CABLE RESISTANCE THERMOMETER

WITH THREADED PROCESS CONNECTION, **TYPE TOPE409, TOPE410**

Data sheet TOPE409-410 | Edition 2023

Application

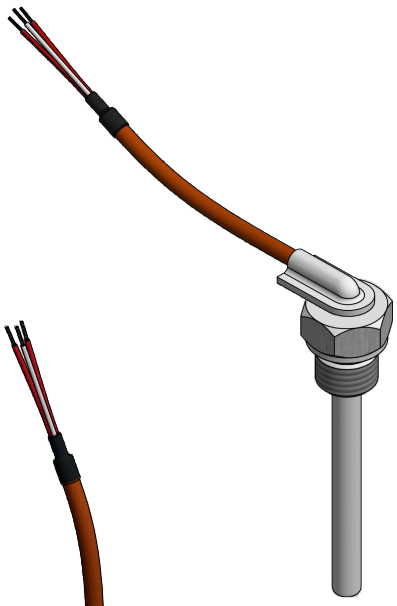
- For direct installation into the process
- General industrial services

Features

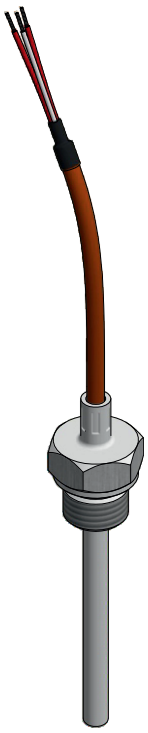
- Single and double sensing element
- Sensor ranges from -50 .. +400°C
- Connection line 2-, 3-, 4-wire
- Threaded process connection
- Versions with/without connector
- Cable from PVC, silicone, PFA or other materials

Options

- Cable material according to customer's specification
- Reduced diameter of the thermowell
- Spring protection at cable relief
- ATEX, IECEx certification



TOPE409
Angle version
TSL cable insulation
(teflon®FEP/silicone)



TOPE410
Straight version
TSL cable insulation
(teflon®FEP/silicone)

Description

esistance thermometers TOPE409 and TOPE410 are designed for screw-in directly into the process or into the machine parts.

Complete probe consist of thermometric resistor, protection tube, threaded process connection welded to the tube and connection cable. Inner space between the resistor and the wall of the protection tube is filled by thermo-conductive mass, which ensures very good heat transfer and high vibration resistance.

Insertion length, protection tube diameter, process connection thread, number of sensing elements, accuracy, cable length and material can be selected individually for the respective application.

Temperature transmitter (Option)

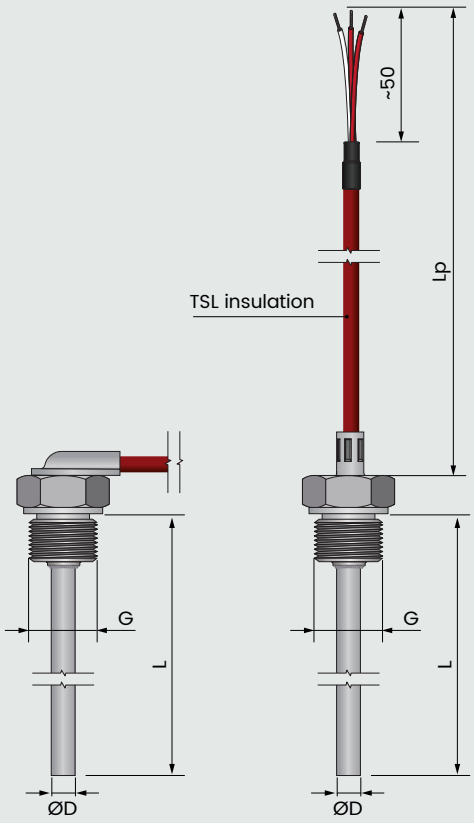
It is possible to use a temperature transmitter with signal output 4÷20mA or 0÷10V in the control cabinet. Transmitters with communication protocol HART®, Profibus® are also available. More details in "Temperature transmitters" section.

