

## Microelectronic gauge pressure sensors P Series

- Resolution 0,01 %
- Operating pressure range  
from 0-0,16 to 0-40 MPa
- Operating temperature range  
from -20 to +200 °C
- Electrical insulation  
strength – 700 V
- Titanium body



### Applications

- ★ Industrial automatics
- ★ Pumping stations/ Compressors
- ★ Heat metering

■ The sensors are intended for proportional conversion of pressure into electric signal.

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

- ✓ Sensitive element of pressure sensors is a two-layer sapphire-titanium membrane with monocrystal silicon resistance strain gauges.
- ✓ Monocrystal sapphire membrane 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.
- ✓ Exceptional insulating properties and radiation resistance of sapphire enable to use the sensitive element within temperature range from -200 to +350°C under the effect of high electromagnetic interferences and radiation.
- ✓ Strain gauges elements are manufactured in groups by solid-state micro-electronic methods and provide high quality and good repeatability of the output parameters.

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# Datasheet

## 1 Nominal, overload and burst pressure

Designation	Nominal pressure, MPa	Overload pressure, MPa	Burst pressure, MPa
P 0,16...	0...0,16	-0,1...0,32	0,48
P 0,25...	0...0,25	-0,1...0,5	0,75
P 0,4...	0...0,4	-0,1...0,8	1,2
P 0,6...	0...0,6	-0,1...1,2	1,8
P 1...	0...1	-0,1...2	3
P 1,6...	0...1,6	-0,1...3,2	4,8
P 2,5...	0...2,5	-0,1...5	7,5
P 4...	0...4	-0,1...8	12
P 6...	0...6	-0,1...12	18
P 10...	0...10	-0,1...20	30
P 16...	0...16	-0,1...32	48
P 25...	0...25	-0,1...50	75
P 40...	0...40	-0,1...80	100

## 2 Temperature ranges

### 2.1 Operating temperature range

2.1.1 Version 1 .....from - 40 to + 100°C

2.1.2 Version 2 .....from - 20 to + 155°C

2.1.3 Version 3 .....from - 20 to + 200°C

### 2.2 Limiting temperature range

2.2.1 Version 1 .....from - 40 to + 130°C

2.2.2 Version 2 .....from - 20 to + 160°C

2.2.3 Version 3 .....from - 20 to + 200°C

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Note: operating and limiting temperature ranges of the sensors are determined by the applying O-rings from ethylene propylene rubber Keltan (operating temperature from -40 to +130°C) and from fluoric rubber Viton (operating temperature range from -20 to +200°C).

### 3 Accuracy parameters

3.1 Resolution, % FS	.0,01
3.2 Non-linearity, % FS	±0,2
for P 0,25(0,4...25)-101-C(V)-D17-L	±0,25
3.3 Variation, % FS	.0,05
for P 0,25(0,4...25)-101-C(V)-D17-L	0,1
3.4 Output signal repeatability, % FS	±0,1
3.5 Long-term stability of the output signal range within 12 months, %	
3.5.1 For P 0,16... - P 1...	±0,25
3.5.2 For P 1,6... - P 40...	±0,15
3.6 Output signal error caused by the influence of overload pressures, % FS	
for zero output signal	±0,2
for output signal range	±0,05
3.7 Additional ambient temperature error, % FS/1°C	
3.7.1 Zero output signal	±0,05
for P 0,16... - P 0,4...	.0,025±0,05
for P 0,25(0,4...25)-101-C(V)-D17-L	.0,05±0,07
3.7.2 Output signal range	
operating temperature range from -40 to +100 °C	±0,05
operating temperature range from +100 to +200 °C	-0,05±0,025
3.8 Additional vibration error of the output signal, % FS	±0,05

### 4 Electrical characteristics

4.1 Output signal at room temperature, mV	
4.1.1 Zero output signal	±10
4.1.2 Output signal range (FS)	150±50
for P 0,16 (D19); P 0,25 (D17)	100±35
4.2 Strain gauge bridge resistance at room temperature, kOhm	3,40-4,85
4.3 Temperature resistance coefficient of the strain gauge bridge, K <sup>-1</sup>	
4.3.1 Modification V	(1,75±0,1)·10 <sup>-3</sup>
4.3.2 Modification C	(1,2±0,2)·10 <sup>-3</sup>

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4.4 Insulation resistance, MOhm	
at room temperature	100
at the upper ambient temperature value	20
4.5 Electrical insulation strength (AC voltage), V	700
for P 0,25(0,4...25)-101-C(V)-D17-L	500
4.6 Power supply	
4.6.1 Modification V - stabilized DC voltage, V	1-10
for P 0,25(0,4...25)-101-C(V)-D17-L	10
4.6.2 Modification C - stabilized DC, mA	0,2-2
for P 0,25(0,4...25)-101-C(V)-D17-L	1,5

Output signal is rated by the voltage 10 V and by the current 1,5 mA.

