

Transmitter PD5

With ceramical cell for differential pressure, flow- and level measurements

**Self-monitoring measuring cell
made of high corrosion resistant ceramics**

Local adjustment of parameters

Usable turn down 100:1

**Output signal selectable for flow or differential pressure
or level, free programmable**

Explosion protection type EEx ia IIC

Smart

GENERAL

Transmitter PD5 is suitable for gauge, vacuum or differential pressure and for flow measurements with gases and liquids as well as for hydrostatic level measurements.

Spans between >1 and 3000 mbar are available. The nominal pressures for the four measuring cell types are PN10, PN16 or PN100.

The output is a standard 4...20 mA signal proportional to the applied differential pressure or flow or level (e.g. in a horizontal cylindrical container).

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

An intrinsic safe version is available for application within hazarded areas.

DESCRIPTION

Transmitter PD5 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 membranes are of sintered aluminium oxide ceramic. Four versions provide spans from >1 to 3000 mbar.

The capacitive differential pressure signal is derived from the separation of the capacitor plates.

Process flanges wetted by the process media, can be made of:

- Steel
- Stainless steel
- Hastelloy C or
- PVDF

Process seals are available of:

- Viton
- EPDM
- PTFE on Hastelloy C or
- KALREZ.

The pressure medium enters the measuring cell via two ¼-18NPT 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 transmitter. The electronics housing can be rotated up to 320° relative to the cell, which prevents the indicator being upside down.

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

Electronics and terminal compartment are hermetically separated, i.e. with the terminal compartment open, the electronics remain protected from environmental contamination.

All parameter are adjustable by means of 4 push buttons or with an external hand-held control unit.

Transmitter PD5 can be supplied with a digital indicator. Retrofitting is possible.

Depending on the measuring cell span, a turn-down of 100 : 1 is possible. This means for example, that the 25 mbar cell even is adjustable downwards to a span of 1pa¹⁾.

OPERATING PRINCIPLE

Measuring cell

The measuring cell consists of the ceramic support and the two ceramic pressure diaphragms p1 and p2. 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. The difference between capacitance C1 and C2 corresponds to the applied pressure.

¹⁾ increased conformity error

Self monitoring

Because of temperature proportional expansion of the oil volume, 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 signal in case of discrepancy.

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

TECHNICAL DATA

INPUT

Fig. 1 Measuring cells

Cell	1B	2D	3F	3H
Nominal-range	0...25	0...100	0...500	0...3,000
Span	>1...25	1...100	5...500	30...3,000
Span start	-25...24	-100...99	-500...495	-3,000...2,970
Nominal pressure	PN10	PN16	PN 140	
Overload (single sided)	10 bar	16 bar	100 bar	
Filling medium	Silicon oil*)		Mineral oil	

Nominal range and span in mbar

*) Fluorolube for high grade gases

Static pressure: up to max. PN of corresponding measuring cell

Minimum pressure: 100 mbar abs.

Static pressure effect

With symmetrical load: < 0.2 % at PN for span start and span.