ATEX, IECEx, EAC Ex versions

Intrinsically safe designs are available for applications in hazardous areas. These models are provided with certificate for ‚intrinsically safe" type of protection according to Directive 2014/34/UE (ATEX), IECEx scheme and EAC Ex TR-CU 012/2011 (Eurasian Economic Union).

Construction

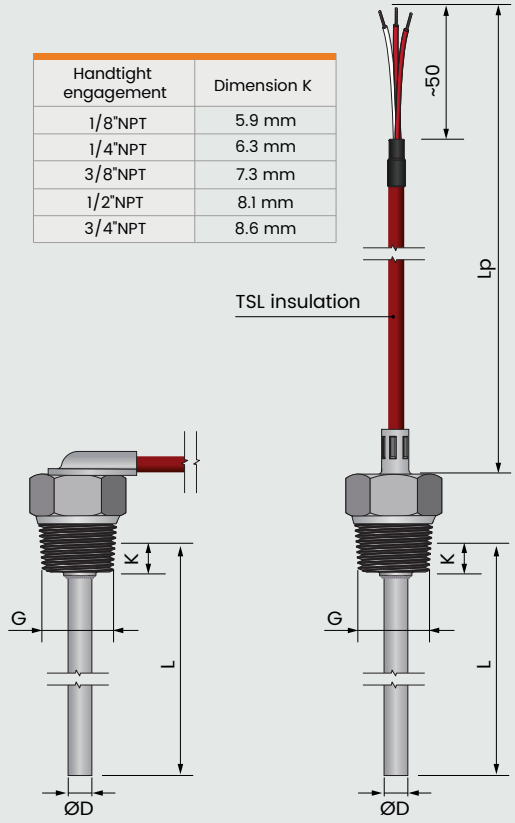
Process connection with cylindrical thread



TOPE409 TOPE410

Process connection with tapered thread

Handtight engagement	Dimension K
1/8"NPT	5.9 mm
1/4"NPT	6.3 mm
3/8"NPT	7.3 mm
1/2"NPT	8.1 mm
3/4"NPT	8.6 mm



TOPE409 TOPE410

Measuring ranges and thermowell diameters

Measuring range of the sensor depends on selected cable insulation material. Below table presents standard cable types and available thermowell diameters.

Measuring range	Thermowell diameter D [mm]	Code	Insulation material
-10 .. +105°C	Ø5, Ø6, Ø8	JJ	PVC
-50 .. +180°C	Ø4, Ø5, Ø6, Ø8	SLSL, TSL, TPSL	silicone
-50 .. +260°C	Ø3, Ø4, Ø5, Ø6, Ø8	TT, TP, TCuT	teflon® PFA
-50 .. +400°C	Ø5, Ø6, Ø8	GLGLP	fiberglass

Sensing element

Pt100, Pt500, Pt1000 (IEC 751, α =0.00385)

Option:
Ni100, Ni500, Ni1000 (DIN43760,α =0.00618)
Cu50, Cu100 (GOST 6651-94,α =0.00426)

Tolerances

Platinum

Class A (±0.15°C in temp. 0°C)
Class B (±0.30°C in temp. 0°C)

PN-EN 60751 standard defines the formulas for calculating acceptable measure tolerance of platinum thermometers

Class of tolerance	Tolerance
A	± 0.15 + (0.002 x | t |)
B	± 0.30 + (0.005 x | t |)

Electrical parameters

Measuring current	nom. 0,1 mA to 1 mA
Isolation resistance	>10 GΩ (test 500 VDC)

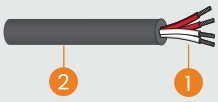
Housing material

Stainless steel 1H18N9T (1.4541 / AISI321)

