

PIEZORESISTIVE PRESSURE SENSORS

SERIES 2/3/4

FOR ABSOLUTE-, GAUGE- AND DIFFERENTIAL PRESSURE

The pressure sensors Series 2, 3 and 4 are suited for direct-mounting on printed circuit boards. The pressure sensor is a piezoresistive measuring cell consisting of a glass back plate and the silicon chip with the diffused resistor bridge. The cell is mounted on a glass feed through and packaged in a housing for easy pressure connection. The high, stable and reliable output signal of the sensor can easily be conditioned with standard amplifiers. All sensors are tested for temperature, stability and linearity and are delivered with an individual calibration sheet.

Series 2

The medium is acting directly on the silicon chip and comes into contact with the strain gauges of the Wheatstone bridge. Application in dry air only.

Series 3

The sensor is mounted in an aluminium housing. Housing and sensor are protected by a thin (7 µm) parylene layer. This layer grants full protection in applications where condensation may occur. Continuous water exposure is not recommended. The average time of water resistance of the parylene layer is 6 months.

Series 4

The medium acts on the rear side of the silicon chip. The pressure medium may be wet. Applications in gas, water and non-aggressive fluids with benign reference atmosphere. Ideal for negative pressure measurements.

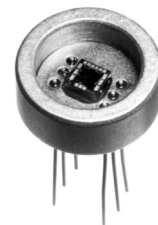
Typical Applications

Barometric, deltagliders, small airplanes, meteorology, pneumatic control instruments, robotic, sanitary and pharmaceutical gases, air conditioning.

- Rugged, small in size and in price
- High sensitivity and resolution (10 cm air column resolution)



