Microelectronic stainless steel gauge pressure sensors
MDX Series

► **Resolution   0,01 %**
► **Operating pressure range**
   from 0-2,5 to 0-60 MPa
► **Operating temperature range**
   from -45 to +200 °C
► **Electrical insulation**
   strength – 500 V
► **Titanium body**

Applications
- **Industrial automatics**
- **Oil and gas industry**
- **Hydraulics/Pneumatic**
- **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

ᵛ Sensitive element of pressure sensors is a two-layer sapphire-titanium diaphragm with monocrystal silicon resistance strain gauges.

ᵛ 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.

ᵛ Monocrystal silicon resistance strain gauges are automatically connected with sapphire (heteroepitaxy method) and provide almost no hysteresis or fatigue effects.

ᵛ 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.

ᵛ Strain gauges elements are manufactured in groups by solid-state micro-electronic methods and provide high quality and good repeatability of the output parameters.

Microtensor

Stainless steel pressure sensors MDX Series

| Lomonosov str.6, building 2, 302040 Orel, Russia Tel: +7(4862) 30-34-50, e-mail: mail@microtensor.ru | M-232 2022 | Page 1 | Pages 7 |

Datasheet

1 Nominal, overload and burst pressure

Designation	Nominal pressure, MPa	Overload pressure, MPa	Burst pressure, MPa
MDX 2,5...	0...2,5	-0,1...5	7,5
MDX 4...	0...4	-0,1...8	12
MDX 6...	0...6	-0,1...12	18
MDX 10...	0...10	-0,1...20	30
MDX 16...	0...16	-0,1...32	48
MDX 25...	0...25	-0,1...50	75
MDX 40...	0...40	-0,1...80	120
MDX 60...	0...60	-0,1...120	180

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

    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

Microtensor

Stainless steel pressure sensors MDX Series

| Lomonosov str.6, building 2, 302040 Orel, Russia Tel: +7(4862) 30-34-50, e-mail: mail@microtensor.ru | M-232 2022 | Page 2 | Pages 7 |

3 Accuracy parameters

3.1 Resolution, % FS 0,01

3.2 Non-linearity, % FS . . . . ±0,2

3.3 Variation, % FS 0,1

3.4 Output signal repeatability, % FS . . . . ±0,1

3.5 Output signal error caused by the influence of overload pressure, % FS

    for zero output signal . . . . ±0,2

    for output signal range . . . . ±0,05

3.6 Additional ambient temperature error, % FS/1°C

    3.6.1 For zero output signal

          3.6.1.1 V type . . . . ±0,05

          For MDX 2,5 . . . . ±0,08

          3.6.1.2 C type . . . . 0,03±0,05

          For MDX 2,5 . . . . ±0,08

    3.6.2 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

3.7 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 MDX 2,5 . . . . 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^{-1}

    4.3.1 V type . . . . $(1{,}75{\pm}0{,}1){\cdot}10^{-3}$

    4.3.2 C type . . . . $(1{,}2{\pm}0{,}2){\cdot}10^{-3}$

4.4 Insulation resistance, MOhm

    at room temperature 100

    at the upper ambient temperature value 20

4.5 Electrical insulation strength (AC voltage), V 500

4.6 Power supply

    4.6.1 V type - stabilized DC voltage, V 1-10

    4.6.2 C type - stabilized DC, mA 0,2-2

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

Microtensor

Stainless steel pressure sensors MDX Series

Lomonosov str.6, building 2, 302040 Orel, Russia Tel: +7(4862) 30-34-50, e-mail: mail@microtensor.ru	M-232 2022	Page 3	Pages 7

5 Mechanical characteristics

5.1 Vibration resistance (sinusoidal vibration):

Frequency range, Hz . . . . from 10 to 2000

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

5.3 Torque effect while installation should not be higher, N·m 30-40

6 Operating conditions

6.1 IP level IP40

6.2 Sensor body and pressure diaphragm are made of stainless steel.

6.3 Pressure media - gases, vapor, liquid, which are neutral to stainless steel.

Microtensor

Stainless steel pressure sensors MDX Series

| Lomonosov str.6, building 2, 302040 Orel, Russia
Tel: +7(4862) 30-34-50, e-mail: mail@microtensor.ru | M-232
2022 | Page 4 | Pages 7 |

