TEMPERATURE SENSORS WITH CABLE AND METAL TIP

DESCRIPTION AND USE

Temperature sensors with a cable are designed for contact temperature measuring of solid, liquid or gaseous substances in various sectors of industry, e.g. in the food industry, chemical industry, refrigeration etc.

Temperature sensors consist of a metal case, which conceals the temperature sensor and lead-in cable. All types of resistance sensors can be used as resistance sensors, i.e. – Pt 100, Pt 500, Pt 1000, Ni 1000, Ni 10000, Ni 891, T1 = Ni 2226, NTC, PTC etc, as well as other types of sensors, such as elements KTY, SMT 160, DALLAS, TSic, etc. The following tables state the basic combinations of these types of cases, sensors and cables. Other combinations based on the wishes of the customer are possible through custom manufacturing.

Based on design, sensor connections can be two-wire, or custom three-wire and four-wire.
The basic materials for sensor cases are class 1.4301 stainless steel, Aluminium alkou or brass. Temperature sensors can be used for measuring temperatures ranging from -190 to 450 °C, the specific range is stipulated for each type separately.
Sensors are designed for use in chemically non-aggressive environments.

SPECIFICATIONS

Type of sensing element	**Resistance temperature sensing element** – Pt 100/3850, Pt 500/3850, Pt 1000/3850, Ni 1000/5000, Ni 1000/6180, Ni 10000/5000, Ni 10000/6180, T1 = Ni 2226, Ni 891, NTC
	Thermocouple temperature sensing element – TCK, TCJ, TCT
	Special temperature sensing elements – KTY, SMT 160, DALLAS, TSic, etc.
Accuracy class of individual sensors	Ni sensing elements: class B, $\Delta t = \pm (0.4 + 0.007t)$, for $t \geq 0$; $\Delta t = \pm (0.4 + 0.028\|t\|)$, for $t \leq 0$ in °C; Pt sensing elements: class B in accordance with IEC 751, $\Delta t = \pm (0.3 + 0.005\|t\|)$ in °C NTC 20 kΩ: ± 1 °C at a range of 0 to 70 °C KTY: ± 1 % at 25 °C NTC: ± 1 %, 3 %, 5 % at 25 °C (according to type) TC: class 2 in accordance with IEC 584-2 DS18B20: ± 0.5 °C for -10 up to 80 °C SMT 160-30: ± 0.7 °C TSic: according to type
Sensor connection	2-wire, 3-wire or 4-wire
Insulation resistance	> 200 MΩ at 500 V DC, 25 °C ± 3 °C; humidity < 85 %
Insulation variant of lead-in cables	Silicone -50 up to 200 °C
	PVC -30 up to 80 °C
	PVC* -40 up to 105 °C
	Teflon -190 to 250 °C (short-term 300 °C)
	Fibreglass insulation 0 up to 400 °C

* With increased temperature resistance.

MAXIMUM FLOW SPEED OF THE MEASURED MEDIUM – AIR AND WATER STEAM/WATER [m.s^{-1}] **

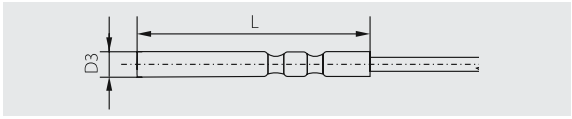
Length of case L (mm) / Case diameter (mm)	up to 60	> 60 to 100	> 100 to 160	> 160 to 220	> 220 to 400
∅ 6	20 / 2.0	15 / 1.5	8.0 / 1.0	2.5 / 0.6	0.6 / 0.3
∅ 4	8.0 / 0.8	6 / 0.6	3.2 / 0.4	1.0 / 0.25	0.25 / 0.12

** For sensors with a thread for direct mounting.

Temperature sensors with a smooth probe and diameter ≤ 5 mm

TG 3 and TG 3A sensors – stainless steel 3 mm diameter

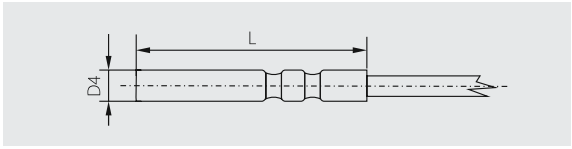
These resistance sensors are designed for contact measuring of the temperature of gaseous, liquid or solid substances. The temperature range of use for TG 3 sensors is -50 °C to 200 °C and -50 °C to 260 °C for model TG 3A. The case diameter ensures a quick response to changes in temperature. Lead-in cables with Teflon insulation without shielding are used. The sensors are designed for universal use. The method of use must be selected with consideration to the temperature and chemical resistance of the case and lead-in cable.



Sensor	TG 3	TG 3A
Temperature range of use	-50 to 200 °C	-50 to 260 °C (short-term 300 °C)
Type of sensing element	Pt, Ni, NTC, Thermocouple K, J	
Ingress protection	IP 67 in accordance with EN 60529	IP 64 in accordance with EN 60529
Case material	Stainless steel 1.4301	
Case diameter	3 mm	
Case length L	40 mm (minimum length of 25 mm)	
Lead-in cable	Teflon unshielded 2 x 0.205 mm^2	
Circuit resistance	0.16 Ω for 1 m of cable for 2-wire connection	
Response time	$\tau_{0.5}$ = up to 3 s, $\tau_{0.9}$ = up to 9 s	

TR 024 and TR 024A sensors – stainless steel 4 mm diameter

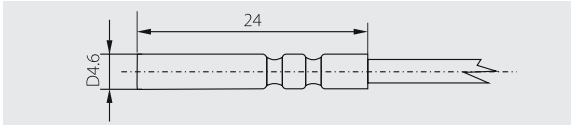
These resistance sensors are designed for contact measuring of the temperature of gaseous, liquid or solid substances. The temperature range of use for TR 024 sensors with a Teflon cable is -50 °C to 260 °C and -50 °C to 200 °C for model TR 024A with a silicone cable. The case diameter ensures a quick response to changes in temperature. The sensors are designed for universal use. The method of use must be selected with consideration to the temperature and chemical resistance of the case and lead-in cable.



Sensor	TR 024	TR 024A
Temperature range of use	-50 to 250 °C	-50 to 200 °C
Type of sensing element	Pt, Ni	
Ingress protection	IP 64 in accordance with EN 60529	IP 67 in accordance with EN 60529
Case material	Stainless steel 1.4301	
Case diameter	4 mm	
Case length L	35 to 60 mm (in 10 mm)	
Lead-in cable	Teflon shield. 2 x 0.14 mm^2 Teflon shield. 4 x 0.14 mm^2	Silicone shielded 2 x 0.22 mm^2
Circuit resistance	0.254 Ω for 1 m of cable for 2-wire connection	0.16 Ω for 1 m of cable for 2-wire connection
Response time	$\tau_{0.5}$ < 5 s in water flowing at a rate of 0.4 $m.s^{-1}$	

TG 4 sensors – brass case 4.6 mm diameter

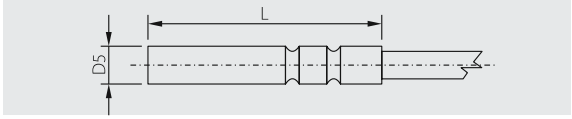
These resistance sensors are designed for contact measuring of the temperature of gaseous, liquid or solid substances. The maximum temperature range of use for the sensors is -50 °C to 200 °C. The applied materials and the case diameter ensure a quick response to changes in temperature. Lead-in cables with silicone insulation and shielding are used. The sensors are designed for use in a chemically non-aggressive environment. The method of use must be selected with consideration to the temperature and chemical resistance of the case and lead-in cable.



