SMART DIFFERENTIAL PRESSURE TRANSMITTER APR-2000ALW

- 4…20 mA output signal + HART protocol (special version: 0…20 mA or 0…5 mA output signal + HART protocol)
- Display with backlight
- SIL 2 certificate
- Intrinsic safety certificate (ATEX, IECEx)
- Explosion proof certificate (ATEX, IECEx)
- PED Conformity (97/23/EC)
- Programmable zero range, shift, characteristic and damping ratio with local panel keys
- Static pressure limit up to 700bar
- Accuracy 0,075% (0,05% on request)
- Marine certificate – DNV, BV
- Gold plated diaphragms
- Wetted parts material 316L/Hastelloy C276

Transmitter APR-2000ALW – version with **type C** process connection to be mounted together with a valve manifold

Version with process connection rotated 90°

Transmitter APR-2000ALW Version with **P type** process connection.

Transmitter APR-2000ALW Version with **PN type** process connection.

Transmitter APR-2000ALW Version with direct or remote diaphragm seal.
Application and construction

The APR-2000ALW transmitter is applicable to the measurement of differential pressure of gases, vapours and liquids. The active element is a piezoresistive 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 250/320/413/700 bar. The casing is made of aluminium alloy cast or 316SS stainless steel, degree of protection IP66/IP67. The design of the casing enables the use of a local display, rotation of the display, rotation of the casing by 0–340° relative to the sensor, and a choice of cable direction.

Communication and configuration

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

Communication with the transmitter is carried out with:
– a KAP-03, KAP-03Ex communicator
– some other Hart type communicators(*)
– a PC using an HART/USB converter and Raport 2 configuration software.


The data interchange with the transmitter enables users to:

- identify the transmitter
- configure the output parameters:
  - measurement units and the values of the start points and end points at the measurement 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 a model pressure

Installation

The transmitter with P or PN type process connection is not heavy, so can be installed without additional mounting bracket on application. For fitting in any desired position we recommend an universal Aplisens mounting bracket for 2” pipe (AL mounting bracket, see page IV/ 5). 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 (page IV/ 2). A transmitter without a valve manifold can be fitted in any position on a 2” mounting bracket (page IV/ 5). When the special process connections are required for the measurement of specific media levels 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 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</td>
<td>0...70 mbar</td>
<td>10:1</td>
<td>250…80°C</td>
</tr>
<tr>
<td>2</td>
<td>0...16 bar</td>
<td>0...16 mbar</td>
<td>10:1</td>
<td>200…60°C</td>
</tr>
<tr>
<td>3</td>
<td>0...25 bar</td>
<td>0...25 mbar</td>
<td>10:1</td>
<td>150…40°C</td>
</tr>
<tr>
<td>4</td>
<td>0...1 bar</td>
<td>0...1 mbar</td>
<td>10:1</td>
<td>100…25°C</td>
</tr>
<tr>
<td>5</td>
<td>0...2,5 bar</td>
<td>0...2,5 mbar</td>
<td>10:1</td>
<td>75…20°C</td>
</tr>
<tr>
<td>6</td>
<td>-0,5…0,5 bar</td>
<td>-0,5…0,5 mbar</td>
<td>10:1</td>
<td>50…15°C</td>
</tr>
<tr>
<td>7</td>
<td>-100…100 mbar</td>
<td>-100…100 mbar</td>
<td>10:1</td>
<td>25…7°C</td>
</tr>
<tr>
<td>8</td>
<td>-5…70 mbar</td>
<td>-5…70 mbar</td>
<td>10:1</td>
<td>10…3°C</td>
</tr>
<tr>
<td>9</td>
<td>-25…25 mbar</td>
<td>-25…25 mbar</td>
<td>10:1</td>
<td>5…1°C</td>
</tr>
<tr>
<td>10</td>
<td>-7…7 mbar</td>
<td>-7…7 mbar</td>
<td>10:1</td>
<td>2…0,5°C</td>
</tr>
</tbody>
</table>

C-type: 250 / 320 / 413 bar  (250 bar for PED version)
P-type: 40 bar (for range no. 1, 70 bar)

Technical data

Accuracy

\[ \pm 0.075\% \text{ of the calibrated range} \]

\[ \pm 0.1\% \text{ for range no. 10} \]

Special version: \[ \pm 0.05\% \text{ of the calibrated range} \]

Long term stability

\[ \pm 0.5\% \text{ accuracy for 3 years} \]

or \[ \pm 2\% \text{ accuracy for 5 years} \]

HS version: \[ \pm 0.5\% \text{ accuracy for 6 years} \]

or \[ \pm 2\% \text{ accuracy for 10 years} \]

Thermal error

\[ \pm 0.05\% \text{ (FSO) / 10°C for ranges no. 1 - 9} \]

\[ \pm 0.08\% \text{ (FSO) / 10°C for ranges no. 10} \]

max. \[ \pm 0.25\% \text{ (FSO) in the whole compensation range} \]

spec. version for ranges no 1-9:

\[ \pm 0.03\% \text{ (FSO) / 10°C} \]

max. \[ \pm 0.1\% \text{ (FSO) in the whole compensation range} \]

Thermal compensation range

-25…80°C

Zero shift error for static pressure

0,01% (FSO) / 10 bar for range no. 1, 2, 3, 4, 5, 6, 7, 9

0,03% (FSO) / 10 bar for range no. 8

0,06% (FSO) / 10 bar for range no. 1, 2

0,01% (FSO) / 10 bar for range no. 2, 8 in HS version

0,02% (FSO) / 10 bar for range no. 10

Zeroing the transmitter in conditions of static pressure can eliminate this error.

