match the cable gland).
- Do not use the lower clamping area when using very soft cable types.
- Only use round cables (a slightly oval cross-section may also be suitable).
- Do not twist the cable.
- Multiple opening/closing is possible, but can have a negative effect on the protection class.
- For cables with pronounced cold flow behaviour, please tighten the screw connection if necessary.

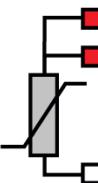
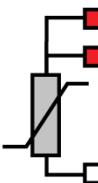
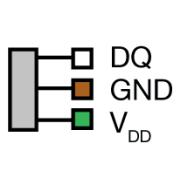
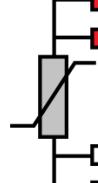
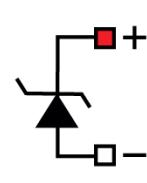
3.3. Drilling template

You will find the drilling template, if available, in the technical data.

3.4. Pin assignment

The characteristics of our sensors can be found on our website or in the appendix to these operating instructions.

- The products are designed for operation on safety extra-low voltages (SELV).
- For the electrical connection of the products, the technical data of the products apply.
- Especially for passive probes (e.g. Pt100 etc.) in a two-wire circuit, the lead resistance of the supply line must be taken into account in order to correct measured value deviations (offset).
- If necessary, the lead resistance must be corrected in the subsequent electronics.
- Due to self-heating, the measuring current influences the measuring accuracy. Therefore, the measuring current should not be greater than 1 mA.

Wiring diagram				
		 <p>DQ GND V_{DD}</p>		
2-Wire	3-Wire	3-Wire for DS -Sensors	4-Wire	LM235Z
Connection LM235Z				
The LM235Z sensor is a semiconductor. Attention must be paid to the correct polarity when connecting. The measuring current is between 400 µA und 5 mA, the resolution is 10 mV / K.				

3.5. Maintenance

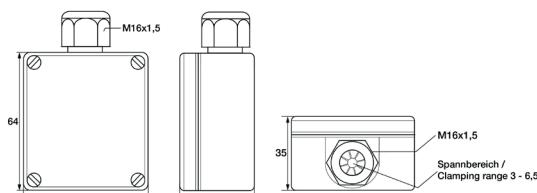
The product is maintenance-free. Repairs may only be carried out by the manufacturer or by qualified personnel.

3.6. Disposal

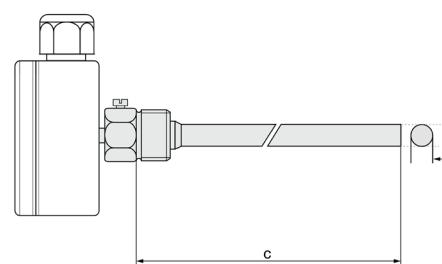
The product is to be classified as electrical and electronic equipment, so that it must be disposed of as electrical / electronic waste. Alternatively, you can return the product to us for proper disposal. The product should not be disposed of as household waste. Special treatment for special components may be legally mandatory and ecologically sensible. Please also observe the local legislation applicable to disposal.

Housing

Material	Polyamide
Dimension (L/W/H) (mm)	64 x 58 x 35
Color	white similar RAL 9010
Cable entry	with strain relief
Clamping range (mm)	5 to 9
Electrical connection	Screw terminals max. 1,5 mm ²

**Screw-in thread****C - Mounting length**

Material	Stainless steel 1.4571 316Ti	Code	Length (mm)
Process connection	G1/2 "	C0050	50 ¹⁾
Protection sleeve			C0100 100 ¹⁾
Material	Stainless steel 1.4571 316Ti	C0150	150 ¹⁾
Mounting length (mm)	please choose	C0200	200 ¹⁾
Ø (mm)	6 ¹⁾	C0250	250 ¹⁾
Immersion sleeve			C0300 300 ¹⁾
Ø immersion sleeve (mm)	9	C0400	400 ¹⁾
Material immersion sleeve	Stainless Steel		
Pressure immersion sleeve	max. 40bar		



Other mounting lengths on request | ¹⁾Tolerance ± 1% | other protective sleeve lengths and Ø available on request | ¹⁾ Tolerance ± 0,1 mm

Your order code

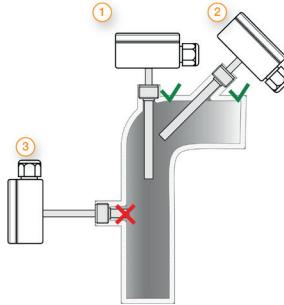
Article no.	Measuring element	Connection Type	Mounting length
803016 1011	A____	B____	C____

Delivery and Assembly

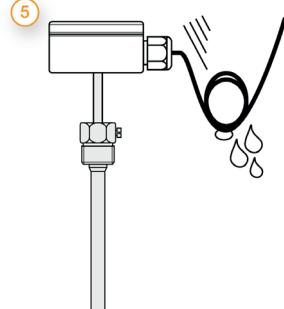
Assembly instructions	via immersion sleeve
Delivery and Packaging	Probe, separately packaged in PE bag

Important assembly advices

Measuring errors can occur due to heat dissipation to the environment. To keep these as small as possible, we recommend immersing the protection sleeve of your temperature probe as deep as possible into the medium to be measured during installation. The optimum installation depth should be 10-15 times the Ø of the protection sleeve or, if an immersion sleeve is used, the Ø of the immersion sleeve. When installing in pipes whose Ø does not have a sufficiently deep installation depth, you should either install the probe at an angle or in a pipe elbow. Make sure that you have enough space so that the probe can be removed again. 1) Installation with sufficient installation depth 2) Installation at an angle with small pipe Ø 3) Not like this: Minimum installation depth not reached



Installation by using an immersion sleeve (4): Please ensure that the Ø and length of the immersion sleeve are selected to suit the installation situation so that the minimum immersion depth can be achieved. Please also ensure that the process connection is correct. Because the probe is not inserted directly into the medium, but via the immersion sleeve, the response times are somewhat slower. The probe should be selected so that the protection sleeve touches the bottom of the immersion sleeve and the air cushion around the protection tube is as small as possible. The use of thermal conduction paste can improve the response times.



