



## PIEZORESISTIVE OEM PRESSURE TRANSDUCERS

## SERIES 9

SEALED GAUGE, ABSOLUTE, VENTED GAUGE, DIFFERENTIAL

The Series 9 pressure sensor is the most economic version for pressure ranges from 100 mbar to 200 bar. The standard version is supplied with connecting pins (leadouts are fitted only on request) and the serial number is not engraved.

A high-sensitivity piezoresistive silicon chip is used for pressure sensing. The chip is protected against ambient influences by a stainless steel housing sealed with a concentrically corrugated diaphragm. The housing is filled with silicone oil for the transfer of the pressure from the diaphragm to the sensing component.

All metal parts in contact with the pressure media are made of stainless steel 316 L. The fully welded housing is vacuum-tight. The connecting pins allow direct PCB mounting or can be used for connecting cables.

Typical Applications: Measurement of altitude, aviation electronics, meteorology, servo controls, robotics, hydraulics, sanitary and pharmaceutical engineering, underground mining, injection engineering...

### Rugged, Small Dimensions, Light Weight

The piezoresistive chip immersed in silicone oil is welded into a housing made of stainless steel 316L. Diameter 19 mm; Height 5 mm; Weight 8 grammes.

### High Sensitivity

A nominal signal of 200 mV is obtained at a supply current of 1 mA for standard pressure ranges above 2 bar.

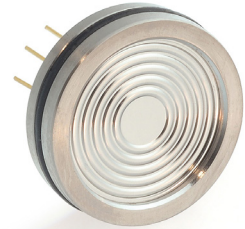
### Ranges from 0,1 to 200 bar

Absolute pressure, sealed gauge, differential, barometric, vented gauge and wet/wet differential.

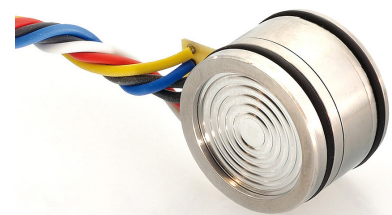
### Quality

Each pressure transducer is subjected to comprehensive tests for its pressure response and temperature characteristics, and is delivered with an individual calibration certificate stating the characteristics as well as the results of all tests which were performed. Special testing is available if demanded by the customer.

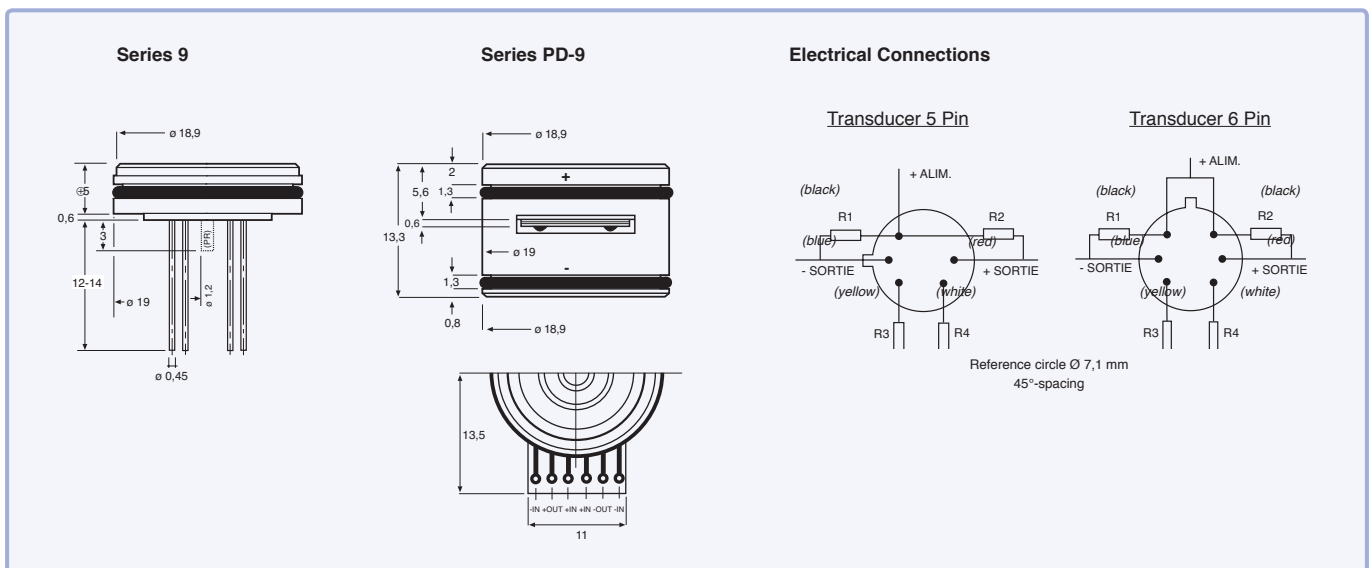
The Series 9 can also be delivered with a laser welded media isolation diaphragm (see data sheet Series 3 L - 10 L). The technique for laser welding stainless steel diaphragms further improves the resistancy against crevice corrosion and still retains all the traditional performance, stability and quality for which KELLER is renowned.



