DTR.PCE.PRE-28.SMART.01*(ENG)*

APLISENS

MANUFACTURE OF PRESSURE TRANSMITTERS
AND CONTROL INSTRUMENTS

USER'S MANUAL

SMART PRESSURE TRANSMITTERS
type: **PCE-28.SMART**

SMART DIFFERENTIAL PRESSURE TRANSMITTERS
type: **PRE-28.SMART**

SMART HYDROSTATIC LEVEL PROBES
type: **PCE-28P.SMART**

Edition A1

WARSAW AUGUST 2015

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Symbols used

Symbol	Description
	Warning to proceed strictly in accordance with the information contained in the documentation in order to ensure the safety and full functionality of the device.
	Information particularly useful during installation and operation of the device.
	Information particularly useful during installation and operation of a type Ex device.
	Information on disposal of used equipment.

BASIC REQUIREMENTS AND SAFE USE

- **The manufacturer will not be liable for damage resulting from incorrect installation, failure to maintain the device in a suitable technical condition, or use of the device other than for its intended purpose.**
- Installation should be carried out by qualified staff having the required authorizations to install electrical and pressure-measuring devices. The installer is responsible for performing the installation in accordance with these instructions and with the electromagnetic compatibility and safety regulations and standards applicable to the type of installation.
- The device should be configured appropriately for the purpose for which it is to be used. Incorrect configuration may cause erroneous functioning, leading to damage to the device or an accident.
- In systems with pressure transmitters there exists, in case of leakage, a danger to staff on the side where the medium is under pressure. All safety and protection requirements must be observed during installation, operation and inspections.
- If a device is not functioning correctly, disconnect it and send it for repair to the manufacturer or to a firm authorized by the manufacturer.

In order to minimize the risk of malfunction and associated risks to staff, the device is not to be installed or used in particularly unfavourable conditions, where the following dangers occur:

- possibility of mechanical impacts, excessive shocks and vibration;
- excessive temperature fluctuation, exposure to direct sunlight;
- condensation of water vapour, dust, icing

Installation of intrinsic safety versions should be performed with particular care, in accordance with the regulations and standards applicable to that type of installation.

Changes to the products manufacturing documentation may forestall a paper user updating. Current Instruction Manual is available at Producer http. on www.aplisens.pl

CONTENTS

I. APPENDIX Ex.01

CE 1453

PCE–28.SMART/XX/YY SMART PRESSURE TRANSMITTER
PCE–28P.SMART/YY SMART LEVEL PROBE
PRE–28.SMART/XX/YY SMART DIFFERENTIAL PRESSURE TRANSMITTER
Ex VERSIONS according to ATEX

1. Introduction

1.1. The „Appendix Ex.01" to DTR.PCE.PRE-28.SMART.01*(ENG)* applies to PCE-28.SMART/XX/YY, PCE-28P.SMART/YY and PRE-28.SMART/XX/YY.

1.2. The appendix contains supplementary information relating to the Ex version transmitters.
During installation and use of the Ex transmitters, reference should be made to **DTR.PCE.PRE-28.SMART.01*(ENG)*** in conjunction with **"Appendix Ex.01".**

2. Using of PCE–28.SMART/XX/YY, PCE–28P.SMART/YY and PRE–28.SMART/XX/YY transmitters in danger zones.

2.1. The PCE–28.SMART, PCE–28P.SMART and PRE–28.SMART transmitters are produced in accordance with the requirements of the following standards: EN 60079-0:2009, EN 60079-26:2007, EN 60079-11:2012, EN 50303:2004.

2.2. The transmitters may operate in areas where there is a risk of explosion, in accordance with the rating of the explosion protection design:

Ex

I M1 Ex ia I Ma
II 1/2G Ex ia IIC T4/T5/T6 Ga/Gb
II 1D Ex ia IIIC T105°C Da
KDB 12ATEX0071X

3. Identifying marks

Intrinsically safe transmitters (Ex version) must have a rating plate containing the information specified in paragraph 4 of DTR.PCE.PRE-28.SMART.01*(ENG)* and also at least the following:

- CE mark and the notified unit number: 1453, mark Ex
- designation of explosion protection design, certificate number
- values of parameters such as: Ui, Ii, Ci, Li,
- manufacture year and serial number,
- inscription: " Version Exi SA "- for transmitters with the protection against overvoltage (surge arrester).

