

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.

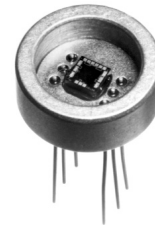
Typical Applications

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)
- Quality: all sensors produced according to ISO 9001 quality standards



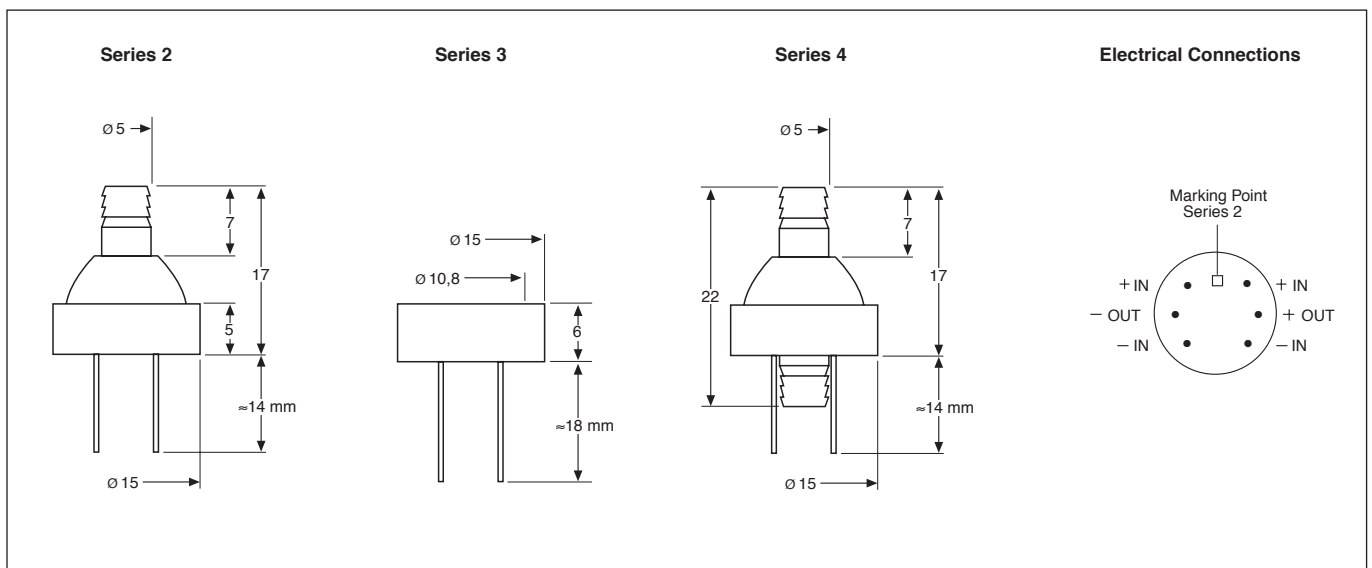
Series 2



Series 3



Series 4



Subject to alterations

2/00



KELLER

SPECIFICATIONS

• **General Characteristics:** Excitation I=4 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		PR				PR-PAA-PD			PR-PAA-PA-PD				
Series 3		PR-PAA-PA											
Series 4		PR-PD											

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	70	100	180	280	70	110	230	360	540	900	900	900
Output Signal, typ. (Series 4)	mV	70	100	180	280	70	100	180	280	400	600	-	-

• Electrical Characteristics (at 25°C)

Bridge Resistance	Ω	3500	± 20%
Constant Current Excitation ⁽¹⁾	mA	≤ 4	max. 4,5
Isolation / 50 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	> 100.10 ⁶	

• Mechanical Characteristics

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

• Specific Characteristics Excitation I = 4 mA constant current

Accuracy ⁽³⁾	% FS	0,25 typ.	0,5 max.
Offset at 25°C	mV	< 20 mV (compensated with R5 to ± 2 mV)	
Compensated Temp. Range	°C	0...50°C	
- Temp. Coeff. of Zero:	mV/°C	0,05 typ.	0,1 max.
- Temp. Coeff. of Sensitivity:	%/°C	0,01 typ.	0,025 max.
Long Term Stability	mV	1 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
- Sensor with leads

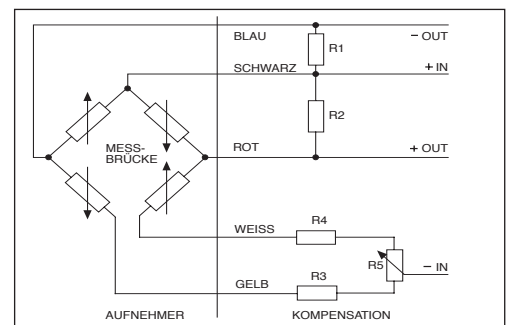
PR-2 / 8235-1 ⁽¹⁾				
⁽³⁾ Temp	⁽⁴⁾ Zero	⁽⁵⁾ -220	⁽⁶⁾ Comp	⁽⁷⁾ dZero
1.1	15.6	56.6	40.7	-1.0
26.2	13.7	59.5	41.7	0.0
51.0	8.9	60.4	40.4	-1.3
COMP	R2 =	360 kOhm ⁽⁸⁾	R3 =	39.0 Ohm ⁽⁸⁾
ZERO		2.7 mV ⁽⁹⁾	(P_atm	962 mbar) ⁽¹⁰⁾
SENS		410 mV/bar ⁽¹¹⁾		
LIN	+/-	0.31%FS ⁽¹²⁾		
Long Term Stability Ok ⁽¹³⁾				
Excitation 4.00 mA ⁽¹⁴⁾				
28.07.99 ⁽¹⁵⁾ LOWO.DO2F00 ⁽¹⁵⁾				

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

1. Type (PR-2), drawing-no. (8235) and range (1 bar) of sensor
2. Test location-no. of sensor
3. Test temperatures
4. Uncompensated zero offset in mV
5. Zero offset values, in mV, with test resistance (220 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. Linearity error in %FS (Full Scale)
13. Results of long term stability
14. Excitation (constant current)
15. 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.



Subject to alterations

2/00

KELLER AG für Druckmesstechnik
KELLER Gesellschaft für Druckmesstechnik mbH

St. Gallerstrasse 119
Schwarzwaldstrasse 17

CH-8404 Winterthur
D-79798 Jestetten

Tel. 052 - 235 25 25
Tel. 07745 - 9214 - 0

Fax 052 - 235 25 00
Fax 07745 - 9214 - 50