



Microelectronic gauge pressure sensors MP-PT Series with temperature sensor

- ▶ **Operating pressure range**
from 0-1 to 0-150 MPa
- ▶ **Operating temperature range**
from -45 to +200 °C
- ▶ **Titanium body**

Applications

- **Oil and gas industry**
- **Hydraulics/Pneumatic**
- **Pumping stations/ Compressors**



- **The sensors are intended for proportional conversion of pressure and temperature into electric signals.**

New solutions in pressure measurement – “Silicon-on-Sapphire” Technology

- √ Sensitive element of pressure sensors is a two-layer sapphire-titanium diaphragm with monocrystal silicon resistance strain gauges.
- √ Monocrystal sapphire diaphragm is a perfect elastic element that due to connection with titanium acquires the best quality as to the deformation level, and preserves its elastic properties up to +400°C.
- √ Monocrystal silicon resistance strain gauges are automatically connected with sapphire (heteroepitaxy method) and provide almost no hysteresis or fatigue effects.
- √ Strain gauges elements are manufactured in groups by solid-state micro-electronic methods and provide high quality and good repeatability of the output parameters.
- √ Temperature sensor is a thin-film platinum resistor on a ceramic substrate.

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Datasheet

1 Nominal, overload and burst pressure

Designation	Nominal pressure, MPa	Overload pressure, MPa	Burst pressure, MPa
MP-PT 1...	0...1	-0,1...2	3
MP-PT 1,6...	0...1,6	-0,1...3,2	4,8
MP-PT 2,5...	0...2,5	-0,1...5	7,5
MP-PT 4...	0...4	-0,1...8	12
MP-PT 6...	0...6	-0,1...12	18
MP-PT 10...	0...10	-0,1...20	30
MP-PT 16...	0...16	-0,1...32	48
MP-PT 25...	0...25	-0,1...50	75
MP-PT 40...	0...40	-0,1...80	120
MP-PT 60...	0...60	-0,1...120	180
MP-PT 100...	0...100	-0,1...150	250
MP-P 150...	0...150	-0,1...165	300

2 Temperature ranges

2.1 Operating temperature range

- 2.1.1 Version 1 from - 45 to + 125°C
- 2.1.2 Version 2 from - 45 to + 155°C
- 2.1.3 Version 3 from - 45 to + 200°C

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2.2 Limiting temperature range

2.2.1 Version 1	from - 60 to + 130°C
2.2.2 Version 2	from - 60 to + 160°C
2.2.3 Version 3	from - 60 to + 205°C

3 Accuracy parameters

3.1 For pressure part

3.1.1 Resolution, % FS	0,01
3.1.2 Non-linearity, % FS	±0,15
3.1.3 Variation, % FS	0,05
3.1.4 Output signal repeatability, % FS	±0,05
3.1.5 Long-term stability of the output signal range within 12 months, %	0,15
3.1.6 Output signal error caused by the influence of overload pressure, % FS for zero output signal	±0,2
for output signal range	±0,05
3.1.7 Additional ambient temperature error, % FS/1°C	
3.1.7.1 For zero output signal	±0,05
3.1.7.2 For output signal range operating temperature range from -45 to +125 °C	±0,05
operating temperature range from +125 to +200 °C	-0,05±0,025
3.1.8 Additional vibration error of the output signal, % FS	±0,05

3.2 For temperature part

3.2.1 Tolerance class	F 0,15
3.2.2 Tolerance at the measured value of temperature t, °C	±(0,15+0,002 t)

4 Electrical characteristics

4.1 For pressure part

4.1.1 Output signal at room temperature, mV	
zero output signal	±15
output signal range (FS)	150±50
for MP-PT 1...	100±35
4.1.2 Strain gauge bridge resistance at room temperature, kOhm	3,40-4,85
4.1.3 Temperature resistance coefficient of the strain gauge bridge, K ⁻¹	(1,75±0,1)·10 ⁻³
4.1.4 Insulation resistance, MOhm	
at room temperature	100
at the upper ambient temperature value	20

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4.1.5 Electrical insulation strength (AC voltage), V	300
4.1.6 Power supply - stabilized DC voltage, V	1-10
Output signal is rated by the voltage 10 V.	
4.2 For temperature part	
4.2.1 Temperature coefficient, K^{-1}	$3,85 \cdot 10^{-3}$
4.2.2 Nominal resistance at 0 °C, Ohm	1000
4.2.3 Insulation resistance, MOhm	
at 20 °C	100

5 Mechanical characteristics

5.1 Vibration resistance (sinusoidal vibration):	
Frequency range, Hz	from 10 to 2000
Acceleration amplitude, m/s^2	400
5.2 Shock resistance (multiple mechanical shocks):	
Shock acceleration peak, m/s^2	1000
Shock pulse width, ms	2
5.3 Torque effect while installation should not be higher, N·m	
for pressure port types	
M1, U1, U2	25
M2, U3, M3, U4, M4, U5, M5, U6, M6, U7	5