4. Consignment contents

Together with the transmitter are delivered:

a) Product certificate, which is also as the warranty card,
b) Declaration of Conformity,
c) Certificate copy – on request,
d) User's Manual signed „DTR.PCE.PRE-28.SMART.01*(ENG)".*

Items b), c), d) are available at www.aplisens.pl

5. Permissible input parameters (based on data from the KDB 12ATEX 0071X certificates)

- for power supply with a linear characteristic

Ui = 30V DC; Ii = 0,1A

- for power supply with a "trapezial" and "rectangular" characteristic

Ui = 24V DC; Ii = 0,05A

Pi for all type of power supply; see the table below

Pi[W]	Ta[ºC]	Temperature classification
0,7	60	T6
	80	T5, T4, and Group I
1,2	50	T6
	70	T5
	80	T4, and Group I

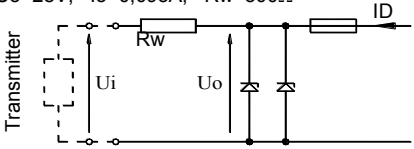
Ta – maximum ambient temperature, temperature of the measured medium
Input inductance and capacity: Ci = 11nF; Li = 1,0mH

5.1. Special conditions for safe use

- When installing the transmitters should be considered requirements current standards of installation;
- Version of transmitter with surge arrester, marked on the plate "Exi SA", does not meet the requirements of Section 10.3 of the EN 60079-11(500Vrms). This must be taken into account when installing the equipment.

6. Supply examples

Power supply with a “linear” characteristic may be e.g. a typical barrier with parameters:
Uo=28V; Io=0,093A; Rw=300Ω



Example of practical provision of power supply:
use the barrier with the parameters given above.

Fig.1. Power supply from a source with “linear” characteristic.

Example of power supply from a source with trapezial characteristic (see Fig.2).
Uo=24V; Io=0,05A

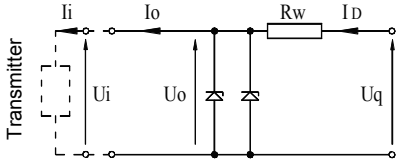


Fig.2. Power supply from a source with trapezial characteristic.

If $Uo < \frac{Uq}{2}$ then parameters Uq, Io, Po are interrelated as follows:

$$Uq = \frac{4Po}{Io}, \qquad Rw = \frac{Uq}{Io}, \qquad Po = \frac{Uo(Uq-Uo)}{Rw`}$$

For power supply with rectangular characteristic:

The supply of power from a source with a rectangular characteristic means that the voltage of the Ex power supply remains constant until current limitation activates.
The protection level of power supplies with a rectangular characteristic is normally “ib”.
The transmitter powered from such supply is also the Ex device with “ib” level protection.

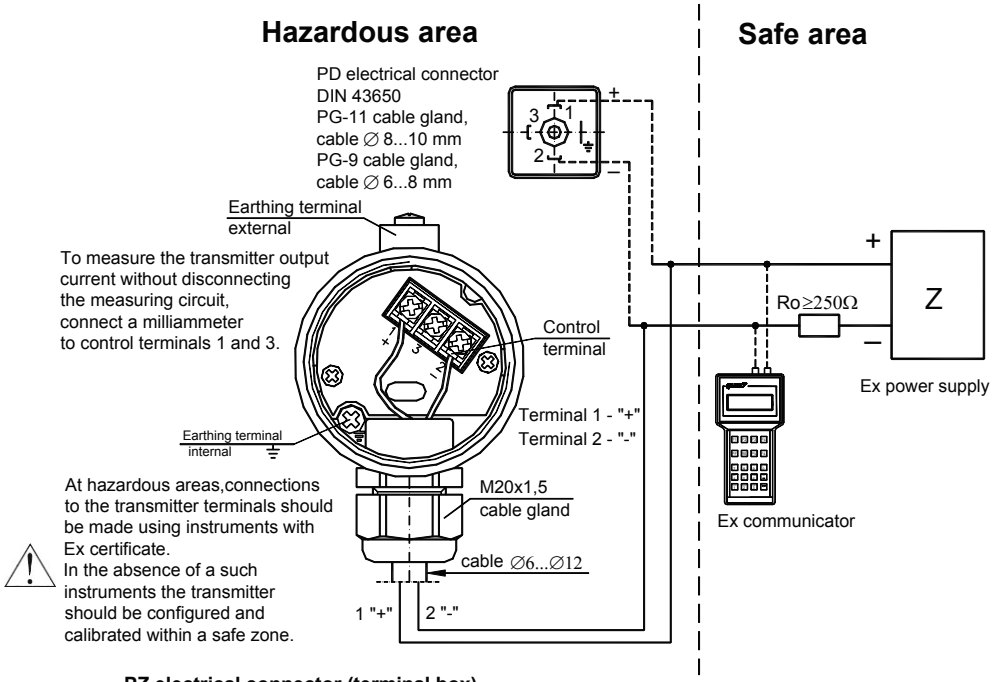
Example of practical provision of power supply with a rectangular characteristic:
Stabilized power supply with Uo=24V, with the “ib” level protection and current limited to 25mA<Io<30mA.