Please lay the cable so that no water can penetrate the probe and with a spare loop (4). This allows you to extend the probe without disconnecting the electrical connection.

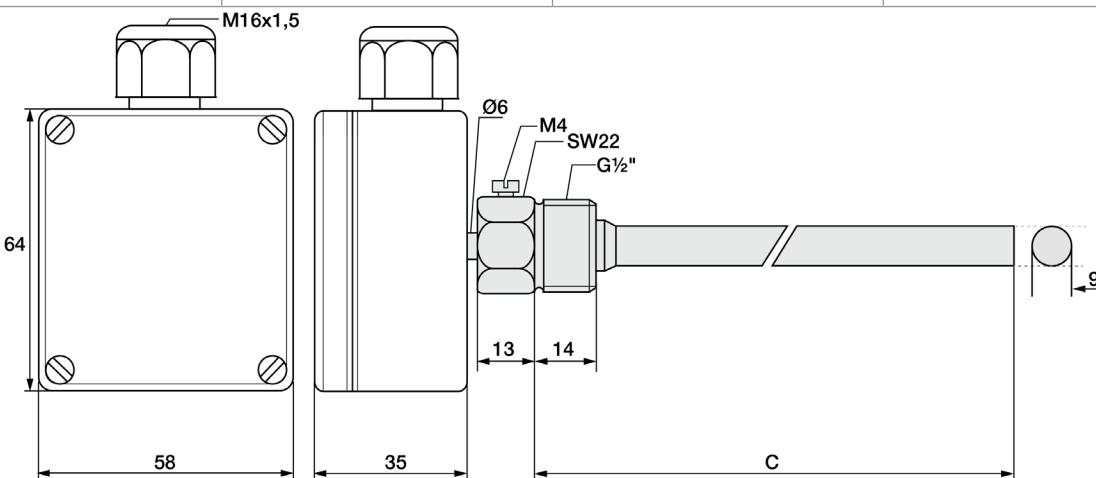
Technical drawing

Customizable options
A - Measuring element

B - Connection Type

C - Mounting length

All dimensions in mm



Matching accessories: Connection cable

Connection cable

Please select your desired cable first.

Picture	Code	Connection Type	Color	IP	From (°C) ¹⁾	To (°C) ¹⁾	Outside material	Material strand	Ø (mm) ²⁾	Q (mm ²) ³⁾	Color strand	Ω / m ⁴⁾
	809200 0	2-Wire	black	IP67	-30	+105	PVC	PVC	4,8	0,22	rd, wt	0,07
	809200 1	3-Wire	black	IP67	-30	+105	PVC	PVC	4,8	0,22	rd, wt, rd	0,07
	809200 2	4-Wire	black	IP67	-30	+105	PVC	PVC	4,8	0,22	rd, wt, rd, wt	0,07
	809210 0	2-Wire	red-brown	IP67	-50	+180	Silicone	Silicone	4,7	0,22	rd, wt	0,08
	809210 1	3-Wire	red-brown	IP67	-50	+180	Silicone	Silicone	4,9	0,22	rd, wt, rd	0,08
	809210 2	4-Wire	red-brown	IP67	-50	+180	Silicone	Silicone	4,9	0,22	0,08	0,08

Insulation resistance: $\geq 100 \text{ MOhm}$ at min. 100 VDC | ¹⁾Perm. range $^{\circ}\text{C}$ | ²⁾Tolerance $\pm 0,2 \text{ mm}$ | ³⁾Tolerance $\pm 0,03 \text{ mm}^2$ | ⁴⁾per single strand | ⁵⁾We use this cable only when using a DS18B20 or LM34 sensor. Litz color brown, green, white | Please also note the connection Type of your selected temperature sensor.

Now please select the length and add the code to the article no. of the cable.

Length (m)	1	2	5	10	20
Code	010	020	050	100	200

Please append these digits to the part number of your desired cable.

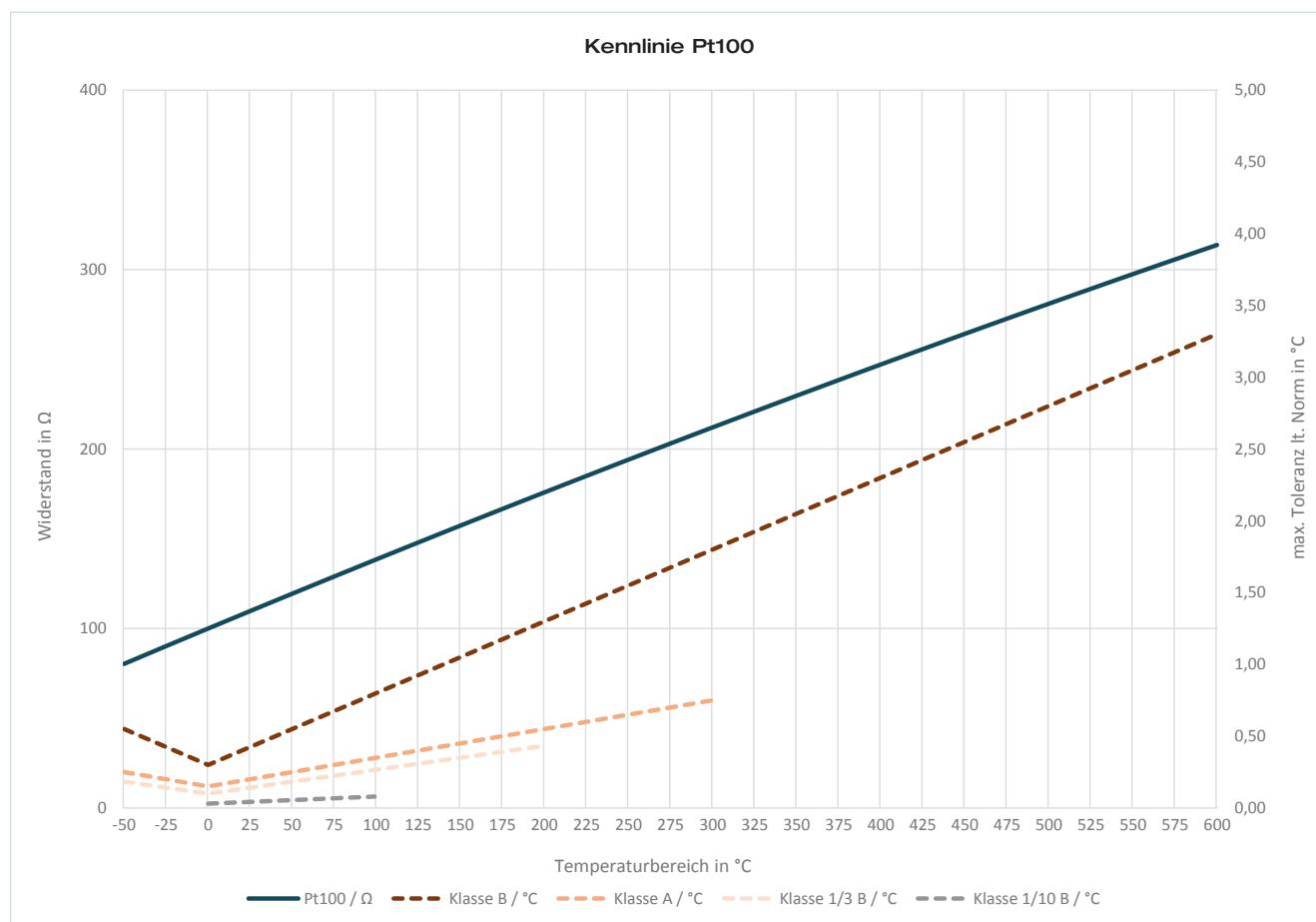
Matching accessories: Heat-conducting paste

