SMART PRESSURE TRANSMITTER APCE-2000

HART COMMUNICATION PROTOCOL

- ✓ **4…20 mA output signal + HART protocol**
- ✓ **ATEX Intrinsic safety**
- ✓ **Accuracy 0.1%**
- ✓ **Rangeability 100:1**

Application

The APCE-2000 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.

APCE-2000PD

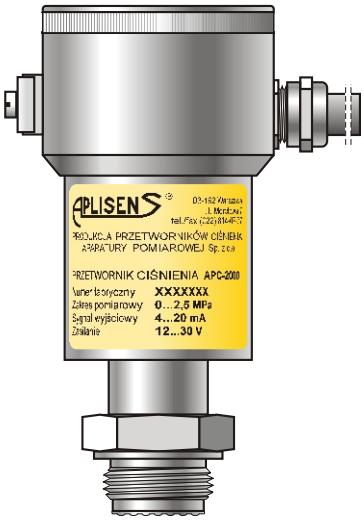
PD version

Economical version:

- housing 304ss
- protection Ip65
- electrical connection DIN 43650
- the electronics encased in a protective silicon gel
- ATEX Intrinsic safety

II 1/2G Ex ia IIC T4/T5/T6
Ga/Gb Exia IIC T4/T5/T6
I M1 Ex ia I

APCE-2000PZ

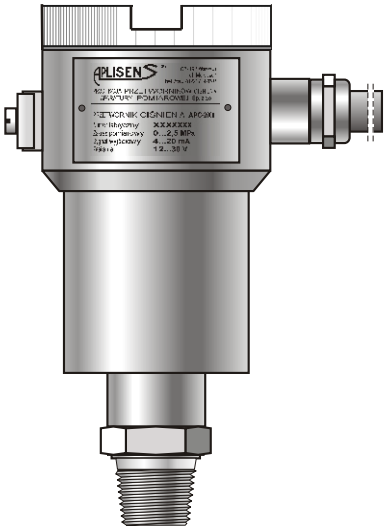


PZ version

Version designed to work in hard conditions:

- housing 304ss
- protection IP66
- the electronics encased in a protective silicon gel
- cup with knurled handgrip
- ATEX Intrinsic safety

II 1/2G Ex ia IIC T4/T5/T6
Ga/Gb Exia IIC T4/T5/T6
I M1 Ex ia I



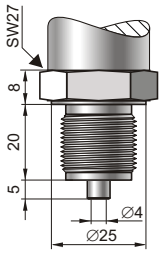
PZ316 version

Version designed to work in extremely hard conditions:

- housing 316ss, fully welded
- stainless steel tag fixed to the body
- protection IP66
- the electronics encased in a protective silicone gel
- cap with knurled handgrip and slot
- ATEX Intrinsic safety

II 1/2G Ex ia IIC T4/T5/T6
Ga/Gb Exia IIC T4/T5/T6
I M1 Ex ia I

Process connections



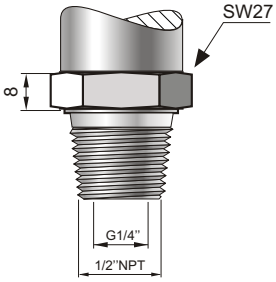
G1/2 type
G1/2″, ∅4 hole

M type
M20×1.5, ∅4 hole

Wetted parts material: **316Lss**

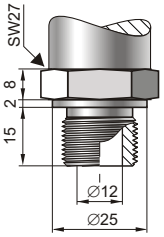
Application

Applicable to measurement the pressure of uncontaminated gases, vapours and liquids at any measuring ranges.



1/2”NPT type
1/2”NPT, internal thread G1/4”

Wetted parts materials:
316Lss – standard
Max. range 1000 bar



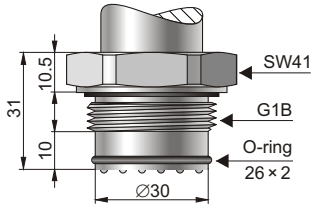
GP type
G1/2″, ∅12 hole

P type
M20×1.5, ∅12 hole

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

Application

Applicable to measurement the pressure of viscous and contaminated media.

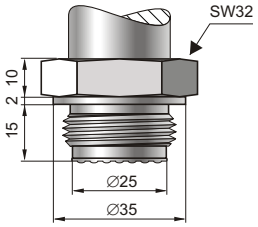


CG1 type
G1″ with flush diaphragm
Wetted parts material: **316Lss**

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 diaphragm are applied in food industry and pharmaceutical industry in aseptic systems. Using of Aplisens fitting sockets with a seal upstream the process connection (see page 64) is recommended.



CM30×2 type
M30×2 with flush diaphragm
Wetted parts materials: **316Lss – standard**
Hastelloy C-276

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 communicator,
- ◊ some other Hart type communicators,
- ◊ a PC using an RS-HART converter and RAPORT-01 configuration software.

