

PIEZORESISTIVE OEM PRESSURE TRANSDUCERS

SEALED GAUGE, ABSOLUTE, VENTED GAUGE, DIFFERENTIAL

SERIES 9

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 316L. 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 900 mV is obtained at a supply current of 4 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

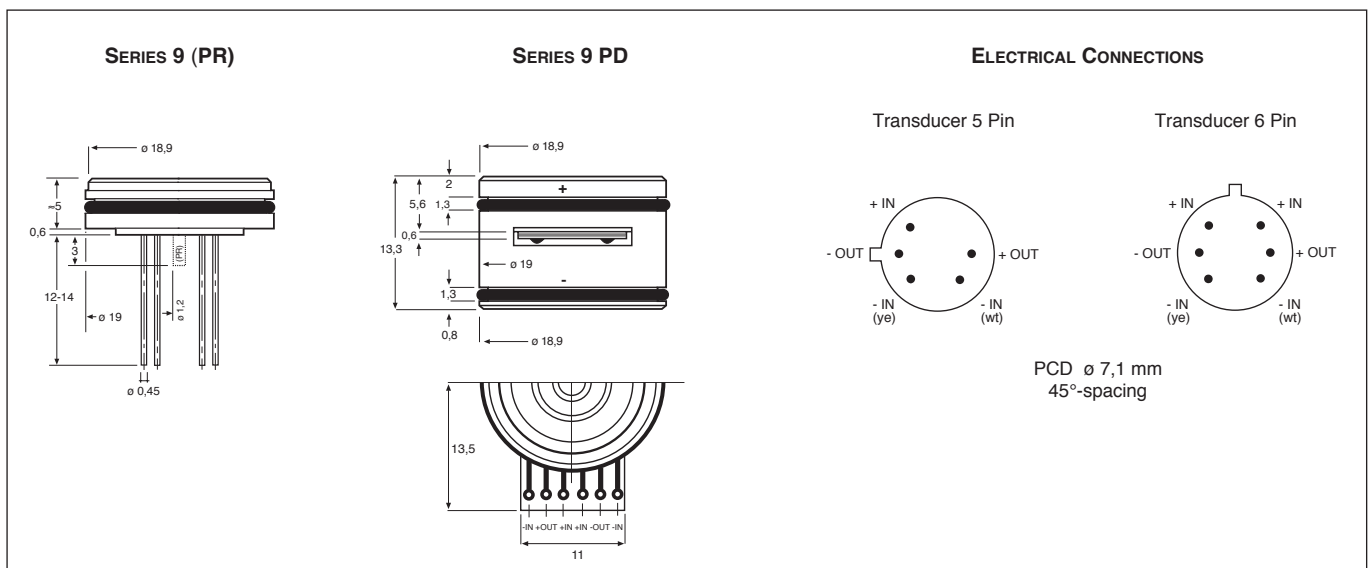
Each pressure transducer is subjected to comprehensive tests for its pressure response and temperature characteristics, and is delivered with an individual calibration certificate stating the characteristics as well as the results of all tests which were performed. Special testing is available if demanded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



SERIES 9



SERIES 9 PD



Subject to alterations

4/99



KELLER

SPECIFICATIONS. Excitation I = 4 mA

| | PRESSURE RANGES (FS) AND OVERPRESSURE IN BAR. | | | | | | | | | | | | SIGNAL OUTPUT IN mV. | | | | | | | | |
|-------------------------|---|------|------|------|-----|-----|-----|-----|-----|-----|-----|-----|----------------------|-----|-----|-----|-----|-----|-----|-----|--|
| | -1 | -0,5 | -0,2 | -0,1 | 0,1 | 0,2 | 0,5 | 1 | 2 | 5 | 10 | 20 | 400 | 600 | 900 | 900 | 900 | 900 | 900 | 900 | |
| PR-9 | | | | | | | | | | | | | | | | | | | | | |
| PD-9 | | | | | 0,1 | 0,2 | 0,5 | 1 | 2 | 5 | 10 | 20 | | | | | | | | | |
| PAA-9 | | | | | 0,1 | 0,2 | 0,5 | 1 | 2 | 5 | 10 | 20 | | | | | | | | | |
| PA-9 | | | | | | | | 1 | 2 | 5 | 10 | 20 | 50 | 100 | 200 | | | | | | |
| Signal Output typ. | 400 | 300 | 120 | 60 | 60 | 120 | 300 | 400 | 600 | 900 | 900 | 900 | 900 | 900 | 900 | 900 | | | | | |
| Overpressure | -1 | -1 | -1 | -1 | 2,5 | 2,5 | 2,5 | 3 | 4 | 7 | 15 | 30 | 100 | 200 | 300 | | | | | | |
| PD, neg. Overpressure - | | | | | 1 | 1 | 1 | 1 | 2 | 3 | 5 | 5 | | | | | | | | | |
| 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

| | | | |
|--------------------------|--------|---------------------------|-------------------------|
| Bridge Resistance @ 25°C | Ω | 3500 | ± 20% |
| Constant Current Supply | mA | 4 nominal | 5 max. |
| Insulation @ 50 VCC | MΩ | 100 | |
| Operating Temperature | °C | -30...100 | -55...150 (optional) |
| Compensated Range | °C | 0...50 ⁽¹⁾ | -10...80 ⁽¹⁾ |
| Storage Temperature | °C | -40...100 | -60...150 |
| Vibration (20...5000 Hz) | g | 20 | |
| Endurance (FS @ 25°C) | Cycles | >100 x 10 ⁶ FS | |

