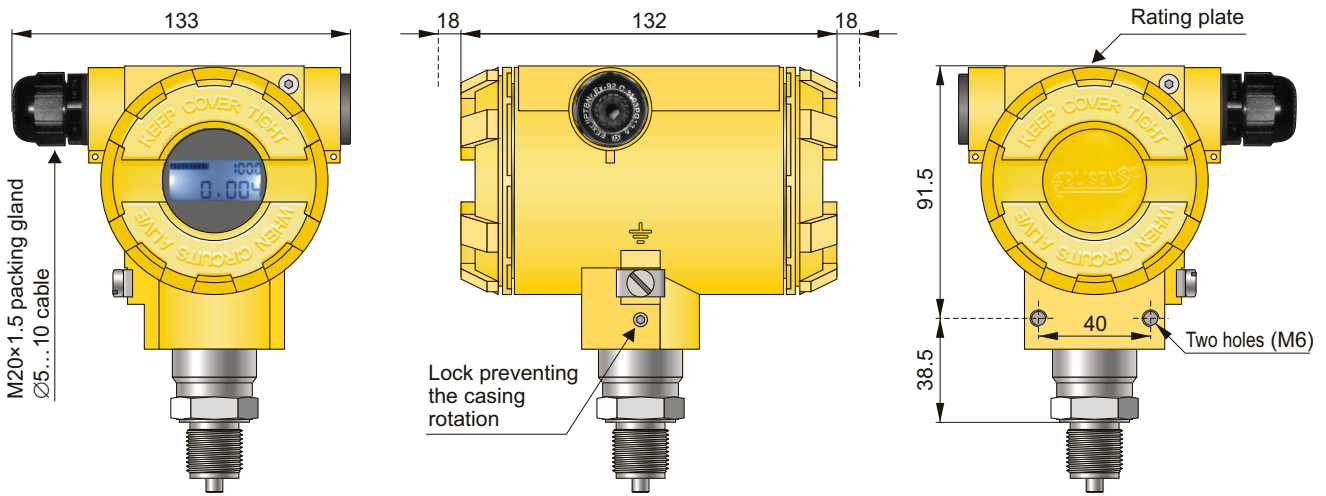


# SMART PRESSURE TRANSMITTER APC-2000ALW

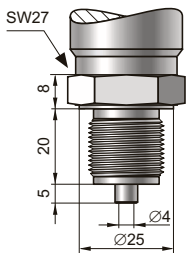
**Model  
2008**



- ✓ Digital PROFIBUS PA signal
- ✓ Programable range, zero shift, characteristic and damping ratio with local panel keys
- ✓ 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

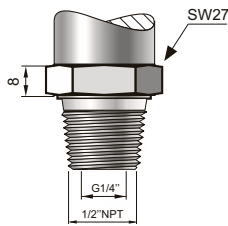


## Process connections



**G1/2 type**  
G1/2", Ø4 hole  
**M type**  
M20x1.5, Ø4 hole  
Wetted parts material: 316Lss

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

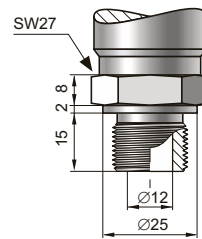


**1/2" NPT type**  
1/2" NPT, internal thread G1/4"

Wetted parts materials:  
**316Lss – standard**  
Min. range 0,25 bar  
Max. range 300 bar

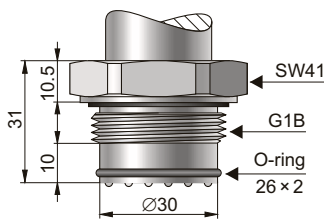
**Application**  
Applicable to measurement the pressure of dusty gases, and viscous or solidifying liquids at the measuring ranges from –100...100 mbar to 0...70 bar.

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 64) is recommended.