Response time

16…480ms (programmable)

Exd version: 150ms

Additional electronic damping

0…80 s

Error due to supply voltage changes

0,002% (FSO) / V
Operating conditions

Operating temperature range (ambient temp.)
-25...85°C
special version -40...85°C
Exia version -25...80°C
Exd version -25...75°C

Medium temperature range

-25...120°C
over 120°C – measurement with use an impulse line or diaphragm seals
up to 100°C - PED version
up to 100°C - version for 413bar static pressure
up to 80°C - version for 700bar static pressure

CAUTION: the medium must not be allowed to freeze in the impulse line or close to the process connection of the transmitter

Accuracy depending on the set range

\[ \rho_0 \text{ – error for range } 30...100\% \text{ FSO} \]
\[ \rho_1 \text{ – error for range } 10\% \text{ FSO} \]
\[ \rho_1 = 2 \times \rho_0 \]

Numerical error values are given in the technical data under metrological parameters
Other specification

<table>
<thead>
<tr>
<th>Model</th>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>APR-2000</td>
<td></td>
<td>Smart differential pressure transmitter</td>
</tr>
<tr>
<td>Casing, output signal</td>
<td></td>
<td>Aluminum housing, IP66 with display, output 4-20mA + Hart</td>
</tr>
<tr>
<td>/ALW</td>
<td></td>
<td>Stainless steel housing, IP66, with display, output 4-20mA + Hart</td>
</tr>
<tr>
<td>/EXia</td>
<td></td>
<td>II 1/2G Ex ia IIC T4/T5 Ga/Gb</td>
</tr>
<tr>
<td>/IDEx</td>
<td></td>
<td>II 1/2G Ex ia IIC T4/T5 Ga/Gb</td>
</tr>
<tr>
<td>/IDDx</td>
<td></td>
<td>II 1/2D Ex ia IIC T4/T5 Ga/Gb</td>
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<tr>
<td>/Exia(Da)</td>
<td></td>
<td>II 1/2D Ex ia IIC T4/T5 Ga/Gb</td>
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<tr>
<td>/Exid</td>
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<td>II 1/2D Ex ia IIC T4/T5 Ga/Gb</td>
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<tr>
<td>/Exd</td>
<td></td>
<td>II 1/2D Ex ia IIC T4/T5 Ga/Gb</td>
</tr>
<tr>
<td>/Exd(2G)</td>
<td></td>
<td>II 1/2D Ex ia IIC T4/T5 Ga/Gb</td>
</tr>
<tr>
<td>/LA</td>
<td></td>
<td>Surge arrester for Exia version</td>
</tr>
<tr>
<td>/SA</td>
<td></td>
<td>SIL F - Functional Safety certificate according to PN-EN 61508-1:2010;</td>
</tr>
<tr>
<td>/SA</td>
<td></td>
<td>European Pressure Equipment Directive N° 97/23/EC, category IV</td>
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<tr>
<td>/SIL</td>
<td></td>
<td>Ultra stable version (only ranges no. 2, 4+10)</td>
</tr>
<tr>
<td>/IC</td>
<td></td>
<td>Accuracy ( \leq 0.05%)</td>
</tr>
<tr>
<td>/MR</td>
<td></td>
<td>Marine certificate – DNV, BV</td>
</tr>
<tr>
<td>/HS</td>
<td></td>
<td>For oxygen service (sensor filled with Fluorolube fluid)</td>
</tr>
<tr>
<td>/MR/HS</td>
<td></td>
<td>Static pressure 320 bar, only for C process connection, not available in PED version</td>
</tr>
<tr>
<td>/Si</td>
<td></td>
<td>Static pressure 413 bar, only for C process connection, not available in PED version</td>
</tr>
<tr>
<td>/Si</td>
<td></td>
<td>Static pressure 700 bar, only for C process connection, not available in PED version</td>
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<tr>
<td>/MT</td>
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<td>Execution on request – please consult availability with manufacturer</td>
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<tr>
<td>/MT</td>
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<td>Protection class IP67</td>
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<tr>
<td>/MT</td>
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<td>NACE MR-01-75 certificate (process connections: C)</td>
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<tr>
<td>Nominal measuring ranges</td>
<td></td>
<td>Calibrated range in relation to 4mA and 20mA output</td>
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<tr>
<td>/0+70 bar</td>
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<td>Range</td>
</tr>
<tr>
<td>/0+16 bar</td>
<td></td>
<td>0+70 bar (0÷7000 kPa)</td>
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<tr>
<td>/0+2,5 bar</td>
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<td>0+16 bar (0÷1900 kPa)</td>
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<tr>
<td>/0+1 bar</td>
<td></td>
<td>0+2,5 bar (0÷250 kPa)</td>
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<tr>
<td>/0+0,25 bar</td>
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<td>0+1 bar (0÷100 kPa)</td>