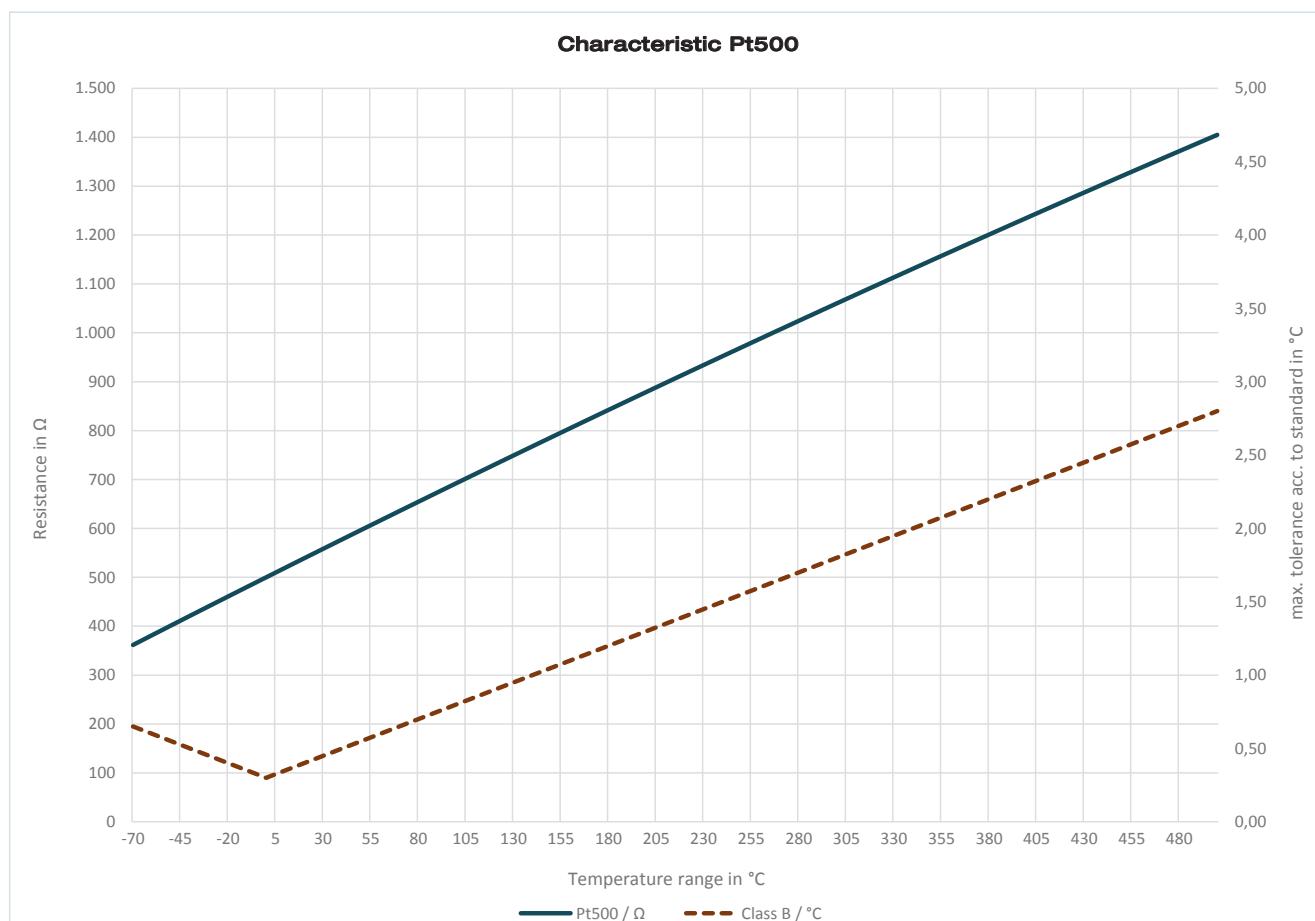
Heat-conducting paste

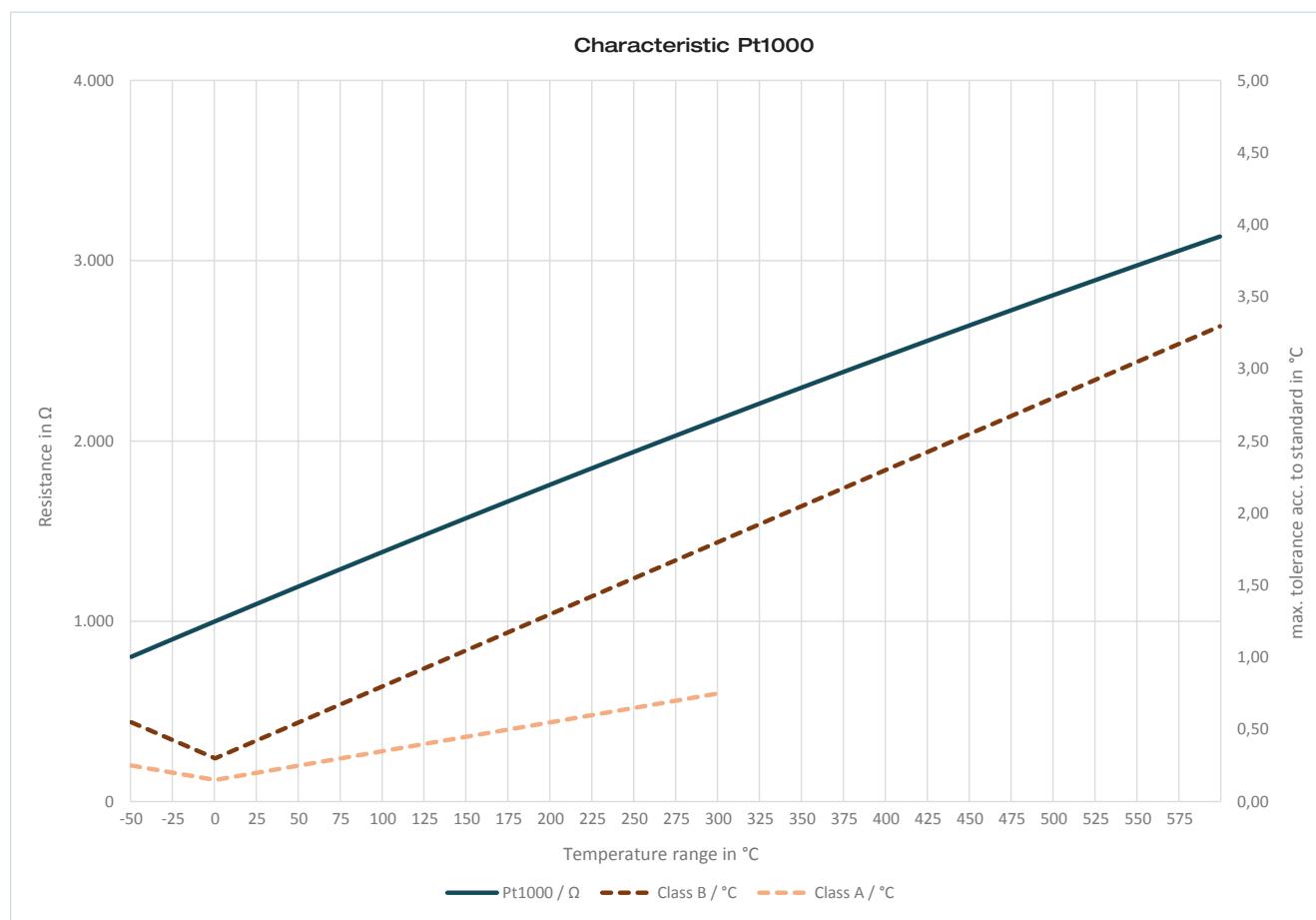


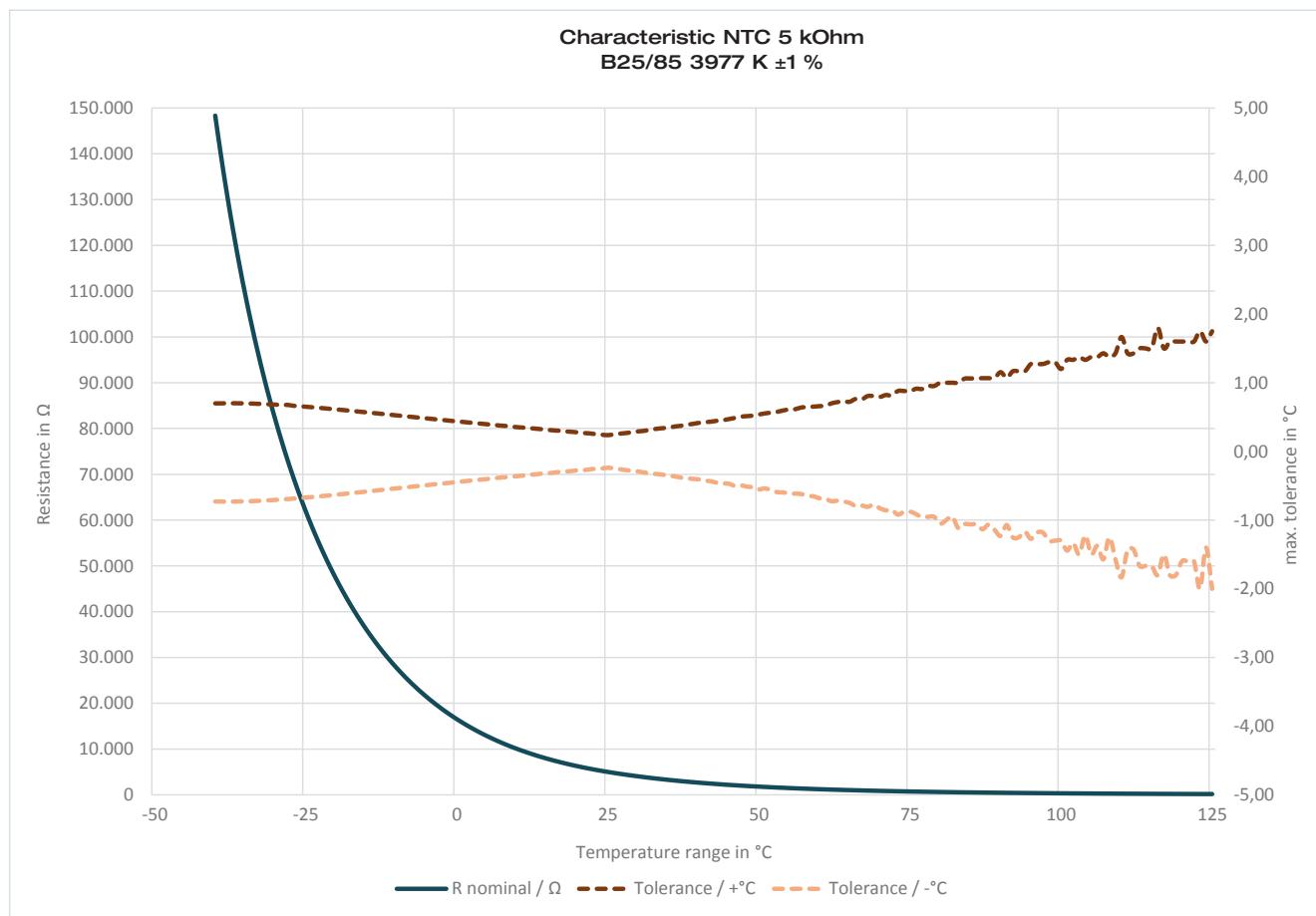
Article no.	809540 1000
Content	10 ml
Thermal conductivity	>2.5 W/mK
Min / Max °C	-30 °C to +280 °C
Thermal resistance	< 0.126