6.1. The protection level

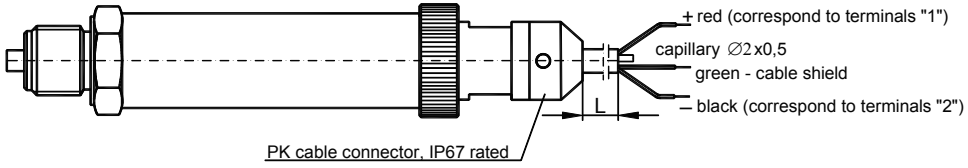
The transmitter is intrinsically safe device with the degree of protection "ia", when the power circuit has a degree of protection "ia".
The transmitter is intrinsically safe device with the degree of protection "ib", when the power circuit has a degree of protection "ib".

7. How to connect Ex transmitters: PCE-28.SMART/XX/YY, PCE-28P.SMART/YY, PRE-28.SMART/XX/YY

The transmitter and other devices in the measuring loop should be connected in accordance with the intrinsic-safety and explosion-safety regulations and the conditions for use in dangerous areas.
Failure to observe the intrinsic-safety regulations can cause explosion and the resulting hazard to people.



PZ electrical connector (terminal box),
Terminals 1, 2 of the box correspond to terminals 1, 2 of the PD connector.



It is not allowed to repair or otherwise interfere with the transmitter's electrical circuits in any way.
Damage and possible repair can be assessed and done by the manufactures or another authorized party only.

8. Installation rules

Installing rules intrinsically safe devices in hazardous areas used according to EN 60079-25 and EN 60079-14.

II. APPENDIX Ex.02

CE 1453

PCE–28.SMART/XX/YY SMART PRESSURE TRANSMITTER
PCE–28P.SMART/YY SMART LEVEL PROBE
PRE–28.SMART/XX/YY SMART DIFFERENTIAL PRESSURE TRANSMITTER
Ex VERSIONS according to IECEx

1. Introduction

1.1. The „Appendix Ex.02" to DTR.PCE.PRE-28.SMART.01*(ENG*) applies to PCE-28.SMART/XX/YY, PCE-28P.SMART/YY and PRE-28.SMART/XX/YY.

1.2. The appendix contains supplementary information relating to the Ex version transmitters.
During installation and use of the Ex transmitters, reference should be made to **DTR.PCE.PRE-28.SMART.01*(ENG*)** in conjunction with **"Appendix Ex.02".**

2. Using of PCE–28.SMART/XX/YY, PCE–28P.SMART/YY and PRE–28.SMART/XX/YY transmitters in danger zones

2.1 The PCE–28.SMART, PCE–28P.SMART and PRE–28.SMART transmitters are produced in accordance with the requirements of the following standards: IEC 60079-0:2007-10, IEC 60079-26:2006, IEC 60079-11:2006.

2.2. The transmitters may operate in areas where there is a risk of explosion, in accordance with the rating of the explosion protection design:

Ex ia IIC T4/T5/T6 Ga/Gb
Ex ia I Ma
Ex ia IIIC T105°C Da

IECEx KDB 12.0010X

3. Identifying marks

Intrinsically safe transmitters (Ex version) must have a rating plate containing the information specified in paragraph 4 of DTR.PCE.PRE-28.SMART.01*(ENG)* and also at least the following:

- values of parameters such as: Ui, Ii, Ci, Li,
- manufacture year and serial number,
- inscription: " Version Exi SA " - for transmitters with the protection against overvoltage (surge arrester).

4. Consignment contents

Together with the transmitter are delivered:

e) „Product certificate", which is also as the warranty card,
f) Declaration of Conformity – on request,
g) Certificate copy – on request,
h) User's Manual signed „DTR.PCE.PRE-28.SMART.01*(ENG)".*

Items b), c), d) are available at www.aplisens.pl

5. Permissible input parameters (based on data from the IECEx KDB12.0010X certificates)

- for power supply with a linear characteristic
  Ui = 30V DC; Ii = 0,1A
- for power supply with a "trapezial" and "rectangular" characteristic
  Ui = 24V DC; Ii = 0,05A

Pi for all type of power supply; see the table below

Pi[W]	Ta[ºC]	Temperature classification
0,7	60	T6
	80	T5, T4, and Group I
1,2	50	T6
	70	T5
	80	T4, and Group I

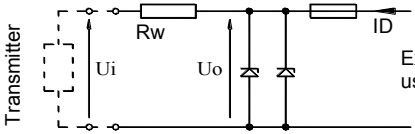
Ta – maximum ambient temperature, temperature of the measured medium
Input inductance and capacity: Ci = 11nF; Li = 1,0mH

5.1. Special conditions for safe use

Version of device with surge arrester, marked on the plate "Exi SA", does not meet the 500V rms isolation test required by EN-60079-11:2007. This must be taken into account when installing the equipment.

6. Supply examples

Power supply with a “linear” characteristic may be e.g. a typical barrier with parameters:
Uo=28V Io=0,093A Rw=300Ω



Example of practical provision of power supply:
use the barrier with the parameters given above.