## 5 Mechanical characteristics

5.1 Vibration resistance (sinusoidal vibration):	
Frequency range, Hz	from 10 to 5000
Acceleration amplitude, $m/s^2$	500
5.2 Shock resistance (multiple mechanical shocks):	
Shock acceleration peak, $m/s^2$	1000
Shock pulse width, ms	2

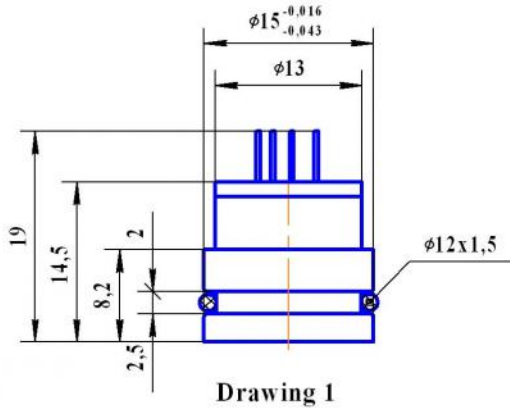
## 6 Operating conditions

6.1 IP level	IP40
6.2 Sensor body (pressure connection) and membrane 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 etc)	

## 7 Overall and mounting dimensions

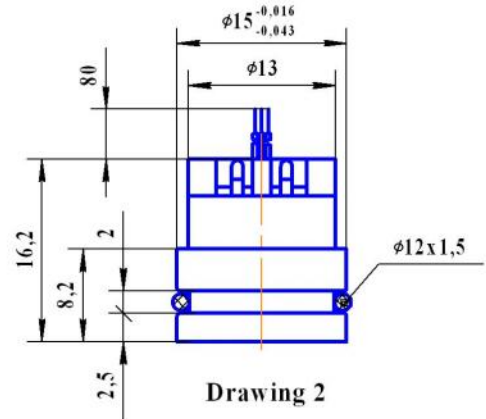
### 7.1 Version with pins

P 1,6(2,5...40)-...-D15-P



### 7.2 Version with wires

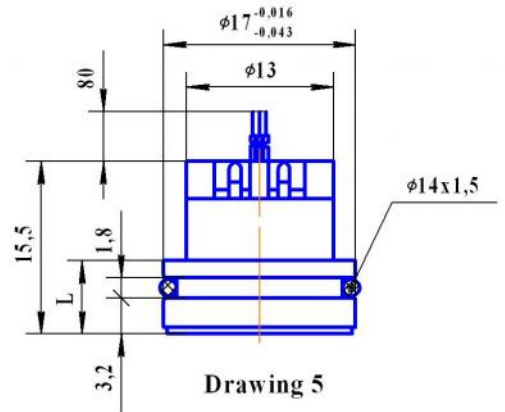
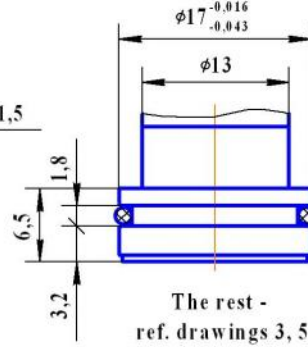
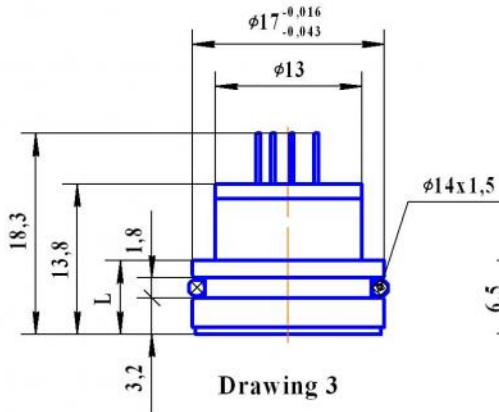
P 1,6(2,5...40)-...-D15-L