Insulation types of connection cable

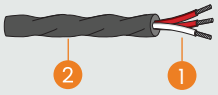
JJ insulation

1 Conductor	PVC
2 Sheath	PVC



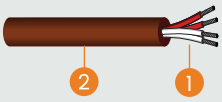
SLSL insulation

1 Conductor	Silicone
2 Sheath	Silicone



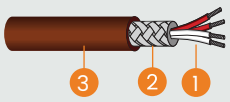
TSL insulation

1 Conductor	Teflon® FEP
2 Sheath	Silicone



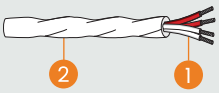
TPSL insulation

1 Conductor	Teflon® FEP
2 Screen	Copper braid
3 Sheath	Silicone



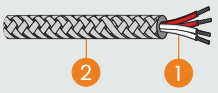
TT insulation

1 Conductor	Teflon® PFA
2 Sheath	Teflon® PFA



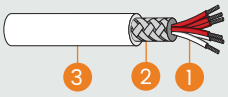
TP insulation

1 Conductor	Teflon® PFA
2 Sheath	Stainless steel braid



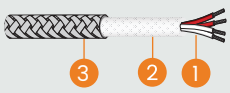
TCuT insulation

1 Conductor	Teflon® PFA
2 Screen	Copper braid
3 Sheath	Teflon® PFA

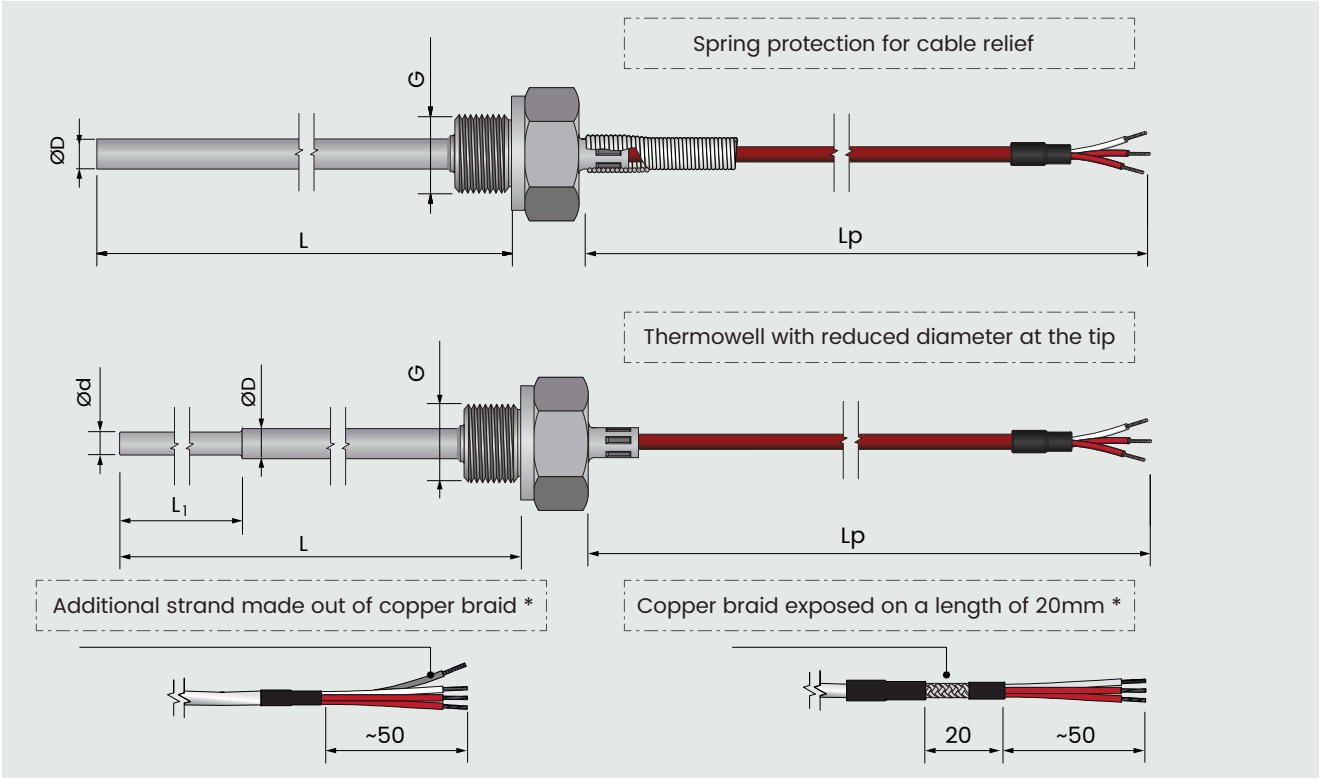


GLGLP insulation

1 Conductor	Fiberglass
2 Screen	Fiberglass
3 Sheath	Stainless steel braid



Non-standard sensor versions

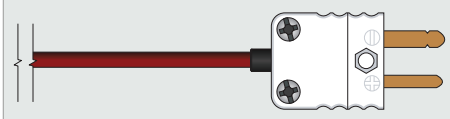


