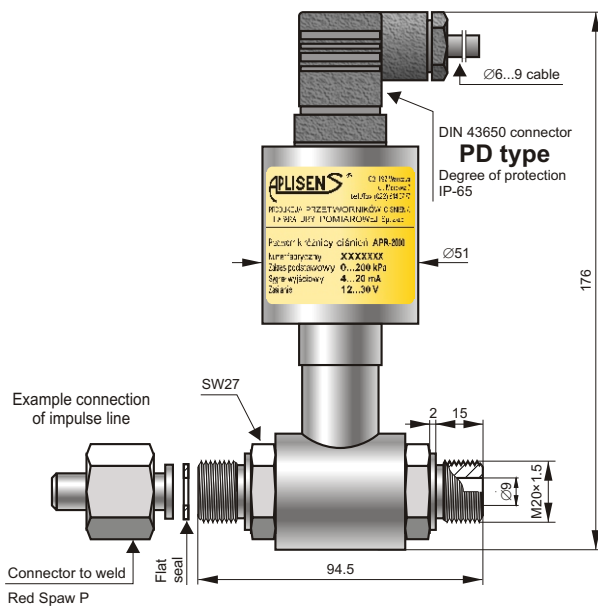


SMART DIFFERENTIAL PRESSURE TRANSMITTER APRE-2000



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



Transmitter APRE-2000PD
Version with **P type** process connection.
Static pressure limit **40 bar**

Application and construction

The APRE-2000 transmitter is applicable to the measurement of differential pressure of gases, vapours 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 420bar. 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.

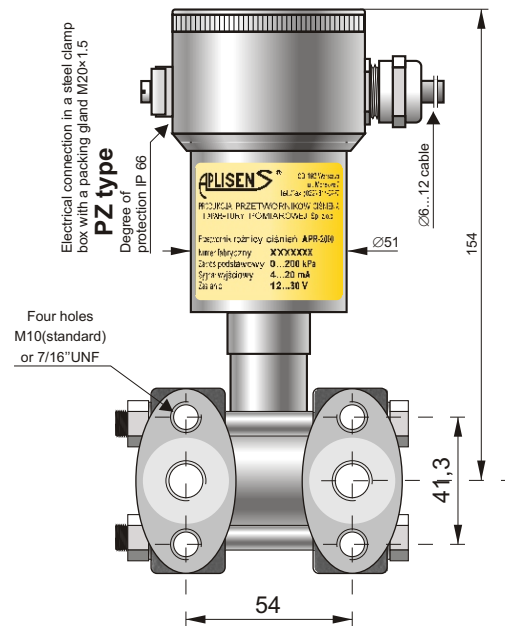
Communication with the transmitter is carried out with:

- ◆ a KAP-03 communicator,
- ◆ some other HART type communicators, (*)
- ◆ a PC with the RS-HART converter and Aplsens RAPORT-02 configuration software.

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

The data interchange with the transmitter enables the user to:

- ◆ identify the transmitter;
- ◆ configure the output parameters:
 - measurement units and values of the start and end-points of the measuring range;



Transmitter APRE-2000PZ – version with **type C** process connection to mount together with a valve manifold
Static pressure limit **250,320 or 420bar**

- 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.

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 Ø25 pipe an Aplsens mounting bracket (**Fi 25 mounting bracket**, see page 65) 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 62). 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 65).

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 Aplsens diaphragm seal. Sets of differential pressure transmitters with diaphragm seals are described in detail presented in the further part of the catalogue.

Measuring ranges

No.	Nominal measuring range(FSO)	Minimum set range	Rengeability	Overpressure limit/ static pressure limit
1	0...16 bar (0...1,6Mpa)	1,6 bar (160kPa)	10:1	250 bar / (320 or 420 bar option) (40 bar for P type Process connection) (250 bar for PED version)
2	0...2 bar (0...200kPa)	0,2 bar (200kPa)	10:1	
3	0...1 bar (0...100kPa)	70mbar (7kPa)	14:1	
4	0...0,25 bar (0...25 kPa)	10mbar (1kPa)	25:1	
5	-100...100 mbar (10...10kPa)	4mbar (0,4kPa)	50:1	
6	-5...70mbar (-0,5...7kPa)	4mbar (0,4kPa)	18:1	
7	-0,5...0,5 bar (-50...50kPa)	0,1 bar (10kPa)	10:1	
8	-20...20 mbar (-2...2kPa)	2 mbar (0,2kPa)	20:1	20bar (2MPa)

Technical data

Metrological parameters

Accuracy	≤ ±0.1% of calibrated range
Long term stability (for the nominal measuring range)	≤ accuracy for 3 years
Thermal error	≤ ±0.08% (FSO) / 10°C max. ±0.3% (FSO) in the whole compensation temperature range
Thermal compensation range	-25...80°C
Zero shift error for static pressure	
0.01% (FSO) / 10 bar for range 3, 4	
0.03% (FSO) / 10 bar for range 5, 6	
0.08% (FSO) / 10 bar for ranges 1, 2, 7, 8	
Zeroing the transmitter in conditions of static pressure can eliminate this error.	
Time Constant	500 ms
Additional electronic damping	0...30 s
Error due to supply voltage changes	0.002% (FSO) / V

