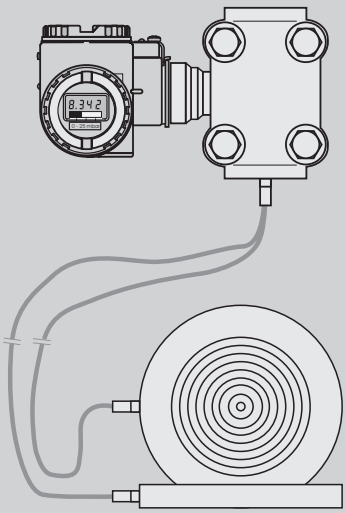


Transmitter PD6DM

With sealing diapragms for differential pressure flow- and level measurements

Selfmonitoring sensor

Local setting of parameters

Usable Turn-Down 100 : 1

Ex-protection EEx ia IIC

Smart

GENERAL

Transmitter PD6DM is suitable for measurement of gauge / vacuum, differential pressure, for flow measurements with aggressive, hot or high-viscosity medias, gases, vapours and liquids, as well as for hydrostatic level measurments.
Spans between 10 up to 6000 mbar are available. The nominal pressure for the measuring cells is PN140.
The output is a standardized 4...20 mA signal, proportional to the applied differential pressure or flow or level (e.g. in a horizontal cylindrical container).

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

DESCRIPTION

Transmitter PD6DM comprises the measuring cell, two process flanges with seals and the electronics housing. Connected to each of these process flanges is a liquid filled capillary, which provides the connection to the sealing diaphragm.
The flat sealing diaphragm is welded or brazed into a ring carrier. Depending on the respective positions of sealing diaphragm and transmitter, the diaphragm can be supplied with different length of capillary tube.

Pressure transfere is achieved by different types of oil, which are sealed under vacuum into the system.
Process flanges are of

– Stainless steel

Diaphragm material is available in

– Stainless steel 316 L (1.4435)
– Stainless steel, PTFE coated
– Hastelloy C
– Tantalum

Microprocessor controlled electronics provide high-precision signal processing and monitoring, from the sensor to the signal output. Measuring cell monitoring, which is possible with silicone 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 four push-buttons, or with an external hand-held control unit.
Transmitter PD6DM 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 160 mbar cell is adjustable downwards to a span of 1.6 mbar[1)].

[1)] increased conformity error

OPERATING PRINCIPLE

Function of measuring cell

The measuring cell consists of a piezoresistive silicone measuring element and a body with two metallic isolating diaphragms. The compartment between the two diaphragms is filled with silicone oil. Any changes in the differential pressure causes a displacement of the sealing diaphragms and is transferred to the sensing element, which in cause changes its bridge resistance. The resistive change is beeing measured and processed.

Self monitoring

The measuring element on the silicone diaphragm is designed as a piezoresistive strain gauge, which can be monitored accordingly. The microprocessor monitors continously corresponding 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

MEASURING CELLS PN 140

Measuring cell	4E	4G	4K
Nominal - range	160	1,000	6,000
Span	1.6...160	10...1,000	60...6,000
Span start	-160...+150	-1,000...+950	-6,000...+5.700
Nominal pressure	PN 140		
Filling medium	Silicone oil		

(All values in mbar)

FILLING LIQUID ISOLATING DIAPHRAGM

Selecting the filling liquid for isolating diaphragms depends from pressure and temperature conditions of the process. Second criteria is immunity of the filling liquid with the process. Details see tabel filling liquids.

Static pressure

up to max. PN of corresponding measuring cell.

Static pressure effect

With symmetrical load 0.2 % / 100 bar for span start and span.

Minimum pressure

>10 mbar abs.

Overload limit: PN

PROCESS MEDIA

liquids and gases (agressive and corrosive media with suitable material selection)

MATERIALS

Isolating diaphragm diaphragm

– ANSI SS 316 L (no 1.4435)

– Hastelloy C

– Tantalum

– Stainless steel PTFE coated

Flange body

– ANSI SS 316 Ti (no 1.4571)

Bolts and nuts for process flange

– ANSI SS 316 Ti (no 1.4571)

Process flange

– ANSI SS 316 Ti (no 1.4571)

Fig. 1 Dimensions

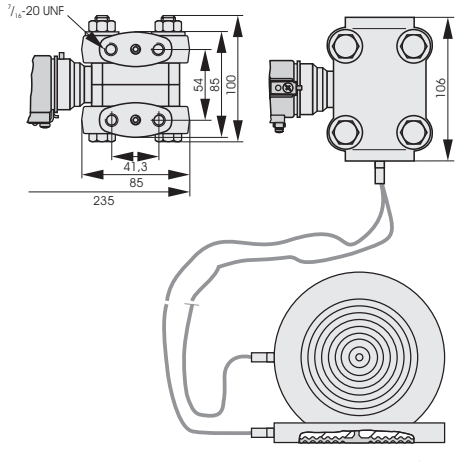


Table 1: Filling liquids

Filling liquids for isolating diaphragm	Mediumtemp. at 50 mbar ≤ p_{abs} ≤ 1 bar	Mediumtemp. at p_{abs} ≥ 1 bar	Max. difference in height	Application
Silicone il	-40 up to +180 °C	-40 up to +200 °C	max. 7 m	Standard, Food and beverage
High temperature oil	-10 up to +200 °C	-10 up to +350 °C		
Fluorolube	-40 up to 80 °C	-40 up to +175 °C		Inert oil
Glycerin	-	+15up to +200 °C		Food and beverage
Vegetable oil	-10 up to +120 °C	-10 up to +200 °C		Food and beverage

SMALLEST SPANS

Based upon the thermal expansion of the filling liquid, isolating diphragms cause an additional temperature effect with measurement. Following points should be considered for selection.

