Smart Differential Pressure Transmitter

- 4...20 mA output signal + HART protocol
- ATEX Intrinsic safety
- Static pressure limit up to 420 bar
- Accuracy 0.1%
- Gold plated diaphragms (Au)
- Wetted parts material Hastelloy C276

Application and construction

The APRE-2000 transmitter is applicable to the measurement of differential pressure of gases, vapors and liquids. The active element is a piezoresistant silicon sensor separated from the medium by separating diaphragms and a specially selected type of manometric fluid. The special design of the active sensing element ensures that it is able to withstand pressure surges and overloads of up to 250, 320 or 420 bar. Electronics in the casing with a degree of protection IP65, IP66.

Communication and configuration

The communication standard for data interchange with the transmitter is the HART protocol.

Communication with the transmitter is carried out by:
- a KAP-03 communicator,
- some other HART type communicators,(*)
- a PC with the HART/USB/Bluetooth converter and Aplisens RAPORT 2 configuration software.

(*).eddl files available on www.aplisens.com

The data interchange with the transmitter enables user to:
- identify the transmitter;
- configure the output parameters:
  - measurement units and values of the start and end-points of the measuring range;
  - damping time-constant;
  - conversion characteristic (inversion, user’s non-linear characteristic);
- read the currently measured pressure value of the output current and the percentage output control level;
- force an output current with a set value;
- calibrate the transmitter in relation to model pressure.

**Smart Differential Pressure Transmitter TM-APRE 2000**

### Installation

The transmitter with P type process connection is not heavy, so it can be fitted directly onto impulse lines. For fitting in any desired position on a 2/5 pipe an Aplisens mounting bracket (FI 25 mounting bracket, see page IV/5) is recommended.

The version with C type process connections can be fitted directly to a 3- or 5-valve manifold. We recommend factory-mounted transmitters with VM type valve manifold (see page IV/2). A transmitter without a valve manifold can be fitted in any position on a 2" pipe or on a wall using the C-2* mounting bracket (see page IV/5).

When the special process connections are required for the level measurement of media in closed tanks (e.g. in the sugar and chemical industries) the transmitter is fitted with an Aplisens diaphragm seal. Sets of differential pressure transmitters with diaphragm seals are described in detail presented in the further part of the catalogue.

### Measuring ranges

<table>
<thead>
<tr>
<th>No.</th>
<th>Nominal measuring range (FSO)</th>
<th>Minimum set range</th>
<th>Rangeability</th>
<th>Overpressure limit/ static pressure limit</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>0...70 bar (0...7 MPa)</td>
<td>7 bar (700 kPa)</td>
<td>10:1</td>
<td>exception: 70 bar for P type</td>
</tr>
<tr>
<td>2</td>
<td>0...16 bar * (0...1.6 MPa)</td>
<td>1.6 bar (160 kPa)</td>
<td>10:1</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>0...2.5 bar (0...250 kPa)</td>
<td>0.2 bar (20 kPa)</td>
<td>12.5:1</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>0...1 bar * (0...100 kPa)</td>
<td>50 mbar (5 kPa)</td>
<td>20:1</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>0...0.25 bar * (0...25 kPa)</td>
<td>10 mbar (1 kPa)</td>
<td>25:1</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>-0.5...0.5 bar * (-0.5...0.5 MPa)</td>
<td>0.1 bar (10 kPa)</td>
<td>10:1</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>-100...100 mbar * (-10...10 kPa)</td>
<td>15 mbar (1 kPa)</td>
<td>20:1</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>-5...70 mbar * (-0.5...7 kPa)</td>
<td>4 mbar (0.4 kPa)</td>
<td>18:1</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>-25...25 mbar * (-2.5...2.5 kPa)</td>
<td>2 mbar (0.2 kPa)</td>
<td>25:1</td>
<td>C-type: 200 bar (10 bar for PED version); P-type: 40 bar</td>
</tr>
<tr>
<td>10</td>
<td>-7...7 mbar ** (-700...700 Pa)</td>
<td>1 mbar (0.1 kPa)</td>
<td>14:1</td>
<td>20 bar</td>
</tr>
</tbody>
</table>

*available only in HS version; ** available only in HS version;

### Technical data

#### Metrological parameters

- **Accuracy**: ≤ 0.1% of calibrated range
- **Long term stability**: ≤ accuracy for 3 years
- **Thermal error**: ≤ 2 x accuracy for 5 years
- **Thermal compensation range**: -25...80°C

#### Operating conditions

- **Medium temperature range**: -25...120°C
- **Ex i a version**: -25...85°C
- **CAUTION**: the medium must not be allowed to freeze in the impulse line or close to the process connection of the transmitter

#### Output signal

4÷20 mA, two wire transmission

#### Load resistance

\[
R[\Omega] \leq \frac{U_{\text{out}}[V]}{7.5V} \cdot 0.0225A
\]

#### Power supply

7.5...55 VDC (Ex i a 7.5...28 VDC)

#### Response time

16...230ms (programmable)