Fig.1. Power supply from a source with “linear” characteristic.

Example of power supply from a source with trapezial characteristic (see Fig.2).
Uo=24V; Io=0,05A

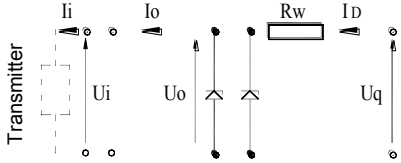


Fig.2. Power supply from a source with trapezial characteristic.

If $Uo < \frac{Uq}{2}$ then parameters UQ, Io, Po are interrelated as follows:

$$Uq = \frac{4Po}{Io}, \quad Rw = \frac{Uq}{Io}, \quad Po = \frac{Uo(Uq-Uo)}{Rw`}$$

For power supply with rectangular characteristic:

The supply of power from a source with a rectangular characteristic means that the voltage of the Ex power supply remains constant until current limitation activates.
The protection level of power supplies with a rectangular characteristic is normally “ib”.
The transmitter powered from a such supply is also the Ex device with “ib” level protection.

Example of practical provision of power supply with a rectangular characteristic:
Stabilized power supply with Uo=24V, with the “ib” level protection and current limited to 25mA<Io<30mA.

6.1. The protection level

The transmitter is intrinsically safe device with the degree of protection "ia", when the power circuit has a degree of protection "ia".

The transmitter is intrinsically safe device with the degree of protection "ib", when the power circuit has a degree of protection "ib".

7. How to connect Ex transmitters: PCE-28.SMART/XX/YY, PCE-28P.SMART/YY, PRE-28.SMART/XX/YY

acc. to p.7 DTR.PCE.PRE-28.SMART.01*(ENG).* Appendix Ex.01

1. INTRODUCTION

1.1. This user's manual is intended for **PCE–28.SMART** electronic pressure transmitters, **PRE–28.SMART** differential pressure transmitters and **PCE–28P.SMART** level probes users. Containing the data and guidelines necessary to understand the functioning of the transmitters and how to operate them. It includes essential recommendations concerning installation and use, as well as emergency procedures.

1.2. Complementary technical data for the **PCE–28.SMART** and **PRE–28.SMART** transmitters with diaphragm seal connectors and technical data for seals are contained in the catalogue cards "DIAPHRAGM SEALS".

1.3. The transmitters comply with the requirements of EU directives as shown on the plate and with the relevant Declaration of Conformity.

1.4. Additional data on **PCE–28.SMART, PRE–28.SMART** transmitters and **PCE–28P.SMART** probes in Ex versions covered by the common EC-type test certificate **KDB 12ATEX0071X** are contained in the appendix designated **Appendix Ex.01.**

During installation and use of **PC–28.SMART, PR–28.SMART** transmitters and **PC–28P.SMART** probes in Ex version, reference should be made to **DTR.PC.PR–28.SMART.01*(ENG)*** in conjunction with **Appendix Ex.01.**

1.5. The pressure transmitters: **PCE-28.SMART, PRE-28.SMART** in realization for sea uses are complied with Det Norske Veritas (DNV) Rules for Classification of Ships, High Speed & Light Craft and Det Norske Veritas' Offshore Standards. Certificate **No. A-13385** for application in following Location Classes: Temperature **D**, Humidity: **B**, Vibrations: **B**, EMC: **B**, Enclosure: **C**.

2. CONSIGNMENT CONTENTS

Transmitters are delivered in single and/or multiple packs.
Together with the transmitter are delivered:

a) „Product certificate", which is also as the warranty card,
b) Declaration of Conformity - on request,
c) Certificate copy – on request,
d) User's Manual signed „DTR.PCE.PRE-28.Smart.01*(ENG)*".

Items b), c), d) are available at www.aplisens.pl

3. APPLICATIONS AND MAIN FEATURES

3.1. The **PCE-28.SMART** pressure transmitters are designed to measure gauge pressure, vacuum pressure and absolute pressure of gases, vapours and liquids (including corrosive).
3.2. PRE–28.SMART differential pressure transmitters are used to measure liquid levels in closed tanks, static pressure up to 25MPa or 32MPa for special versions, and to measure differential pressure at filters, orifices and others.
PRE–28.SMART differential pressure transmitters with P-type connectors are designed to work with static pressure of up to 4MPa or 7MPa only.

3.3. The **PCE-28.SMART, PRE–28.SMART** can be fitted with a range of additional process connectors, enabling them to be used in a conditions variety, such as dense media, reactive media, high and low temperature etc.

3.4. For depth measurements in open tanks, the transmitters are fitted with sensing modules with an extension tube, and are referred to as the **PCE-28P.SMART** level probes (for details see Section 12).