P 0,25(0,4...40)-...-D17-P

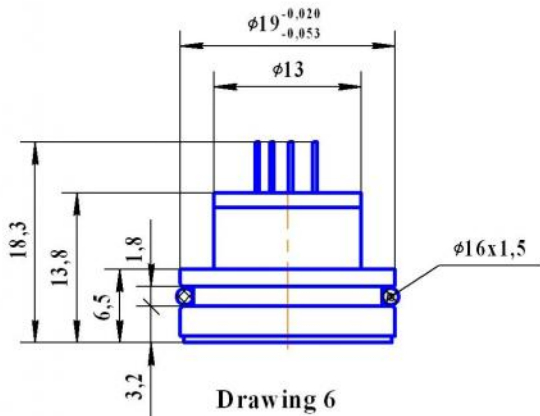
P 0,25(0,4...10)-...-D17...  
with flush membrane

P 0,25(0,4...40)-...-D17-L

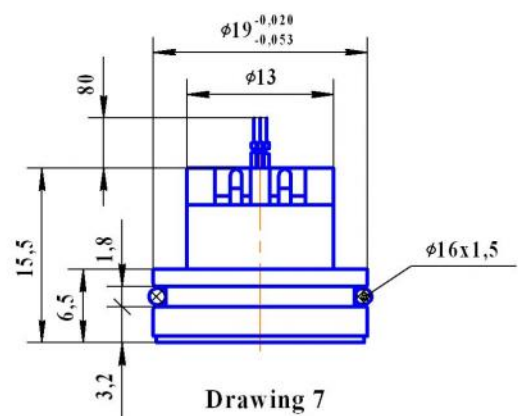


Pressure, MPa	L
from 0-0,25 to 0-1	6,5
from 0-1,6 to 0-40	7,5

P 0,16(0,25...1)-...-D19-P



P 0,16(0,25...1)-...-D19-L

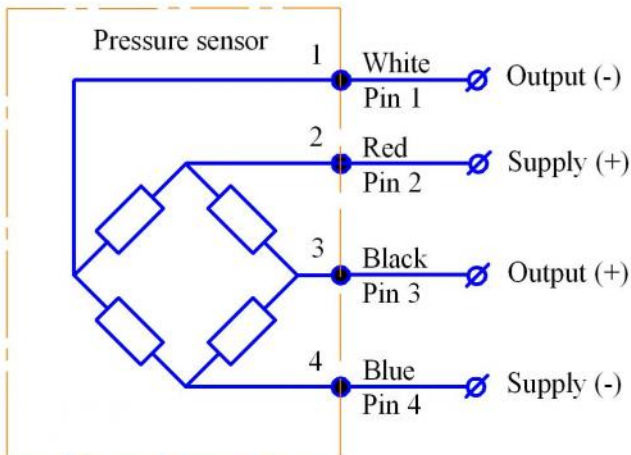


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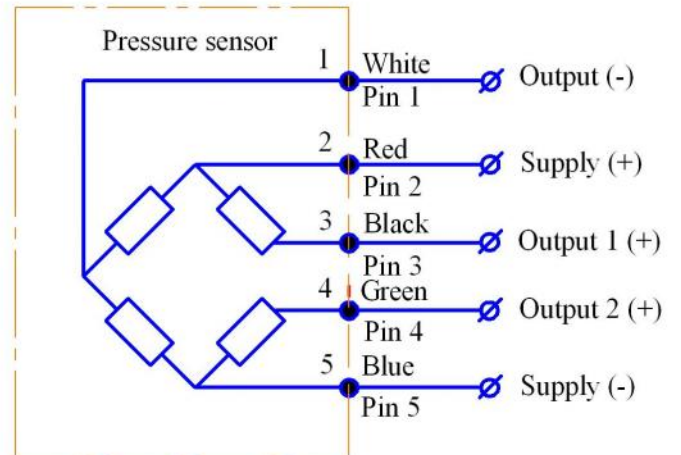
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## 8 Circuit diagram

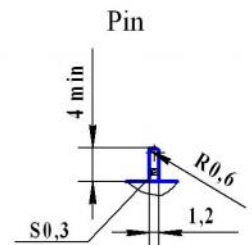
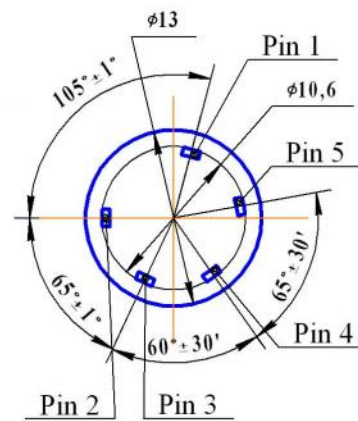
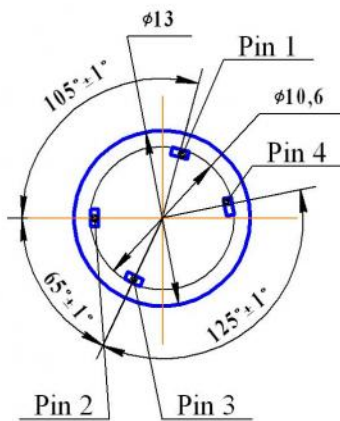
"Closed bridge" diagram