Maximum temperature range of use	-50 to 200 °C (can be restricted depending on the type of sensor, specified in the instructions for use)
Type of sensing element	Pt, Ni, NTC, Thermocouple K, J
Ingress protection	IP 67 in accordance with EN 60529
Case material	Brass
Case diameter	4.6 mm
Case length	24 mm
Lead-in cable	Silicone shielded 2 x 0,22 mm^2
Circuit resistance	0.16 Ω for 1 m of cable for 2-wire connection
Response time	$\tau_{0.5}$ < 7 s in water flowing at a rate of 0.4 $m.s^{-1}$

TR 125 sensors – stainless steel 5 mm diameter

These resistance sensors are designed for contact measuring of the temperature of gaseous and liquid substances. The maximum temperature range of use for the sensors is -50 °C to 200 °C. The applied materials and the case diameter ensure a quick response to changes in temperature. Lead-in cables with silicone insulation and shielding are used. The sensors are designed for universal use. The method of use must be selected with consideration to the temperature and chemical resistance of the case and lead-in cable.

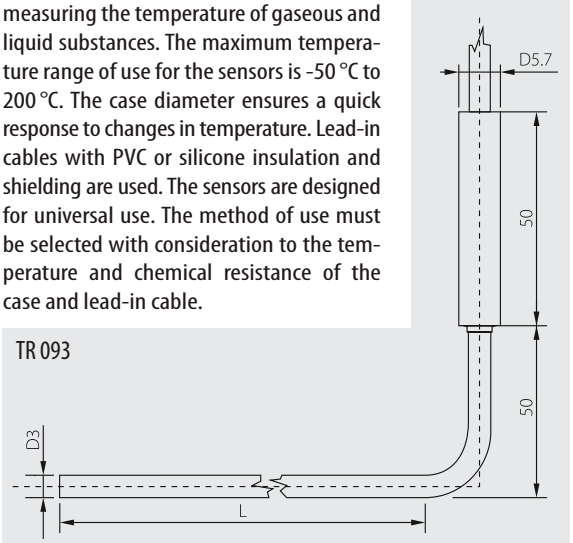


Maximum temperature range of use	-50 to 200 °C (can be restricted depending on the type of sensor, specified in the instructions for use)
Type of sensing element	Pt, Ni, NTC, TCx
Ingress protection	IP 67 in accordance with EN 60529
Case material	Stainless steel 1.4301
Case length L	30 to 200 mm
Lead-in cable	Silicone shielded 2 x 0.22 mm^2 Silicone shielded 4 x 0.15 mm^2
Circuit resistance	0.16 Ω for 1 m of cable for 2-wire connection
Response time	$\tau_{0.5}$ < 7 s in water flowing at a rate of 0.4 $m.s^{-1}$

TR 093 and TR 093A sensors – stainless steel 3 mm diameter

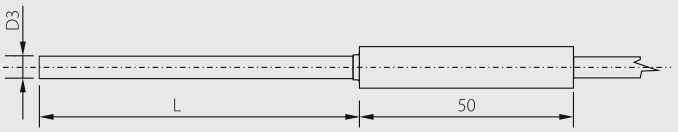
These resistance sensors are designed for measuring the temperature of gaseous and liquid substances. The maximum temperature range of use for the sensors is -50 °C to 200 °C. The case diameter ensures a quick response to changes in temperature. Lead-in cables with PVC or silicone insulation and shielding are used. The sensors are designed for universal use. The method of use must be selected with consideration to the temperature and chemical resistance of the case and lead-in cable.

TR 093



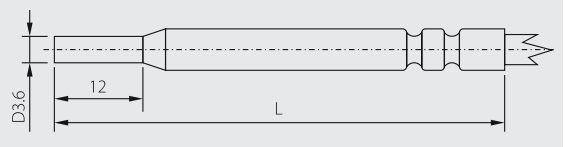
Maximum temperature range of use	-50 to 200 °C (can be restricted depending on the type of sensor and cable, specified in the instructions for use)
Type of sensing element	Pt 100, Pt 500, Pt 100, Ni 1000, NTC, Thermocouple K, J
Ingress protection	IP 67 in accordance with EN 60529
Case material	Stainless steel 1.4301
Case diameter	3 mm
Case length L	100 to 300 mm
Lead-in cable	PVC shielded 2 x 0.25 mm² or 4 x 0.25 mm² Silicone shielded 2 x 0.22 mm² or 4 x 0.22 mm²
Circuit resistance	0.16 Ω for 1 m of cable for 2-wire connection - silicone 0.14 Ω for 1 m of cable for 2-wire connection - PVC
Response time	$\tau_{0.5}$ < 4 s in water flowing at a rate of 0.4 m.s^{-1}

TR 093A



TG9 sensors – stainless steel 5/3.6 mm diameter

These resistance sensors are designed for measuring the temperature of gaseous and liquid substances. The maximum temperature range of use for the sensors is -50 °C to 200 °C. The shape of the case tapering to 3.6 mm in diameter ensures a quick response to changes in temperature. Lead-in cables with silicone insulation and shielding are used. The sensors are designed for universal use. The method of use must be selected with consideration to the temperature and chemical resistance of the case and lead-in cable.

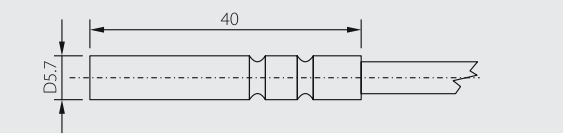


Maximum temperature range of use	-50 to 200 °C (can be restricted depending on the type of sensor and cable, specified in the instructions for use)
Type of sensing element	Pt, Ni (except for T1 = Ni 2226 and Ni 10000), NTC, TCx
Ingress protection	IP 67 in accordance with EN 60529
Case material	Stainless steel 1.4301
Case diameter	5 mm
Case tip diameter	3.6 mm
Case length L	60 to 200 mm
Lead-in cable	Silicone shielded 2 x 0.22 mm² Silicone shielded 4 x 0.22 mm²
Circuit resistance	0.16 Ω for 1 m of cable for 2-wire connection
Response time	$\tau_{0.5}$ < 4 s

Temperature sensors with a smooth probe and diameter > 5 mm

TGL and TGLJ sensors – stainless steel 5.7 mm diameter

These resistance sensors are designed for measuring the temperature of gaseous and liquid substances. The maximum temperature range of use for the sensors is -40 °C to 105 °C. Lead-in cables with PVC insulation for up to 80 °C with shielding or up to 105 °C without shielding are used. The diameter of the case enables even special temperature sensors to be encased – KTY, SMT 160, DS 18B20, TSiC etc. In combination with a TG8 thermowell these sensors can be used for measuring the temperature in pipes as well as a pressure device pursuant to Government Regulation No. 26/2003 Coll., as amended. The sensors are designed for universal use. The method of use must be selected with consideration to the temperature and chemical resistance of the case and lead-in cable.



