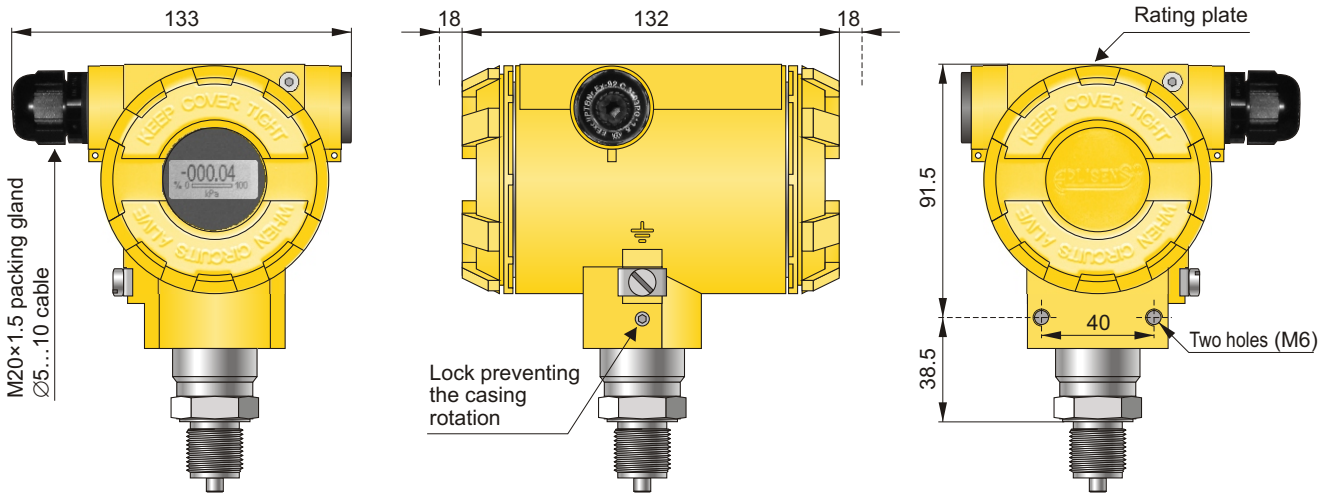


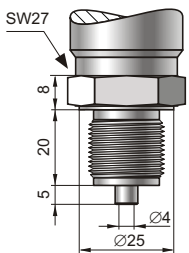
# SMART PRESSURE TRANSMITTER APCE-2000AL



- ✓ Digital PROFIBUS PA signal
- ✓ 4...20 mA, 0...20 mA or 0...5 mA output signal + HART protocol
- ✓ ATEX Intrinsic safety
- ✓ ATEX Explosion – proof
- ✓ PED Conformity (97/23/EC)
- ✓ Accuracy 0.075%
- ✓ Rangeability 100:1



## Process connections



### G1/2 type

G1/2", Ø4 hole

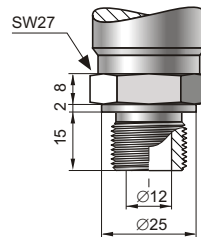
### M type

M20×1.5, Ø4 hole

Wetted parts material: 316Lss

### Application

Applicable to measurement the pressure of uncontaminated gases, vapours and liquids.



### GP type

G1/2", Ø12 hole

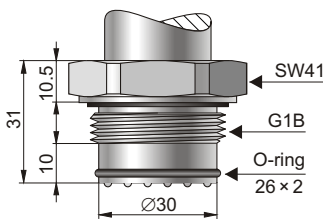
### P type

M20×1.5, Ø12 hole

Wetted parts materials: 316Lss – standard  
Hastelloy C-276

### Application

Applicable to measurement the pressure of viscous and contaminated media.  
Max. measuring range 0...70 bar.



### CG1 type

G1" with flush diaphragm

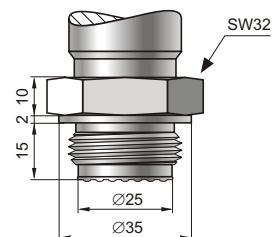
Wetted parts material:

316Lss – standard  
Hastelloy C-276

### Application

Applicable to measurement the pressure of dusty gases, and viscous or solidifying liquids at the measuring ranges from –100...100 mbar to 0...70 bar.