7 Overall and mounting dimensions

7.1 Version with pins

MDX 2,5(4...10)-...-P

Drawing 1

A-A
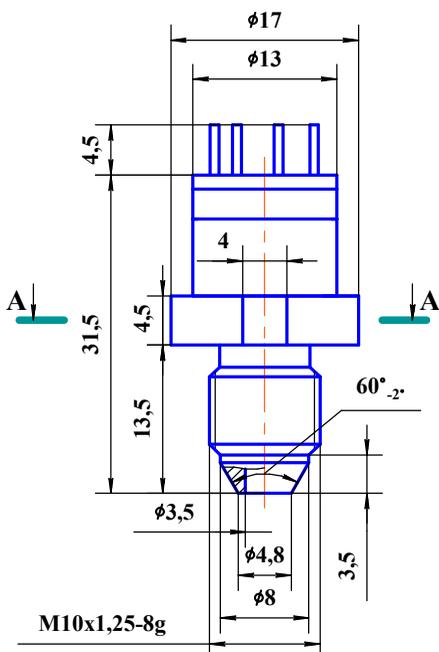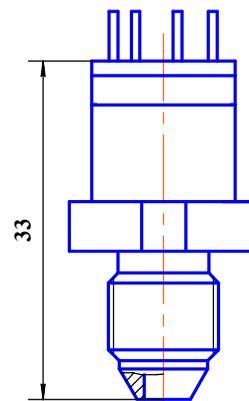
MDX 16(25...60)-...-P


Drawing 2
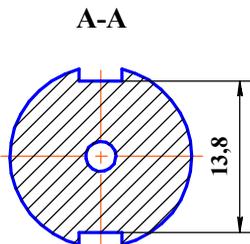
7.2 Version with wires

MDX 2,5(4...10)-...-L
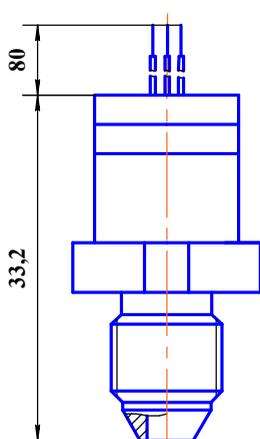
**The rest -
ref. drawing 1**

**Drawing 3**

MDX 16(25...60)-...-L
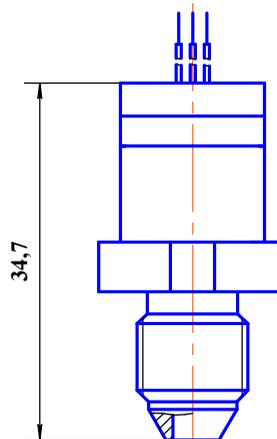
**The rest -
ref. drawings 1, 3**

Drawing 4

Microtensor

Stainless steel pressure sensors MDX Series

8 Circuit diagram

"Closed bridge" diagram

Pressure sensor

4	Blue Pin 4	Supply (-)
3	Black Pin 3	Output (+)
2	Red Pin 2	Supply (+)
1	White Pin 1	Output (-)

"Open bridge" diagram

Pressure sensor

5	Blue Pin 5	Supply (-)
4	Green Pin 4	Output 1 (+)
3	Black Pin 3	Output 2 (+)
2	Red Pin 2	Supply (+)
1	White Pin 1	Output (-)
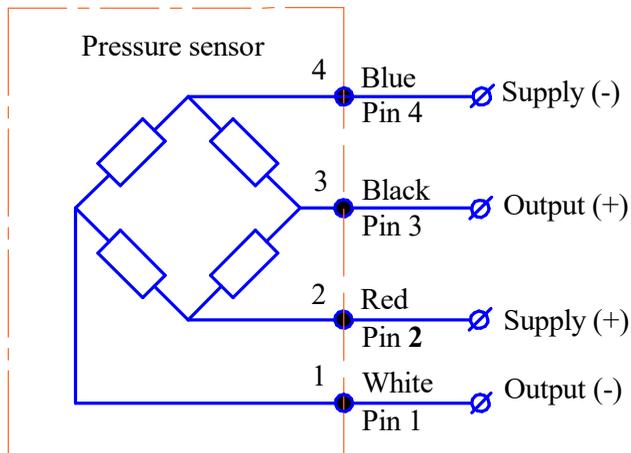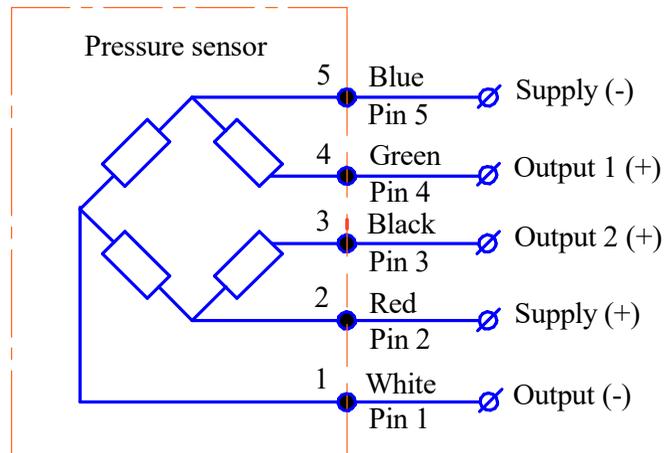
Location of pins on a collector