Series 9



Series PD-9





## Specifications

### Standard Pressure Ranges (FS)

PR-9	-1	-0,5	-0,2	-0,1	0,1	0,2	0,5	1	2	5	10	20				bar
PD-9					0,1	0,2	0,5	1	2	5	10	20				bar
PAA-9					0,1	0,2	0,5	1	2	5	10	20				bar
PA-9								1	2	5	10	20	50	100	200	bar
Signal Output typ.* @ 1 mA	100	60	30	15	15	30	60	100	140	200	200	200	200	200	200	mV
Overpressure	-1	-1	-1	-1	2,5	2,5	2,5	3	4	7	15	30	100	200	300	bar
PD, neg. Overpressure [-]					1	1	1	1	2	3	5	5				bar
PD, Line Pressure	≤ 100 bar															

PAA: Absolute. Zero at vacuum    PA: Sealed Gauge. Zero at atmospheric pressure (at calibration day)    PR: Vented Gauge. Zero at atmospheric pressure    PD: Differential    \* ± 40%

Bridge Resistance @ 25 °C	3,5 kΩ	± 20%	
Constant Current Supply	1 mA nominal	3 mA max.	
Isolation @ 500 VDC	100 MΩ		
Storage-/ Operating Temperature	-20...100 °C	optional -55...150 °C	
Kompensierter Bereich	-10...80 °C <sup>(1)</sup>		
Vibration (20 up to 5000 Hz)	20 g		
Endurance @ 25 °C	> 10 Mio. FS Cycles		
Housing and Diaphragm	Stainless steel, AISI 316 L		
Seal Ring	Viton® <sup>(1)</sup> , Ø 17 x 1 mm		
Oil Filling	Silicone Oil <sup>(1)</sup>		
Weight	8 g (PA/PAA/PR), 15 g (PD)		
Dead Volume Change @ 25 °C	< 0,1 mm <sup>3</sup> / FS		
Electrical Wires (optional)	0,09 mm <sup>2</sup> (12 x Ø 0,1 mm), silicone sheathed Ø 1,2 mm, Length: 7 cm / 10 cm (PD) <sup>(1)</sup>		
Accuracy <sup>(2)</sup>	0,5 %FS typ. <sup>(1)</sup>	1 %FS max.	
Offset at 25 °C	< 5 mV (compensatable with R5 of 20 Ω <sup>(3)</sup> )		
<b>Temperature Coefficient</b>	<b>0...50 °C</b>	<b>-10...80 °C</b>	<b>-55...150 °C</b>
- Zero max.	0,025 mV/°C	0,05 mV/°C	0,075 mV/°C
- Sensitivity typ. <sup>(4)</sup>	0,02 %/°C	0,05 %/°C	0,07 %/°C
Long Term Stability typ.	0,5 mV	0,75 mV	1,25 mV
Line Pressure Influence	< 0,0125 mV/bar (PD 9)		
Natural Frequency (Resonance)	> 30 kHz		

The sensor characteristics may be influenced by installation conditions. Please follow the installation instructions on our product-specific web pages.

- <sup>(1)</sup> Others on request.  
<sup>(2)</sup> Including linearity, hysteresis and repeatability. Linearity calculated as best straight line through zero.  
**Note:** Generally, accuracy and overload is improved by factor of 2 to 4 if the sensor is used in the range of 0...50 %FS.  
<sup>(3)</sup> External compensation, potentiometer not supplied.  
<sup>(4)</sup> On request, a maximal TC Sensitivity can be guaranteed or the value for the compensation resistor (Rp) can be indicated.