Sensor	TGL	TGLJ
Use	General	For JTG8 thermowell
Temperature range of use	-40 to 105 °C (it may be restricted by the cable type)	
Type of sensing element	All types	
Ingress protection	IP 67 in accordance with EN 60529	
Case material	Stainless steel 1.4301	
Case diameter	5.7 mm	
Case length	40 to 200 mm (in 20 mm)	
Lead-in cable	PVC shielded 2 x 0.34 mm² or 4 x 0.25 mm² (-40 to 80 °C) PVC unshielded 2 x 0.35 mm² or 4 x 0.35 mm² (-40 to 105 °C)	
Circuit resistance	0.11 Ω for 1 m of cable for 2-wire connection	
Response time	$\tau_{0.5}$ < 7 s in water flowing at a rate of 0.4 m.s^{-1}	$\tau_{0.5}$ < 45 s in water flowing at a rate of 0.4 m.s^{-1}

TEMPERATURE SENSORS WITH CABLE AND METAL TIP

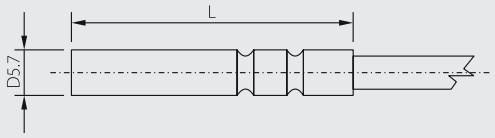
TG8 and TG8J sensors – stainless steel 5.7 mm diameter

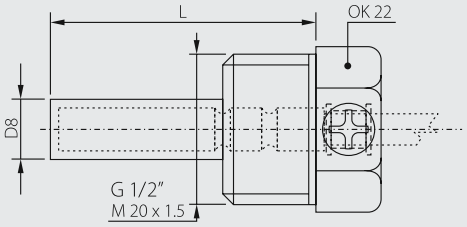
These resistance sensors are designed for measuring the temperature of gaseous and liquid substances. The maximum temperature range of use for the sensors is -50 °C to 105 °C. Lead-in cables with silicone insulation and shielding are used. The diameter of the case enables even special temperature sensors to be encased – KTY, SMT 160, DS 18B20, TSiC etc. In combination with a TG8 thermowell these sensors can be used for measuring the temperature in pipes as well as a pressure device pursuant to Government Regulation No. 26/2003 Coll., as amended. The sensors are designed for universal use. The method of use must be selected with consideration to the temperature and chemical resistance of the case and lead-in cable.

TG8 sensors are also supplied in the design for explosive environments. More information available in the catalogue in data sheet 14.4.

Sensor	TG 8	TG 8J
Use	General	For JTG8 thermowell
Maximum temperature range of use	-50 to 200 °C (it may be restricted by the sensor type, specified in the instructions for use)	
Type of sensing element	All types	
Ingress protection	IP 67 in accordance with EN 60529	
Case material	Stainless steel 1.4301	
Case diameter	5.7 mm	
Case length L	40 to 200 mm (in 20 mm)	
Lead-in cable	Silicone shielded 2 x 0.34 mm^2 Silicone shielded 4 x 0.22 mm^2	
Circuit resistance	0.11 Ω for 1 m of cable for 2-wire connection	
Response time	$\tau_{0.5}$ < 7 s in water flowing at a rate of 0.4 $m.s^{-1}$	$\tau_{0.5}$ < 45 s in water flowing at a rate of 0.4 $m.s^{-1}$

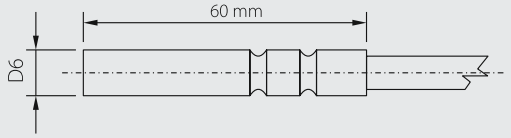
TG8J sensor + JTG 8 thermowell





TG 68 sensors – stainless steel 6 mm diameter, IP 68 d5

These resistance sensors are designed for measuring the temperature of gaseous and liquid substances. The maximum temperature range of use for the sensors is -40 °C to 200 °C for the model with a silicone cable and -40 °C to 105 °C for PVC cable models. The diameter of the case enables even special temperature sensors to be encased – KTY, SMT 160, DS 18B20, TSiC etc. In combination with a thermowell these sensors meet the IP 68 (d = 5 m) degree of ingress protection in accordance with EN 60529 and are designed for measuring temperatures below the surface **for permanent immersion in a depth of up to 5 m**. The method of use must be selected with consideration to the temperature and chemical resistance of the case and lead-in cable.

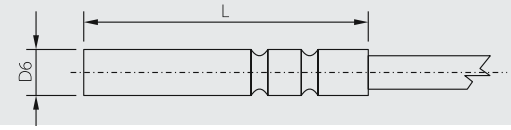


Maximum temperature range of use	-40 to 105 °C PVC cable, -40 to 200 °C silicone cable
Type of sensing element	All types
Ingress protection	IP 68 (d = 5 m) in accordance with EN 60529
Case material	Stainless steel 1.4301
Case diameter	6 mm
Case length L	60 mm
Lead-in cable	Silicone shielded 2 x 0.34 mm^2 or 4 x 0.22 mm^2 PVC unshielded 2 x 0.35 mm^2 nebo 4 x 0.35 mm^2
Circuit resistance	0.11 Ω for 1 m of cable for 2-wire connection
Response time	$\tau_{0.5}$ = 12 s, $\tau_{0.9}$ = 35 s in water flowing at a rate of 0.4 $m.s^{-1}$

The sensors meet the ingress protection level of IP 68 in accordance with EN 60529 and can be permanently immersed at a depth of up to 5 m.

TR 046 sensors – stainless steel 6 mm diameter

These resistance sensors are designed for measuring the temperature of gaseous and liquid substances. The maximum temperature range of use for the sensors is -50 °C to 200 °C. The case can be made from stainless steel class 17240, 17349 or 17348. Lead-in cables with silicone insulation and shielding are used. The diameter of the case enables even special temperature sensors to be encased – KTY, SMT 160, DS 18B20, TSiC etc. The sensors are designed for universal use. The method of use must be selected with consideration to the temperature and chemical resistance of the case and lead-in cable.