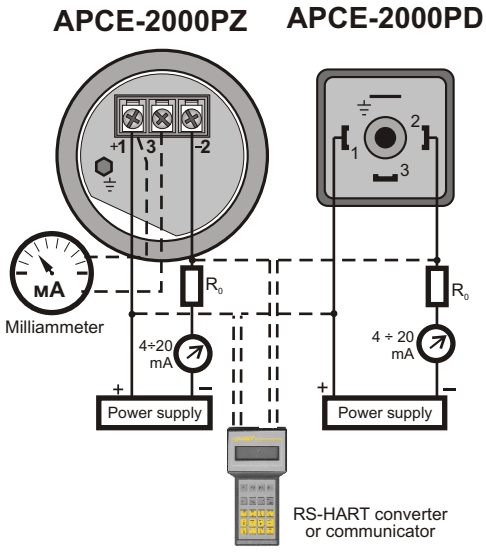
Along with the RAPORT-01, the SECTIONAL LINEARIZATION software is supplied. The software enables leading of the 21-point, non-linear user’s characteristic into the transmitter.

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 on the installation. 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 diagram



Measuring ranges

No.	Nominal measuring range (FSO)		Minimum set range		Rangeability	Overpressure limit (without hysteresis)**	
1	0…1000 bar	(0..100 MPa)	10 bar	(1MPa)	100:1	1200 bar	(120 MPa)
2	0..300 bar	(0..30 MPa)	3 bar	(300 kPa)	100:1	450 bar	(45 MPa)
3	0..160 bar	(0..16 MPa)	1,6 bar	(160 kPa)	100:1	450 bar	(45 MPa)
4	0...70 bar	(0...7 MPa)	0.7 bar	(70 kPa)	100:1	140 bar	(14 MPa)
5	0...25 bar	(0...2.5 MPa)	0.25 bar	(25 kPa)	100:1	50 bar	(5 MPa)
6	0...7 bar	(0...0.7 MPa)	0.07 bar	(7 kPa)	100:1	14 bar	(1.4 MPa)
7	-1...6 bar	(-100...600kPa)	300mbar	(30 kPa)	23:1	14 bar	(1.4 MPa)
8	0...2 bar	(0...200 kPa)	100 mbar	(10 kPa)	20:1	4 bar	(400 kPa)
9	0...1 bar	(0...100 kPa)	50 mbar	(5 kPa)	20:1	2 bar	(200 kPa)
10	-0.5...0.5 bar	(-50...50 kPa)	50 mbar	(5 kPa)	20:1	2 bar	(200 kPa)
11	0...0.25 bar	(0...25 kPa)	25 mbar	(2.5 kPa)	10:1	1 bar	(100 kPa)
12	-100...100 mbar*	(-10...10 kPa)	20 mbar	(2 kPa)	10:1	1 bar	(100 kPa)
13	-15...70 mbar*	(-1.5...7 kPa)	5 mbar	(0.5 kPa)	17:1	0.5 bar	(50 kPa)
14	-7...7 mbar*	(-0.7...0.7 kPa)	1 mbar	(0.1 kPa)	14:1	0.5 bar	(50 kPa)
15	0...1.3 bar abs	(0...130 kPa abs)	50 mbar abs	(5 kPa abs)	26:1	2 bar	(200 kPa)
16	0...7 bar abs	(0...7 MPa abs)	0.07 bar abs	(7 kPa abs)	100:1	14 bar	(1.4 MPa)
17	0...25 bar abs	(0...2.5 MPa abs)	0.25 bar abs	(25 kPa abs)	100:1	50 bar	(5 MPa)
18	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

**overpressure limit can be different for version according to PED norm N° 97/23/EC

Technical data

Metrological parameters

Accuracy ≤ ±0.1% of calibrated range (0,25% for range 14)

Long-term stability (for the basic range) ≤ accuracy for 3 years

Thermal error < ±0.08% (FSO) / 10°C (0.1% for ranges 12, 13, 14)
max. ±0.25% (FSO) in the whole compensation range (0.4% for ranges 12, 13, 14)

Thermal compensation range -25...80°C
(-5...65°C for range 14)
-40...80°C – special version

Time Constant 300 ms

Additional electronic damping 0...60 s

Error due to supply voltage changes 0.002% (FSO) / V

Electrical parameters

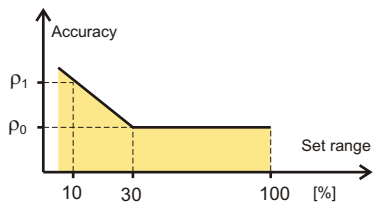
Power supply 10.5...36 V DC (EEx 12...28 V)

Output signal 4...20 mA, two wire transmission

Load resistance $R[\Omega] \le \frac{U_{sup}[V] - 10.5\,V}{0.02\,A} \cdot 0.85$

Resistance required for communication 240...1100 Ω

Accuracy depending on the set range



ρ_0 – error for nominal measuring range (0...100% FSO)

ρ_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

Materials

Wetted parts and diaphragms: 316Lss or Hastelloy C 276

Casing: 304ss

Optional: 316ss

Operating conditions

Operating temperature range (ambient temp.) -40...85°C

EEx version -40…65°C

Medium temperature range -40...120°C

over 120°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°C**

◊ Extended compensation range **-60...50°C**

◊ **EExA** – ATEX Intrinsic safety

◊ **PED** – European Pressure Equipment Directive N° 97/23/EC, category IV (max. pressure 400bar)

◊ **TIen** – 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 and CM30×2 process connection) without ranges 13 and 14.

