

TEMPERATURE TRANSMITTER

Compact version

TPT-100



- Piezoresistive silicon pressure sensor developed and fabricated in MTM
- Ranges (-200⁰C, 0⁰C) to (0⁰C, 120⁰C).
- Standard outputs 4-20mA
- Compact and economical design, small overall dimensions, low weight.
- High accuracy, repeatability, long term stability and reliability

APPLICATION

Measurement of temperature in plants with standard process fluids. Compact and economical design, IP65 mechanical protection, choice of material in contact with process fluid, and good technical and metrological characteristics provide the application under normal conditions and compatibility with standard automatic regulation and control systems.

STRUCTURE

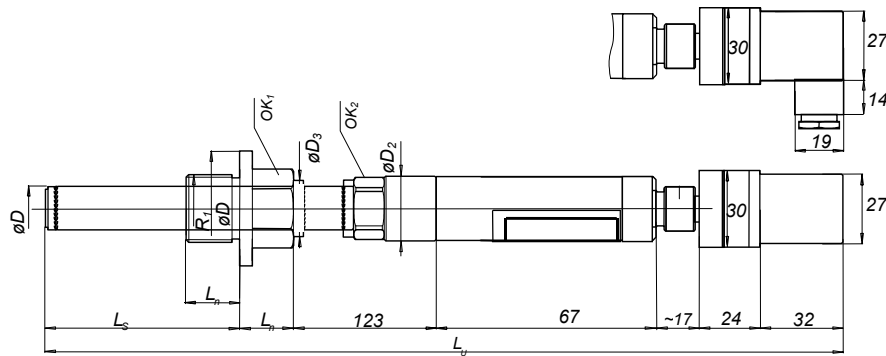
Central section consists from the stainless steel measurement chamber fabricated with several optional diameters and the pressure sensor chip structure welded to it, while the interior is filled with inert gas. Measurement chamber consists from the central section, the external housing tube with optional diameters and measurement chamber mounts with the screw process flange welded to the chamber housing. Central section is connected by a screw to the housing of the measurement chamber. The connection is made airtight by the use of Loctite glue.

Electronic amplifier, fabricated in the surface mount technology, supplies sensors and converts its output signal into the standard electric signal. Two or three wire electrical connection at the transmitter output is intended simultaneously for supply and measurement. The zero and range potentiometers fitted in the electronic

amplifier provide additional correction of the manufacturer-preset range in the limits up to $\pm 5\%$.

OPERATION

The temperature of the measured fluid is conducted through the central section, causing changes of the measured pressure of the inert gas with constant volume and thus deflects the sensor diaphragm. The deflection causes an unbalance of the Wheatstone bridge (four piezoresistors integrated into the diaphragm edge). The bridge unbalance is detected electronically, the obtained signal is further processed in the electronic amplifier and finally sent to the transmitter output. The output signal is linearly dependent on measured fluid temperature.



C	21	1"	41	32	32	27	27	32	C	112	132	192	232	282	392	432	C	405	425	485	525	575	685	725
B	17	3/4"	32	27	25	22	22	21	B	101	121	181	221	271	381	421	B	383	403	463	503	553	663	703
A	13.5	1/2"	27	22	25	17	17	16	A	96	116	176	216	266	376	416	A	373	394	453	493	543	653	693
Var.	D	R	D	OK	D	OK	D	L _r	Var.	80	100	160	200	250	360	400	Var.	80	100	160	200	250	360	400
										L _s for standard lengths								L _U for standard lengths						

CHARACTERISTICS

- Available measurement ranges (-200...-100...0), (-100...-50...0), (-50...-25...0), (-25...0...+50), and (0...50...120)^oC
- Two-wire (4-20)mA
- Electric output is either cable (standard length 2m) or connector.
- Zero suppression: 100% of range
- Elevation: standardly 20% of range
- The measurement range is manufacturer-preset, and the user may perform additional corrections during transmitter operation in the range $\pm 5\%$.
- Materials: electronic unit housing Al.Cu5.Mg1.55, measurement chamber 316 stainless steel, measurement chamber housing Al.Cu5.Mg1.55 or 316 stainless

steel, central section housing and process flange stainless steel with galvanic Zn or 316 stainless steel. Other materials upon request.

- Measurement chamber housing diameter $\varnothing 13.5$, $\varnothing 17$ ili $\varnothing 21$.
- standard lengths of measurement chamber 80, 100, 160, 200, 250, 360 i 400.
- Process connection R1/2" or 1/2"NPT-M for $\varnothing 13.5$, R3/4" or 3/4" NPT-M for $\varnothing 17$ and R1" or 1"NPT-M for $\varnothing 21$.
- Mechanical protection IP65

TABLE 1: GENERAL AND OPERATING CONDITIONS

Parameter	Units	Reference conditions	Normal conditions	Limit conditions	Transport conditions
Ambient temperature	$^{\circ}\text{C}$	20 \pm 1	-30 to +80	-40 to +80	-50 to +100
Chamber temperature	$^{\circ}\text{C}$	-200 to 120	-200 to 120	-200 to 120	-50 to 100
Relative humidity	%	10 to 50	0 to 100	0 to 100	0 to 100
Vibration frequency	Hz			≤ 500	≤ 500
Vibration acceleration	9.81 m/s ²			$\leq 2^1$	$\leq 2^1$
Vibration amplitude	mm			$\leq 0.21^2$	$\leq 0.21^2$
Shock	9.81 m/s ²			≤ 100	≤ 100
Supply voltage	V	24 \pm 1	24 \pm 1	12 to 36	
Line resistance	Ω	600	600	0 to 1100	

¹⁾ Frequency range 60 to 500Hz; ²⁾ Frequency range 10 to 60Hz

Operating condition for measurement fluid:

- Temperature max. 120 $^{\circ}\text{C}$
- Pressure max. 50 bar
- Permitted gas flow velocity 9, 12 or 15 m/s for measurement probe diameters $\varnothing 13.5$, $\varnothing 17$ or $\varnothing 21$, respectively.
- Water flow velocity 2, 2.5, 3.5 m/s for measurement probe diameters $\varnothing 13.5$, $\varnothing 17$ or $\varnothing 21$, respectively.

MEASUREMENT CHARACTERISTICS

- In accordance with IEC 770/84
- Accuracy (linearity, hysteresis, repeatability), table 2; independent on measuring range.
- Additional effects for minimum (4mA) and maximum (20mA) signal:
 - Power supply effect $\pm 0.01\%$ FS/1V,
 - Line resistance effect, $\pm 0.01\%$ FS/100 Ω .
 - Long term stability $\pm 0.2\%$ FS/1 year.

These effects are independent on measurement range.

- Effects of overtemperature and temperature of the ambient around the amplifier are dependent on measurement range. They are measured for each transmitter separately and the data are enclosed in the data sheets.

TABLE 2: MEASURING ACCURACY ($\pm\%$ FS)

Class	0.20	0.40	0.60	1.00
Linearity	0.10	0.30	0.40	0.60
Hysteresis	0.05	0.05	0.10	0.20
Repeatability	0.05	0.05	0.10	0.20