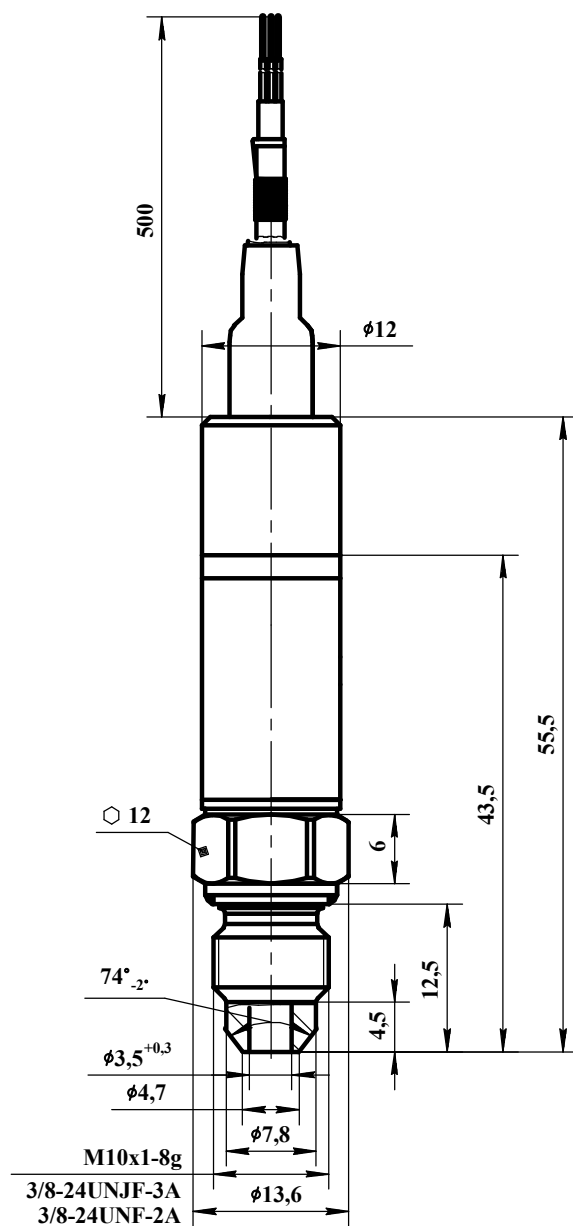
6 Operating conditions

6.1 IP level	IP65
6.2 Sensor body (pressure connection) and diaphragm are made of titanium alloy with 87 % of titanium.	
6.3 Pressure media - gases, liquids and their mixtures not aggressive to the titanium alloy (air, sea water, 5 % vitriol acid, chlorine water, chloride solutions, oils, ethyne etc).	

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7 Overall and mounting dimensions

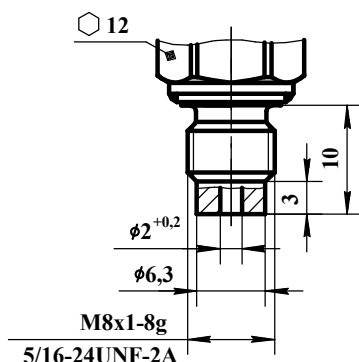


Thread	Code
M10x1-8g	M1
3/8-24UNJF-3A	U1
3/8-24UNF-2A	U2

Drawing 1

7.1 Thread design

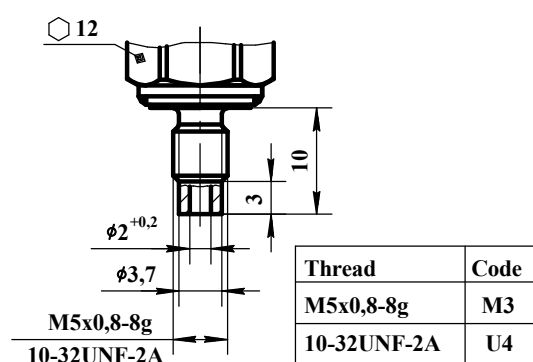
MP-PT 1(1,6...25)-...-M2(U3)-...



Drawing 2

Thread	Code
M8x1-8g	M2
5/16-24UNF-2A	U3

MP-PT 1(1,6...10)-...-M3(U4)-...