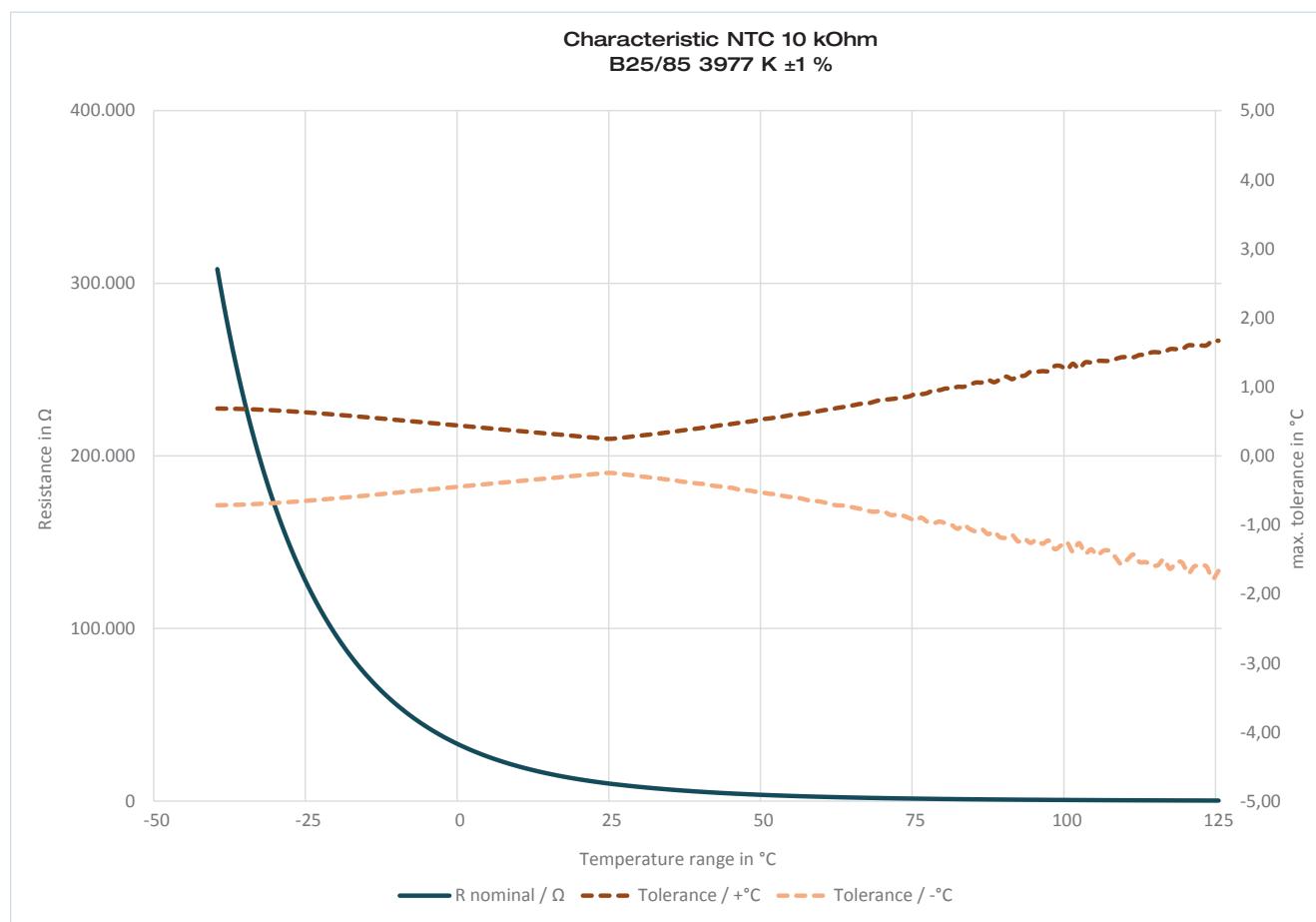
5. Characteristics

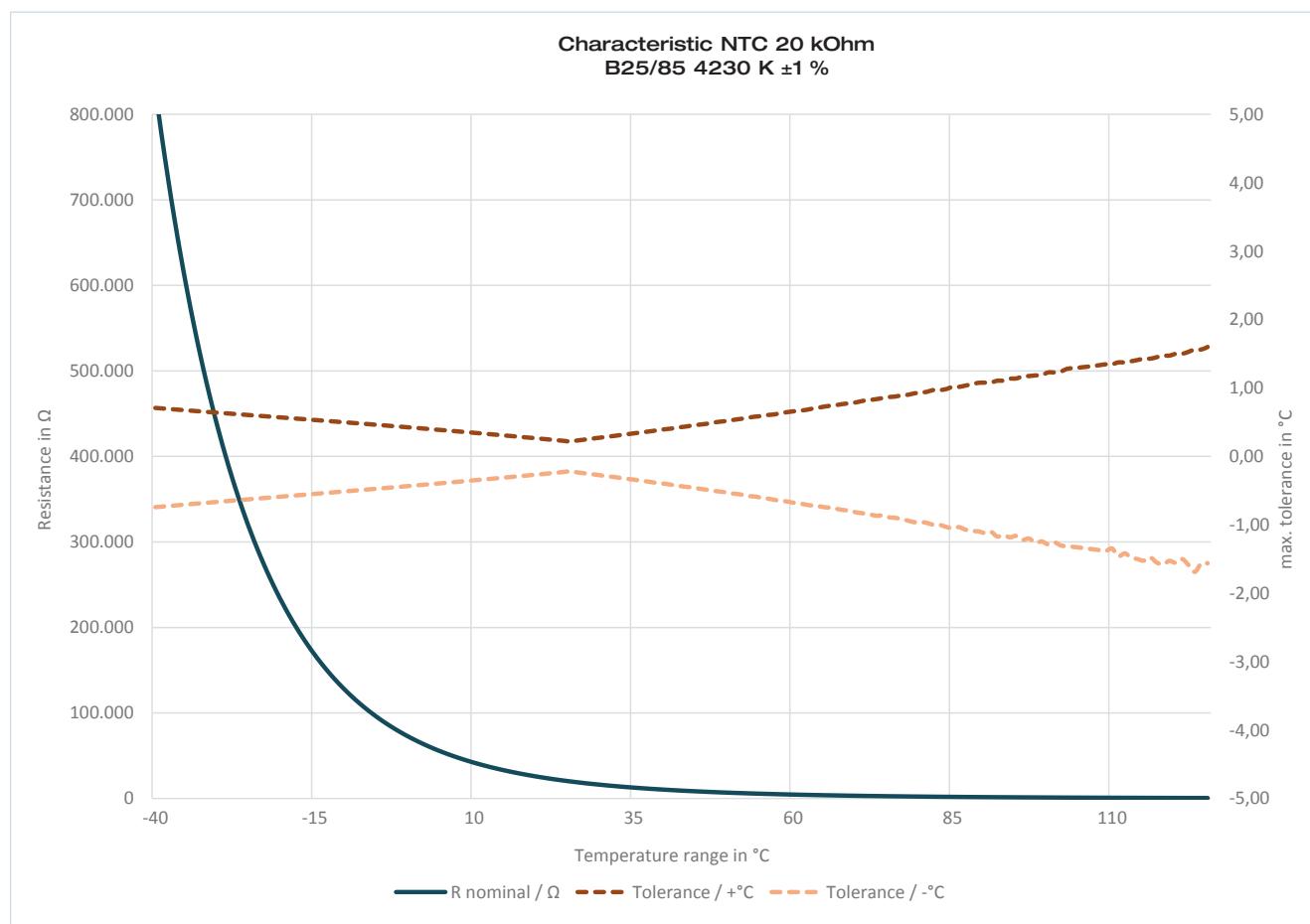






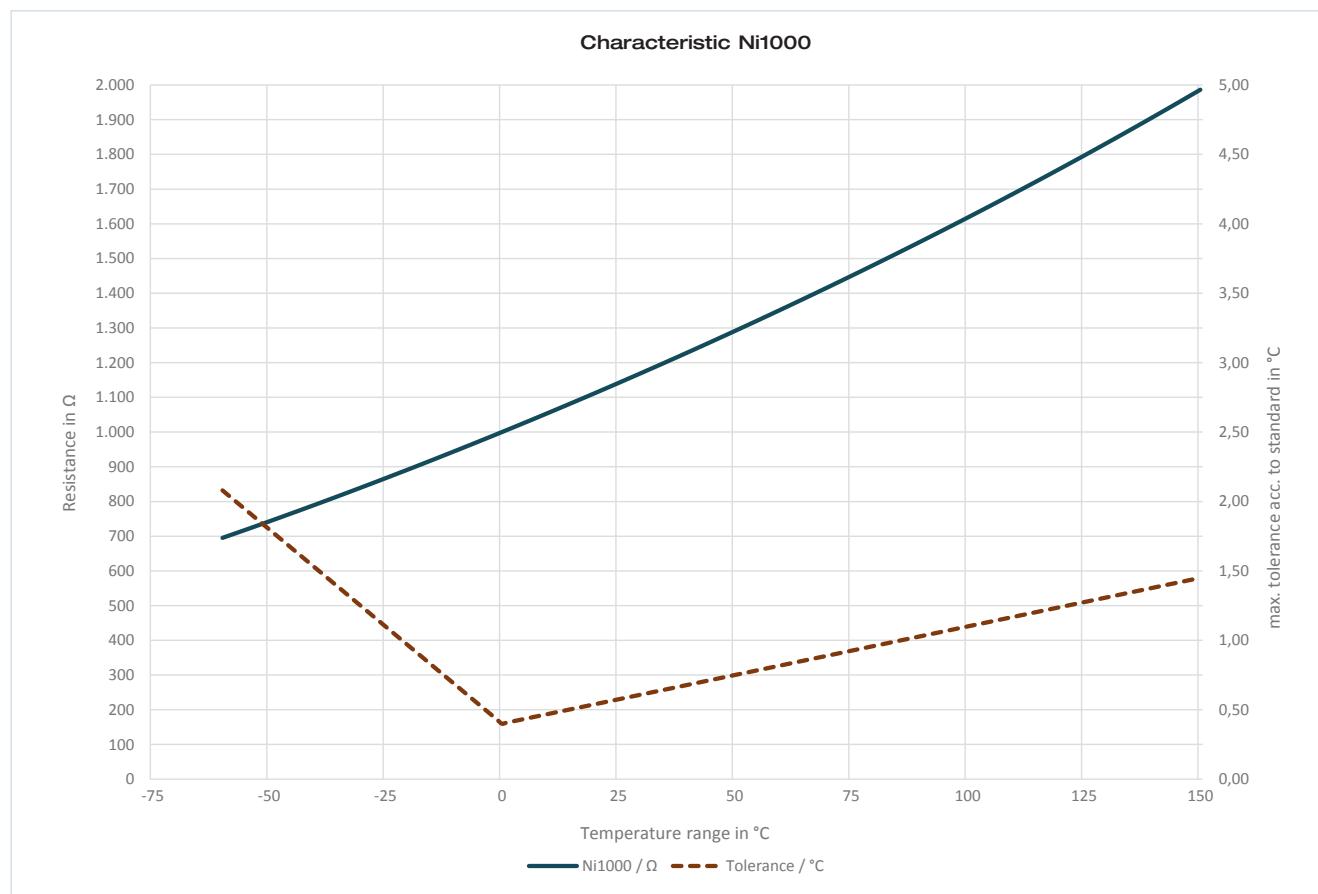


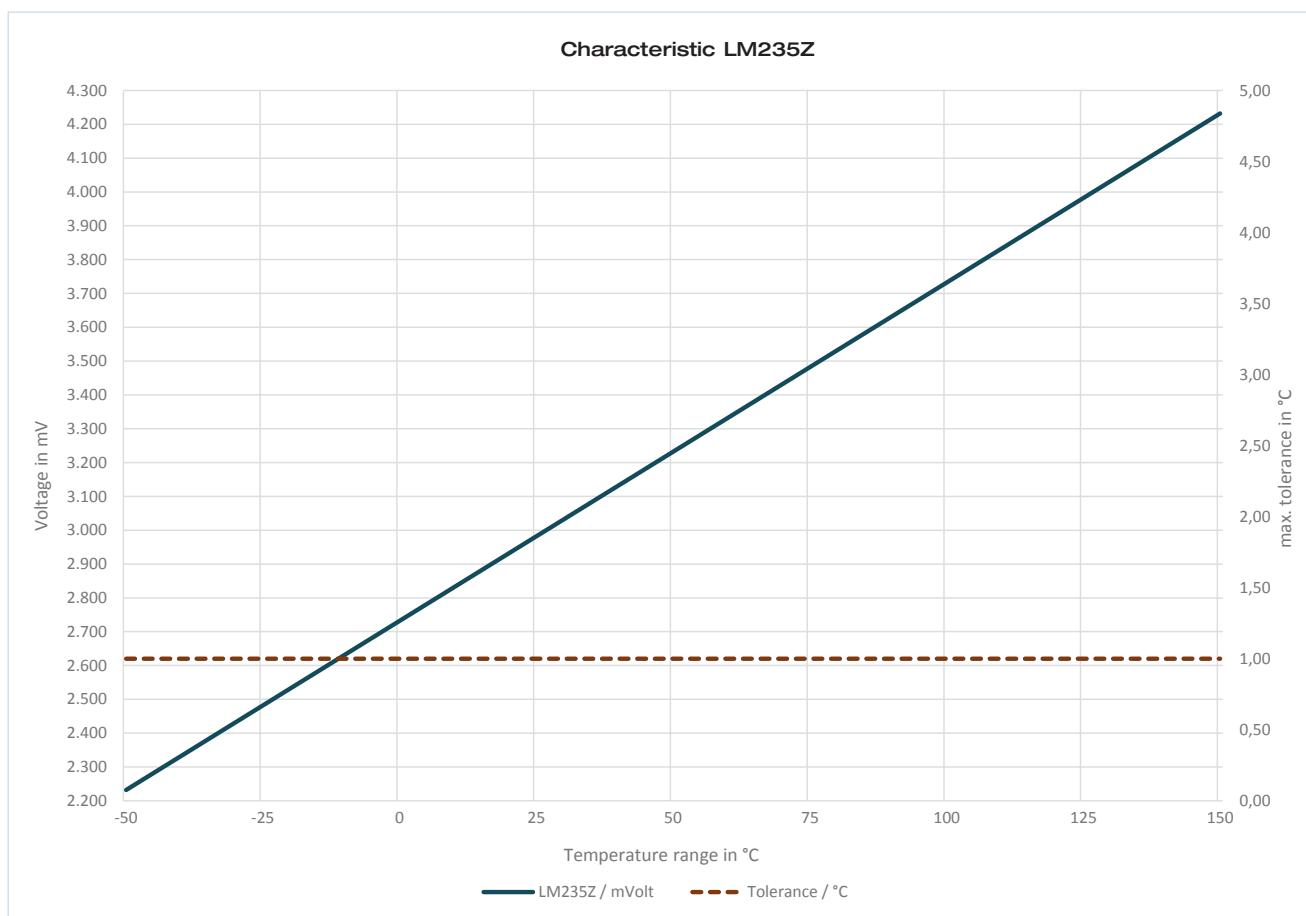




T °C	R Ω	max.tol. ± in °C*												
130	1833,35	1,3	135	1870,87	1,3	140	1908,87	1,4	145	1947,35	1,4	150	1986,35	1,5
131	1840,82	1,3	136	1878,43	1,4	141	1916,52	1,4	146	1955,11	1,4			
132	1848,3	1,3	137	1886,01	1,4	142	1924,2	1,4	147	1962,89	1,4			
133	1855,8	1,3	138	1893,61	1,4	143	1931,9	1,4	148	1970,69	1,4			
134	1863,33	1,3	139	1901,23	1,4	144	1939,62	1,4	149	1978,51	1,4			