Overload limit: PN

Process media

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

Materials

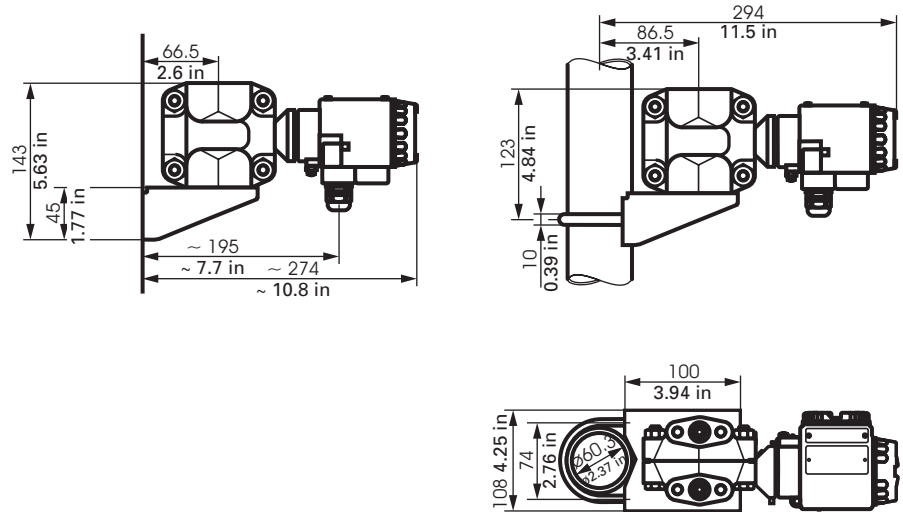
Diaphragm

- Ceramic

Gasket

- Viton (FPM)
- NBR (EPDM)
- PTFE on Hastelloy C
- KALREZ (only with PVDF flange)

Fig. 2 Dimensions



Process flanges

- C. steel 1.0460
- Stainless steel SS 316Ti (1.4571)
- Hastelloy C-276 (No.2.4819)
- PVDF

Bolts and nuts for process flange

- Stainless steel SS 316Ti (1.4571)

Blind stopper, Venting valve

- Stainless steel SS 316 (1.4401)

Conformity error: < 0.1 %

Terminal based for nominal span of cell up to TD 10:1

For TD 100:1 Conformity error

$$= \pm 0,1\% \times \frac{0,1 \times \text{nominal value}}{\text{set span}}$$

(Hysteresis and reproducibility included)

Long term drift: 0.1 % / a

MAXIMUM LOAD

$$R_{Load} = \frac{U_{Supply} - U_{Min} [V]}{0,023 [A]} - R_{Lead} [\Omega]$$

Load effect: < 0.01 % per 100 Ω

DYNAMIC RESPONSE

Average delay: depending from cell, 0.5 up to 2 s

Rise time: depending from cell and span 0.4 up to 1.6 s

Damping

0 to 16 s adjustable by switch, per SW up to 40 s adjustable

CREEP FLOW CUT-OFF

factory set to 2.25 %, other values adjustable via SW

OUTPUT

OUTPUT SIGNAL

4...20 mA

Output current limiting: 20.5 mA

Lowest value: 3.8 mA (4 mA selectable)

For alarm selectable: 3.6 mA; 21.5 mA; „keep value“

Ripple: ≤ ±0.25 % fsd

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

and $U_{rms} < 2.2$ mV (500 Hz up to 10 kHz)

CHARACTERISTIC

- Proportional to the applied differential pressure or
- proportional to the flow rate, or
- proportional to the level (free programmable)

POWER SUPPLY

SUPPLY VOLTAGE

11.5...45 VDC
11.5...30 VDC for EEx

Supply voltage effect

< 0.1 % between 11.5...45 VDC

Ripple

No effect for $U_{pp} \leq \pm 5\%$ with the nominal supply range.

EXPLOSION PROTECTION

Protection type: EEx ia IIC T4/T6 zone 0

Certificate of conformity
KEMA No. Ex 97.D.2523X

Installation
Transmitter in zone 1 hazardous area

ENVIRONMENTAL CONDITIONS

TEMPERATURE LIMITS

Nominal temperature: -38 °C...+85 °C
For storage: -40 °C...+100 °C

Temperature effects

on span start and span (incl. media temperature)
< $\pm 0.02\%$ / 10 K within -10 °C...+60 °C and
< $\pm 0.1\%$ / 10 K within -40 to -10 °C and within +60 to 85 °C

Process temperature at the measuring cell

-40°C...+85°C, for short periods 120°C,
depending on process gasket
(+70 °C with EEx ia IIC T4)

Process gasket	Lower temperature limit
VITON (FPM)	-20 °C
VITON for Oxygen	-10 °C
EPDM (NBR)	-40 °C
PTFE	-40 °C

RELATIVE HUMIDITY

100 % r.H. no condensation

Climatic category: class GPC to DIN 40040:

VIBRATION EFFECT

< $\pm 0.1\%$
(tested to DIN IEC 68, part 2-6, referred to nominal span of cell)

ELECTROMAGNETIC COMPATIBILITY

Complies with EN 50082-2 and NAMUR with 30 V/m
Tests to IEC 801-1 up to 801-6
Electromagnetic radiation to EN 50081-1, CE-labelled

GENERAL

HOUSING FOR ELECTRONICS

Di-cast aluminium AlSi 12 free of copper, with fully chromated surface, epoxy polyester coated, seals of NBR.