3.5. PCE-28.SMART series transmitters generate a 4...20mA + Hart 5.1 output signal and a digital communication signal in a two-wire system.
The use of smart electronics enables regulation of the zero point, the measurement range, damping, radical conversion characteristic and another functions using an Aplisens **KAP** communicator or a HART/RS232 converter, Aplisens "RAPORT 2" configuration software and a PC computer.

4. IDENTIFYING MARKS. ORDERING PROCEDURE.

4.1. Every transmitter and probe carries a rating plate containing at least the following information: CE mark, notified institutions numbers and certificates obtained designations, manufacturer name, type, serial number, measurement range, output signal, and power supply voltage.

4.2. PCE-28.SMART series transmitters in Ex version, in accordance with the ATEX directive, have additional marks as described in **DTR.PCE.PRE-28.SMART.01***(ENG)* **Appendix Ex.01** p.3.

4.3. PCE-28.SMART series transmitters in Ex version, in accordance with the IECEX directive, have additional marks as described in **DTR.PCE.PRE-28.SMART.01***(ENG)* **Appendix Ex.02** p.3.

4.4. PCE-28.SMART series transmitters in realization for sea uses are equipped in additional rating plates with the DNV certificate number **DNV No. A-13385**, and signs of environmental classes.

4.5. The designations to be used when ordering can be found in the Catalogue Cards.

5. TECHNICAL DATA

5.1. Common parameters

5.1.1. Electrical parameters

Power supply for non-intrinsic-safe versions	7,5 ÷ 55V DC, nominal 24V DC
Power supply for intrinsic-safe versions	in accordance with **Appendix Ex.01** or **Appendix Ex.02**
Output signal	4÷20mA + HART 5.1
Communication	HART Protocol via a 4÷20mA signal loop using specialized Aplisens equipment
Resistance required for HART communication	min. 240Ω
Load resistance	$Romax.[\Omega] = \frac{Usup[V] - 7,5V}{0,0225A}$
Processing time	16...230 ms (set by software)
Additional electronic damping	0...30s
Voltage for insulation testing	
– Normal, Exi version	500 V AC or 750 V DC
– "Exi SA" version	100 V DC
Excess voltage protection	see p.9.4

5.1.2. Permitted environmental conditions

Operating temperature range	- 40°C ÷ 85°C (ambient temperature) – for PCE-28.SMART -25°C ÷ 85°C (ambient temperature) – for PRE-28.SMART -25°C ÷ 80°C (ambient temperature) – for PCE-28P.SMART

Operating temperature range for safe versions (Ex) in accordance with **Appendix Ex.01** or **Appendix Ex.02.**

Medium temperature range	-40°C ÷ 120°C – direct measurement – for PCE-28.SMART -25°C ÷ 120°C – direct measurement – for PRE-28.SMART over 120°C measurement with the use of a transmission tube or diaphragm seal
Thermal compensation range	-25º ÷80ºC, 0º ÷ 25°C for PCE-28P.SMART -40º ÷80ºC for PCE-28.SMART – special version
Relative humidity	0% ÷ 98%
Vibration during operation	max 4g

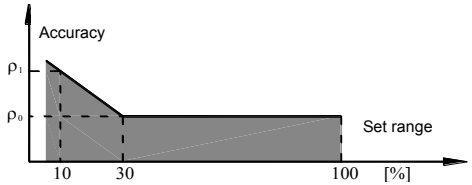
5.1.3. Construction materials

Diaphragm	Stainless steel 1.4435 (316L)
Sensing module	Stainless steel 1.4404 (316L)
Casing for electronic parts	Steel pipe, 1.4301 (304)
Connectors	Stainless steel 1.4404 (316L)
Liquid filling of the interior the sensing module	Silicone oil, chemically inactive liquid for measurement of oxygen

5.1.4. Degree of protection according to PN-EN 60529:2003

IP65 – for PD type connector
IP66/67 – for PZ type connector
IP67 – for PK type connector
IP68 – for SG type connector
IP67 – for PM12 type connector

5.1.4. Accuracy depending on the set range



ρ_0 – error for nominal measuring range (0...100%FSO)
ρ_1 - error for range (0...10%FSO)
$\rho_1 = 2 \times \rho_0$