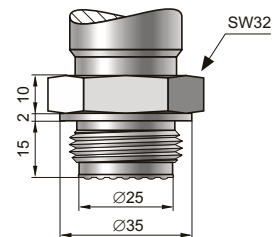


**GP type**  
G1/2", Ø12 hole  
**P type**  
M20x1.5, Ø12 hole  
Wetted parts materials: 316Lss – standard

**Hastelloy C-276**  
**Application**  
Applicable to measurement the pressure of viscous and contaminated media.  
Max. measuring range 0...300 bar.



**CG1 type**  
G1" with flush diaphragm  
Wetted parts material:  
**316Lss – standard**  
**Hastelloy C-276**



**CM30x2 type**  
M30x2 with flush diaphragm  
Wetted parts materials:  
**316Lss – standard**  
**Hastelloy C-276**

**Application and construction**

Smart pressure transmitters are 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 IP66. 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.

**Version APC-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, characteristic etc. with the display panel keys
- ☑ Configurable display 5 digits with illumination (working temperature range -40...+85°C)
- ☑ ATEX Intrinsic safety (Ex) II 1/2G Ex ia IIC T5
- ☑ ATEX Explosion – proof (Ex) II 1/2G Ex d ia IIC T5

**Version APC-2000ALE**



- ☑ 0...20 mA, 0...5 mA, 4...20 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 display (LCD) 3½ digits (working temperature range -40...+85°C)
- ☑ No EEx or Profibus PA

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 65). 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.

**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.

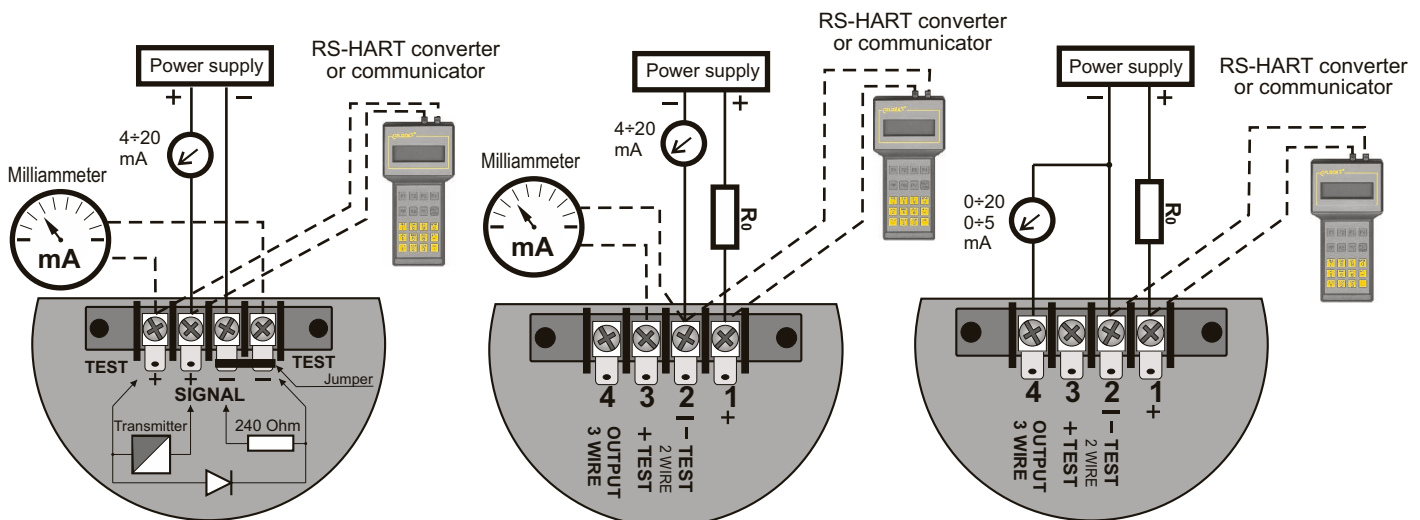
(\*) .eddl files available on [www.aplisens.pl](http://www.aplisens.pl)