### Casing

- SS316L, Hastelloy C276
- SS316L, Hastelloy C 276, Au

### Materials

- type P, PN process connection: SS316L
- type P(H) process connection: SS316L or Hastelloy C276
- type C process connection: SS316L

### Electrical parameters

- **Resistance required for communication**: min. 240 Ω

### Accuracy depending on the set range

\[
\text{Error} = \frac{R_0}{R_1} \cdot P_1
\]

\[
P_1 = \frac{P_0}{P_0 + R_0}
\]

**Note**: Numerical error values are given in the technical data under metrological parameters.
### Smart Differential Pressure Transmitter

#### TM-APRE 2000

**Ordering procedure**

<table>
<thead>
<tr>
<th>Model</th>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>APRE-2000</td>
<td></td>
<td>Smart differential pressure transmitter</td>
</tr>
<tr>
<td>Casing, output signal, electrical connection</td>
<td>/PD</td>
<td>Housing IP65 with DIN43650 connector, without display, output 4-20mA + Hart</td>
</tr>
<tr>
<td></td>
<td>/P2</td>
<td>304SS housing, IP66, without display, output 4-20mA + Hart</td>
</tr>
</tbody>
</table>

**Versions, certificates**

- /Exia
- /PED
- /HS
- /Telm

**more than one option is available**

- /320 bar
- /420 bar

**Nominal measuring range**

<table>
<thead>
<tr>
<th>Range</th>
<th>Min. set range</th>
</tr>
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<tr>
<td>0-70 bar</td>
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<tr>
<td>0-10 bar</td>
<td>1.6 bar (160 kPa)</td>
</tr>
<tr>
<td>0-1 bar</td>
<td>0.2 bar (20 kPa)</td>
</tr>
<tr>
<td>0-0.25 bar</td>
<td>0.1 bar (10 kPa)</td>
</tr>
<tr>
<td>-0.5 bar</td>
<td>4 mbar (0.4 kPa)</td>
</tr>
<tr>
<td>-0.1 bar</td>
<td>2 mbar (0.2 kPa)</td>
</tr>
<tr>
<td>-0.7 mbar</td>
<td>1 mbar (0.1 kPa)</td>
</tr>
</tbody>
</table>

**Measuring set range**

- [ ]/C.......Thread 1/4NPT F on the cover flanges cover flanges material SS316. Allows mounting with a valve manifold. Process connection of cover flange: M10 (option /C7/16) - 7/16"UNF acc. to IEC 61518
- /CR....C-type process connection rotated 90°
- /P......Thread M20x1,5 (male)
- /PN......Thread 1/4"NPT (female)
- /code of diaphragm seal....Diaphragm seal (see chapter of diaphragm seals) mounted on Hi side of transmitter, Lo side 1/4NPT Female

**Process connections**

- /C..............SS316L
- /CR..............Diaphragms material Hastelloy C276
- /P..............(P and /PN – all wetted parts in Hastelloy C276 on request)
- /PN..............(not available for transmitters in HS version)
- /code of diaphragm seal........Gold plated diaphragms (not available for transmitters in HS version)

**Material of diaphragms**

- (without marking)............Diaphragms material SS316L
- /H....................Diaphragms material Hastelloy C276
- /Au..............Gold plated diaphragms (not available for transmitters in HS version)

**Gasket (refers only to C, CR process connection)**

- /NBR..............NBR (for oxygen service)
- /PTFE..............PTFE

**Electrical connection**

- /UJS..............Packing gland M20x1,5
- /JUS..............Thread 1/2NPT Female

**Accessories**

- /C-2..............Mounting bracket for 2” pipe (to C process conn.), mat. zinced steel
- /C-2(SS)........Mounting bracket for 2” pipe (to C process conn.), mat. Stainless Steel
- /RI25..............Mounting bracket for 2” pipe (to P process conn.), mat. Stainless Steel
- /RedSpaw P........Connector to weld impulse pipes dia. 12 and 14 mm, material 15HM(SO) or SS316(S). Only process connection P type
- /RedSpaw C........Connector to weld impulse pipes dia. 12 and 14 mm, material 15HM. Only process connection C type.
- /Red dP 1/2"........Adapter for differential pressure transmitters with C type process connection, output thread 1/2NPT F. Material SS316L

**Other specification**

- Description of required parameters

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**Example 1:** Differential pressure transmitter, output 4...20mA + HART, version Ex ia, static pressure 320bar, nominal measuring range 0...25 mbar, calibrated range 0...16 bar, process connection C, stainless steel housing, mounting bracket for 2” pipe

**APRE-2000PZ/Exia/320bar/0...25mbar/0...16bar/C/2"**

**Example 2:** Differential pressure transmitter, output 4...20mA + HART, nominal measuring range 0...1 bar, calibrated range 0...1 bar, process connection flange diaphragm seal DN80PN40, electrical connection with DIN43650 connector.

**APRE-2000PD/0...1bar/0...1bar/S-P DN80**

**Note:** Differential pressure transmitter APRE-2000 with two diaphragm seals is offered as a model APRE-2200ALW.