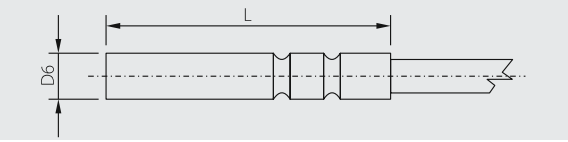


Maximum temperature range of use	-50 to 200 °C (it may be restricted by the sensor type, specified in the instructions for use)
Type of sensing element	All types
Ingress protection	IP 67 in accordance with EN 60529
Case material	Stainless steel 1.4301
Case diameter	6 + 0.1 mm
Case length L	40 to 200 mm (in 20 mm)
Lead-in cable	Silicone shielded 2 x 0.34 mm^2 Silicone shielded 4 x 0.22 mm^2
Circuit resistance	0.11 Ω for 1 m of cable for 2-wire connection
Response time	$\tau_{0.5}$ < 7 s in water flowing at a rate of 0.4 $m.s^{-1}$

TEMPERATURE SENSORS WITH CABLE AND METAL TIP

TR 050A sensors – stainless steel 6 mm diameter, up to 400 °C

These resistance sensors are designed for measuring the temperature of gaseous or solid substances. **The maximum temperature range of use for the sensors is 0 °C to 350 °C, 400 °C short-term.** Considering the type of lead-in cable used with fibreglass insulation and metal braiding, the sensors are not resistant against the penetration of humidity into the case and are designed for application in a dry environment. The sensors are designed for use in a chemically non-aggressive environment. The method of use must be selected with consideration to the temperature and chemical resistance of the case and lead-in cable.

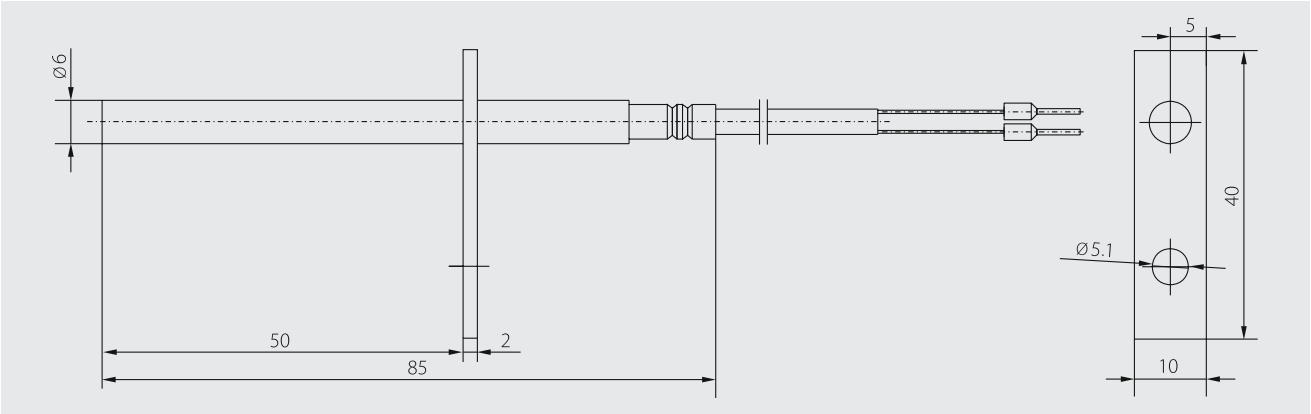


Temperature range of use	0 to 350 °C (400 °C short-term)
Type of sensing element	Pt 100, Pt 500, Pt 1000
Ingress protection	IP 50 in accordance with EN 60529
Case material	Stainless steel 1.4301
Case diameter	6 + 0,1 mm
Case length L	40, 60, 100 and 200 mm
Lead-in cable	with fiberglass and metal braiding 2 x 0.35 mm^2 with fiberglass and metal braiding 4 x 0.35 mm^2
Circuit resistance	0.11 Ω for 1 m of cable for 2-wire connection

TR 050H sensors – stainless steel 6 mm diameter, up to 400 °C

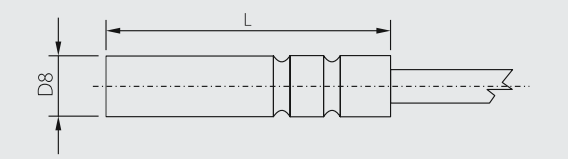
These resistance sensors are designed for measuring the temperature of gaseous or solid substances. **The maximum temperature range of use for the sensors is 0 °C to 350 °C, 450 °C short-term for the active part of the sensor case**. Lead-in cables with silicone insulation and shielding are used, thus the ambient temperature of the cables must not exceed 200 °C. The sensors are primarily designed for measuring the temperature of flue gases and combustion gases in fireplace vents, fireplace stoves and boilers. The sensors are designed for a chemically non-aggressive environment. The method of use must be selected with consideration to the temperature and chemical resistance of the case and lead-in cable.

Temperature range of use	0 to 350 °C (450 °C short-term) – measuring part of the case up to 250°C in the surroundings of the cables
Type of sensing element	Pt 100, Pt 500, Pt 1000
Ingress protection	IP 65 in accordance with EN 60529
Case material	Stainless steel 1.4301
Case diameter	6 + 0.1 mm 50 / 85 mm
Case length L	50 / 85 mm
Lead-in cable	Silicone shielded 2 x 0.22 mm^2
Circuit resistance	0.16 Ω for 1 m of cable for 2-wire connection



TR 081 sensors – stainless steel 8 mm diameter

These resistance sensors are designed for measuring the temperature of gaseous and liquid substances. The maximum temperature range of use for the sensors is -50 °C to 200 °C. The case can be made from stainless steel class 17240 or 17348. Lead-in cables with silicone insulation and shielding are used. The diameter of the case enables even special temperature sensors to be encased – KTY, SMT 160, DS 18B20, TSiC etc. The sensors are designed for universal use. The method of use must be selected with consideration to the temperature and chemical resistance of the case and lead-in cable.

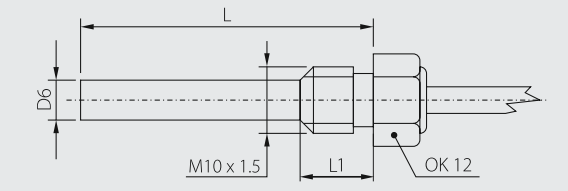


Maximum temperature range of use	-50 to 200 °C (it may be restricted by the sensor type, specified in the instructions for use)
Type of sensing element	All types
Ingress protection	IP 67 in accordance with EN 60529
Case material	Stainless steel 1.4301
Case diameter	8 ± 0.1 mm
Case length L	60 to 200 mm (in 20 mm)
Lead-in cable	Silicone shielded 2 x 0.34 mm^2 Silicone shielded 4 x 0.22 mm^2
Circuit resistance	0.11 Ω for 1 m of cable for 2-wire connection
Response time	$\tau_{0.5}$ < 7 s in water flowing at a rate of 0.4 m.s^{-1}

Temperature sensors with a thread

TG1 and TG2 sensors – brass 6 mm diameter

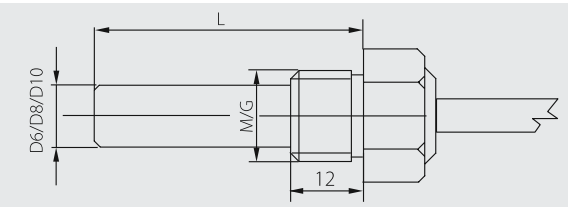
These resistance sensors are designed for measuring the temperature of gaseous and liquid substances. The maximum temperature range of use for the sensors is -50 °C to 200 °C. Lead-in cables with silicone insulation and shielding are used. The sensors are primarily designed for measuring the temperature in pipes. Their design facilitates a faster response to changes and allows them to be used as a pressure device pursuant to Government Regulation No. 26/2003 Coll., as amended. The sensors are designed for use in a chemically non-aggressive environment. The method of use must be selected with consideration to the temperature and chemical resistance of the case and lead-in cable.