**Electrical diagrams for transmitters with HART protocol**

Version: **APC-2000ALW**

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

Version: **APC-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...1000bar (0...100MPa)	10bar (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...16MPa)	1,6bar (160kPa)	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...6bar (-100...600kPa)	300 mbar (30 kPa)	23:1	14 bar (1.4 MPa)
8	-1...1,5 bar (-100...150 kPa)	120 mbar (12 kPa)	20:1	4 bar (400 kPa)
9	0...2 bar (0...200 kPa)	100 mbar (10 kPa)	20:1	4 bar (400 kPa)
10	0...1 bar (0...100 kPa)	50 mbar (5 kPa)	20:1	2 bar (200 kPa)
11	-0,5...0,5 bar (-50...50 kPa)	50 mbar (5 kPa)	20:1	2 bar (200 kPa)
12	0...0,25 bar (0...25 kPa)	25 mbar (2,5 kPa)	10:1	1 bar (100 kPa)
13	-100...100 mbar (-10...10 kPa)	20 mbar (2 kPa)	10:1	1 bar (100 kPa)
14	-15...70 mbar* (-1,5...7 kPa)	5 mbar (0,5 kPa)	17:1	0,5 bar (50 kPa)
15	0...1,1 bar abs (0...110 kPa abs)	50 mbar abs (5 kPa abs)	22:1	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)

### Technical data

#### Metrological parameters

<b>Accuracy</b>	≤ ±0.075% of the calibrated range
<b>Long-term stability</b> (for the nominal measuring range)	≤ accuracy for 3 years
<b>Thermal error</b>	< ±0.08% (FSO) / 10°C (0.1% for ranges 10, 11) max. ±0.25% (FSO) in the whole compensation range (0.4% for ranges 10, 11)
<b>Thermal compensation range</b>	-25...80°C -40...80°C – special version
<b>Additional electronic damping</b>	0...60 s
<b>Error due to supply voltage changes</b>	0.002% (FSO) / V

#### Electrical parameters

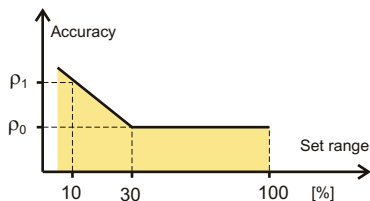
<b>Power supply</b>	12...45 V DC (EEx 13,5...28 V)
<b>Additional voltage drop when display illumination switched on</b>	3 V
<b>Output signal</b>	4...20 mA, two wire transmission APC-2000ALE: 0...20 or 0...5, 4...20 [mA]

$$\text{Loadresistance } R[\Omega] \leq \frac{U_{\text{sup}}[\text{V}] - 12\text{V}^*}{0,02\text{A}} \cdot 0,85$$

\* - 15 V when display illumination switched on

**Resistance required for communication** 250...1100 Ω

#### 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

#### Materials

**Wetted parts and diaphragms:** 316Lss or Hastelloy C 276

**Casing:** Aluminium

- NACE MR – 01 – 75 compatible

#### Operating conditions

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

EEx version -40...80°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**
- ◇ **Ex ia** – ATEX Intrinsic safety (ALW only)
- ◇ **Ex d** – ATEX Explosion proof (ALW only) only for pressure ≥250mbar
- ◇ **PED** – European Pressure Equipment Directive N° 97/23/EC, category IV
- ◇ **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 and CM30x2 process connection) without ranges
- ◇ **Others**

# SMART PRESSURE TRANSMITTER APC-2000AL/Profibus PA

## Application and construction

The APC-2000AL/Profibus PA 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-66 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 APC-2000AL/Profibus PA transmitter is produced with process connections described on page 4 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 IEEEE754) 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 APC-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 APC-2000AL/Profibus PA.

