

## 20 Series

Piezoresistive pressure sensor head with optimum stability

### Features

- High long-term stability
- Robust, compact stainless-steel housing
- High proof pressure
- Optimised thermal behaviour

### Technology

- Insulated piezoresistive pressure sensor chip, encapsulated in an oil-filled metal housing
- Fully welded design with no internal seals
- Typical range of output signal of 160 mV / mA

### Typical applications

- OEM
- Industry
- Water management
- Air-conditioning technology

### Accuracy

± 0,50 %FS

### Long-term stability

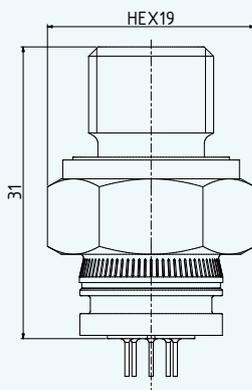
± 0,3 %FS / year

### Pressure ranges

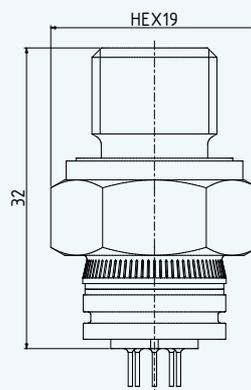
0...5 bar to 0...600 bar



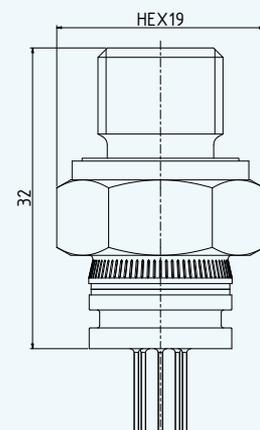
20 Series: 0...5 to 0...50 bar



20 Series: 0...50 to 0...200 bar



20 Series: 0...200 to 0...600 bar



## 20 Series – Specifications

### Standard pressure ranges

Relative pressure PR	Absolute pressure PAA	Absolute pressure PA	Proof pressure	Sensitivity		
				min.	typ.	max.
0...5	0...5	0...5	15	24	32	40
0...10	0...10	0...10	30	12	16	20
0...30	0...30	0...30	90	4	5,3	6,7
	0...100	0...100	300	1,2	1,6	2
	0...200	0...200		0,48	0,64	0,80
	0...400	0...400	600	0,30	0,40	0,50
	0...600	0...600	900	0,20	0,267	0,33
bar rel.	bar abs.	bar abs.	bar	mV / (mA × bar)		
Reference pressure at ambient pressure	Reference pressure at 0 bar abs. (vacuum)	Reference pressure at 1 bar abs.	Based on reference pressure	The standard pressure ranges are available from the warehouse. Additional calibrations to intermediate pressure ranges can also be made.		

### Performance

Accuracy @ RT (20 – 25 °C)	$\leq \pm 0,50$ %FS	Non-linearity (best fitted straight line BFSL), pressure hysteresis, non-repeatability
Offset @ RT (20...25 °C)	$< \pm 25$ mV / mA	Uncompensated, the sensitivity value must be added for PA.
	$< \pm 2$ mV / mA	Compensated with R3 or R4.
Compensated temperature range	-10...80 °C	Other temperature ranges within -20...100 °C possible as an option.
Long-term stability	$\leq \pm 0,3$ %FS	Per year under reference conditions.
Degree of dependency on location	$\leq 2$ mbar	Calibrated in vertical installation position with pressure connection facing downwards.
Temperature coefficient	$\leq \pm 0,025$ %FS / K	Zero (TCzero) pre-compensated with R1 or R2.
	$\leq \pm 0,06$ % / K	Sensitivity (TCsens)
	1800...3000 ppm / K	Total bridge resistance TC-resistance

## 20 Series – Specifications

### Electrical data

Half-bridge configuration

Constant current supply	1 mA nominal 3 mA maximum	
Bridge resistance @ RT (20...25 °C)	3,5 kΩ ± 20 %	
Electrical connection	Gold-plated pins ø 0,45 mm L = version-dependent	See Dimensions and options Optional: AWG28 (0,09 mm <sup>2</sup> ) silicone wires, L = 70 mm, other lengths on request. Optional: Circuit board with JST female connector
Insulation	> 100 MΩ @ 500 VDC	

### Mechanical data

Materials in contact with fluid

Housing and separating diaphragm	Stainless steel AISI 316L	
Pressure connection seal	FKM (75 Shore) -20...200 °C	For medium temperatures < -20 °C FVMQ is used.