| | |
|-----------------------------|--|
| Housing and Diaphragm | Stainless Steel, Type 316 L |
| Seal Ring | Viton ⁽¹⁾ , iØ 17 x 1 mm |
| Oil Filling | Silicone Oil ⁽¹⁾ |
| Weight | 8 g (PA/PAA/PR), 15 g (PD) |
| Dead Volume Change @ 25°C | <0,1 mm ³ / FS |
| Electrical Wires (optional) | 0,09 mm ² , 12 x Ø 0,1 mm, Silicone sheathed, Insulation 250V, øØ 1,2 mm, Length 7cm ⁽¹⁾ |

| | | | | |
|-------------------------------|---------|--|-------------------|--------------------|
| Accuracy ⁽²⁾ | % FS | 0,5 typ. ⁽¹⁾ | 1 max. | |
| Offset at 25°C | mV | < 20 mV (compensated with R5 of 22Ω ⁽³⁾) | | |
| Temperature Error | | 0...50°C | -10...80°C | -55...150°C |
| - Zero | mV / °C | < 0,10 | < 0,20 | < 0,30 |
| - Sensitivity | % / °C | < 0,01 | < 0,03 | < 0,07 |
| Long Term Stability typ. | mV | 2 | 3 | 5 |
| Line Pressure Influence | mV/bar | < 0,05 (PD 9) | | |
| Natural Frequency (Resonance) | kHz | > 30 | | |

(1) Others on request.
 (2) 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
 (3) External compensation, potentiometer not supplied.

OPTIONS

- Platinum- or Hastelloy C-276 diaphragm. Transducer all Hastelloy C-276
- Flush diaphragm
- Oil for low temperatures. Fluorinated oil. Olive oil
- Integrated temperature sensor (version PA, PAA, PR)
- Special characteristics: Linearity, overpressure, lower TC-zero
- Special tests
- All pressure ranges between 0,1 and 200 bar
- All temperature ranges between -55 and +150°C
- Compensation PCB fitted

| PA-9/8336-10 ⁽¹⁾ | | SN 925EQ ⁽²⁾ | | |
|--|----------------------|------------------------------|--------------------------------|----------------------|
| ⁽³⁾ Temp | ⁽⁴⁾ Zero | ⁽⁵⁾ -1000 | ⁽⁶⁾ Comp | ⁽⁷⁾ dZero |
| 2.8 | -30.5 | -19.0 | -8.0 | -0.1 |
| 25.8 | -31.8 | -19.6 | -7.9 | 0.0 |
| 50.0 | -33.5 | -20.3 | -7.6 | 0.3 |
| COMP | | R2 = 510 kOhm ⁽⁸⁾ | R3 = 0.0 Ohm ⁽⁸⁾ | |
| ZERO | | -7.9 mV ⁽⁹⁾ | P_atm 962 mbar ⁽¹⁰⁾ | |
| SENS. | | 87.9 mV/bar ⁽¹¹⁾ | | |
| ⁽¹²⁾ (bar) | ⁽¹³⁾ (mV) | ⁽¹⁴⁾ Lnorm | ⁽¹⁵⁾ LbfsI | |
| 5.000 | 443.2 | 0.42 | 0.32 | |
| 10.000 | 875.3 | -0.42 | -0.32 | |
| Long Term Stability OK ⁽¹⁶⁾ | | | | |
| Chip (1010) ⁽¹⁷⁾ | | | | |
| Excitation | | 4.0 mA ⁽¹⁸⁾ | 500 Volt Test ⁽¹⁹⁾ | |
| 01.10.97 ⁽²⁰⁾ | | GOLI.V20F00 ⁽²⁰⁾ | | |

- Each sensor is delivered with a calibration sheet with the following data:
1. Type (PA-9), drawing-no. (8336) and range (10 bar) of sensor
 2. Serial number of pressure sensor (engraved on request)
 3. Test temperatures
 4. Uncompensated zero offset in mV
 5. Zero offset values, in mV, with test resistance (1000 kΩ) (for factory computation only)
 6. Zero offset, in mV, with calculated compensation resistor R1 or R2
 7. Temp. zero error, in mV, with compensation resistor R1 or R2
 8. Compensation resistor values R1 / R2 and R3 / R4
 9. Offset with compensation resistors R1/ R2 and R3 / R4 fitted. (fine adjustment of zero with R5 potentiometer)
 10. Ambient pressure, zero reference for absolute sensors < 20 bar
 11. Sensitivity of pressure sensor
 12. Pressure test points
 13. Signal at pressure test points
 14. Linearity (best straight line through zero)
 15. Linearity (best straight line)
 16. Results of long term stability
 17. Chip-type (on request, identification of silicon chip)
 18. Excitation (constant current)
 19. Voltage insulation test
 20. Date of test -----Test equipment

- Remarks:
- The indicated specifications only apply for constant current supply; the sensor should be excited between 0,5 and 4 mA. The sensor signal is proportional to the current. When exciting with constant voltage, the zero offset values remain the same, the sensitivity decreases approx. 1% per +5°C.
 - If exposed to extreme temperatures, the compensation resistors should have a temperature coefficient of < 50 ppm/°C. Sensor and resistors can be exposed to different temperatures.
 - The sensors may be ordered with integrated compensation resistors.