The pressure transmitter APC-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,  $\text{Ex} \text{II} 1/2\text{G EExia IIB/T5}$  are available

## Technical data

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

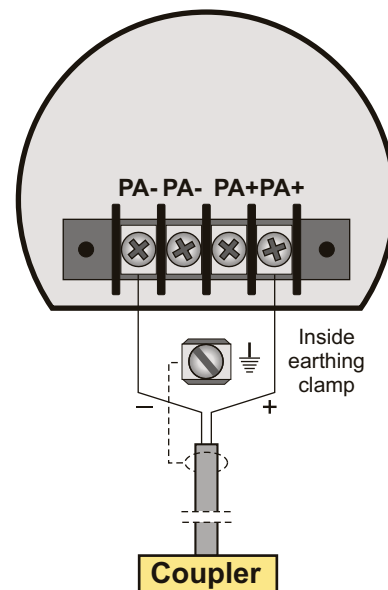
## Electrical parameters

Power supply (from DP/PA coupler )	
10,5 ±28V DC	
12,05 ±28V DC - when display illumination switched on.	
Power supply from intrinsically safe coupler according to FISCO requirements.	
Vi=17,5VDC	
Ii=0,38A for IIB	
Ii=0,36A for IIC	
Current consumption	14mA

## Output parameters

Output signal – Digital communication signal Profibus – PA (according to EN 50170)	
PA function	slave
Physical layer	IEC61158-2
Transmission rate	31,25kBit/S

## Electrical diagram



## Ordering procedure

See next page

**Example 1:** Pressure transmitter with display, output 4..20mA + HART, version EExia, nominal measuring range 0..7bar, calibrated range 0..6bar, process connection M20x1,5, electrical connection gland M20x1,5.

**APC-2000ALW/EExia/0..7bar/0..6bar/M**

**Example 2:** Pressure transmitter with display, output 4..20mA + HART, version EExia, version PED, nominal measuring range 0..25bar, calibrated range 0..16bar, process connection G1/2", electrical connection 1/2NPT F, mounting bracket for 2" pipe

**APC-2000ALW/EExia/PED/0..25bar/0..16bar/G1/2/US/AL**

**Example 3:** Pressure transmitter with display, Profibus PA, version EExia, nominal measuring range 0..7bar, calibrated range 0..6bar, process connection flange diaphragm seal DN50PN40, electrical connection M20x1,5,

**APC-2000AL/Profibus PA/W/EExia/0..7bar/0..6bar/S-P DN50.**

Model	Code	Description	
<b>APC-2000</b>		Smart pressure transmitter.	
Casing, output signal,	⇒ ALW.....	Aluminum housing, IP66, with display, output 4–20mA + Hart	
	ALE.....	Aluminium housing, IP66, with display, output 4–20mA + Hart 0 – 20mA+ Hart, 0 – 5mA+ Hart,	
	AL/Profibus PA.....	Aluminium housing, IP66, without display, output Profibus PA	
	AL/Profibus PA/W.....	Aluminium housing, IP66, with display, output Profibus PA	
Versions, certificates*	/EExia.....	Ex II 1/2G Exia IIC T5 ( not available for ALE version). for Profibus PA version Ex II 1/2G EEExia IIB T5	
	/EEXd.....	Ex II 1/2G EEEx d ia IIC T5, for pressure >250mbar ( not available for ALE, AL/Profibus PA, AL/Profibus PA/W). Packing gland available for request.	
	/PED.....	European Pressure Equipment Directive N° 97/23/EC, category IV	
	/Tlen.....	For oxygen service (sensor filled with Fluorolube fluid), only M and G1/2 conn.	
	/-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		<b>Range</b>	<b>Min. set range</b>
	/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÷1.5bar.....	-1÷1,5bar ( -100÷150kPa)	120mbar ( 12kPa)
	/-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)
	/0÷1.1bar ABS.....	0÷1.1bar 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" (male) 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 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)		
Electrical connection	⇒ (without marking).....	Packing gland M20x1,5	
	/US.....	Thread 1/2NPT Female	
Accessories	⇒ /AL.....	Mounting bracket type AL. for 2" pipe, material zincated steel	
Other specification	/.....	Description of required parameters (e.g. non-standard process connection G3/4", M22x1.5)	
The most typical specification is marked by "⇒" mark.			