- Nominal width determs diameter of sealing diaphragm.
- Large diameter of diaphragm results in smaller temperature effect.
- Small spans require large diameter to minimize temperature effects.

TEMPERATURE EFFECTS

Main temperature effect depends mainly from the process temperature adjacent to the sealing diaphragms.
Capillary tubes will be influenced by the ambient temperature at the measuring site.

- Effect for silicone oil per meter length of capillary tube (both sides), 0.12 mbar / 10 K.
- Total temperature coefficient T_K results from the addition of effects of sealing diaphragm and effects of capillary tubes.
- Both capillaries must have similar length to minimize asymmetrical effects.

MOUNTING HINTS FOR CAPILLARY TUBES

- If a transmitter is mounted above the lower measuring point, the maximum difference in height (see tab filling liquids) must not be exceeded.
- Larger heights lead to an interruption of the liquid column in the capillary tubes and destroy the measuring system.
- Radius for bending must be larger than 100 mm.
- Measurements under vacuum require mounting of transmitter at or below lower measuring point.

OUTPUT

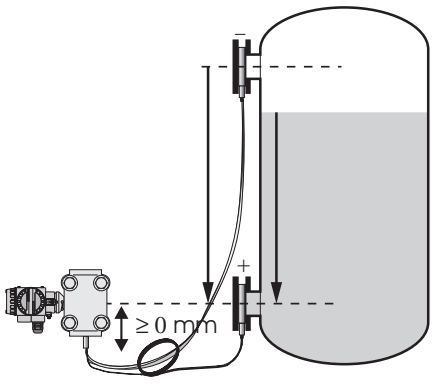
OUTPUT SIGNAL

Standard signal 4...20mA

Output current limiting: 20.5 mA
Lowest value 3.8 mA (4 mA adjustable)
For alarm selectable 3.6 mA; 21.5 mA;
„keep value"

Ripple: ≤ ±0.25 % fsd
HART protocol U_{pp} < 200 mV (47 Hz to 125 kHz) and U_{rms} < 2.2 mV (500 Hz to 10 kHz)

Fig. 2 Mounting of isolating diaphragm



CHARACTERISTIC

- Proportional to applied differential pressure or
- Proportional to flow rate or
- Proportional to level in a cylindrical tank or
- Proportional to level free programmable

Conformity: < 0.1% terminal based for nominal span of cell up to TD 10:1

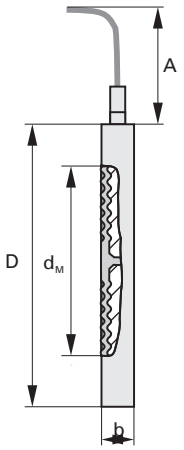
For TD 100:1 conformity error

$$= \pm 0.1\% \times \frac{0.1 \times nominal \circ value}{set \circ span}$$

(Hysterisis and reproducibility included)

Long term drift: 0.1 % / à

Fig. 3 Isolating diaphragm to DIN 2501



MAXIMUM LOAD

$$R_{Load} = \frac{U_{Supply} - 11.5[V]}{0.023[V]} - R_{Lead}[\Omega]$$

Load effect: <0.01% per 100 Ω

DYNAMIC RESONSE

Average delay: depending from cell 0.5 ... 2 s
Rise time: depending from cell and span, 0.4 ... 1.6 s

Damping

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

POWER SUPPLY

SUPPLY VOLTAGE

11.5...45 VDC
11.5...30 VDC with EEx

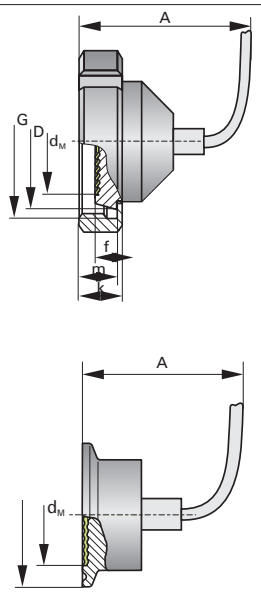
Supply voltage effect

< 0.1 % from 11.5...45 VDC

Ripple of supply

no effect for $U_{PP} \leq \pm 5$ % within the nominal supply range

Fig. 4 Sealing diaphragm hygienic coupling



Tab. 2 Dimensions sealing diaphragm

Type	Pipe	Flange			Sealing diaphragm			
	DN	PN	D	b	dM		A	Weight
	mm	bar	mm	mm	mm	TK [mbar/10K]	Min. mounting-distance [mm]	For 2 diaphr. [kg]
DIN 2501	50	16/400	102	20	46	+ 0.5	130	2.6
	80		138		70	+0.1		4.6
DIN 11851	50	25	68	19	46	+0.5	120	2.2
	65		86	21	52	+0.2		4.0
	80		100	25	71.5	+0.1		5.1
Clamp	2"	40	64	-	45	+0.5	100	1.4
	3"		91	-	71.5	+0.1		2.4