*Maximum tolerance ± according to IEC 751 / EN 60751 in °C





Characteristic KTY 81-210

Measuring range: -50 °C to +150 °C

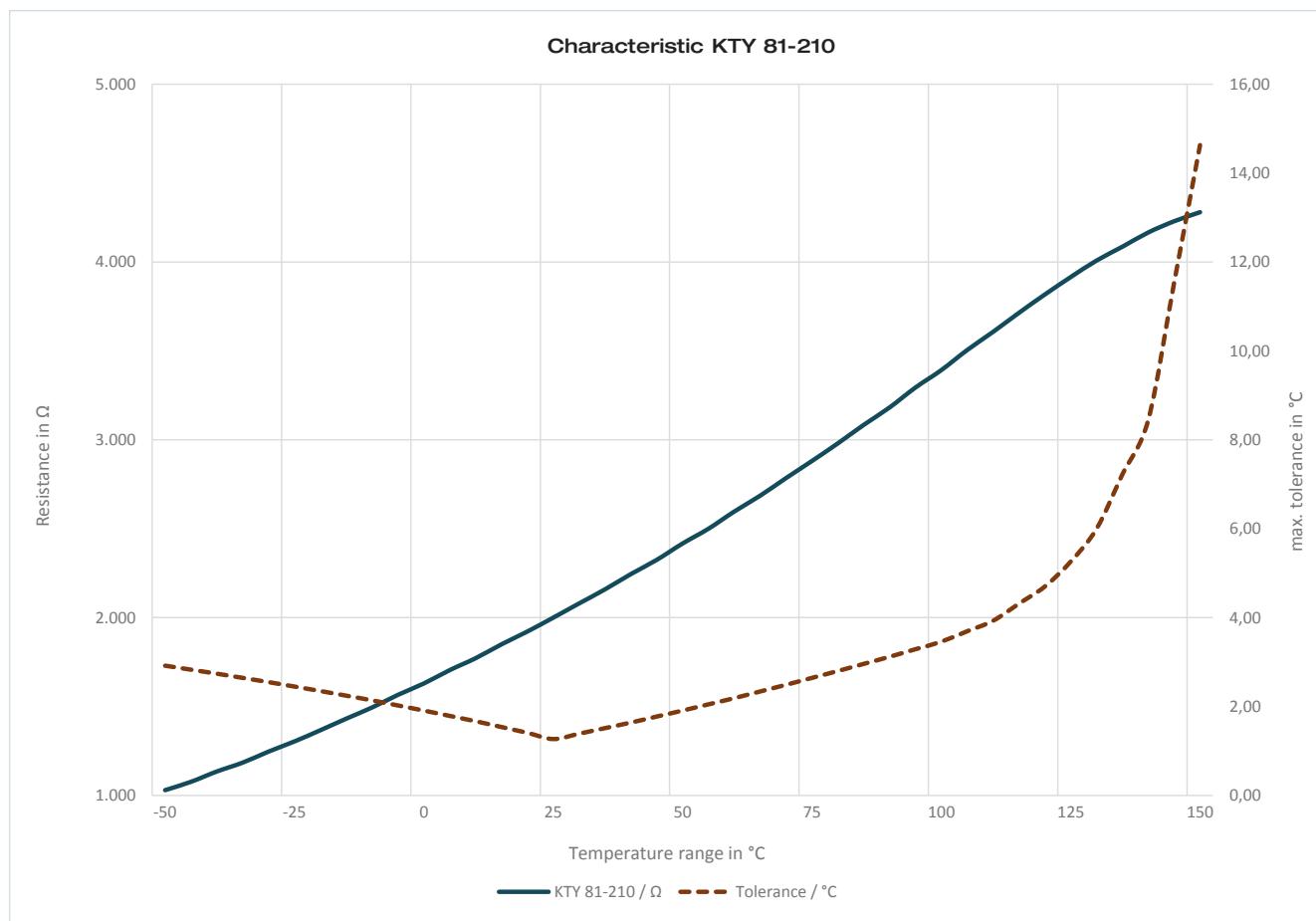
Example values @ +25 °C	
+°C	-°C
1,27	-1,27

T °C	R Ω	Max. tol. ± in °C*
-50	1.030	2,9
-40	1.135	2,7
-30	1.247	2,6
-20	1.367	2,4
-10	1.495	2,1
0	1.630	1,9
10	1.772	1,7
20	1.922	1,4
25	2.000	1,3

T °C	R Ω	Max. tol. ± in °C*
30	2.080	1,4
40	2.245	1,6
50	2.417	1,9
60	2.597	2,2
70	2.785	2,5
80	2.980	2,8
90	3.182	3,1
100	3.392	3,5

T °C	R Ω	Max. tol. ± in °C*
110	3.607	3,9
120	3.817	4,7
125	3.915	5,3
130	4.008	6,0
140	4.166	8,5
150	4.280	14,6

* Maximum tolerance



To keep the temperature error low, an operating current of $I_{sen(cont)} = 1 \text{ mA}$ is recommended for temperatures above 100 °C
For further information see data sheet: https://www.nxp.com/docs/en/data-sheet/KTY81_SER.pdf

Characteristic DS18B20

Measuring range: -55 °C to +120 °C

Accuracy

-10 °C to +85 °C: ±0,5 °C

°C	Digital output (binary)	Digital output (Hex.)
+125	0000 0111 1101 0000	07D0h
+85	0000 0101 0101 0000	0550h
+25,0625	0000 0001 1001 0001	0191h
+10,125	0000 0000 1010 0010	00A2h
+0,5	0000 0000 0000 1000	0008h
±0,0	0000 0000 0000 0000	0000h
-0,5	1111 1111 1111 1000	FFF8h
-10,125	1111 1111 0101 1110	FF5Eh
-25,0625	1111 1110 0110 1111	FE6Fh
-55	1111 1100 1001 0000	FC90h

For further information see data sheet: <https://datasheets.maximintegrated.com/en/ds/DS18B20.pdf>

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