5.2. PCE-28.SMART - Measurement ranges and metrological parameters

5.2.1. PCE-28.SMART, Measurement ranges

N°	Nominal measuring range (FSO*)	Minimum set range	Rangeability	Overpressure limit (without hysteresis)
1.	0...1000bar (0...100MPa)	10bar (1MPa)	100:1	1200bar (120MPa)
2.	0...300bar (0...30MPa)	3bar (300kPa)	100:1	450bar (45MPa)
3.	0...160bar (0...16MPa)	1,6bar (160kPa)	100:1	450bar (45MPa)
4.	0...70bar (0...7MPa)	0,7bar (70kPa)	100:1	140bar (14MPa)
5.	0...25bar (0...2,5MPa)	0,25bar (25kPa)	100:1	50bar (5MPa)
6.	0...7bar (0...0,7MPa)	0,07bar (7kPa)	100:1	14bar (1,4MPa)
7.	-1...6bar (-100...600kPa)	300mbar (30kPa)	23:1	14bar (1,4MPa)
8.	0...2bar (0...200kPa)	100mbar (10kPa)	20:1	4bar (400kPa)
9.	0...1bar (0...100kPa)	50mbar (5kPa)	20:1	2bar (200kPa)
10.	-0,5...0,5bar (-50...50kPa)	50mbar (5kPa)	20:1	2bar (200kPa)
11.	0...0,25bar (0...25kPa)	25mbar (2,5kPa)	10:1	1bar (100kPa)
12.	-100...100mbar (-10...10kPa)	20mbar (2kPa)	10:1	1bar (100kPa)
13.	-15...70mbar (-15...7kPa)	5mbar (0,5kPa)	17:1	0,5bar (50kPa)
14	-7...7bar (-700...700Pa)	1mbar (0,1kPa)	14:1	0,5bar (50kPa)
15.	0...1,3bar abs (0...130kPa abs)	100mbar abs (10kPa abs)	13:1	2bar (200kPa)
16.	0...7bar abs (0...7MPa abs)	0,07bar abs (7kPa abs)	100:1	14bar (1,4MPa)
17.	0...25bar abs (0...2,5MPa abs)	0,25bar abs (25kPa abs)	100:1	50bar (5MPa)
18.	0...70bar abs (0...7MPa abs)	0,7bar abs (70kPa abs)	100:1	140bar (14MPa)

5.2.2. PCE-28.SMART, Metrological parameters

Accuracy	≤ ± 0,1% of calibrated range
Long term stability	≤ accuracy/3 years
(For the basic range)	
Error due to supply voltage changes	± 0,002%(FSO)/1V
Thermal error	± 0,08%(FSO)/10°C (± 0,1% FSO/10°C for range n°12, 13)
Thermal error for the whole thermal compensation range	± 0,25%(FSO) (± 0,4% FSO/10°C for range n°12, 13)

5.2.3. PCE-28.SMART, Pressure Connectors

- M-type connector with M20x1.5 thread – see figure 5a,
- P-type connector with M20x1.5 thread – see figure 6a,
- CM30x2-type connector with flush diaphragm – see figure 7a,
- G1/2 -type connector with G1/2" thread – see figure 8a,
- GP -type connector with G1/2" thread,
- CG1-type connector with G1" thread and flush diaphragm – see figure 8e,
- RM – type connector with M20x1,5 thread with radiator,
- RP – type connector with M20x1,5 thread with hole Φ12 with radiator,
- G1/4 – type connector with G1/4" thread with hole Φ4,
- 1/2NPT M type connector with 1/2NPT tread,
- R1/2-type connector with R1/2 treads,
- CG1/2-type connector with G1/2 treads and flush diaphragm,
- Other connection types by arrangement.

5.3. PRE-28.SMART - Measurement ranges and metrological parameters

5.3.1. PRE-28.SMART, Measurement ranges

N°	Nominal measuring range (FSO)		Minimum set range		Rangeability	Overpressure limit	Static pressure limit
1.	0...70bar	(0...7MPa)	7bar	(700kPa)	10:1	(70bar for P-type connector)	
2.	0...16bar	(0...1,6MPa)	1,6bar	(160kPa)	10:1		
3.	0...2bar	(0...200kPa)	0,2bar	(200kPa)	10:1		
4.	0...1bar	(0...100kPa)	70mbar	(7kPa)	14:1	250 / (320 or 420bar option)	
5.	0...0,25bar	(0...25kPa)	10mbar	(1kPa)	25:1	(40bar for P-type connector)	
6.	-100...100mbar	(-10...10kPa)	10mbar	(1kPa))	20:1		
7.	-5...70mbar	(-0,5...7kPa)	4mbar	(0,4kPa)	18:1		
8.	-0,5...0,5bar	(-50...50kPa)	0,1bar	(10kPa)	10:1		
9.	-20...20mbar	(-2...2 kPa)	2mbar	(0,2kPa)	20:1	20bar	

5.3.2. PR-28.SMART, Metrological parameters

Accuracy	± 0,1% of calibrated range
Long term stability (for the normal measuring range)	≤ accuracy / 3 years
Error due to supply voltage changes	± 0,002%(FSO)/1V
Thermal error	± 0,08%(FSO)/10ºC
Thermal error for the whole thermal compensation range	± 0,3%(FSO)
Zero shift error for static pressure*	± 0,08 % (FSO)/10 bar (for range n°2, 3, 9) ± 0,01 % (FSO)/10 bar (for range n°4, 5, 6) ± 0,03 % (FSO)/10 bar (for range n°1, 7, 8)

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

5.3.3. PRE-28.SMART, Pressure Connectors

PRE-28.SMART without diaphragm seals- P-type connector (fig.9 or C-type connector to mount together with a valve manifold see fig.10.