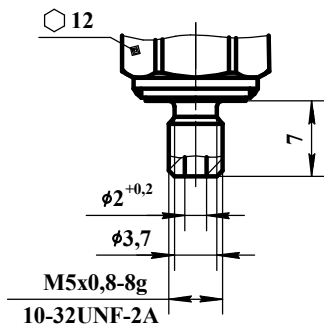
Drawing 3

Thread	Code
M5x0,8-8g	M3
10-32UNF-2A	U4

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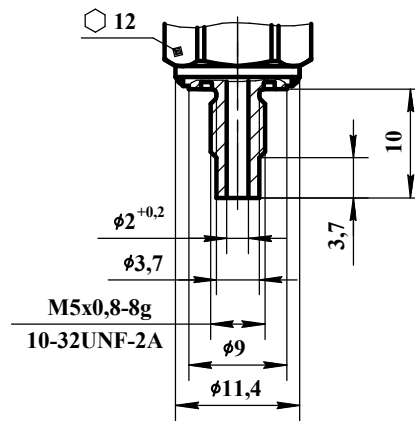
MP-PT 1(1,6...10)-...-M4(U5)-...



Thread	Code
M5x0,8-8g	M4
10-32UNF-2A	U5

Drawing 4

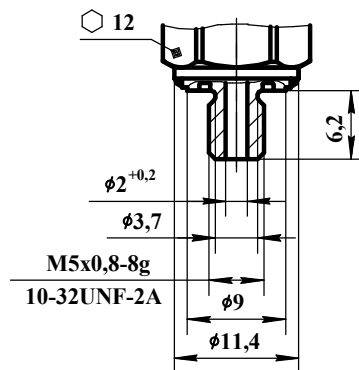
MP-PT 1(1,6...10)-...-M5(U6)-...



Thread	Code
M5x0,8-8g	M5
10-32UNF-2A	U6

Drawing 5

MP-PT 1(1,6...25)-...-M6(U7)-...

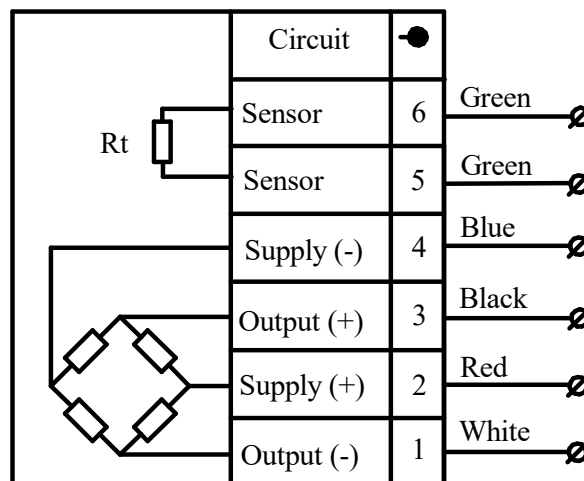


Thread	Code
M5x0,8-8g	M6
10-32UNF-2A	U7

Drawing 6

8 Circuit diagram

MP-PT with pressure seal



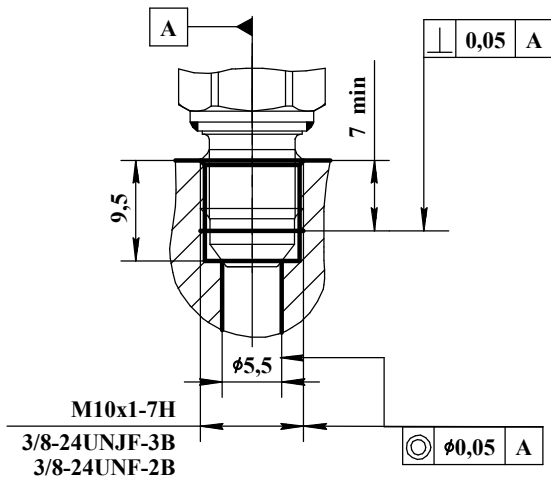
Rt - thin film platinum temperature sensor type L.

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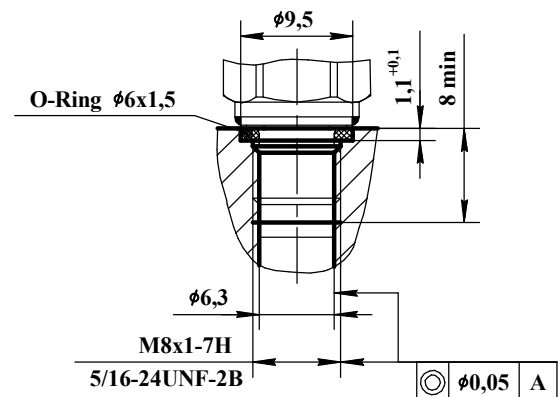
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9 Mounting diagrams

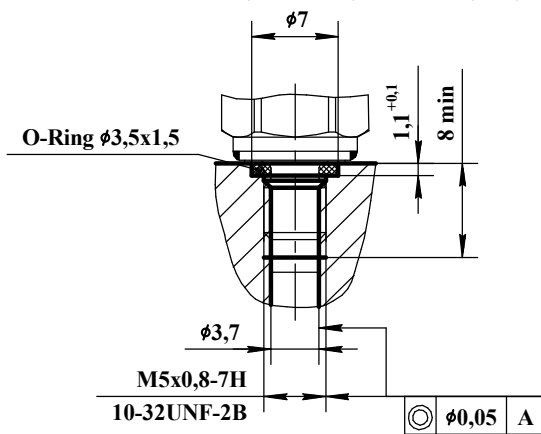
MP-PT 1(1,6...150)-...-M1(U1, U2)-...