◊ **316SS** – housing material: 316ss

◊ **Others**

Ordering Procedure

Model	Code	Description
APCE-2000		Smart pressure transmitter.
⇒ Casing, output signal, electrical connection	PD……	Housing IP65 with DIN43650 connector, without display, output 4–20mA +Hart.
	PZ……	304SS housing, IP66, without display, output 4 –20mA + Hart packing gland M20x1,5
	PZ/316ss……	316SS housing, IP66, without display, output 4- 20mA + Hart
Versions, certificates*	/EExia……	Ex II 1/2G Exia IIC T4/T5/T6, IIGa/Gb Exia IIC T4/T5/T6 and I M1 Exia I
	/TIen……	For oxygen service (sensor filled with Fluorolube flui d, only M and G1/2 Process connection)
	/-60…+50C……	Extended thermal compensation range -60 - 50°C
*) more than one option is available	/-40…+80C……	Extended thermal compensation range -40 - 80°C

Nominal measuring range	Range	Min. set range
/0÷1000bar……	0÷1000bar (0÷100MPa)	10bar (1MPa)
/0÷300bar……	0÷300bar (0÷30MPa)	3bar (300kPa)
/0÷160bar**……	0÷160bar (0÷16MPa)	1,6 bar (160kPa)
/0÷70bar……	0÷70bar (0÷7MPa)	0,7bar (70kPa)
/0÷25bar……	0÷.25bar (0÷2,5MPa)	0,25bar (25kPa)
/0÷7bar……	0÷7bar (0÷700KPa)	0,07bar(7kPa)
/0÷2bar……	0÷2bar (0÷200kPa)	100mbar (10kPa)
/0÷1bar……	0÷1bar (0÷100kPa)	50mbar (5kPa)
/0÷0,25bar……	0÷0,25bar (0÷25kPa)	25mbar (2,5kPa)
/-0.5÷ +0.5bar……	-0,5÷0,5bar (-50÷50kPa)	50mbar (5kPa)
/-1÷6bar……	-1÷6bar (-100÷600kPa)	300mbar (30kPa)
/-100÷100mbar……	-100÷100mbar (-10÷10kPa)	20mbar (2kPa)
/-15÷70mbar……	-15÷70mbar (-1,5÷70kPa)	5mbar (0,5kPa)
/-7÷7mbar……	-7÷7bar (-0,7÷0,7kPa)	1mbar (0,1kPa)
/0÷1.3bar ABS……	0÷1.3bar absolute pressure (0÷110kPa abs)	50mbar abs (5kPa abs)
/0÷7barABS……	0÷7bar absolute pressure (0÷700kPa abs)	0,07bar abs (7kPa abs)
/0÷25barABS……	0÷25bar absolute pressure (0÷2.5MPa abs)	0,25bar abs (25kPa abs)
/0÷70bar ABS……	0÷70bar absolute pressure (0÷7MPa abs)	0,7bar abs (70kPa abs)

**) non-standard ranges available on request

Measuring set range	/…÷... [required units]	Start and end of calibrated range in relation to 4mA and 20mA output
⇒ Process connections	/M……	Thread M20x1,5 (male) with Ø4hole, wetted parts SS316L
	/G1/2……	Thread G1/2" with Ø4hole , wetted parts SS316L
	/P……	Thread M20x1,5 (male) with Ø12hole, wetted parts SS316L
	/P (Hastelloy)……	Thread M20x1,5 (male) with Ø12hole, wetted parts Hastelloy C 276
	/GP……	Thread G1/2" (male) with Ø4hole , wetted parts SS316L
	/GP (Hastelloy)……	Thread G1/2" (male) with Ø4hole , wetted parts Hastelloy C 276
	/CM30x2……	Thread M30x2 with flush diaphragm, wetted parts SS316L
	/CM30x2 (Hastelloy)……	Thread M30x2 with flush diaphragm, wetted parts Hastelloy C 276
	/CG1"……	Thread G1" with flush diaphragm, wetted parts SS316L
	/CG1/2"……	Thread G1/2" with flush diaphragm, wetted parts SS316L
	/1/2"NPT M……	Thread M20x1,5 with adapter to ½"NPT Male, wetted parts SS316L
	/1/2"NPT F……	Thread M20x1,5 with adapter to ½"NPT Female, wetted parts SS316L
	/code of diaphragm seal……	Diaphragm seal (see chapter of diaphragm seals)
Other specification	/……	Description of required parameters e.g. non-standard process connection G3/4" or M22x1.5
The most typical specification is marked by "⇒" mark.		

Example : Pressure transmitter , output 4..20mA + HART, version EExia, nominal measuring range 0..7bar, calibrated range 0..6bar, process connection M20x1,5, electrical connection DIN43650 connector.

APCE-2000PD/EExia/0..7bar/0..6bar/M