* Available only for TCuT and TPSL cable insulation

Connectors (Optional)

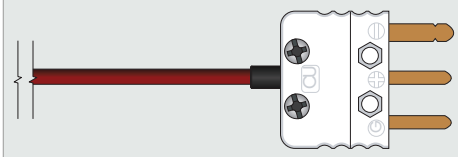
Sensors with connection cable can be equipped with connector.
Available options:

Connector S-010-Cu-W
Miniature plug, 2-pin.

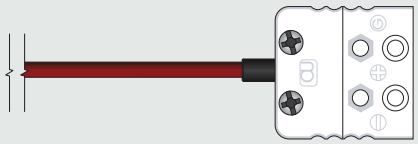


Connector S-010-Cu-G
Miniature socket, 2-pin.

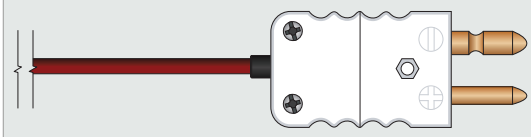
Connector S-013-Cu-W
Miniature plug, 3-pin.



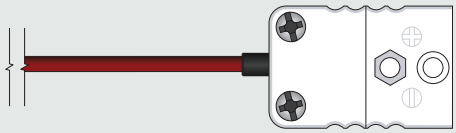
Connector S-013-Cu-G
Miniature socket, 3-pin.



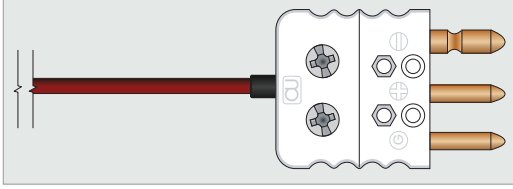
Connector S-020-Cu-W
Standard plug, 2-pin.



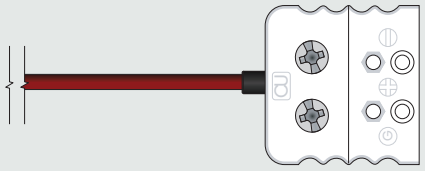
Connector S-020-Cu-G
Standard socket, 2-pin.



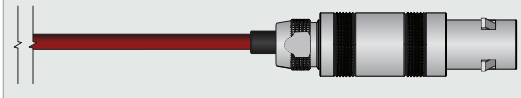
Connector S-023-Cu-W
Standard plug, 3-pin.



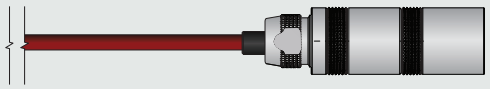
Connector S-023-Cu-G
Standard socket, 3-pin.



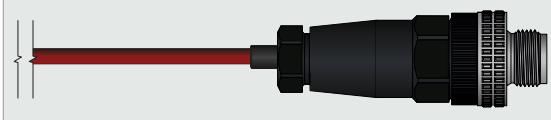
Connector LEMO® FFA
Plug size from 0S to 3S. 2-, 3-, 4-, 6-pin.



