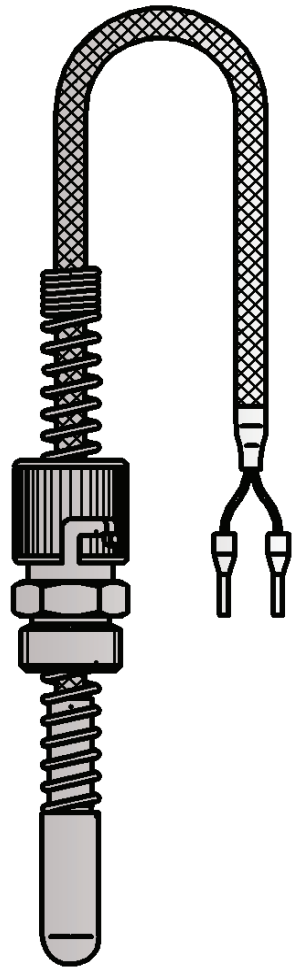
limatherm SENSOR

Temperature Sensors for Measurement of Machinery and Device Parts
TOPE-28, TTJE-28, TTKE-28

AP 108

Temperature sensor suitable for measurement of movable or replaceable parts of machines and devices, e.g. bearings or injection moulds. Equipped with bayonet fitting that enables quick and easy installation in the measured element. Furthermore, the sensor has a spring that protects the flexible cable. The cap of a bayonet fitting can be easily moved across the spring enabling the adjustment of sensor immersion length.



Specification

Temperature range / sensing element

-50÷400ºC	**Pt100**	class B
-40÷400ºC	**K, J**	class 2

Sheath

– material: steel 1.4541
– diameter [mm]: 6, 8
– length L [mm]: 0÷100
– spring diameter [mm]: 8
– tips: round, flat and tapered
– bayonet fitting with connector – nickel-plated brass
– standard length of sheath with round tip: L=13mm

Lead wire

– stranded Cu wire or stranded thermocouple wire:2x0,22mm^2
– fiberglass insulation, metal overbraid
– length L_p [m]: 1,5 (standard)
– Cu wire resistance ~0,14 Ω/m = ~0,36ºC

Other parameters acc. to requirements

Options

Temperature transmitter application

Temperature transmitter with standard 4÷20mA, 0÷10V output signals and with the HART or PROFIBUS communication protocols can be installed in the control cabinet.

Non-standard design

Immersion length, diameter and material of the sheath, and measuring insert parameters can be customized per client request.

Calibrations performed by Limatherm Sensor Sp. z o.o. are confirmed with the Calibration Certificate of the Accredited Laboratory for Temperature Measurements.

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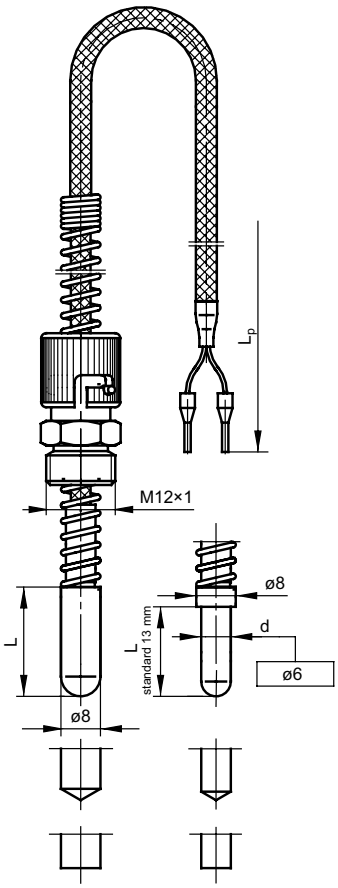
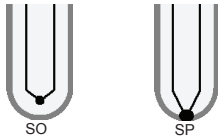


Thermocouple hot junction types



Compensation / thermocouple wire insulations

Insulation material	Operating temperature range [°C]	Properties
PCW (PCV)	-10÷105	Applied in mild environmental conditions. Waterproof and flexible.
Yc- polyvinyl chloride	-10÷105	Applied in mild environmental conditions. Waterproof and flexible.
FEP-teflon	-50÷200	Resistant to oils, acids and other aggressive liquids. Good flexibility.
Si-silicone	-50÷180	Waterproof, flexible. Applied in high humidity conditions.
Ws-fiberglass	-60÷400	Good resistance to high temperature Low resistance to liquid penetration.