Electrical parameters

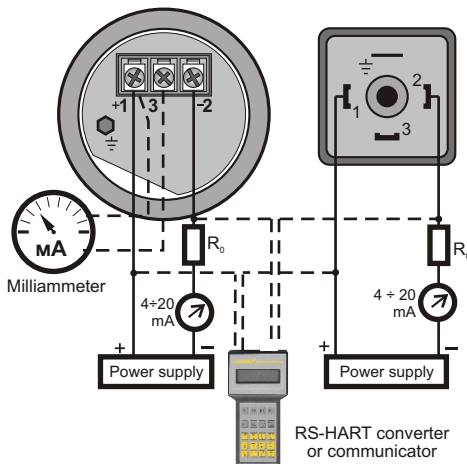
Power supply	10.5...36 V DC (EEx 12...28 V)
Additional voltage drop when display illumination switched on	3V
Output signal	4...20 mA, two wire transmission

$$\text{Load resistance } R[\Omega] \leq \frac{U_{\text{sup}}[V] - 10.5V}{0,02A} \cdot 0.85$$

Resistance required for communication 250...1100 Ω

Electrical diagram

APRE-2000PZ APRE-2000PD



Materials

Wetted parts: type P process connection	316Lss
type C process connection	316ss
Diaphragms:	Hastelloy C 276, Au
Casing:	304ss
Option:	316ss

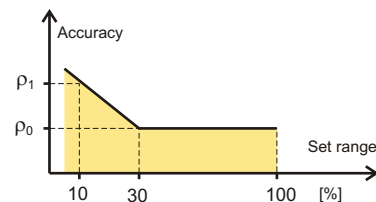
Operating conditions

Operating temperature range (ambient temp.)	-25...85°C
	EEx version -25...65°C
Medium temperature range	-25...120°C
	over 120°C – measurement with the use of impulse line or diaphragm seals
	up to 100°C PED version
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

- ◇ **Ex ia** – Atex Intrinsic safety
- ◇ **PED** – European Pressure Equipment Directive N° 97/23/EC
- ◇ **320 bar** - static pressure limit: 320 bar (not for PED version)
- ◇ **420 bar** - static pressure limit: 420 bar (not for PED version)
- ◇ **Tlen** – transmitter designed for oxygen
- ◇ **Special range:** -1,6...2bar
-1,6...16bar
- ◇ **Thermal compensation** from -40°C
- ◇ **PZ/316ss** – casing material 316ss (only version PZ)
- ◇ **Au** – gold plated diaphragm, only C type connection (range no. 4)
- ◇ **Others**

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

Ordering procedure

Model	Code	Description	
APRE-2000		Smart differential 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 packing gland M20x1,5	
Versions, certificates* *) more than one option is available	/EExia.....	II 1/2G Ga/Gb Ex ia IIC T4/T5/T6 I M1 Ex ia I II 1D Ex iaD 20 T110°C	
	/Tlen.....	For oxygen service (sensor filled with Fluorolube fluid)	
	/320bar.....	Static pressure 320bar /only for C process connection, standard is 250bar/, option not available in PED version.	
	/420bar.....	Static pressure 420bar /option not available in PED version/.	
	/PED.....	European Pressure Equipment Directive N° 97/23/EC, category IV	
Nominal measuring range		Range	
		min set range	
	/0÷16bar.....	0÷16bar (0÷1600kPa)	1,6bar (160kPa)
	/0÷2bar.....	0÷2bar (0÷200kPa)	0,2bar (20kPa)
	/0÷1bar.....	0÷1bar (0÷100kPa)	70mbar (7kPa)
	/0÷0,25bar.....	0÷.0,25bar (0÷25kPa)	10mbar (1kPa)
	/-0,5÷ +0,5bar.....	-0,5÷0,5bar (-50÷50kPa)	0.1bar (10kPa)
	/-0,1÷ +0,1bar.....	-0,1÷0,1bar (-10÷10kPa)	4mbar (0.4kPa)
/-5÷70mbar.....	-5÷70mbar (-1.5÷70kPa)	4mbar (0.4kPa)	
/-25÷25mbar.....	-25÷25mbar(-2,5÷2,5kPa)	2,5mbar (0.25kPa)	
Measuring set range	/...÷... [required units]	Start and end of calibrated range in relation to 4mA and 20mA output	
Process connections	⇒ /C.....	Thread 1/4NPT F on the cover flanges, diaphragms material Hastelloy C 276, cover flanges material SS316L. Allows mounting with a valve manifold.	
	/C(Au).....	Thread 1/4NPT F on the cover flanges, gold plated diaphragm, cover flanges material SS316. Available with range no.4 Allows mounting with a valve manifold.	
	/P.....	Thread M20x1,5 (male) with Ø9hole, diaphragms material Hastelloy C 276, wetted parts SS316L	
	/code of diaphragm seal.....	Diaphragm seal (see chapter of diaphragm seals) mounted on Hi side of transmitter, Lo side 1/4NPT F emale	
Gaskets (only in C process connection)	⇒ (without marking).....	FPM Viton	
	NBR.....	NBR (for oxygen service)	
Accessories** **) more than one option is available	⇒ /C-2".....	Mounting bracket for 2" pipe (to C process conn.), material zinced steel	
	/C-2"(SS).....	Mounting bracket for 2" pipe (to C process conn.), material stainless steel	
	/FI25.....	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 SS 316(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 d/P ½".....	Adapter for differential pressure transmitters with C type process connection, output thread 1/2NPT F. Material 316 LSS	
Other specification	/.....	Description of required parameters	

The most typical specification is marked by "⇒" mark.

Example 1: Differential pressure transmitter, output 4..20mA + HART, version EExia, static pressure 320bar, nominal measuring range 0..1.6bar, calibrated range 0..1,6bar, process connection C, stainless steel housing, mounting bracket for 2" pipe

APRE-2000PZ/EExia/320bar/0..2bar/0..1,6bar/C/C-2"

Example 3: Differential pressure transmitter, output 4..20mA + HART, nominal measuring range 0..1bar, calibrated range 0..1bar, 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 APR-2200ALW (see page 38).