



Transmitter PD60 with ceramic measuring cell



For differential pressure- and flow measurement

Self monitoring sensor

Local parameter setting

Usable Turn Down 100 : 1

**Output signal differential pressure-, flow-
or level proportional**

Operating pressure up to 100 bar

Explosion protection to Atex II G1/2

Smart

GENERAL

The transmitter is suitable for differential pressure as for flow measurements with gases, vapours and liquids.

Spans between $<1^{1)}$ and 3000 mbar are available. The nominal pressures for the four measuring cell types are PN10, PN16 or PN100.

Standard output is a 4...20 mA signal proportional to the applied differential pressure or flow or level.

The microprocessor-controlled electronics works on the two-wire principle. Transmitter PD60 energization is by means of a DC voltage.

DESCRIPTION

Transmitter PD60 comprises the measuring cell, two process flanges with seals as the electronic housing.

The measuring cell is designed as a single-compartment device. Its body and both diaphragm are of sintered aluminium oxide ceramic.

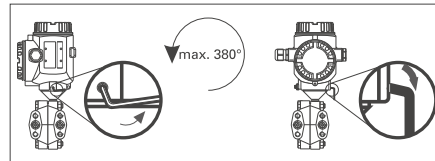
Process flanges wetted by the process media, are available in a variety of materials.

Process seals can be made of FKM (e.g. Viton®), EPDM or KALREZ.

The pressure medium enters the measuring cell via two 1/4-18NPT couplings in the process flanges. Centre to centre distance of the couplings is 54 mm, which enables direct mounting of a valve manifold or integral orifice assembly.

No matter what the left/right arrangement of the „plus“ and „minus“ pressure lines is on site, the position can be matched simply by rotating the housing up to 360°.

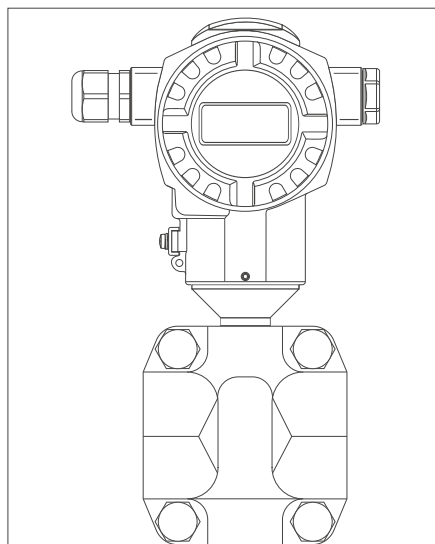
Fig. 1 Adaption of housing position



Microprocessor-controlled electronics provide high-precision signal processing and monitoring, from the sensor to the signal output. Measuring cell monitoring offers outstanding safety for industrial processes.

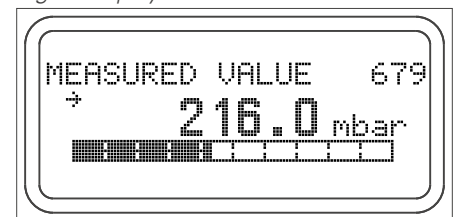
The optional 4-line local display (LCD) reads measuring values, dialog text as error indications and supports the user in every step of set up.

Fig. 2 Transmitter with display



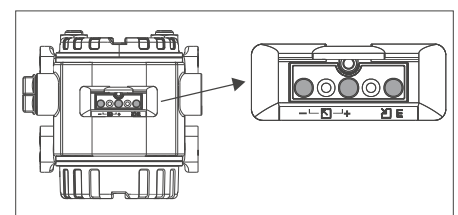
The operational keys are accessible either from outside or will be found on the electronics.

Fig. 3 Display element



The external operating keys use the Hall-sensor principle thus leaking holes into the housing are avoided and the electronics remain protected from environmental contamination.

Fig. 4 External operating keys



OPERATING PRINCIPLE

Measuring cell

The measuring cell consists of the ceramic body and two ceramic pressure diaphragms. The compartment between the two diaphragms is filled with liquid. Any change in the differential pressure causes a displacement of both diaphragms, which is measured directly as a capacitance.