The transmitters with flush diagram are applied in food industry and pharmaceutical industry in aseptic systems. Using of Aplisens fitting sockets with a seal upstream the connection shank thread (see page 54) is recommended.



### CM30×2 type

M30×2 with flush diaphragm

Wetted parts material:

316Lss – standard  
Hastelloy C-276

### Application and construction

The APCE-2000AL pressure transmitter is applicable to the measurement of the pressure, underpressure and absolute pressure of gases, vapours and liquids. The active sensing element is a piezoresistant silicon sensor separated from the medium by a diaphragm and by specially selected type of manometric liquid. The casing is made of aluminium alloy cast, degree of protection IP65. The design of the casing enables the use of a local display, rotation of the display by 90°, rotation of the casing by 0–355° relative to the sensor, and a choice of cable direction.



#### Basic version APCE-2000AL

- ✓ 4...20 mA output signal + HART protocol or digital Profibus PA signal (description page 7)
- ✓ Possibilities of the adjusting both zero point and of the start and end of the measuring range according to set pressure with magnetised elements
- ✓ Possibility of locking the access to configuration changing with magnetised elements
- ✓ ATEX Intrinsic safety  $\text{Ex}$  II 1/2G EEx ia IIC T5/T6
- ✓ ATEX Explosion – proof  $\text{Ex}$  II 1/2G EEx d IIC T5



#### Digital display version APCE-2000ALE

- ✓ 4...20 mA, 0...20 mA, 0...5 mA output signal + HART protocol
- ✓ Possibilities of the of the adjusting both start and end of the measuring range according to set pressure with the display panel keys
- ✓ Configurable liquid crystal display (LCD) 3½ digits (working temperature range –40...+85°C)
- ✓ No EEx or Profibus PA



#### Graphical display version APCE-2000ALW

- ✓ 4...20 mA output signal + HART protocol or digital Profibus PA signal (description page 7)
- ✓ Possibilities of the adjusting both zero point and of the start and end of the measuring range according to set pressure with the magnetized elements
- ✓ Configurable graphical display 5 digits with illumination (working temperature range –40...+85°C)
- ✓ ATEX Intrinsic safety  $\text{Ex}$  II 1/2G EEx ia IIC T5/T6
- ✓ ATEX Explosion – proof  $\text{Ex}$  II 1/2G EEx d IIC T5

- The working mode configuration enables the user:
- ◆ digital reading of the pressure acting on the sensing element;
  - ◆ reading of the output current in % or in the user's units (taking into account the configuration, i.e. range, damping and conversion characteristic);
  - ◆ rotation of displayed characters by 180°;
  - ◆ positive or negative display.

### 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-02 communicator,
- some other Hart type communicators,
- a PC using an RS-Hart converter and RAPORT-01 configuration software. Along with the RAPORT-01, the SECTIONAL LINEARIZATION software is supplied. The software enables leading of the 21-point, non-linear user's characteristic into the transmitter.

The data interchange with the transmitter enables the users to:

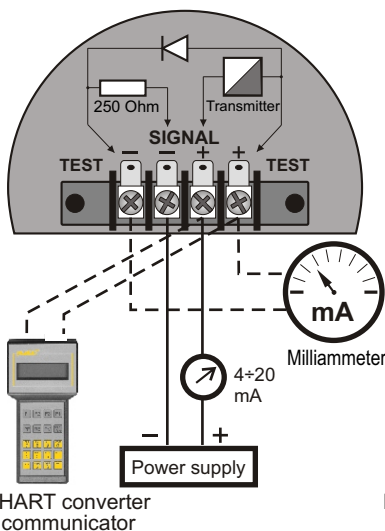
- ◆ identify the transmitter;
- ◆ configure the output parameters:
  - measurement units and the values of the start points and end points at the measurement range;
  - damping time constant;
  - conversion characteristic (inversion, user's non-linear characteristic);
- ◆ read the currently measured 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

