Piezoresistive OEM Pressure Transducers — Series 10

Sealed gauge, absolute, vented gauge, differential

The Series 10 pressure transducers cover all pressure ranges from 100 mbar to 1000 bar. They have been produced for over 30 years and are the premium product of the KELLER OEM-line. They are delivered with engraved serial number and electrical leadouts. Several millions of these pressure transducers are in use world-wide in a variety of different applications. Main fields of application are: Level technology, pneumatics, hydraulics, avionics.

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 so as to ensure 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.

Series 10

A Rugged Pressure Transducer

The piezoresistive chip immersed in silicone oil is welded into a housing made of stainless steel 316 L.

High Sensitivity

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

Flexibility

Versions: absolute pressure, sealed gauge, barometric, vented gauge and wet/wet differential. 18 nominal measurement ranges from 0,1 to 1000 bar. Different materials (Hastelloy, Platinum, Inconel, Monel among others). Various kinds of oil filling (olive oil, fluorinated oil, low temperature oil etc.)

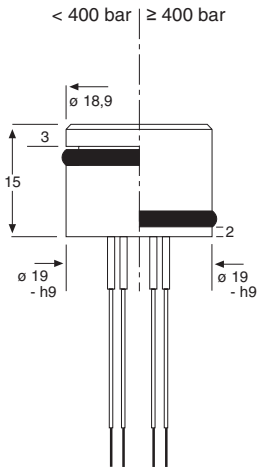
Series 10 PD

Quality

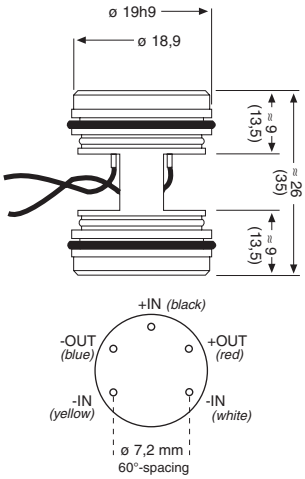
Each pressure transducer is subjected to comprehensive tests as to its pressure response and temperature characteristic, and is delivered with an individual calibration certificate stating the characteristics as well as the results of all tests which were performed. Special testing is available if demanded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

The Series 10 can also be delivered with a laser welded media isolation diaphragm (see data sheet Series 3 L - 10 L). The new 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 10

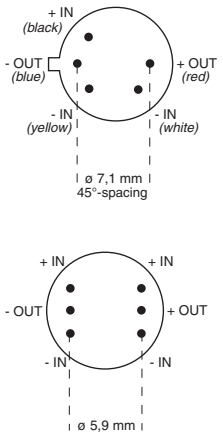


Series 10 PD

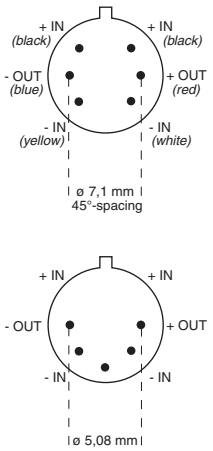


Electrical Connections

Transducer 5 Wire



Transducer 6 Wire



Subject to alterations

02/07

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KELLER

Specifications Excitation I = 1 mA

Pressure Ranges (FS) and Overpressure in Bar. Signal Output in mV.

PR-10	-1	-0,5	-0,2	-0,1	0,1	0,2	0,5	1	2	5	10	20						
PD-10					0,1	0,2	0,5	1	2	5	10	20						
PAA-10					0,1	0,2	0,5	1	2	5	10	20						
PA-10								1	2	5	10	20	50	100	200	400	600	1000
Signal Output typ.*	100	60	30	15	15	30	60	100	140	200	225	225	225	225	225	225	225	225
Overpressure	-1	-1	-1	-1	2,5	2,5	2,5	3	4	10	20	40	100	200	300	600	900	1100
PD, neg. Overpressure -					1	1	1	2	3	5	7	10						
PD, Line Pressure	≤ 200 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	Ω	3500	± 20%	
Constant Supply	mA	1 nominal	5 max.	
Insulation @ 500 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 15,6 x 1,78 mm (PA/PR) iØ 17 x 1 mm (PD)		
Oil Filling		Silicone Oil(1)		
Weight		26 g (PA/PAA/PR), 36 g (PD)		
Dead Volume Change @ 25 °C		< 0,1 mm^3 / FS		
Electrical Wires		0,09 mm^2, 12 x Ø 0,1 mm, Silicone sheathed, oØ 1,2 mm, Length 7 cm(1)		
Accuracy(2)	%FS	0,25 typ.(1)	0,5 max.	
Offset at 25 °C	mV	< 5 mV (compensated with R5 of 20 Ω(3))		
Temperature Error		**0...50 °C**	**-10…80 °C**	**-55…150 °C**
– Zero	mV / °C	< 0,0125	< 0,025	< 0,04
– Sensitivity	% / °C	< 0,01	< 0,02	< 0,05
Long Term Stability typ.	mV	0,25	0,5	0,75
Line Pressure Influence	mV/bar	< 0,0125 (PD 10)		
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
– Special characteristics: Linearity, overpressure, lower TC-zero
– Special tests
– All pressure ranges between 0,1 and 1000 bar
– Other temperature ranges
– Compensation PCB fitted
– With integrated flame barrier (EExd)

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PR-10/0.5 bar/81634.7 (a) **SN I0642 (b)**

(c) Temp [°C]	(d) Zero [mV]	(e) +270 [mV]	(f) Comp [mV]	(g) dZero [mV]
-8.6	-6.6	-16.5	0.4	-0.7
1.3	-5.9	-16.2	0.7	-0.4
25.4	-4.3	-15.8	1.1	0.0
50.5	-2.9	-15.8	1.1	0.0
80.4	-1.3	-16.2	0.8	-0.3

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COMP R1 = 270 kOhm (h) R4 = 68.0 Ohm (h)
RB 3543 Ohm (h)
ZERO 1.1 mV (i)
SENS 123.9 mV/bar at 1.000 mA (j)
SENS 495.7 mV/bar at 4.000 mA (j)

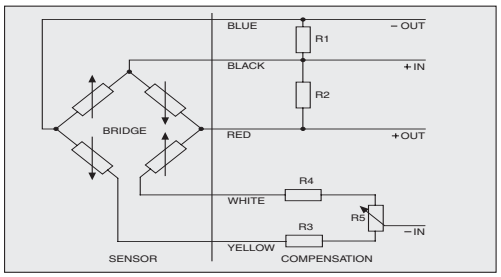
LIN (k) [bar]	(l) [mV]	(m) Lnorm [%Fs]	(n) Lbfsl [%Fs]
0.000	0.0	0.00	0.05
0.125	15.5	-0.07	-0.03
0.250	30.9	-0.07	-0.05
0.375	46.5	-0.01	-0.01
0.500	62.0	0.07	0.05

Long Term Stability Ok (o)
Test 500 Volt Ok (p)
Supply 1.000 mA (q)
25.04.06 (r) ---------- PH01.F03AvK (r)

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

(a) Type (PR-10) and range (0,5 bar) of pressure sensor
(b) Serial number of pressure sensor
(c) Test temperatures
(d) Uncompensated zero offset in mV
(e) Zero offset values, in mV, with test resistance R1 (+) or R2 (-), in kΩ (for factory computation only)
(f) Zero offset, in mV, with calculated compensation resistors
(g) Temp. zero error, in mV, with compensation resistors
(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) Voltage insulation test
(q) Excitation (constant current)
(r) 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. 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.



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