"Open bridge" diagram

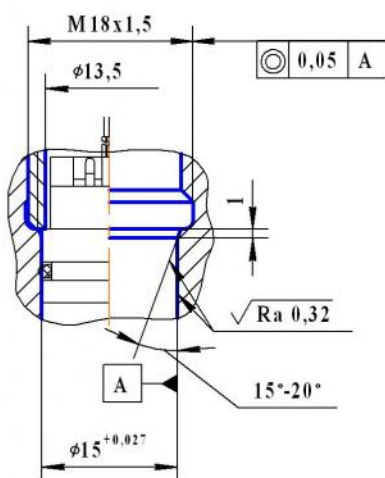


Pins configuration



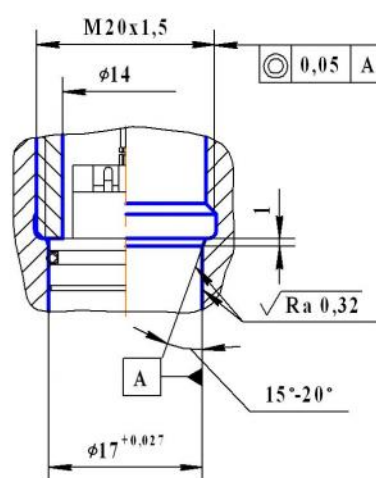
## 9 Mounting diagrams

P 1,6(2,5...40)-...-D15-...

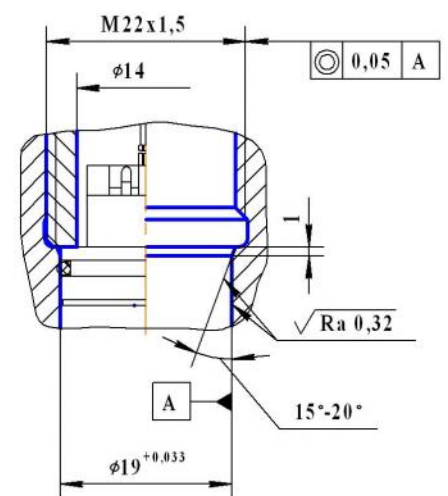


P 0,25(0,4...40)-...-D17-...

P 0,25(0,4...25)-101-...-D17-...



P 0,16(0,25...1)-...-D19-...



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## 9 Type designation

**P**    **XXX - XX - X - X - XXX - X**

Series

Upper gauge pressure limit

0,16; 0,25; 0,4; 0,6; 1; 1,6; 2,5; 4; 6; 10; 16; 25; 40 MPa

Operating ambient temperature range

Version 1 - from - 40 to + 100 °C;

Version 2 - from - 20 to + 155 °C;

Version 3 - from - 20 to + 200 °C

Circuit

0 - "closed bridge" circuit;

1 - "open bridge" circuit

Version

1 - flush membrane

Power supply modification

V - stabilized DC voltage (1-10 V);

C - stabilized DC (0,2-2 mA)

Conjoint part code

D15 - diameter 15 mm (1,6 - 40 MPa, drawings 1, 2);

D17 - diameter 17 mm (0,25 - 40 MPa, drawings 3, 5),  
flush membrane (0,25 - 10 MPa, drawing 4);

D19 - diameter 19 mm (0,16 - 1 MPa, drawings 6, 7)

Electrical connection

L - flexible wire 80 mm length;

P - pin 4,5 mm height

Order example of pressure sensor

Pressure sensor of P series, intended for pressure conversion from 0 to 0,4 MPa, for operation within temperature range from - 40 to + 100 °C, with "closed bridge" circuit, flush membrane, DC voltage power supply, diameter of the conjoint part 17 mm and flexible wire 80 mm length:

Pressure sensor P 0,4-101-V-D17-L.

Note: if wished, the wire length (standard 80 mm) can be changed, in this case the required length should be added to the wire code L, for example:

Pressure sensor P 0,4-101-V-D17-L120.

## 10 Marking

Marking on the sensor body must contain following information: series, upper gauge pressure limit in MPa, version of the operating temperature range, circuit type, version of the membrane, conjoint part code and order number

P 0,4-101-V-D17 000000

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