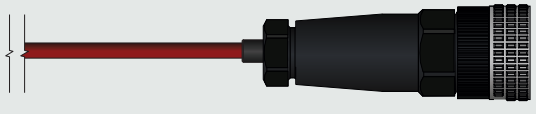
Connector LEMO® PCA
Plug size from 0S to 3S. 2-, 3-, 4-, 6-pin.



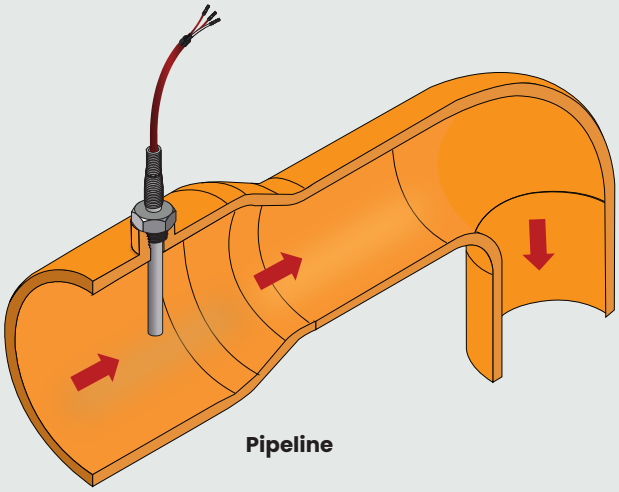
Hirschmann M12 series
4-pin.



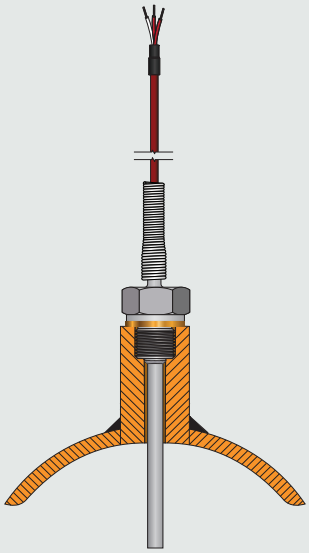
Hirschmann M12 series
Standard socket, 4-pin.



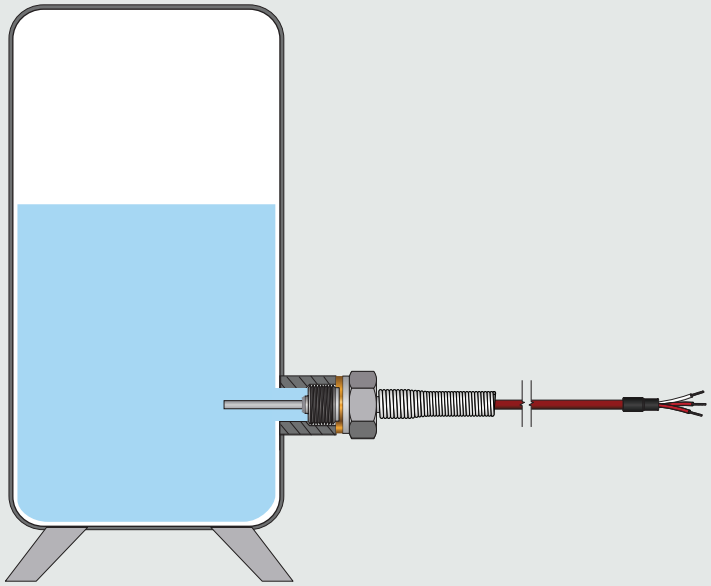
Installation examples



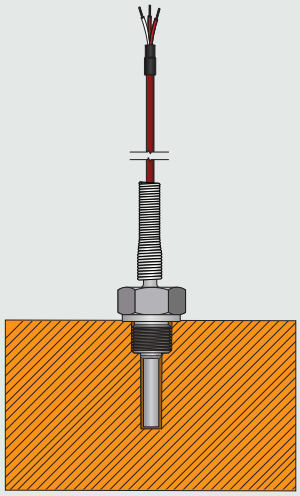
Pipeline



Remarks:
The immersion length of the thermometer may affect the measurement accuracy, therefore, in the case of installation in pipelines, it is recommended to select the immersion length of the sensor so that its end is located in the pipeline axis.