Notes: Additionally, copper or steel braids/shields are used on wires to prevent electrical noises, Increasing, at the same time, wire insulation resistance to mechanical damages. In case of longer wire lengths grounding may be needed to minimize the noise in measurement circuit

Tolerance for classes of sensors with resistors Pt acc. to PN-EN 60751

Sensor classes	Range of application [°C]	Formula for calculating acceptable deviations [°C]
AA	0÷150	T = ±(0,10 + 0,0017 |t|)
A	-30÷300	T = ±(0,15 + 0,002 |t|)
B	-50÷500	T = ±(0,3 + 0,005 |t|)

|t|- absolute value of temperature

Measurement circuit

1 x Pt100			2 x Pt100			1 x TC	2 x TC
2-wire	3-wire	4-wire	2-wire	3-wire	4-wire	2-wire	2-wire
✓	✓	✓	x	x	x	✓	x

Tolerance for thermocouple classes acc. to PN-EN 60584

Thermocouple type	Class 1		Class 2	
	Range of application [°C]	Tolerance [°C]	Range of application [°C]	Tolerance [°C]
J Fe-CuNi	from -40 to +375 from +375 to +750	±1,5 ±0,004 |t|	from -40 to +333 from +333 to +750	±2,5 ±0,0075 |t|
K NiCr-NiAl	from -40 to +375 from +375 to +1000	±1,5 ±0,004 |t|	from -40 to +333 from +333 to +1200	±2,5 ±0,0075 |t|

|t|- absolute value of temperature

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Types of measuring tips

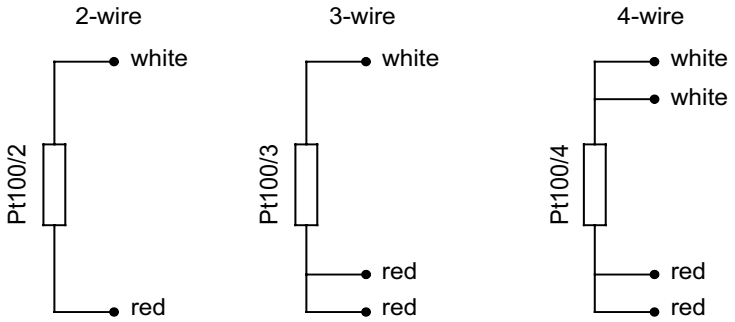
Round			Tapered			Flat		
								
ø8	ø6	ø8	ø8	ø6	ø8	ø8	ø6	ø8

Process connection type

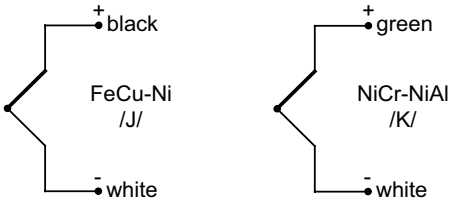
M12x1	M14x1,5
	

Connection schemes

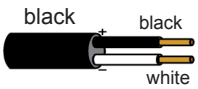
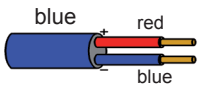
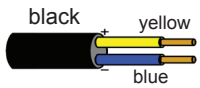
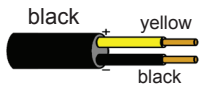
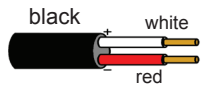
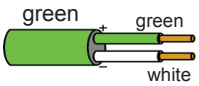
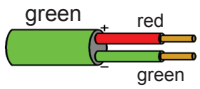
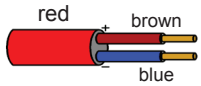
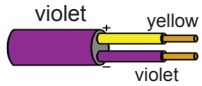
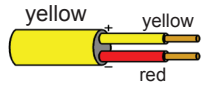
Pt100 (thermometric resistor)



TC (thermocouple)



Cable types and colours acc. to the norm

EU	D	GB	F	USA
Thermocouple J type				
 black / black / white	 blue / red / blue	 black / yellow / blue	 black / yellow / black	 black / white / red
Thermocouple K type				
 green / green / white	 green / red / green	 red / brown / blue	 violet / yellow / violet	 yellow / yellow / red

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TOPE-28, TTJE-28, TTKE-28

Product code

		Sensing element	
		OP	resistor Pt
		TJ	thermocouple Fe-CuNi /J/
1		**TK**	thermocouple NiCr-NiAl /K/
		Measuring tip type	
		P	flat
		K	round
2		**S**	tapered
		Sheath length	
		13	13mm
3			other parameters acc. to requirements
		Sheath diameter	
		6	ø6mm
		8	ø8mm
4			other parameters acc. to requirements
		Dimension of process connection thread	
		M12x1	metric thread M12x1
5			other parameters acc. to requirements
		Resistor type or hot junction type for thermocouple	
		Pt100	Pt100/Pt500/Pt1000
		SO	insulated hot junction
6		**SP**	grounded hot junction
		Accuracy	
		A or B	for measuring resistor
7		**1 or 2**	for thermocouple
		Measurement circuit (for resistor)	
		2	2 - wire
		3	3 - wire
8		**4**	4 - wire
		Lead wire length	
		1,5	1,5m
9			other parameters acc. to requirements

1				2		3		4		5		6		7		8		9
T		**E**	–	**28**	–		–		–		–		–		–		–	

Ordering example:

TOPE-28–K–10–6– M14x1,5 –Pt100–B–2–2 m single sensor with Pt100, class B, 2-wire connection, sheath with round tip, length L=10mm and diameter 6mm, lead wire length L_p=2m, threaded connector M14x1,5