Other materials

Pressure transducer oil filling	Silicone oil
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Further details

Pressure connection	G1/4 male	See Dimensions and variants
	1/4-18NPT male	
Diameter × height	Depends on pressure range	
Connection for capillary for reference pressure compensation	ø 1,2 mm × 3 mm	Optional: Capillary (silicone)
Weight	approx. 40 g	For pressure ranges ≤ 200 bar
	approx. 45 g	For pressure ranges > 200 bar

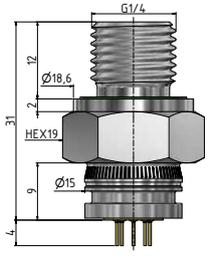
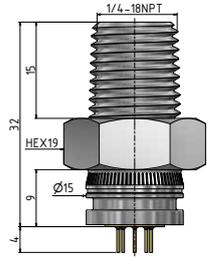
### Ambient conditions

Media temperature range	-20...100 °C	Operating temperature, consider o-ring. Icing not permitted
Ambient temperature range	-20...100 °C	
Storage temperature range	-20...100 °C	
Vibration endurance	10 g, 10...2000 Hz, ± 10 mm	IEC 60068-2-6
Shock endurance	50 g, 6 ms	IEC 60068-2-27
Natural frequency (resonance)	> 20 kHz	
Pressure endurance @ RT (20...25 °C)	> 10 million pressure cycles	0...100 %FS

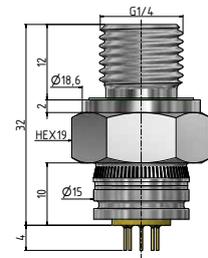
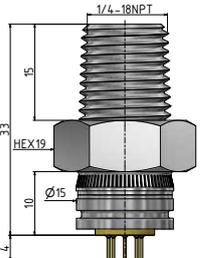
## 20 Series – dimensions and variants

### Available pressure connection

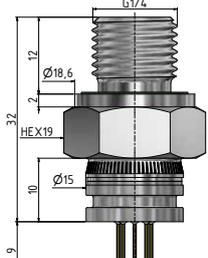
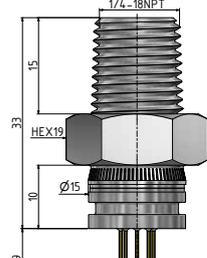
For pressure ranges  $\leq 50$  bar

G1/4	1/4-18NPT
	
DIN EN ISO 1179-2	ASME/ANSI B 120.1

For pressure ranges  $> 50$  bar to  $\leq 200$  bar

G1/4	1/4-18NPT
	
DIN EN ISO 1179-2	ASME/ANSI B 120.1

For pressure ranges  $> 200$  bar

G1/4	1/4-18NPT
	
DIN EN ISO 1179-2	ASME/ANSI B 120.1

Other pressure connections available on request.

## 20 Series – dimensions and variants

### Electrical connection

Glass feedthrough connection		Half-open measurement bridge pin assignment			
		PIN	Label	Designation	Wire colour
		1	+OUT	Positive Output	red
		2	+IN	Positive Supply	black
		3	-OUT	Negative Output	blue
		4	-IN <sub>-OUT</sub>	Negative Supply (half bridge -OUT)	yellow
For pressure ranges ≤ 200 bar		Electrical diagram with compensation resistors			
		For pressure ranges > 200 bar		TRANSUCER	

The alignment of the PIN arrangement to the hexagon can vary.