Sensor	TG 1	TG 2
Maximum temperature range of use	-50 to 200 °C (it may be restricted by the sensor type, specified in the instructions for use)	
Type of sensing element	Pt, Ni, NTC	All types
Ingress protection	IP 67 in accordance with EN 60529	
Thread / OK	M 10 x 1.5 / OK 12	
Case material	Brass	Stainless steel 1.4301
Case diameter	6 mm	
Thread length L1X	8 mm	10 mm
Case length L	10 to 60 mm (in 10 mm)	10 to 100 mm (in 10 mm)
Lead-in cable	Silicone shielded 2 x 0.22 mm^2 Silicone shielded 4 x 0.15 mm^2	
Circuit resistance	0.16 Ω for 1 m of cable for 2-wire connection	
Response time	$\tau_{0.5} < 7$ s in water flowing at a rate of 0,4 $m.s^{-1}$	$\tau_{0.5} < 9$ s in water flowing at a rate of 0,4 $m.s^{-1}$

TR 011 sensors – stainless steel 6-10 mm diameter

These resistance sensors are designed for measuring the temperature of gaseous, liquid and solid substances. The maximum temperature range of use for the sensors is -50 °C to 200 °C. Lead-in cables with silicone or PVC insulation with shielding or without shielding are used. The sensors are primarily designed for measuring the temperature in pipes. Their design facilitates a faster response to changes and allows them to be used as a pressure device pursuant to Government Regulation No. 26/2003 Coll., as amended. The sensors are designed for use in a chemically non-aggressive environment. The method of use must be selected with consideration to the temperature and chemical resistance of the case and lead-in cable.

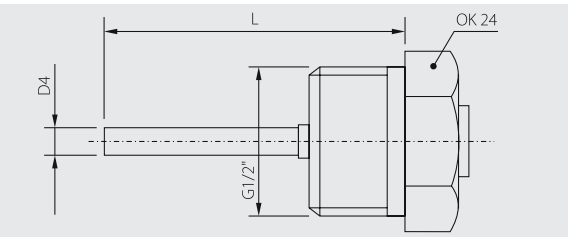


Maximum temperature range of use	-50 to 200 °C (it may be restricted by the sensor type, specified in the instructions for use)
Type of sensing element	All types
Ingress protection	IP 67 in accordance with EN 60529
Thread / OK	According to the customer
Case material	Stainless steel 1.4301
Case diameter	6 to 10 mm
Case length L	40 to 500 mm
Lead-in cable	According to the customer
Response time	$\tau_{0.5} < 9$ s in water flowing at a rate of 0.4 m.s-1

TR 011 sensors are also supplied in the design for explosive environments. Please refer to data sheet section 14.4a in this catalog for more information.

TR 080A sensors – stainless steel 4 mm diameter

These resistance sensors are designed for measuring the temperature of gaseous, liquid and solid substances. The maximum temperature range of use for the sensors is -30 °C to 180 °C. Lead-in cables with silicone insulation with shielding are used. The sensors are primarily designed for measuring the temperature in air-conditioning ducts. The case diameter ensures a quick response to changes in temperature. The sensors are designed for use in a chemically non-aggressive environment. The method of use must be selected with consideration to the temperature and chemical resistance of the case and lead-in cable.

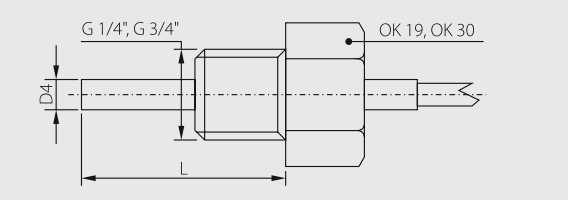


Maximum temperature range of use	-30 to 180 °C (it may be restricted by the sensor type, specified in the instructions for use)
Type of sensing element	Ni 1000, Pt 100, Pt 500, Pt 1000, NTC
Ingress protection	IP 65 in accordance with EN 60529
Thread / OK	According to the customer
Case material	Stainless steel 1.4301
Case diameter	4 mm
Case length L	40 to 200 mm
Lead-in cable	Silicone shielded 2 x 0.22 mm^2 Silicone shielded 4 x 0.15 mm^2
Circuit resistance	0.16 Ω for 1 m of cable for 2-wire connection
Response time	$\tau_{0.5} < 5$ s in water flowing at a rate of 0.4 $m.s^{-1}$

TEMPERATURE SENSORS WITH CABLE AND METAL TIP

TR 129 sensors – stainless steel 4 mm diameter, 250 °C

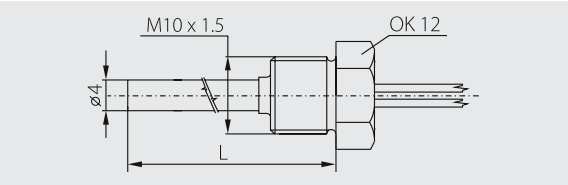
These resistance sensors are designed for measuring the temperature of gaseous and liquid substances. The maximum temperature range of use for the sensors is -50°C to 250°C. Lead-in cables with silicone insulation with shielding are used. The production technology and case diameter ensure a quick response to changes in temperature even up to 250 °C. The sensors are designed for use in a chemically non-aggressive environment. The method of use must be selected with consideration to the temperature and chemical resistance of the case and lead-in cable.



Maximum temperature range of use	-50 to 250 °C (it may be restricted by the sensor type, specified in the instructions for use)
Type of sensing element	Pt, Ni, NTC, TCx
Ingress protection	IP 67 in accordance with EN 60529
Thread / OK	According to the customer
Case material	Stainless steel 1.4301
Case diameter	4 mm
Case length L	100 to 300 mm
Lead-in cable	Silicone shielded 2 x 0.22 mm^2 Silicone shielded 4 x 0.22 mm^2
Circuit resistance	0.16 Ω for 1 m of cable for 2-wire connection
Response time	$\tau_{0.5} < 5$ s

TR 030 sensors – stainless steel 4 mm diameter

These resistance sensors are designed for measuring the temperature of gaseous, liquid and solid substances. The maximum temperature range of use for the sensors is -50 °C to 200 °C. The resistance signal of the temperature sensor is conducted by a pair of lead wires with Teflon insulation, whereby ensuring the minimization of heat transfer and thus achieving higher measuring accuracy even at shallow immersion depths. The case diameter ensures a quick response to changes in temperature. The sensors are designed for use in a chemically non-aggressive environment. The method of use must be selected with consideration to the temperature and chemical resistance of the case and lead-in cable.