¹⁾ Turn-down 100:1 respectively smaller ranges on request

Viton®: registered trade mark of DuPont Performance Elastomers

Any change in the differential pressure causes a displacement of both diaphragms, which is measured directly as a capacitance. The difference between capacitances corresponds to the pressure applied.

Self monitoring

Because of temperature proportional expansion of the oil, the sum of capacities C1 and C2 also corresponds to the process temperature.

An integrated temperature measurement in the cell provides the actual process temperature value. The microprocessor continuously compares both values and provides an alarm in case of discrepancy.³⁾

- The alarm acts on the analogue output signal and can be set for upscale, downscale or off (keeping the process value).

TECHNICAL DATA

INPUT

Measuring cells

Overload limit

Cell type	7B	7D	7F	7H
Nominal span	25	100	500	3,000
Span ²⁾	2...25	25...100	33...500	200...3,000
Span start	-25...23	-100...75	-500...467	-3,000...2,800
Nom. pressure ³⁾	10 bar	16 bar	100 bar	
Filling medium	Silicone oil, respectiv. Halocarbon with Oxygen use			

All values for span resp. span start given in mbar

Max. PN of corresponding cell, depends also from application (e.g. Oxygen, and gasket)

Static Pressure effect

Cell	25 mbar[X]	100 mbar[X]	500 mbar[X]	3000 mbar[X]
Zero	±0.7 % of X / 7 bar	±0.175 % of X / 7 bar	±0.075 % of X / 70 bar	±0.075 % of X / 70 bar
Span	±0.14 % of X / 7 bar	±0.14 % of X / 7 bar	±0.14 % of X / 70 bar	±0.14 % of X / 70 bar

Minimum Pressure: 10 mbar abs.

PROCESS MEDIA

Liquids, gases and vapours (aggressive and corrosive media with suitable material selection).

MATERIALS

Process flanges	Steel C 22.8 [1.0460]	Seals	FKM ⁴⁾
	SS 316 L [1.4435]		EPDM
	Alloy C22		KALREZ
			CHEMRAZ
			FKM for Oxygen use

OUTPUT

SIGNAL

Standard signal 4...20mA with superimposed HART communication -protocol

Resolution: 1µA

Signal range HART: 3.8...20.5 mA

Failure signal

Max. Alarm: adjustable from 21 to 23 mA³⁾

Min. Alarm: 3.6 mA

Keep Value: last measured value remains continued.

Ripple

≤ ±0.25 % fsd

HART protocol: U_{pp} ≤ 200 mV (47 Hz ... 125 kHz)

and U_{rms} ≤ 2.2 mV (500 Hz ... 10 kHz)

CHARACTERISTIC

- Proportional to the applied differential pressure or
- proportional to the flow rate, or
- proportional to the level

Long term stability

Cell	≥ 500 mbar	≤ 100 mbar
Per annum	±0.05 %	±0.18 %
5 years	±0.125 %	
Referred to nominal span of cell		

MAXIMUM LOAD

$$R_{Load} = \frac{U_{Supply} - 10.5[V]}{0.023[A]} - R_{Lead} [\Omega]$$

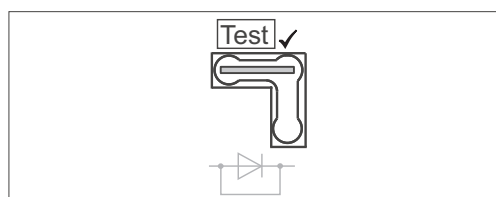
Load effect: < 0.1 % per 100

Hint

11.5 V minimum supply voltage if interlock diode is activated for test purpose.

Manual control unit or PC-operation requires 250 Ω communication resistor.

