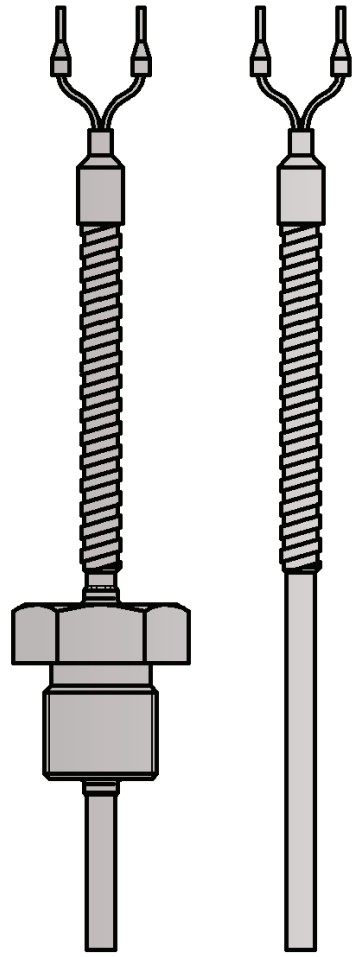
limatherm SENSOR

Temperature Sensors for Measurement of Machinery and Device Parts
TOPWO-1,TTJWO-1,TTKWO-1

AP 108

Sensor suitable for temperature measurement in district heating substations. Sensor with welded connector is applicable also for temperature measurement of liquid and gaseous media in high pressure conditions. Sensor consists of resistor placed in the thin-walled acid-resistant sheath connected to flexible lead protected with corrugated steel pipe.



Specification

Temperature range / sensing element

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

Thermowell

– material: steel 1.4541
– length L [mm]: 50÷1000

Thread dimension	Max. sheath diameter
M8x1	5
G⅛; M10; M10x1	6
M12; M12x1,5; M12 x 1	8
G¼; M14x1,5	9
G⅜; M16x1,5	10
G½; M20x1,5	14

Lead wire

– stranded Cu wire lub stranded thermocouple wire: 2x0,22mm^2
– fiberglass insulation, metal overbraid
– flexible corrugated pipe, stainless steel, ø7/5mm
– length L_p [m]: 1,5 (standard)
– Cu wire resistance~0,14 Ω/m = ~0,36°C

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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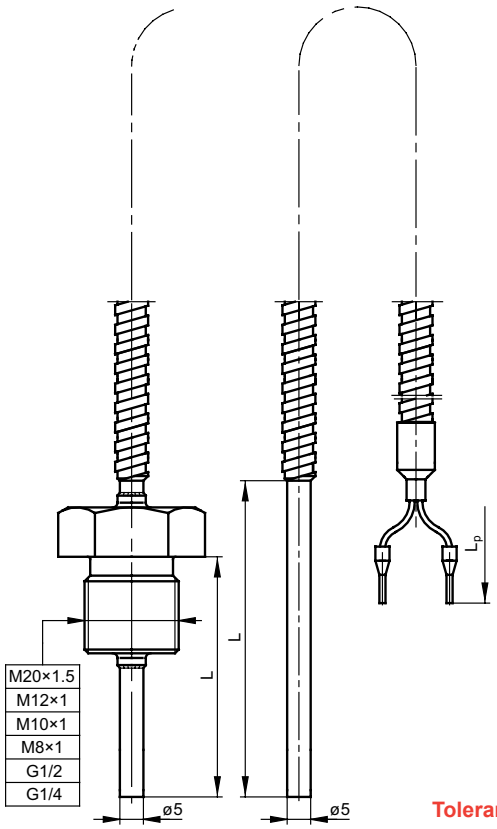
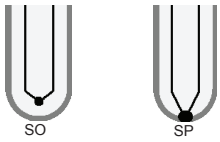


Compensation / thermocouple wire insulations

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

Thermocouple hot junction types



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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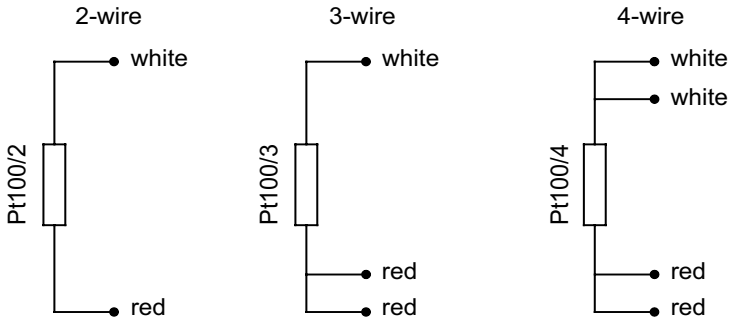
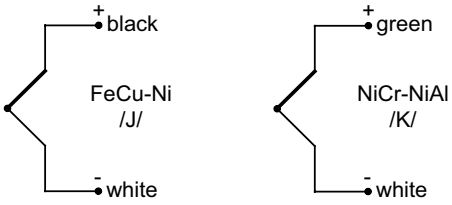
Connection schemes

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

Product code

		Sensing element	
1		**OP**	resistor Pt
		TJ	thermocouple Fe-CuNi /J/
		TK	thermocouple NiCr-NiAl /K/
		Sheath length	
		50	50mm
		500	500mm
2			other parameters acc. to requirements

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		Sheath diameter	
		4	4mm (only version with thread)
		5	5mm (standard)
		6	6mm (only version with thread)
		8	8mm (only version with thread)
3			other parameters acc. to requirements
		Resistor type or hot junction type	
		Pt100	Pt100/Pt500/Pt1000
		SO	insulated hot junction
		SP	grounded hot junction
4			other parameters acc. to requirements
		Accuracy	
		A or B	for measuring resistor
5		**1 or 2**	for thermocouple
		Measurement circuit for Pt	
		2	2 - wire
		3	3 - wire
6		**4**	4 - wire
		Dimension of process connection thread	
		M8x1	metric thread M8x1
		M10x1	metric thread M10x1
7			other parameters acc. to requirements
		Lead wire length	
		1,5	1,5m
8			other parameters acc. to requirements

1			2	3	4	5	6	7	8
T		**WO-1**	–	–	–	–	–	–	–

Ordering example: **TOPWO-1–200–5–Pt100–B–2–1,5 m** single sensor with Pt100, class B, 2-wire connection, straight sheath without threaded fitting, sheath length L=200 mm, lead wire length L_p=1,5 m