Tank



Solid body block

Ordering code

	1	2	3	4	5	6	7	8	9	10
TOPE4	☐	- ☐	- ☐	- ☐	- ☐	- ☐	- ☐	- ☐	- ☐	- ☐

Order	Parameter	Code	✓	Description	
1	Model type	09	☐	Angle version	
		10	☐	Straight version	
2	Type of sensing element	1xPt100	☐	Single Pt100	IEC 751, α =0.00385
		2xPt100	☐	Double Pt100	IEC 751, α =0.00385
		1xNi100	☐	Single Ni100	DIN43760, α =0.00618
		2xNi100	☐	Double Ni100	DIN43760, α =0.00618
		xxx	☐	Other, please specify	
3	Thermowell diameter ØD	5	☐	Ø5 mm	
		6	☐	Ø6 mm	
		8	☐	Ø8 mm	
		xxx	☐	Other, please specify	
4	Thermowell length L	50	☐	50mm	
		100	☐	100mm	
		150	☐	150mm	
		xxx	☐	Other, please specify	
5	Connecting cable length Lp	1000	☐	1000mm	
		2500	☐	2500mm	
		xxx	☐	Other, please specify	
6	Tolerance class	A	☐	Class A acc. to PN-EN 60751 / IEC 751 (available only for Pt sensing elements)	
		B	☐	Class B acc. to PN-EN 60751 / IEC 751 / DIN43760 / GOST 6651-94	
7	Measuring circuit	2	☐	2-wire (not available for class A)	
		3	☐	3-wire	
		4	☐	4-wire	
8	Process connection thread	M10x1	☐	M10x1	
		M12x1	☐	M12x1	
		G1/4"	☐	G1/4"	
		G1/2"	☐	G1/2"	
		1/2"NPT	☐	1/2"NPT	
		xxx	☐	Other, please specify	Temperature range of sensor
9	Connecting cable type	JJ	☐	PVC / PVC	-10 .. +105°C
		SLSL	☐	Silicone / Silicone	-50 .. +180°C
		TSL	☐	Teflon® FEP / Silicone	-50 .. +180°C
		TPSL	☐	Teflon® FEP / Cu braid / Silicone	-50 .. +180°C
		TT	☐	Teflon® PFA / Teflon® PFA	-50 .. +260°C
		TP	☐	Teflon® PFA / Stainless steel	-50 .. +260°C
		TCuT	☐	Teflon® PFA / Cu braid / Teflon® PFA	-50 .. +260°C
		GLGLP	☐	Fiberglass / Fiber glass / Stainless steel	-50 .. +400°C
10	Connector (optional)		☐	without connector, free end conductors of connection cable	
		S-013-Cu-W	☐	Miniature plug, 3-pin	
		FFA.1S	☐	Connector LEMO® FFA size 1S	
		xxx	☐	Other, please specify	

Example

TOPE409-1xPt100-8-150-2000-A-3-G1/4"-TSL
Angle version type, RTD sensor 1xPt100, thermowell diameter Ø8 mm, thermowell length L=150 mm, connection cable length Lp=2000 mm, A tolerance class, 3-wire measuring circuit, threaded thermowell connection G1/4", single conductors in teflon insulation, sheath in silicone insulation.

TOPE410-1xPt100-6-100-2500-B-2-M10x1-TT-FFA.1S
Straight version type, RTD sensor 1xPt100, thermowell diameter Ø6 mm, thermowell length L=100 mm, connection cable length Lp=2500 mm, B tolerance class, 2-wire measuring circuit, threaded thermowell connection M10x1, single conductors in teflon insulation, sheath in teflon insulation, connection cable equipped with LEMO® FFA plug size 1S..