Fig 5 Link in position "Test"



DYNAMIC RESPONSE

Warm-up delay: < 10 s

Idle-time, rise time (T₆₃)

Cell	Idle-time	Rise time
25 mbar	90 ms	4700 ms
100 mbar		280 ms
500 mbar		210 ms
3000 mbar		110 ms

Damping: adjustable by means of local display, Manual Control Unit or SW (PC) 0 ...999 sec. Factory set to 2 sec

Creep flow cut-off

Adjustable

POWER SUPPLY

SUPPLY VOLTAGE

10.5...45 VDC⁶⁾

10.5...30 VDC for EEx⁶⁾

Supply voltage effect: < 0.02 % from 10.5...45 VDC

Ripple

No effect for U_{pp} ≤ ± 5 % within the nominal supply range

CONFORMITY

Cell	TD 1:1	TD > 1:1
25 mbar	±0.15 %	±0.15 % x TD
100 mbar	≤ TD 4:1 ±0.075 %	TD > 4:1 ±(0.0012 x TD + 0.027)%
≥500 mbar	≤ TD 15:1 ±0.075 %	TD > 15:1 ±(0.0015 x TD + 0.053)%

Referred to set span, Terminal based method to IEC 60770 including

²⁾ smallest span (TD) which can be calibrated on request
³⁾ ex works set for 22 mA
⁴⁾ FKM e.g. Viton®, DuPont Performance Elastomers
⁶⁾ Watch position of link, in position "Test" with Interlock-Diode, minimum supply voltage 11.5 V

EXPLOSION PROTECTION

Mode of protection:

ATEX Ex G 1 / 2
EEx ia IIC T4/T6

Certificate of Conformity

KEMA 06ATEX0169

Mounting

Transmitter in Ex-area G1

ENVIRONMENTAL CONDITIONS

Nominal temperature: -40 ...+85 °C

For storage: -40 ...+100 °C
(Local display max. +85 °C)

Temperature effects on span start and span

Cell	-10...+60 °C	-40...-10; +60...+85°C
25 mbar	$\pm(0.35 \times \text{TD} + 0.05)\%$	$\pm(0.3 \times \text{TD} + 0.15)\%$
≥ 100 mbar	$\pm(0.05 \times \text{TD} + 0.05)\%$	$\pm(0.08 \times \text{TD} + 0.07)\%$

Referred to set span

Process temperature at measuring cell

-40°C...+85°C,
(see also process seal resp. Oxygen use)
(+70 °C at EEx ia IIC T4)

Process sea	Temperature limits
FKM (e.g. VITON®)	-20 ...+85 °C
EPDM	-20 ...+85 °C
KALREZ	- 5 ...+85 °C
FKM for Oxygen use	-10 ...+60 °C

Relative humidity: 100% r.H.
Condensation permissible⁷⁾

Climatic category

Class 4K4H
to DIN EN 60721-3-4

Vibration effect: 0.1 %
(10...60 Hz: 0.15 mm; 60...2000Hz: 2g,
with mounting bracket)

Mounting effect

Mounting rotated vertical to diaphragm
axis: ≤ 3 mbar

ELECTROMAGNETIC COMPATIBILITY

Complies with EN 61326
operating resource B
Immunity to EN 61326 NAMUR recom-
mendation NE21 with 30 V/m.