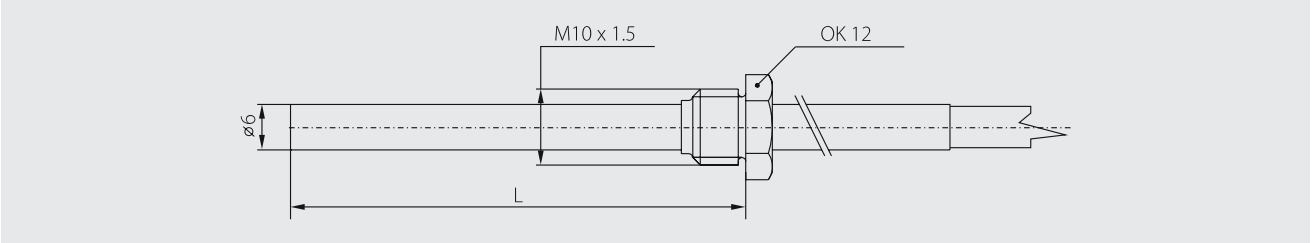


Maximum temperature range of use	-50 to 200 °C (it may be restricted by the sensor type, specified in the instructions for use)
Type of sensing element	Pt, Ni, NTC, TCx
Ingress protection	IP 52 in accordance with EN 60529
Thread / OK	M 10 x 1.5 / OK 12
Case material	Stainless steel 1.4301
Case diameter	4 mm
Case length L	20 to 60 mm
Lead-in cable	2 x LT 0.07 mm^2 with Teflon insulation
Circuit resistance	0.51 Ω for 1 m of lead wire
Response time	$\tau_{0.5} < 5$ s

TR 068C sensors – stainless steel 6 mm diameter, 400 °C

These resistance sensors are designed for measuring the temperature of gaseous and liquid substances. **The temperature range of use for the sensors is 0 °C to 400 °C, 500 °C short-term for the active part of the sensor case after the thread**. Lead-in cables with Teflon insulation with shielding are used, thus the ambient temperature of the cables must not exceed 250 °C. The production technology and case diameter ensure a quick response to changes in temperature even up to 250 °C. The sensors are primarily designed for measuring the temperature of flue gases and combustion gases in fireplace vents, fireplace stoves and boilers. The sensors are designed for a chemically non-aggressive environment. The method of use must be selected with consideration to the temperature and chemical resistance of the case and lead-in cable.

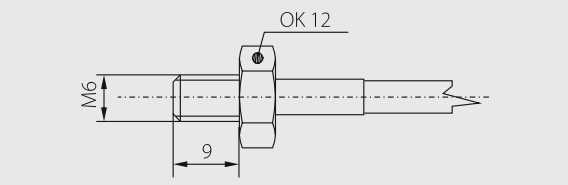
Maximum temperature range of use	0 to 400 °C (500 °C short-term)
Type of sensing element	Pt 100, Pt 500, Pt 1000
Ingress protection	IP 64 in accordance with EN 60529
Thread / OK	M 10 x 1.5/OK12
Case material	Stainless steel 1.4301
Case diameter	6,0 ± 0,1 mm
Case length L	60 mm
Lead-in cable	Teflon shielded 2 x 0.14 mm^2
Circuit resistance	0.3 Ω for 1 m of cable for 2-wire connection



Contact temperature sensors

TG 6 sensors – brass, M 6 thread

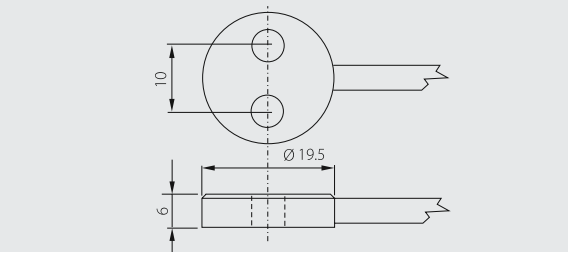
These resistance sensors are designed for measuring the surface temperature of solid substances. The maximum temperature range of use for the sensors is -30 °C to 200 °C and must not be exceeded even short-term. The structure of the sensors, which includes an M6 thread, enables measuring the temperature of solids below the surface. The sensors are designed for use in a chemically non-aggressive environment. The method of use must be selected with consideration to the temperature and chemical resistance of the case and lead-in cable.



Maximum temperature range of use	-30 to 200 °C (it may be restricted by the sensor type, specified in the instructions for use)
Type of sensing element	Pt, Ni, NTC, TCx
Ingress protection	IP 67 in accordance with EN 60529
Thread / OK	M 6 / OK 12
Case material	Brass
Thread length	9 mm
Lead-in cable	Silicone shielded 2 x 0.22 mm^2 Silicone shielded 4 x 0.15 mm^2
Circuit resistance	0.16 Ω for 1 m of cable for 2-wire connection
Response time	$\tau_{0.5} < 4$ s
Maximum permissible cable tension	1 kg

TG 7 sensors – brass

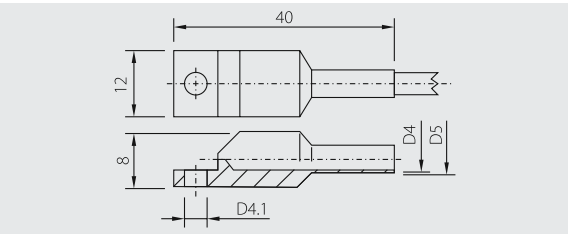
These resistance sensors are designed for measuring surface temperatures. The maximum temperature range of use for the sensors is -50 °C to 200 °C and must not be exceeded even short-term. The structure of the sensors ensures fast response to temperature changes and high accuracy using the contact method of measuring, especially when silicone Vaseline or contact paste is applied between the measured surface and the sensor. Mounting the sensor to the surface is carried out using one or two M4 screws. The sensors are designed for use in a chemically non-aggressive environment. The method of use must be selected with consideration to the temperature and chemical resistance of the case and lead-in cable.



Maximum temperature range of use	-50 to 200 °C (it may be restricted by the sensor type, specified in the instructions for use)
Type of sensing element	Pt, Ni, NTC, TCx
Ingress protection	IP 65 in accordance with EN 60529
Case material	Brass
Case dimensions	∅ 19.5 mm, height 6 mm
Lead-in cable	Silicone shielded 2 x 0.22 mm^2 Silicone shielded 4 x 0.15 mm^2
Circuit resistance	0.16 Ω for 1 m of cable for 2-wire connection
Response time	$\tau_{0.5} < 7$ s (on a flat surface of an Al prism without paste)
Maximum permissible cable tension	2 kg
Recommendation	Use contact paste for mounting

TR 141 and TR 141 B sensors – dural or stainless steel, 350 °C

These resistance sensors are designed for measuring the surface temperature of solid substances with flat and smooth surfaces. The maximum temperature range of use for the sensors is 0 °C to 350 °C, 400 °C short-term. Considering the type of lead-in cable used with fibreglass insulation and metal braiding, the sensors are not resistant against the penetration of humidity into the case and are designed for application in a dry environment. The sensors are designed for use in a chemically non-aggressive environment. The method of use must be selected with consideration to the temperature and chemical resistance of the case and lead-in cable.