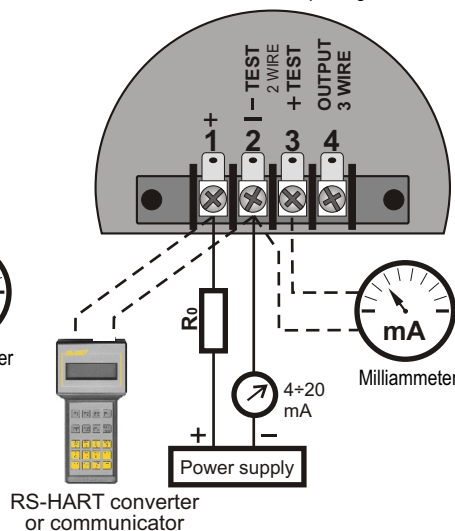
The transmitter is not heavy, so it can be installed directly on the installation. An universal mounting bracket is provided to transmitter fitting on 2" pipe (the AL mounting bracket, see page 55). When the pressure of steam or other hot media is measured, a siphon or impulse line should be used. The needle valve placed upstream the transmitter simplifies installation process and enables the zero point adjustment or the transmitter replacement. When the special process connections are required for the measurement of levels and pressures (e.g. at food and chemical industries), the transmitter is provided with an Aplisens diaphragm seal. Installing accessories and a full scope of diaphragm seals are described in detail in the further part of the catalogue. The transmitter's electrical connections should be performed with twisted cable. The place for the communicator should be assigned before the communicator installation.

## Electrical diagrams for transmitters with HART protocol

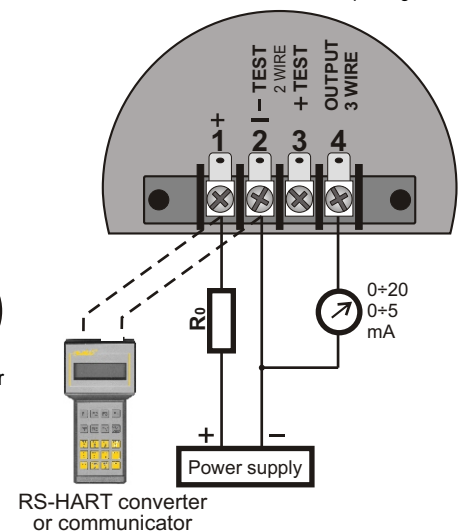
Version: **APCE-2000AL**  
**APCE-2000ALW**



Version: **APCE-2000ALE**  
with 4...20mA output signal



Version: **APCE-2000ALE**  
with 0...5 or 0...20mA output signal



## Measuring ranges

No.	Nominal measuring range (FSO)	Minimum set range	Rangeability	Overpressure limit (without hysteresis)
1	0..300 bar (0..30 MPa)	3 bar (300 kPa)	100:1	450 bar (45 MPa)
2	0..70 bar (0..7 MPa)	0.7 bar (70 kPa)	100:1	140 bar (14 MPa)
3	0..25 bar (0..2.5 MPa)	0.25 bar (25 kPa)	100:1	50 bar (5 MPa)
4	0..7 bar (0..0.7 MPa)	0.07 bar (7 kPa)	100:1	14 bar (1.4 MPa)
5	-1..1.5 bar (-100...150 kPa)	120 mbar (12 kPa)	20:1	4 bar (400 kPa)
6	0..2 bar (0..200 kPa)	100 mbar (10 kPa)	20:1	4 bar (400 kPa)
7	0..1 bar (0..100 kPa)	50 mbar (5 kPa)	20:1	2 bar (200 kPa)
8	-0.5..0.5 bar (-50...50 kPa)	50 mbar (5 kPa)	20:1	2 bar (200 kPa)
9	0..0.25 bar (0..25 kPa)	25 mbar (2.5 kPa)	10:1	1 bar (100 kPa)
10	-100...100 mbar (-10...10 kPa)	20 mbar (2 kPa)	10:1	1 bar (100 kPa)
11	-15...70 mbar* (-1.5...7 kPa)	5 mbar (0.5 kPa)	17:1	0.5 bar (50 kPa)
12	-7...7 mbar* (-0.7...0.7 kPa)	1 mbar (0.1 kPa)	14:1	0.5 bar (50 kPa)
13	0...1.1 bar abs (0...110 kPa abs)	50 mbar abs (5 kPa abs)	22:1	2 bar (200 kPa)
14	0...7 bar abs (0...7 MPa abs)	0.07 bar abs (7 kPa abs)	100:1	14 bar (1.4 MPa)
15	0...25 bar abs (0...2.5 MPa abs)	0.25 bar abs (25 kPa abs)	100:1	50 bar (5 MPa)
16	0...70 bar abs (0...7 MPa abs)	0.7 bar abs (70 kPa abs)	100:1	140 bar (14 MPa)