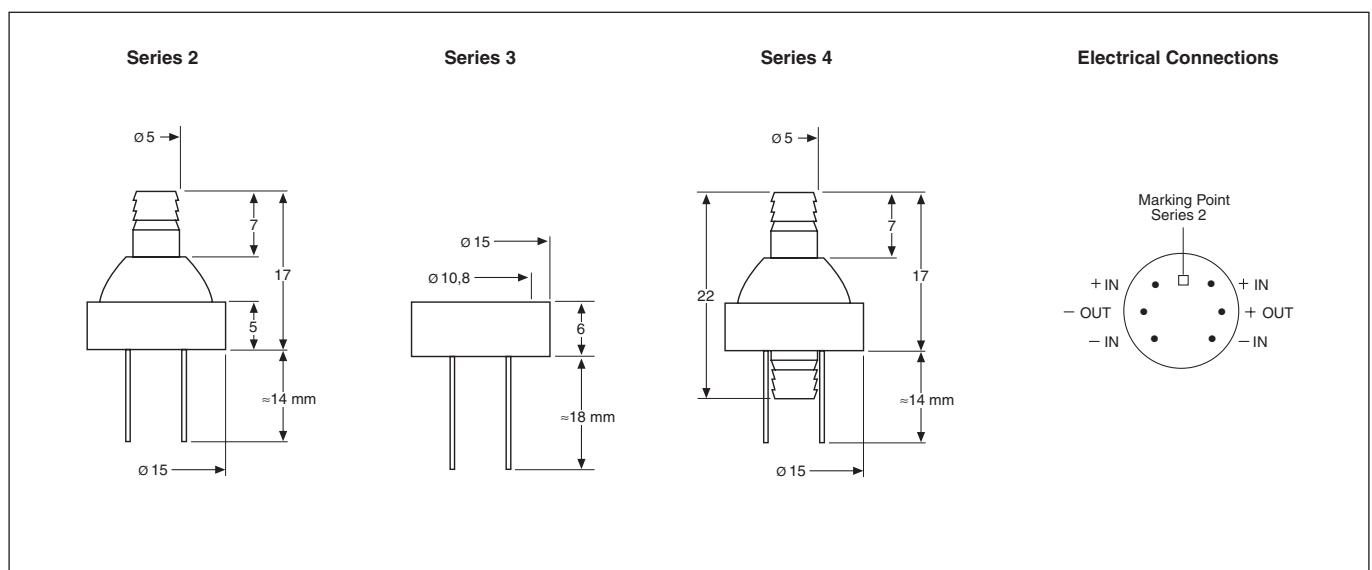
Series 2



Series 3



Series 4



Subject to alterations

04/08

KELLER AG für Druckmesstechnik
KELLER Ges. für Druckmesstechnik mbH

St. Gallerstrasse 119
Schwarzwaldstrasse 17

CH-8404 Winterthur
D-79798 Jestetten

Tel. +41 (0)52 - 235 25 25
Tel. +49 (0)7745 - 9214 - 0

Fax +41 (0)52 - 235 25 00
Fax +49 (0)7745 - 9214 - 60



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Specifications

General Characteristics: Excitation I = 1 mA constant current

| Ranges (FS) | bar | -0,1 | -0,2 | -0,5 | -1 | 0,1 | 0,2 | 0,5 | 1 | 2 | 5 | 10 | 20 |
|-------------|-----|------|------|------|----|-----|-----|-----|---|---|---|----|----|
| Series 2 | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| Series 3 | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| Series 4 | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |

PAA: Absolute, Zero at vacuum PA: Absolute, Zero at ambient (sealed gauge) PR: Gauge PD: Differential

Ranges, Overpressure, Output Signal (FS)

| Pressure Ranges (FS) | bar | -0,1 | -0,2 | -0,5 | -1 | 0,1 | 0,2 | 0,5 | 1 | 2 | 5 | 10 | 20 |
|----------------------------------|-----|------|------|------|----|-----|-----|-----|-----|-----|-----|-----|-----|
| Overpressure | bar | -1,0 | -1,0 | -1,0 | -1 | 2,5 | 2,5 | 2,5 | 2,5 | 3 | 7,5 | 15 | 30 |
| Output Signal, typ. (Series 2/3) | mV | 18 | 25 | 45 | 70 | 18 | 28 | 58 | 90 | 135 | 200 | 200 | 200 |
| Output Signal, typ. (Series 4) | mV | 18 | 25 | 45 | 70 | 18 | 25 | 45 | 70 | 100 | 150 | - | - |

Electrical Characteristics (at 25 °C)

| | | | |
|--|----|------|----------|
| Bridge Resistance | Ω | 3500 | ± 20% |
| Constant Current Excitation ⁽¹⁾ | mA | 1 | max. 4,5 |
| Isolation / 500 V | MΩ | 100 | |

Environmental Characteristics

| | | | |
|-------------------------------------|--------|-------------------------|---------------------|
| Operating Temperature | °C | -10...80 | |
| Compens. Temp. Range ⁽²⁾ | °C | 0...50 | -10...80 (optional) |
| Storage Temperature | °C | -30...100 | |
| Vibration (20 to 2000 Hz) | g | 10 | |
| Endurance (FS at 25 °C) | cycles | > 100 x 10 ⁶ | |

Mechanical Characteristics

| | |
|---------------------------|--|
| Housing Series 2 and 4 | Delrin (POM) |
| Housing Series 3 | Aluminium |
| Weight | 8 gramme |
| Volume Displacement | < 0,1 mm ³ /FS |
| Flexible Wires (optional) | 0,09 mm ² , 12 x ø 0,1 mm, Silicone Insulation Insulation 250 V, ø ext. 1,2 mm, l gr., 7 cm ⁽²⁾ |

Specific Characteristics Excitation I = 1 mA constant current

| | | | |
|--------------------------------|-------|--|------------|
| Accuracy ⁽³⁾ | % FS | 0,25 typ. | 0,5 max. |
| Offset at 25 °C | mV | < 5 mV (compensated with R5 to ± 0,5 mV) | |
| Compensated Temp. Range | °C | 0...50 °C | |
| - Temp. Coeff. of Zero: | mV/°C | 0,01 typ. | 0,025 max. |
| - Temp. Coeff. of Sensitivity: | %/°C | 0,01 typ. | 0,025 max. |
| Long Term Stability | mV | 0,25 typ. | |