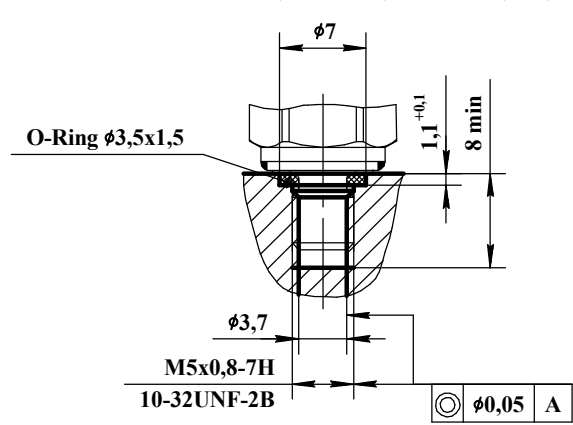
MP-PT 1(1,6...25)-...-M2(U3)-...



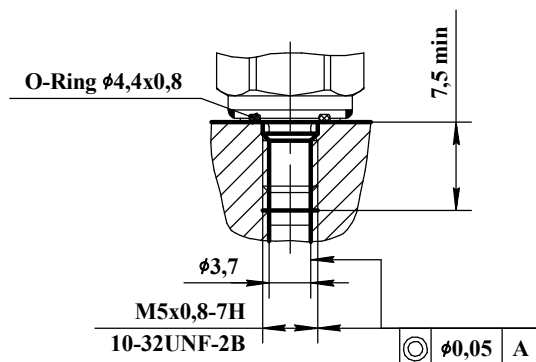
MP-PT 1(1,6...10)-...-M3(U4)-...



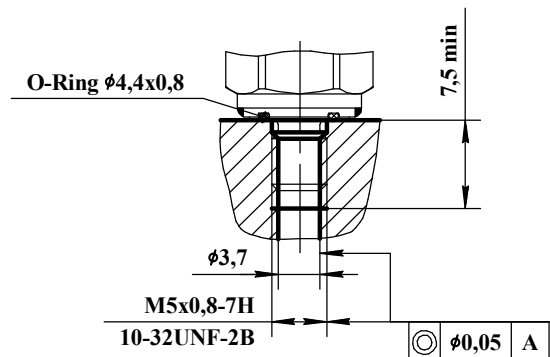
MP-PT 1(1,6...10)-...-M4(U5)-...



MP-PT 1(1,6...10)-...-M5(U6)-...



MP-PT 1(1,6...10)-...-M6(U7)-...



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10 Type designation

MP-PT XXX - XX - X - X

Series

Upper gauge pressure limit

1; 1,6; 2,5; 4; 6; 10; 16; 25;
40; 60; 100; 150 MPa

Operation ambient temperature range

Version 1 - from - 45 to + 125 °C;
Version 2 - from - 45 to + 155 °C;
Version 3 - from - 45 to + 200 °C

Circuit

0 - “closed bridge” circuit

Thread code

M1 - M10x1-8g (1-150 MPa, drawing 1);
U1 - 3/8-24UNJF-3A (1-150 MPa, drawing 1);
U2 - 3/8-24UNF-2A (1-150 MPa, drawing 1);
M2 - M8x1-8g (1-25 MPa, drawing 2);
U3 - 5/16-24UNF-2A (1-25 MPa, drawing 2);
M3, M4, M5, M6 - M5x0,8-8g (1-10 MPa, drawings 3-6);
U4, U5, U6, U7 - 10-32UNF-2A (1-10 MPa, drawings 3-6)

Electrical connection

L - flexible cable 500 mm length

Order example of pressure sensor

Pressure sensor of MP-PT series with temperature sensor, intended for pressure conversion from 0 to 60 MPa, for operation within temperature range from - 45 to + 200 °C, with “closed bridge” circuit, 3/8-24UNJF-3A thread and flexible cable 500 mm length:

Pressure sensor MP-PT 60-30-U1-L.

Note: if wished, the cable length (standard 500 mm) can be changed, in this case the required length should be added to the cable code L, for example:

Pressure sensor MP-PT 60-30-U1-L1200.

11 Marking

Marking on the sensor body must contain the following information: series, upper gauge pressure limit in MPa, operation temperature range, circuit type, thread code and order number



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