HOUSING PROTECTION

IP 65 to DIN 40050

PROCESS COUPLING

¼-18NPT female
Centre-to-centre distance: to DIN 19213 (54 mm). Other distances are possible by means of oval flanges with ½-14NPT female thread.

ELECTRICAL CONNECTION

Screw terminals for 2.5 mm² via cable gland

MOUNTING METHOD

Pipe or wall mounting possible by means of mounting plate or valve manifold¹⁾

WEIGHT

approx. 5 kg

MOUNTING POSITION

Process flanges vertical (with mounting bracket 9404-290-01031 on horizontal pipe - horizontal process flanges; therefore horizontal outlet of effective pressure pipes, corresponding adjustment of zero necessary).

ACCESSORIES

– Instructions for PD5/6

Fig. 3 Electrical connection

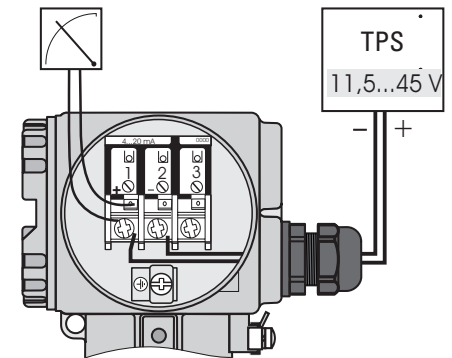
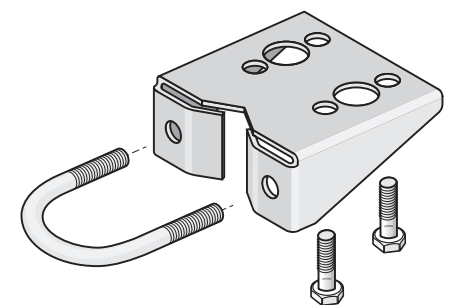


Fig. 4 Mounting bracket



1) only with universal mounting kit

ORDERING STRUCTURE

9407 230 1

Versions with HART protocol

without display, non EEx	5
EEx ia IIC T4/T6	6
with LCD display, non EEx	7
with LCD display, EEx ia IIC T4/T6	8

Process flange: material / seals

Steel C22.8 / Viton (FPM)	0
Stainl.steel 1.4435 / Viton (FPM)	1
Stainl.steel 1.4435 / Viton, for Oxygen	2
Steel C22.8 / NBR (EPDM)	3
Stainl.steel 1.4435 / NBR (EPDM)	4
Hastelloy C / Viton (FPM) *1	5
Hastelloy C / NBR (EPDM) *1	6
Hastelloy C / PTFE on Hastelloy *1, *2	7
PVDF / KALREZ	8

Calibration / units

Calibrated from 0...nom.value of cell in mbar/bar, linear	0
Calibrated from 0...nom.value of cell in kPa/Mpa, linear	1
Calibrated from 0...nom.value of cell in mm H ₂ O, linear	2
Calibrated from 0...nom.value of cell in inch H ₂ O, linear	3
Calibrated from 0...nom.value of cell in kgf/cm ² , linear	4
Calibrated from 0...nom.value of cell in psi, linear	5
Start, span in clear text, e.g. %, linear/ square root/cylindrical	9

Cell, nominal value

Nominal pressure 10 bar	
25 mbar	0
Nominal pressure 16 bar	
100 mbar	1
Nominal pressure 100 bar	
500 mbar	2
3000 mbar	3

*1) mounting with 7/16 - 20 UNF thread

*2) for pressure beginning P_{abs} > 900 mbar

*1) Mounting screw 7/16 20UNF

*2) for pressure abs P_{abs} ≥ 900 mbar



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