All tests at TD 2:1 effect < 0.5 %

CE-labelled

Fig. 6 Dimensions process flange

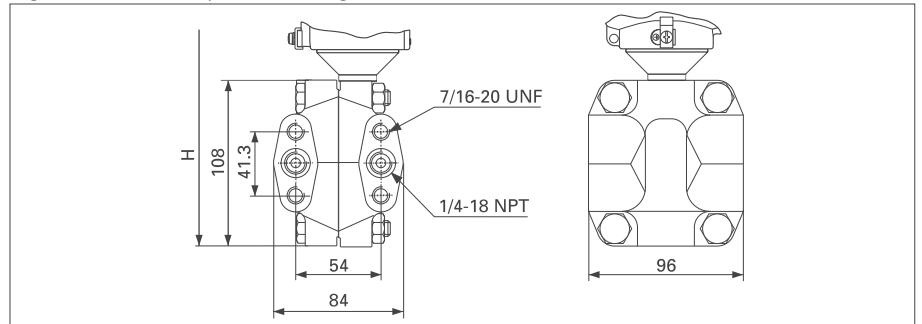


Fig. 7 Dimensions electronic housing

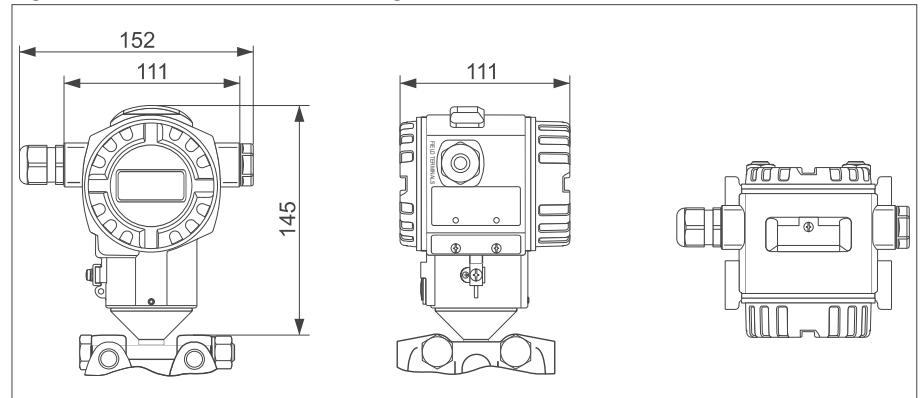
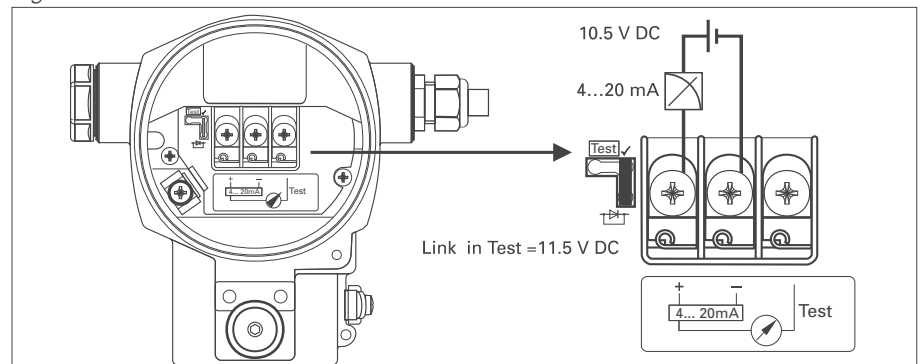


Fig. 8 Electrical Connections



PRESSURE EQUIPMENT DIRECTIVE

Complies with RL 97/23/EG, article 3(3)
and is manufactured to good engineer-
ing practice. Applicable for stable gases
of group 1, category II.

GENERAL

ELECTRONIC HOUSING

Di-cast aluminium AlSi 12 free of copper,
with fully chromated surface, epoxy poly-
ester coated,
O-rings and seals made of NBR

HOUSING PROTECTION TYPE

IP 66 to DIN 40050 (NEMA 6P)

PROCESS COUPLING

1/4-18NPT-f thread, (Centre-to-centre dis-
tance: 54 mm)
Other distances/threads are possible by means of
additional oval flanges with 1/2-14NPT-f thread

ELECTRICAL CONNECTION

Screw terminals for 2.5 mm²

MOUNTING METHODE

Pipe or wall mounting possible by
means of mounting bracket or valve ma-
nifold. Mounting thread oval flange
7/16-20 UNF.

⁷⁾ Avoid condensation inside the housing

WEIGHT

approx. 5.3 kg
With mounting bracket 6.4 kg

OPERATIONAL POSITION

Pressure ports directing to top and bottom.
(horizontal outlet of effective pressure pipes, that means pressure ports show to the sides, corresponding adjustment of zero necessary)

COMPRISES

- 2-Venting valves (not for Alloy version)
- Quickstart -Manual

ADDITIONAL DOCUMENTATION

Instruction manual **9499-040-79711**
Atex Safety instructions **9499-047-12601**
SIL Certificate/Handbook **9499-047-12918**

FITTINGS

Mounting bracket kit

Material SS304, inclusive (short) screws, see ordering structure, Option 2, code U