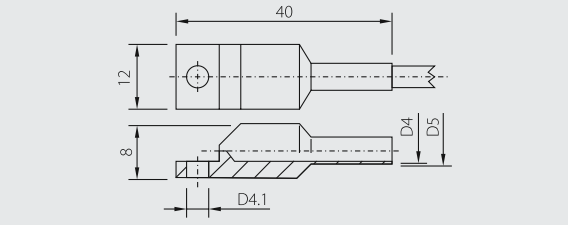


Sensor	TR 141	TR 141B
Maximum temperature range of use	0 to 350 °C	
Type of sensing element	Pt 100, Pt 500, Pt 1000, Thermocouple K, J	
Ingress protection	IP 50 in accordance with EN 60529	
Case material	Aluminium alloy	Stainless steel 1.4301
Case length	40 mm	
End sleeves	H 0.25 / 10 mm	
Lead-in cable	With fiberglass insulat. and metal braiding 2 x 0.35 mm^2 With fiberglass insulat. and metal braiding 4 x 0.35 mm^2	
Circuit resistance	0.11 Ω for 1 m of cable for 2-wire connection	
Maximum permissible cable tension	1 kg	
Recommendation	Use contact paste for mounting	

TEMPERATURE SENSORS WITH CABLE AND METAL TIP

TR 141A and TR 141E sensors – Al-alloy or stainless steel, 200 °C

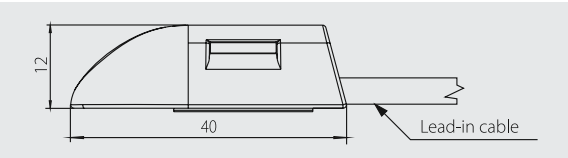
These resistance sensors are designed for measuring the surface temperatures. The maximum temperature range of use for the sensors is -50 °C to 200 °C. When mounting using an M4 screw, it is recommended to apply contact paste or silicone Vaseline to the measured surface, which ensure faster response time and minimizes the error rate of the measuring method. **The structure of the sensors ensures increased resistance against vibrations. The sensors meet the requirements of EN 61373 category 1, class B standard**. The sensors are designed for use in a chemically non-aggressive environment. The method of use must be selected with consideration to the temperature and chemical resistance of the case and lead-in cable.



Sensor	TR 141A	TR 141E
Maximum temperature range of use	-50 to 200 °C (it may be restricted by the sensor type, specified in the instructions for use)	
Type of sensing element	Pt, Ni, NTC, Thermocouple K, J	
Ingress protection	IP 67 in accordance with EN 60529	
Case material	Stainless steel 1.4301	Aluminium alloy
Case length	40 mm	
Lead-in cable	Silicone shielded 2 x 0.22 mm^2 Silicone shielded 4 x 0.12 mm^2	
Circuit resistance	0.16 Ω for 1 m of cable for 2-wire connection	
Response time	$\tau_{0.5} < 10$ s (on a flat surface of an Al prism without paste)	
Maximum permissible cable tension	1 kg	
Recommendation	Use contact paste for mounting	

S 150A sensors – brass, 130 °C

These resistance sensors are designed for measuring surface temperatures. The maximum temperature range of use for the sensors is -50 °C to 130 °C and must not be exceeded even short-term. The sensor, which is provided with mounting tape and lids, can be used for measuring the temperature of pipes. The structure of the sensors ensures fast response to temperature changes and high accuracy using the contact method of measuring, especially when silicone Vaseline or contact paste is applied between the measured surface and the sensor. Mounting the sensor to the surface is carried out using one or two M4 screws. The sensors are designed for use in a chemically non-aggressive environment. The method of use must be selected with consideration to the temperature and chemical resistance of the case and lead-in cable.

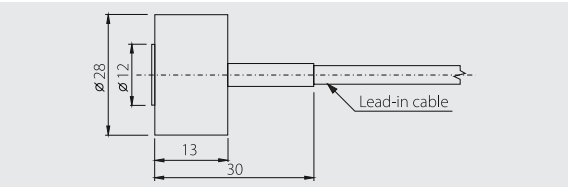


Maximum temperature range of use	-50 to 130 °C
Type of sensing element	All types
Ingress protection	IP 65 in accordance with EN 60529
Case material	Brass
Protective case material	POLYAMIDE
Minimum pipe diameter	20 mm
Lead-in cable	Silicone shielded 2 x 0.22 mm^2 Silicone shielded 4 x 0.15 mm^2
Circuit resistance	0.16 Ω for 1 m of cable for 2-wire connection
Response time	$\tau_{0.5} \leq 10$ s (on a flat surface of an Al prism without paste)
Recommendation	Use contact paste for mounting

Please refer to data sheet section 12.6a in this catalog for more information on the S 150A sensors.

TR 158 sensors – with magnetic mount, 150 °C

These resistance sensors are designed for measuring the surface temperature of ferromagnetic objects. The temperature range of use for the sensors is -30 °C to 150 °C. The minimum surface for placement on the measured surface must be 28 mm in diameter. The structure of the sensors ensures fast response to temperature changes and high accuracy using the contact method of measuring, especially when silicone Vaseline or contact paste is applied between the measured surface and the sensor. Mounting the sensor to the surface is carried out using one or two M4 screws. The sensors are designed for use in a chemically non-aggressive environment. The method of use must be selected with consideration to the temperature and chemical resistance of the case and lead-in cable.



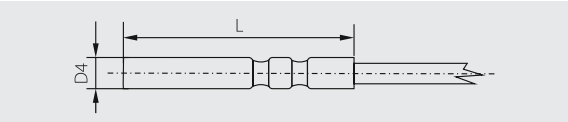
Maximum temperature range of use	-30 to 150 °C
Type of sensing element	Pt, Ni, NTC
Ingress protection	IP 67 in accordance with EN 60529
Holding force of the sensor	20 N
Pressure of the measuring surface	3 N
Case material	Nickel steel / dural
Case dimensions	⌀ 26 x 13 mm
Lead-in cable	Silicone shielded 2 x 0.34 mm^2 Silicone shielded 2 x 0.22 mm^2
Standard cable length	2, 5, 10 m
Circuit resistance	0.11 Ω for 1 m of cable for 2-wire connection

TEMPERATURE SENSORS WITH CABLE AND METAL TIP

Temperature sensors for cryogenic temperatures

TR 024K sensors – 4 mm diameter, -100 to 150 °C

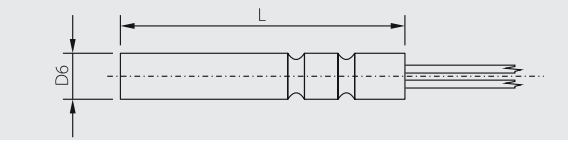
These resistance sensors are designed for measuring the temperature of gaseous, liquid and solid substances. Considering the applied materials and production technology, the sensors can also be used in ultra low temperatures. The temperature range of use for the sensors is -100 °C to 150 °C and this temperature should not be exceeded, not even for a short term. The diameter of the case ensures a quick response to changes in temperature. The method of use must be selected with consideration to the temperature and chemical resistance of the case and lead-in cable.



