**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 hazardous 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 1 Pa.

**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.

\(^{1)} \text{increased conformity error} \)
**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

<table>
<thead>
<tr>
<th>Fig. 1 Measuring cells</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Cell</strong></td>
</tr>
<tr>
<td><strong>Nominal range</strong></td>
</tr>
<tr>
<td><strong>Span</strong></td>
</tr>
<tr>
<td><strong>Nominal pressure</strong></td>
</tr>
<tr>
<td><strong>Overload (single-sided)</strong></td>
</tr>
<tr>
<td><strong>Filling medium</strong></td>
</tr>
</tbody>
</table>

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)

**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)

**CHARACTERISTIC**

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

**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_{op} < 200 mV (47 Hz ...125 kHz) and U_{rms} < 2.2 mV (500 Hz up to 10 kHz)

**MAXIMUM LOAD**

\[
R_{\text{Load}} = \frac{U_{\text{Supply}} - U_{\text{Min}}}{0.023[A]} - R_{\text{load}}[\Omega]
\]

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
**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 hazarded 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)
< ± 0.02 % / 10 K within -10 °C...+60 °C
and
< ± 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)

<table>
<thead>
<tr>
<th>Process gasket</th>
<th>Lower temperature limit</th>
</tr>
</thead>
<tbody>
<tr>
<td>VITON (FPM)</td>
<td>-20 °C</td>
</tr>
<tr>
<td>VITON for Oxygen</td>
<td>-10 °C</td>
</tr>
<tr>
<td>EPDM (NBR)</td>
<td>-40 °C</td>
</tr>
<tr>
<td>PTFE</td>
<td>-40 °C</td>
</tr>
</tbody>
</table>

**RELATIVE HUMIDITY**

100 % r.H. no condensation

Climatic category: class GPC to DIN 40040:

**VIBRATION EFFECT**

< ± 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 manifold

**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

1) only with universal mounting kit
## ORDERING STRUCTURE

<table>
<thead>
<tr>
<th>Versions with HART protocol</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>without display, non EEx</td>
<td></td>
</tr>
<tr>
<td>EEx ia IIC T4/T6</td>
<td>6</td>
</tr>
<tr>
<td>with LCD display, non EEx</td>
<td>7</td>
</tr>
<tr>
<td>with LCD display, EEx ia IIC T4/T6</td>
<td>8</td>
</tr>
</tbody>
</table>

## 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

| Calibration from 0...nom.value of cell                          | 0 |
| in mbar/bar, linear                                            |   |
| in kPa/Mpa, linear                                             | 1 |
| in mm H₂O, linear                                              | 2 |
| in inch H₂O, linear                                            | 3 |
| in kgf/cm², linear                                             | 4 |
| in psi, linear                                                 | 5 |

Start, span in clear text, e.g. %, linear/square root/cylindrical

## Nominal pressure

| Nominal pressure 10 bar                                        | 0 |
| Nominal pressure 16 bar                                        | 1 |
| Nominal pressure 100 bar                                       | 2 |
| Nominal pressure 300 bar                                       | 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