- ⁽¹⁾ At constant voltage excitation, the temperature coefficient of sensitivity is -0,2 %/K
⁽²⁾ Other ranges on request
⁽³⁾ Includes linearity, hysteresis, repeatability. Linearity is defined as best straight line through Zero

Options (on request)

- Compensated temperature range -10...80 °C
- Compensation resistors included
- TC Zero reduced by factor 2 (with NTC resistors)
- Accuracy 0,1 or 0,2 %FS
- Special test procedure, special housing
- Electrical Wires

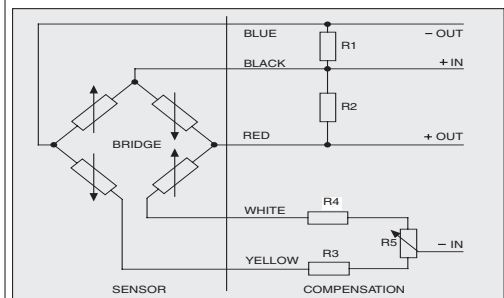
| PR-2/1 bar/8750.8 ^(a) | | | | |
|--|---|--------------------------|------------------------------|---------------------------|
| ^(c) Temp [°C] | ^(d) Zero [mV] | ^(e) +220 [mV] | ^(f) Comp [mV] | ^(g) dZero [mV] |
| 0.1 | -13.0 | -22.5 | 0.1 | -0.2 |
| 25.3 | -11.9 | -22.3 | 0.3 | 0.0 |
| 50.3 | -10.8 | -22.4 | 0.2 | -0.2 |
| COMP | R1 = 220 kOhm ^(b) | | R4 = 91.0 Ohm ^(b) | |
| ZERO | 0.3 mV ⁽ⁱ⁾ | | | |
| SENS | 108.3 mV/bar at 1.000 mA ^(j) | | | |
| SENS | 433.3 mV/bar at 4.000 mA ^(j) | | | |
| LIN. | ^(k) [bar] | ^(l) [mV] | ^(m) Lnorm [%Fs] | ⁽ⁿ⁾ Lbfs [%Fs] |
| | -0.000 | 0.0 | 0.00 | -0.15 |
| | 0.500 | 54.4 | 0.20 | 0.15 |
| | 1.000 | 108.1 | -0.20 | -0.15 |
| Long Term Stability Ok ^(o) | | | | |
| Excitation 1.000 mA ^(p) | | | | |
| 05.03.08 ^(q) ----- GOL3.H03Aa0 ^(q) | | | | |

Each sensor is delivered with a calibration sheet
It contains the following data and information:

- (a) Type (PR-2), drawing-no. (8750.8) and range (1 bar) of sensor
(b) Test location-no. of sensor
(c) Test temperatures
(d) Uncompensated zero offset in mV
(e) Zero offset values, in mV, with test resistance (220 kΩ) (for factory computation only)
(f) Zero offset, in mV, with calculated compensation resistor R1 or R2
(g) Temp. zero error, in mV, with compensation resistor R1 or R2
(h) Compensation resistor values R1 / R2 and R3 / R4
(i) Offset with compensation resistors R1 / R2 and R3 / R4 fitted. (fine adjustment of zero with R5 potentiometer)
(j) Sensitivity of pressure sensor
(k) Pressure test points
(l) Signal at pressure test points
(m) Linearity (best straight line through zero)
(n) Linearity (best straight line)
(o) Results of long term stability
(p) Excitation (constant current)
(q) Date of test -----Test equipment

Remarks:

- The indicated specifications only apply for constant current supply. The sensor should be excited between 0,5 and 5 mA. The sensor signal is proportional to the current.
- 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 (surcharge).



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