PRE-28.SMART with single direct diaphragm seal – as in the example (figure 12).

5.4. PCE-28P.SMART. Measurement ranges and metrological parameters.

5.4.1. PCE-28P.SMART, Measurement ranges

The **PCE-28P.SMART** probes are manufactured with measurement ranges in the interval 200÷3000mm H_2O.

5.4.2. PCE-28P.SMART, Metrological parameters

	Measurement range	
	0...200÷500mm H_2O	0...700÷3000mm H_2O
Accuracy	0,25%	0,16%
Thermal error of zero	typically0,3%/10°C, max 0,5%/10°C	typically 0,2%/10°C, max 0,3%/10°C
Thermal error of span	typically 0,2%/10°C max 0,3%/10°C	typically 0,2%/10°C max 0,3%/10°C
Hysteresis, repeatability	0,05%	

Operating temperature range	-25°C ÷ 85°C (Medium temperature)
Thermal compensation range	0ºC ÷ 25ºC, (-10ºC ÷ 70ºC for special version)
Long term stability	≤ 1,5 mm H_2O + 0,16% range / for year
Error due to supply voltage changes	± 0,002%(FSO)/1V
Relative humidity	0% ÷ 98%
Vibration during operation	max 4g
Exposure to direct sunlight	not recommended causing strong transmitter warming

6. CONSTRUCTION, PRESSURE CONNECTORS, ELECTRICAL CONNECTORS

6.1. Measurement Principles.

PCE-28.SMART series transmitters work by converting changes in the resistance of a piezoresistance bridge, which are proportional to the pressure difference being measured, into a standard current signal.
The active sensing element is a silicon diaphragm with four (bridge) piezoresistors, separated from the medium by a sealing diaphragm and manometric fluid.
The electronic system digitally processes the measurement signal and generates output signals: an analogue: 4÷20 mA signal, and a digital Hart communication signal.
A transmitter electrical block diagram is presented in Figure 1.
On the input circuit two analogue signals are formed, reflecting the measured pressure and the sensing module temperature. These signals are digitalized and inputted to a microprocessor which controls the transmitter's operation. Using data input during the production process adjusts for thermal errors and carries out linearization.
After processing, the digital signal is converted into an analogue 4÷20mA current signal, with a superimposed digital communication signal
For communication with the transmitter via analog signal line the Aplisens KAP communicator, or a PC computer meeting the requirements given in 10.2.4, is used.
The transmitter's input point is fitted with a noise filter and elements protecting against excess voltage. (see p. 9.4.2). The plasma surge arresters are not installed in the standard Ex version.
The plasma surge arrester can be installed on request, then the rating plate is marked "Version Exi SA".

6.2. Construction.

The main components of the smart pressure transmitter is the sensing module, in which the pressure signal is converted into an electrical signal, and the electronic system, which converts the signal from the sensing module into a 4...20mA output analog signal and produces a digital Hart signal.

6.2.1. To the **PCE-28.SMART** sensing module transmitters may be installed the pressure connectors as in figures 5a, 6a, 7a, 8 listed in point 5.2.3 or other. They are equipped with a diaphragm separating the internal part of the module from the medium.

6.2.2. In the **PRE-28.SMART** transmitters, the sensing module has two kind of process connectors: P-type connectors (figure 9), or C-type with covers connecting for installation on a valve manifold (figure 10).

6.2.3. The probe consists of a sensing module and an electronic assembly, connected with an extension tube whose length depends on the depth being measured. The tube can be fitted with a flange for mounting on the cover of the tank (figure 11).

6.3. Casing, Electrical Connections

6.3.1. The casing of the **PCE-28.SMART** series transmitters, made from ø27 pipe, is permanently mounted on the sensing module as shown in figure 3 and 11. On the other side is a **PD** type electrical connector with PG-11 cable gland.

6.3.2. The **PCE-28.SMART** series transmitters may be fitted with a **PK** cable connector (see figure 3, 9), or **PKM** (with external thread ½ "NPT) mounted similarly to the **PD** connector. The body of the connector contains a permanently fixed and sealed cable of standard length 3m (other lengths can be produced to order). The cable contains a capillary, which connects one side of the measuring diaphragm to the atmosphere.

6.3.3. The **PCE-28.SMART** series transmitters with a **PZ** type connector has a terminal box permanently mounted on the upper part of the casing (figure 4). The box is closed with a lid. Mounted, on the inside, a terminal block equipped is with additional control terminals, connected to 1, 2 and 3 terminals.
PZ type connector has an internal, and in Ex version also external earthing terminal.

6.3.4. The **PCE-28.SMART** series transmitters may be fitted with a **SG** cable connector (see figure 3, 9), or **SGM** (with external thread ½ "NPT).
In the connector housing is mounted cable gland providing degree of protection IP68. The cable contains a capillary, which connects one side of the measuring diaphragm to the atmosphere.