\* only for transmitters without diaphragm seal

## Technical data

### Metrological parameters

<b>Accuracy</b>	$\leq \pm 0.075\%$ of the calibrated range (0.16% for range 12)
<b>Long-term stability</b> (for the nominal measuring range)	$\leq$ accuracy for 3 years
<b>Thermal error</b>	$< \pm 0.08\%$ (FSO) / $10^\circ\text{C}$ (0.1% for ranges 10, 11, 12) max. $\pm 0.25\%$ (FSO) in the whole compensation range (0.4% for ranges 10, 11, 12)
<b>Thermal compensation range</b>	$-25...80^\circ\text{C}$ ( $-5...65^\circ\text{C}$ for range 12) $-40...80^\circ\text{C}$ – special version
<b>Time Constant</b>	300 ms
<b>Additional electronic damping</b>	0...30 s
<b>Error due to supply voltage changes</b>	0.002% (FSO) / V

### Electrical parameters

<b>Power supply</b>	10.5...36 V DC (Ex 12...28 V)
<b>Additional voltage drop when display illumination switched on</b>	3 V
<b>Output signal</b>	4...20 mA, two wire transmission APCE-2000ALE: 4...20, 0...20 or 0...5 mA
<b>Load resistance</b>	$R[\Omega] = \frac{U_{\text{sup}}[\text{V}] - 10.5 \text{ V}^*}{0.02 \text{ A}} \cdot 0.85$
* – 13.5 V when display illumination switched on	
<b>Resistance required for communication</b>	250...1100 $\Omega$

### Materials

<b>Wetted parts and diaphragms</b>	00H17N14M2 (316Lss)
<b>Casing</b>	Aluminium

### Operating conditions

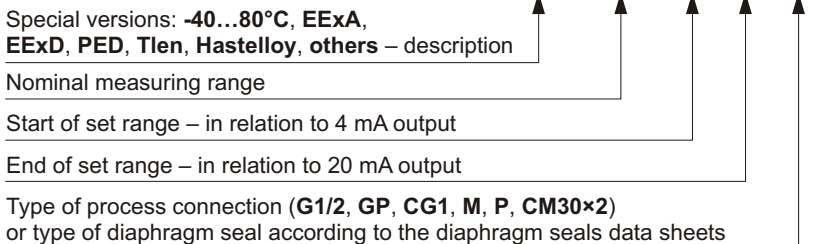
<b>Operating temperature range (ambient temp.)</b>	$-40...85^\circ\text{C}$ Ex version $-40...65^\circ\text{C}$
<b>Medium temperature range</b>	$-40...120^\circ\text{C}$ over $120^\circ\text{C}$ – measurement with the use of impulse line or diaphragm seals
CAUTION: the medium must not be allowed to freeze in the impulse line or close to the process connection of the transmitter	

### Special versions, certificates

- ◇ Extended compensation range  $-40...80^\circ\text{C}$
- ◇ **EExA** – ATEX Intrinsic safety (AL and ALW only)
- ◇ **EExD** – ATEX Explosion proof (AL and ALW only)
- ◇ **PED** – European Pressure Equipment Directive N° 97/23/EC
- ◇ **Tlen** – transmitter designed to measure of oxygen (only type G1/2 or M process connection)
- ◇ **Hastelloy** – wetted parts made of Hastelloy C 276 (only type GP, P, CG1" and CM30x2 process connection)
- ◇ **0...100bar** – Nominal measuring range 0...100 bar
- ◇ **Others**

## Ordering procedure

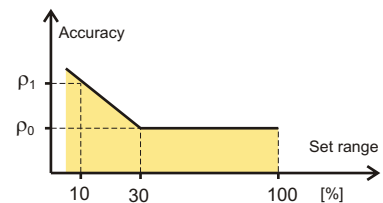
APCE-2000AL /  
APCE-2000ALE /  
APCE-2000ALW /