$\phi 13$ · Pin 1 · $\phi 10,6$ · Pin 4 · $105° \pm 1°$ · $65° \pm 1°$ · $125° \pm 1°$ · Pin 2 · Pin 3

$\phi 13$ · Pin 1 · $\phi 10,6$ · Pin 5 · $105° \pm 1°$ · $65° \pm 1°$ · $65° \pm 30'$ · $60° \pm 30'$ · Pin 4 · Pin 2 · Pin 3

Pin · 4 min · R0,6 · S0,3 · 1,2
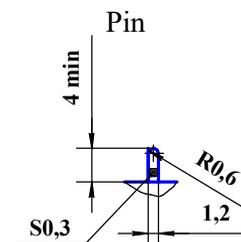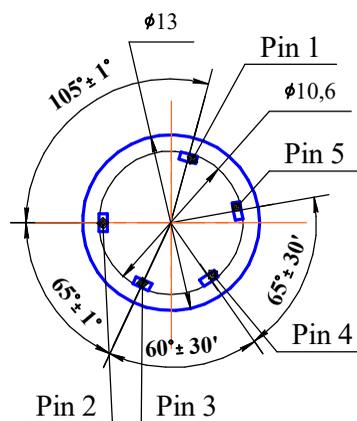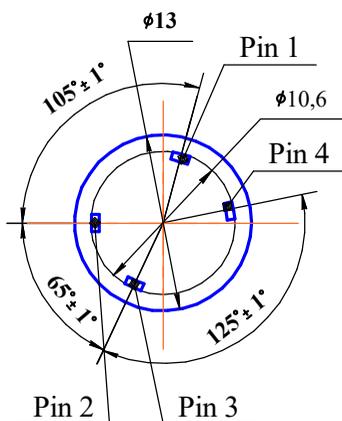
9 Mounting diagram

A

10,5 · 8,5 min

0,05 A

$\phi 5,5$

ϕ 0,05 A

M10x1,25-7H

---
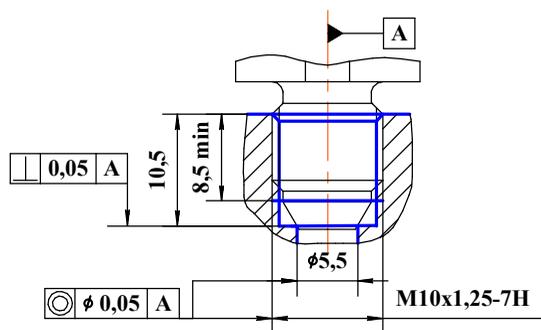
10 Type designation

MDX   XXX - XX - X - X

Series

Upper gauge pressure limit

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

Operating ambient temperature range

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

Curcuit

0 - "closed bridge"circuit;
1 - "open bridge" circuit

Power supply type

V - stabilized DC voltage (1-10 V);
 C - stabilized DC (0,2-2 mA)

Electrical connection

L - flexible wire 80 mm length;
P - pin 4,5 mm height

Order example of pressure sensor

Pressure sensor of MDX series, intended for pressure conversion from 0 to 4 MPa, for operation within temperature range from - 45 to + 125 °C, with "open bridge" circuit, DC voltage power supply and flexible wire 80 mm length:

Pressure sensor MDX 4-11-V-L.

Note: if wished, typical size and wire length (standard 80 mm) can be changed in this case - in the order should be denoted thread designation and the required length should be added to the wire code L, for example:

Pressure sensor MDX 4-11-V-M10x1-8g-L120.

11 Marking

Marking on the sensor body must contain following information: designation of the sensor (no code of connection with external electric circuits) and order number.

Note: the marking on the customer's request is available.

Microtensor | Stainless steel pressure sensors MDX Series

Lomonosov str.6, building 2, 302040 Orel, Russia
Tel: +7(4862) 30-34-50, e-mail: mail@microtensor.ru | M-232
2022 | Page 7 | Pages 7