### Options

- Platinum- or Hastelloy C-276 diaphragm. Transducer all Hastelloy C-276
- Flush diaphragm
- Oil for low temperatures. Fluorinated oil. Olive oil
- Special characteristics: Linearity, overpressure, lower TC-zero and/or TC-sensitivity
- All pressure ranges between 0,1 and 200 bar
- Compensation PCB fitted
- Mathematical modelling: See data sheet Series 30 X

PA-9/20 bar/81336.2 <sup>(a)</sup>					372
<sup>(b)</sup> Temp [°C]	<sup>(c)</sup> Zero [mV]	<sup>(d)</sup> +1000 [mV]	<sup>(e)</sup> Comp [mV]	<sup>(f)</sup> dZero [mV]	58/14
-9.5	-1.8	-4.6	-0.1	0.0	
0.1	-1.7	-4.6	-0.1	0.0	
25.4	-1.4	-4.6	-0.1	0.0	
50.3	-1.1	-4.7	-0.2	-0.1	
80.3	-0.6	-4.8	-0.3	-0.2	
COMP R1	1000 kOhm <sup>(g)</sup>		R4	18.0 Ohm <sup>(g)</sup>	L1
RB	3609 Ohm				
ZERO	-0.1 mV <sup>(h)</sup>		P_atm	943 mbar <sup>(i)</sup>	
SENS	9.23 mV/bar at 1.000 mA <sup>(j)</sup>				
LIN	<sup>(k)</sup> [bar]	<sup>(l)</sup> [mV]	<sup>(m)</sup> Lnorm [%Fs]	<sup>(n)</sup> Lbfs [%Fs]	
	0.000	0.0	0.00	-0.17	
	10.000	92.7	0.23	0.17	
	20.000	184.2	-0.23	-0.17	
Long Term Stability Ok <sup>(o)</sup>					
Lot 7.0825.00 <sup>(p)</sup>					
Test 500 Volt Ok <sup>(q)</sup>					
Supply 1.000 mA <sup>(r)</sup>					
03.03.15 <sup>(s)</sup> -----GOL3.B03CqK <sup>(s)</sup>					

Each sensor is delivered with a calibration sheet with the following data:

- <sup>(a)</sup> Type (PA-9) and range (20 bar) of pressure sensor  
<sup>(b)</sup> Test temperatures esttemperaturen  
<sup>(c)</sup> Uncompensated zero offset in mV  
<sup>(d)</sup> Zero offset values, in mV, with resistance R1 (+) or R2 (-), in kΩ (for factory computation only)  
<sup>(e)</sup> Zero offset, in mV, with calculated compensation resistors  
<sup>(f)</sup> Temp. zero error, in mV, with compensation resistors  
<sup>(g)</sup> Compensation resistor values R1 / R2 and R3 / R4  
<sup>(h)</sup> Offset with compensation resistors R1/ R2 and R3 / R4 fitted (fine adjustment of zero with R5 potentiometer)  
<sup>(i)</sup> Ambient pressure, zero reference for absolute sensors < 20 bar  
<sup>(j)</sup> Sensitivity of pressure sensor  
<sup>(k)</sup> Pressure test points  
<sup>(l)</sup> Signal at pressure test points  
<sup>(m)</sup> Linearity (best straight line through zero)  
<sup>(n)</sup> Linearity (best straight line)  
<sup>(o)</sup> Results of long term stability  
<sup>(p)</sup> Lot (on request, identification of silicon chip)  
<sup>(q)</sup> Voltage insulation test  
<sup>(r)</sup> Excitation (constant current)  
<sup>(s)</sup> Date of test ----- Test equipment

### Remarks:

- The indicated specifications apply only for constant current supply of 1 mA. The sensor must not be supplied with more than 3 mA. The output voltage is proportional to the current supply (excitation). By using excitation unlike the calibrated excitation the output signal can deviate from the calibrated values.
- If exposed to extreme temperatures, the compensation resistors should have a temperature coefficient of < 50 ppm/°C. Note: Sensor and resistors can be exposed to different temperatures.
- The sensors may be ordered with integrated compensation resistors (surcharge).