Maximum temperature range of use	-100 to 150 °C (must not be exceeded even short-term)
Type of sensing element	Pt 100, Pt 1000
Ingress protection	IP 67 in accordance with EN 60529
Case material	Stainless steel 1.4301
Case diameter	4 mm
Case length L	50 to 100 mm (in 10 mm)
Lead-in cable	Teflon shielded 2 x 0.14 mm^2 Teflon shielded 4 x 0.14 mm^2
Circuit resistance	0.3 Ω for 1 m of cable for 2-wire connection
Response time	$\tau_{0.5}$ < 6 s in water flowing at a rate of 0.4 m.s-1

TR 046S sensors – 6 mm diameter, -100 to 150 °C

These resistance sensors are designed for measuring the temperature of gaseous and solid substances. Considering the applied materials and production technology, the sensors can also be used in ultra low temperatures. The temperature range of use for the sensors is -100 °C to 150 °C and this temperature should not be exceeded, not even for a short term. The sensors are primarily designed for measuring in freezers, refrigerators etc. The resistance signal of the temperature sensor is conducted by a pair of lead wires with Teflon insulation, whereby ensuring their small volume, enabling them to be placed between door sealing. The method of use must be selected with consideration to the temperature and chemical resistance of the case and lead-in cable.

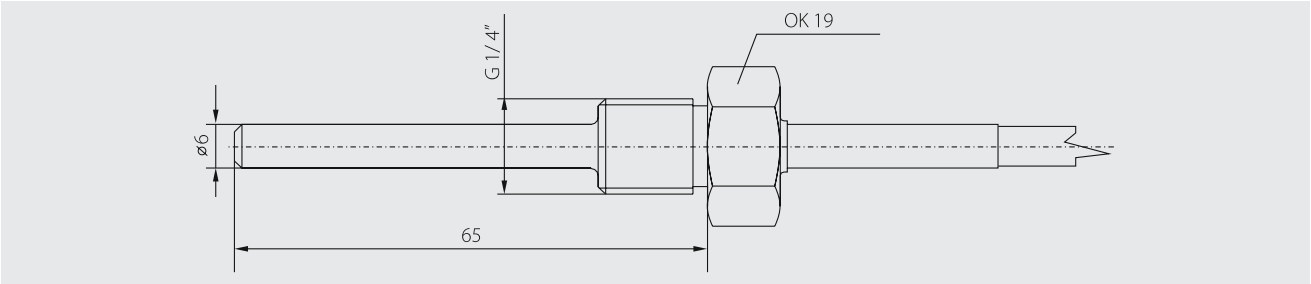


Maximum temperature range of use	-100 to 150 °C (must not be exceeded even short-term)
Type of sensing element	Pt 100, Pt 1000
Ingress protection	IP 67 in accordance with EN 60529
Case material	Stainless steel 1.4301
Case diameter	6.0 ± 0,1 mm
Case length L	40 to 200 mm (in 20 mm)
Lead-in cable	Teflon APFA 0.22 mm^2
Circuit resistance	0.16 Ω for 1 m of cable for 2-wire connection
Response time	$\tau_{0.5}$ < 7 s in water flowing at a rate of 0.4 m.s-1

TR 099 sensors – with a thread, -190 to 100 °C

These resistance sensors are designed for measuring the temperature of gaseous, liquid and solid substances. Considering the applied materials and production technology, the sensors can also be used in ultra low temperatures. The temperature range of use for the sensors is -190 °C to 150 °C, whereby class B accuracy in accordance with EN 60751 is guaranteed within the scope from -100 to 150 °C. The method of use must be selected with consideration to the temperature and chemical resistance of the case and lead-in cable.

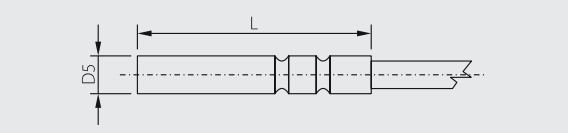
Maximum temperature range of use	-190 to 100 °C
Type of sensing element	Pt 100, Pt 1000
Ingress protection	IP 67 in accordance with EN 60529
Thread	M 10, M 12, G ¼"
Case material	Stainless steel 1.4301
Case diameter	6 ± 0,1 mm
Case length	40 to 80 (in 10 mm); or other lengths customized
Lead-in cable	Teflon shielded 2 x 0.14 mm^2 Teflon shielded 4 x 0.14 mm^2
Circuit resistance	0.16 Ω for 1 m of cable for 2-wire connection



TEMPERATURE SENSORS WITH CABLE AND METAL TIP

TR 125B sensors – 5 mm diameter, -190 to 100 °C

These resistance sensors are designed for measuring the temperature of gaseous, liquid and solid substances. Considering the applied materials and production technology, the sensors can also be used in ultra low temperatures. The temperature range of use for the sensors is -190 °C to 150 °C whereby class B accuracy in accordance with EN 60751 is guaranteed within the scope from -100 to 150 °C. The sensor case includes screw connections that enable it to be used for measuring temperatures in pipes, fittings etc. The structure facilitates a faster response to temperature changes in comparison to sensors with a protective thermowell. The method of use must be selected with consideration to the temperature and chemical resistance of the case and lead-in cable.



Maximum temperature range of use	-190 to 150 °C
Type of sensing element	Pt 100, Pt 1000
Ingress protection	IP 67 in accordance with EN 60529
Case material	Stainless steel 1.4301
Case diameter	5 ± 0,1 mm
Case length L	50 to 80 mm (in 10 mm)
Lead-in cable	Teflon shieled 4 x 0.14 mm^2
Circuit resistance	0.3 Ω for 1 m of cable for 2-wire connection

A variety of sensor types is available, such as:

- 2 x sensing element
- material of the case: stainless steel 1.4401, 1.4404, 1.4571, etc.
- special cable (under soil, FM 4910 cable, etc.)
- various design of the case
- NPT thread, etc.

The most common application of our sensors:

- Control of heating systems
- HVAC equipment
- Energy systems
- Heat meters
- Laboratories
- Machinery and equipment
- Custom made temperature sensors
- Process industry
- Automotive technology
- Home appliances
- Food processing industry
- Health service
- Chemical industry, etc.