### Customised configurations on request

- Calibration to other pressure ranges
- Calibration to other temperature ranges
- Calibration with mathematical modeling
- O-Rings made of other materials
- Other oil filling types for pressure transducers
- Modifications to customer-specific applications

### Examples of similar products

- 20Y Series: Pressure sensor head 20 with analog compensation electronics
- 20C Series: Pressure sensor head 20 with chip-in-oil technology and analog ratiometric output signal
- 20D Series: Pressure sensor head 20 with chip-in-oil technology and I<sup>2</sup>C interface
- 20S Series: High-stability pressure sensor head with pressure ranges of 0...0,3 bar to 0...1000 bar

## 20 Series – Analysis and characteristic curves

### Standard analysis

Calibration sheet: Example type PA-10L					Key
PA-10L / 10 bar / 10-1005-118 <sup>(1)</sup> Sn I107547 <sup>(2)</sup> 449 29/01					<ol style="list-style-type: none"> <li>Type (PA-10L) and measuring range (10 bar)</li> <li>Serial number</li> <li>Actual test temperatures</li> <li>Uncompensated zero offset</li> <li>Zero offset values with calculated compensation resistor R1 (+) or R2 (-)</li> <li>Zero offset values with calculated compensation resistors R1 or R2 and R3 or R4</li> <li>Temperature zero error with calculated compensation resistors</li> <li>Calculated compensation resistor R1 or R2 (TCzero) and R3 or R4 (offset)</li> <li>RB: Bridge resistance at room temperature</li> <li>Calculated offset with compensation resistors R1 or R2 and R3 or R4</li> <li>Sensitivity at room temperature 25° C</li> <li>Pressure test points</li> <li>Signal change at pressure test points at room temperature 25° C</li> <li>Non-linearity (best straight line through zero)</li> <li>Non-linearity (best straight line)</li> <li>Result of the long-term stability test</li> <li>Sensor traceability information</li> <li>Insulation test</li> <li>Excitation (constant current)</li> <li>Date of test ----- Test equipment</li> </ol>
<sup>(3)</sup> Temp [°C]	<sup>(4)</sup> Zero [mV]	<sup>(5)</sup> +510 [mV]	<sup>(6)</sup> Comp [mV]	<sup>(7)</sup> dZero [mV]	
-9.5	18.5	13.3	-0.6	0.2	
0.1	18.7	13.3	-0.6	0.2	
25.0	19.1	13.1	-0.8	0.0	
50.2	19.8	13.0	-0.9	-0.1	
79.9	20.8	12.9	-1.1	-0.2	
L1					
COMP R1	510 kOhm <sup>(8)</sup>	R3	56.0 Ohm <sup>(8)</sup>		
RB	3482 Ohm <sup>(9)</sup>				
ZERO	-0.8 mV <sup>(10)</sup>	P_atm	964 bar		
<b>SENS</b>	<b>16.41 mV/bar <sup>(11)</sup></b>				
LIN <sup>(12)</sup> [bar]	<sup>(13)</sup> [mV]	<sup>(14)</sup> Lnorm [%Fs]	<sup>(15)</sup> Lbfl [%Fs]		
0.000	0.0	0.00	-0.01		
2.500	41.1	0.02	0.01		
5.000	82.1	0.00	0.00		
7.500	123.1	-0.02	-0.01		
10.000	164.1	-0.01	-0.01		
Long Term Stability Ok <sup>(16)</sup>					
Lot 72114-2 <sup>(17)</sup>					
Test 500 Volt Ok <sup>(18)</sup>					
Supply 1.000 mA <sup>(19)</sup>					
01.09.17 <sup>(20)</sup> ----- GOL3.A03D1K <sup>(20)</sup>					

#### Notes

- The indicated specifications apply only for constant current supply of 1 mA. The pressure transducer module must not be supplied with more than 3 mA. The output voltage is proportional to the supply current. If the supply deviates from the calibration, this will cause signal shifts.
- The compensation resistors described in this data sheet are not part of the pressure transducer module and are not included in the scope of delivery.
- It is recommended to use compensation resistors with temperature coefficients of < 50 ppm/°C for large temperature ranges. Pressure transducer modules and resistors can be exposed to different temperatures.
- In addition, a maximum TC-sensitivity can be guaranteed on request or the value for the compensation resistor (R5) can be indicated. See "Electrical diagram of compensation resistors" on page 5.

### Characteristic lines

Examples of typical characteristic lines of the temperature coefficients, normalised at 25 °C, uncompensated and compensated.