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<tr>
<td>/0+0,05 bar</td>
<td></td>
<td>0+0,25 bar (0÷25 kPa)</td>
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<tr>
<td>/-0,1 to 0,1 bar</td>
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<td>-0,05 to 0,5 bar</td>
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<tr>
<td>/1÷50 mbar</td>
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<td>-0,1 to 0,1 bar</td>
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<tr>
<td>/1÷25 mbar</td>
<td></td>
<td>-5 to 50 mbar</td>
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<tr>
<td>/1÷7 mbar</td>
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<td>-25 to 25 mbar</td>
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<tr>
<td>Measuring set range</td>
<td></td>
<td>Min. set range</td>
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<tr>
<td>/0+70 bar</td>
<td></td>
<td>1 bar (700 kPa)</td>
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<tr>
<td>/0+16 bar</td>
<td></td>
<td>1,6 bar (160 kPa)</td>
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<tr>
<td>/0+2,5 bar</td>
<td></td>
<td>0,2 bar (20 kPa)</td>
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<td>/0+1 bar</td>
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<td>50 mbar (5 kPa)</td>
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<td>/0+0,25 bar</td>
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<td>10 mbar (1 kPa)</td>
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<td>0,1 bar (10 kPa)</td>
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<td>/-0,1 to 0,1 bar</td>
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<td>10 mbar (1 kPa)</td>
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<tr>
<td>/1÷50 mbar</td>
<td></td>
<td>4 mbar (0,4 kPa)</td>
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<tr>
<td>/1÷25 mbar</td>
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<td>2 mbar (0,2 kPa)</td>
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<tr>
<td>/1÷7 mbar</td>
<td></td>
<td>1 mbar (0,1 kPa)</td>
</tr>
<tr>
<td>Material of diaphragms</td>
<td></td>
<td>Diaphragms material SS316</td>
</tr>
<tr>
<td>(without marking)</td>
<td></td>
<td>Diaphragms material SS316</td>
</tr>
<tr>
<td>/I(H)</td>
<td></td>
<td>Diaphragms material Hastelloy C276 (all wetted parts in Hastelloy C276 on request)</td>
</tr>
<tr>
<td>/I(Au)</td>
<td></td>
<td>Gold plated diaphragms (not available for transmitters in HS version)</td>
</tr>
<tr>
<td>Gasket (refers only to C, CR, P, PN process connection)</td>
<td>(without marking)</td>
<td>FPM Viton</td>
</tr>
<tr>
<td>/NBR</td>
<td></td>
<td>(all wetted parts in Hastelloy C276 on request)</td>
</tr>
<tr>
<td>/PTFE</td>
<td></td>
<td>Gold plated diaphragms (not available for transmitters in HS version)</td>
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<tr>
<td>Electrical connection</td>
<td>(without marking)</td>
<td>Packing gland M20x1,5</td>
</tr>
<tr>
<td>/AHS</td>
<td></td>
<td>Thread 1/2NPT Female</td>
</tr>
<tr>
<td>Accessories</td>
<td></td>
<td>C-2’</td>
</tr>
<tr>
<td>/C-2’</td>
<td></td>
<td>Mounting bracket for 2&quot; pipe (to C process conn.), mat. zined steel</td>
</tr>
<tr>
<td>/C-2’(SS)</td>
<td></td>
<td>Mounting bracket for 2&quot; pipe (to C process conn.), mat. Stainless Steel</td>
</tr>
<tr>
<td>/C-2’B</td>
<td></td>
<td>Mounting bracket for 2&quot; pipe (to C process conn.), mat. Stainless Steel</td>
</tr>
<tr>
<td>/C-2’B(SS)</td>
<td></td>
<td>Mounting bracket for 1&quot; pipe (to P process conn.), mat. Stainless Steel</td>
</tr>
<tr>
<td>/P/25</td>
<td></td>
<td>Connector to weld impulse pipes dia. 12 and 14 mm, material 15HM(SO) or SS316(S)</td>
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<tr>
<td>/RedSpawP</td>
<td></td>
<td>Only process connection P type</td>
</tr>
<tr>
<td>/RedSpawC</td>
<td></td>
<td>Connector to weld impulse pipes dia. 12 and 14 mm, material 15HM. Only process connection C type.</td>
</tr>
<tr>
<td>/RedpP1/2</td>
<td></td>
<td>Adapter for differential pressure transmitters with C type process connection, output</td>
</tr>
<tr>
<td>/ST</td>
<td></td>
<td>thread 1/2NPT F. Material SS336</td>
</tr>
<tr>
<td>/MT</td>
<td></td>
<td>Stainless Steel plate fixed to the housing</td>
</tr>
<tr>
<td>Other specification</td>
<td></td>
<td>Description of required parameters (e.g. IP66/67)</td>
</tr>
</tbody>
</table>

II/ 5