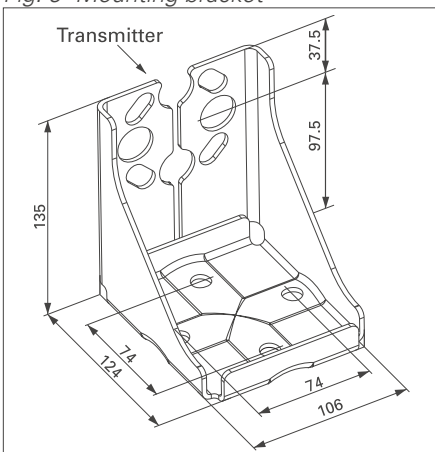
Additional screws

Material SS 304, 4 x 7/16-20 UNF, 1 1/2 -in;
(in case mounting bracket has not been ordered) see ordering structure, Option 2, code R

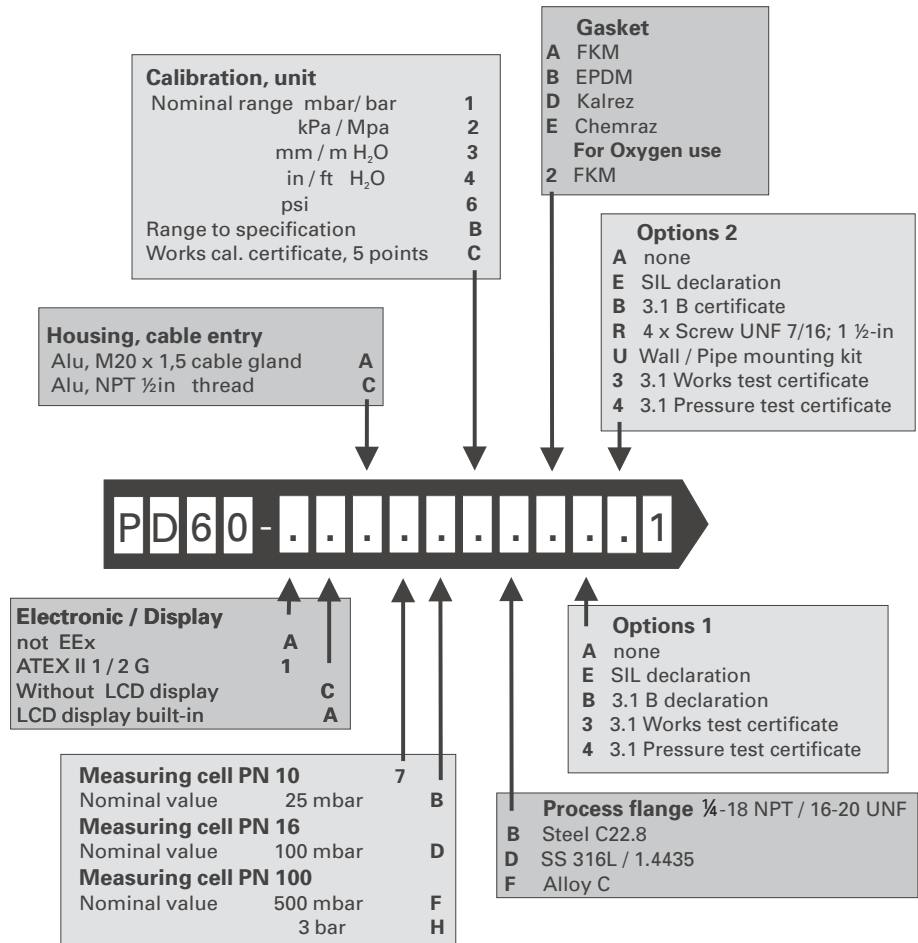
Blind stopper

2 units, material SS 316L (1.4404)
9407-290 00011

Fig. 9 Mounting bracket



ORDERING STRUCTURE



Deutschland
PMA Prozeß- und Maschinen- Automation GmbH
Miramstrasse 87, D-34123 Kassel

Export
Your local dealer

Tel./Fax: (0561) 505 - 1307-1710
E-mail: mailbox@pma-online.de
Internet: http://www.pma-online.de