EXPLOSION PROTECTION

Protection type

EEx ia IIC T4/T6 Zone 1

Certificate of conformity

KEMA No. E x 97.D.2523 X

Installation

Transmitter in zone 1 hazarded area

ENVIRONMENTAL CONDITIONS

TEMPERATURE LIMITS

Operation: -40 °C...+85 °C

Storage: -50 °C...+100 °C

Temperature effect on span start and span

Without sealing diaphragm!
± 0.02 % / 10 K within -10 bis + 60 °C and
<± 0.1%/ 0 K from -40 to -10 °C and from +60 to 85 °C

HUMIDITY

100% r.H., no condensation

VIBRATION

≤ 0.1 %
(to DIN IEC 68, part 2-6, referred to sensor span 6000 mbar)

ELECTROMAGNETIC COMPATIBILITY

Fulfills 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

via sealing diaphragm

ELECTRICAL CONNECTION

Screw terminals for 2.5 mm^2 via cable gland

MOUNTING

Pipe or wall mounting possible by means of a mounting bracket fig. 6 and mounting hints fig. 2.

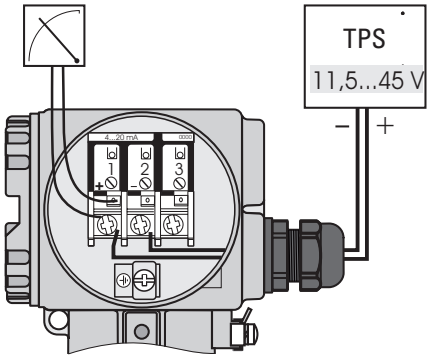
WEIGHT

Sealing diaphragm see tab. 2 plus approx. 4 kg transmitter weight

MOUNTING POSITION

Process flanges vertical
(Mounting bracket 9404-290-01031 on a horizontal pipe leads to horizontal process flanges; thus horizontal outlet of capillary tubes, corresponding adjustment of zero necessary).

Fig.5 Electrical connections



ACCESSORIES

Instructions for PD5/6

Further documentation

Instructions PD5/6 with HART 5.1

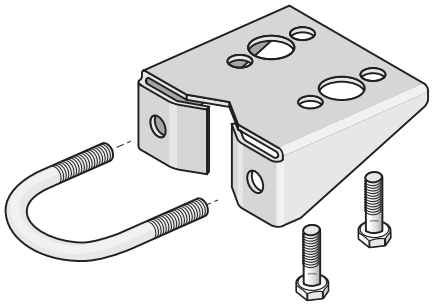
FITTINGS

Mounting bracket for wall- and pipe mounting

Screws 7/16 - 20 UNF
Material: stainless steel

9404-290-01031

Fig. 6 Mounting bracket



ORDERING STRUCTURE

9407 233 · · · · 1

Version with HART protocol

no 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**

Cell, nominal value
Nominal pressure 140 bar 160 mbar
1000 mbar
6000 mbar

Calibration / unit
Calibrated from 0...nominal value of cell in mbar/bar, linear
Calibrated from 0...nominal value of cell in kPa/Mpa, linear
Calibrated from 0...nominal value of cell in mm H_2O, linear
Calibrated from 0...nominal value of cell in inch H_2O, linear
Calibrated from 0...nominal value of cell in kgf/cm², linear
Calibrated from 0...nominal value of cell in psi, linear
Start, span in clear text, e.g.. %, linear/ square root/cylindrical

Process flange: *material stainless steel 1.4435*
Flange diameter DN 50, PN 16/400
Flange diameter DN 80, PN 16/400

Hygienic flange
Diaphragm: Stainl. steel 1.4435, DIN 11851, DN 50, with nut
Diaphragm: Stainl. steel 1.4435, DIN 11851, DN 65, with nut
Diaphragm: Stainl. steel 1.4435, DIN 11851, DN 80, with nut
Diaphragm: Stainl. steel 1.4435, Clamp 2"
Diaphragm: Stainl. steel 1.4435, Clamp 3"

Diaphragm material
Stainless steel 1.4435 (DN 50 / DN 80)
Tantalum (DN 80)
Hastelloy C 276 (DN 80)
Stainless steel PTFE coated

Filling media
Silicone oil
Vegetable oil
High temperature oil
Glycerine
Fluorolube

Length of capillaries
1 m
2 m
4 m
8 m

Missing codes will be given in effect of orders

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