**Example:** APCE-2000ALW transmitter/ EExA version/ nominal measuring range 0 ÷ 7 bar / cal.range 0 ÷ 6 bar / process connection M20x1.5  $\varnothing$ 12

**APCE-2000ALW / EExA / 0 ÷ 7 bar / 0 ÷ 6 bar / P**

## Accuracy depending on the set range



$\rho_0$  – error for nominal measuring range (0...100% FSO)

$\rho_1$  – error for range 0...10% FSO

$\rho_1 = 2 \times \rho_0$

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

## SMART PRESSURE TRANSMITTER APCE-2000AL/Profibus PA

### Application and construction

The APCE-2000AL pressure transmitter is intended for the measurement of the pressure, underpressure and overpressure of gases, vapours and liquids. The active sensing element is a piezoresistant silicon sensor separated from the medium by a diaphragm and by specially selected type of manometric liquid.

The transmitter electronic system performs the digital processing of measurement and generates the output signal with the communication module according to Profibus PA standard. The transmitter function performance bases on profile 3.0 of Profibus PA standard.

The casing is made of high-pressure casting of aluminium alloy, IP-65 rated. The casing design allows using a local liquid crystal graphical display, 90° turn of display, 0–355° turn of casing relative to the sensor, and the choice of direction at cable insertion.

The APCE-2000AL/Profibus Pa transmitter is produced with process connections described on page 54 or, optionally, with Aplisens diaphragm seal.

The measuring ranges, according to the table, page 6.

### Communication

The communication with the transmitter is achieved in two ways:

- ◇ cyclic – the transmitter sends primary measured value (4 bytes IEEE754) and status containing the information on the current state of transmitter and measurement validity (1 byte);
- ◇ acyclic – this way of communication is used to device configuration and to read both primary measured value and the status.

### Configuration

Full configuration of transmitter settings, adjustment of the display mode, transmitter zeroing and calibration in relation to pressure standards proceeds with the PDM (Process Device Manager) software, by Siemens. The EED program library, worked out by Aplisens for cooperation with this transmitter, is helpful in the configuration.

Other commercial configuration software (e.g. Commuwin by Endress and Hauser, DTM/FDT tools) make transmitter configuration possible in the range of basic commands.

Enclosed to APCE-2000AL/Profibus PA is GSD file comprising the description of the transmitter basic properties such as transmission rate, type and format of input data, list of additional functions. GSD file is necessary for the software serving as a device for network configuration and makes the correct connection the appliance to Profibus network possible. The universal file GSD, designed for standard pressure transmitters made according to profile at revision 3 Profibus standard, may also be applicable to APCE-2000AL/Profibus PA.

The pressure transmitter APCE-2000AL/Profibus PA does not have the hardware address switch. This address may be adjusted with accessible configuration software.

### Measurements in the areas under explosion hazard

For pressure measurements in the areas under explosion hazard the Atex intrinsically safe transmitters  $\text{Ex}$  II 1/2G EEx and IIB/T5 are available.

### Technical data

Metrological parameters, materials of process connection, diaphragms and casing, and operating conditions – see the description, page 6.

#### Electrical parameters

**Power supply (from DP/PA coupler)** 11 + 28 V DC  
12.05 + 28 V DC – when display illumination switched on  
15 V DC – EEx version

**Current consumption** 14 mA

#### Output parameters

**Output signal** Digital communication signal Profibus – PA (according to EN 50170)

**PA function** slave

**Physical layer** IEC61158-2

**Transmission rate** 31.25 kBit/s

### Ordering procedure

APCE-2000AL/Profibus PA / / / ÷ /

Special versions: **EEx, PED, Tlen, Hastelloy, others** – description

**W** – casing with display

Nominal measuring range

Type of process connection (**G1/2, GP, CG1, M, P, CM30×2**) or type of diaphragm seal according to the diaphragm seals data sheets

**Example:** APCE-2000AL transmitter / Profibus PA / display / nominal measuring range 0÷300bar / process connection G1/2" Ø4

**APCE-2000AL/Profibus PA / W / 0 ÷ 300 bar / G1/2**

### Electrical diagram