6.3.5. The **PCE-28.SMART** transmitters (only normal version) may be fitted with a **PM12** cable connector, mounted similarly to the **PK** connector.

7. PLACE OF INSTALLATION OF TRANSMITTERS

7.1. General recommendations

7.1.1. The pressure transmitters and differential pressure transmitter can be installed both indoors and outdoors. It is recommended that transmitters, with **PD** or **PM12** type electrical connector, installed outdoor should be placed in a box or under cover.

7.1.2. The place of installation should be chosen in such a way as to allow access to the device and to protect it's from mechanical damage. In planning the transmitter installation and the pulse lines configuration, should be paid attention to the following requirements:

- The impulse lines should be as short as possible, with a sufficiently large cross-section, and free of sharp bends, in order to prevent blockages;
- Where the medium is a gas, the transmitters should be installed above the measuring point, so that condensation flows down towards the site of the pressure measurement; where the medium is a liquid or where a protective liquid is used, the transmitters should be installed below the place where the pressure measurement is taken;
- The impulse lines should be inclined at a gradient of at least 10cm/m;
- The levels of filling liquid in the impulse lines should be equal or kept constant difference;
- The configuration of the impulse lines and the valve connection system should be chosen with regard to the measurement conditions and to requirements such as the need to reset the transmitters in position and the need for access to the impulse lines during water or gas removal and flushing.

7.1.3. Where there is a risk of heavy objects hitting the instrument (resulting, in extreme cases, in a part of the system with transducers being torn off and medium leakage), appropriate means of protection should be applied for safety reasons and to avoid the possibility of sparkling or other, more appropriate location should be selected for the transmitter.

7.1.4. Attention should also be paid to possible installation faults which may lead to measurement errors, such as connections which are not tight, sediment blockage in lines which are too narrow, gas bubbles in a liquid line or liquid column in a gas line etc.

7.2. Low Ambient Temperature.

When the solidification point of the liquid whose pressure is being measured is greater than the ambient temperature, steps should be taken to protect the measurement apparatus from freezing effects.

This is particularly important in the case open-air installations.
Protection is obtained by filling the impulse lines with a mixture of ethylene glycol and water, or another liquid whose solidification point does not exceed the ambient temperature. Thermal insulation can protect the transmitter casing and lines only from brief exposure to low temperatures. Where the temperature is very low, the transmitter and impulse lines should be heated.

7.3. High Medium Temperature.

The **PCE-28.SMART** series transmitters may be used to measure media with temperatures of up to 120°C. To protect the sensing module from temperatures higher than 120ºC, long impulse lines are used to disperse the heat and to lower the temperature of the sensing module.
Where it is not possible to use impulse lines of the required length, **PCE-28.SMART** series transmitters with remote diaphragm seals should be used (see "DIAPHRAGM SEALS" catalogue cards).

For Ex versions apply data by Appendix Ex.01 or Appendix Ex.02.

7.4. Mechanical Vibration, Corrosive Media

7.4.1. Transmitters should correctly work with vibrations with amplitudes to 1,6mm and accelerations to 4g. If strong vibrations are carried via the pressure line and disturb of measuring, use should be made of elastic pulse lines or transmitters with a remote diaphragm seal.

7.4.2. Transmitters should not be installed in places where the diaphragm, made of 316L (steel 00H17N14M2), would be subject to corrosion by the medium being measured. If possible, transmitters with diaphragms made of Hastelloy C276 should be used, or other means of protection applied (e.g. in the form of a separating liquid) or transmitters with diaphragm seals adapted for measuring aggressive mediums according to "DIAPHRAGM SEALS" catalogue cards should be used).

7.5. Place and method of installation. Fitting

The **PC–28P.SMART** level probes are installed in places where liquid levels are to be measured, as described in p.3.4.
The probe is immersed in the medium being measured, but the electronic assembly and connector should remain above the maximum level of the medium. When installing the probe, the zero position should be precisely determined. When the tube is particularly long, it should be fastened at two points. When the probe is installed in the open air, a roof or box should be used to cover the electronic parts. If there is a current or turbulence in the place where the probe will operate, a protective tube should be fitted.

The medium around the sensing module should not be allowed to freeze. The applies particularly to water when the probe is used in the open air. The sealing diaphragms should be checked regularly, and sediment deposits, blockages etc. should not be allowed to occur.
Dirt should be removed only by dissolving or washing off.

8. INSTALLATION AND MECHANICAL CONNECTIONS

8.1. The **PCE–28.SMART** transmitters can be mounted directly on the rigid impulse lines.
For used connectors as in figures 5a, 6a, 7a, 8a, 8c, 8e , it is recommended that connection sockets be used as shown in figure 5b, 6b, 7b, 7c or 8b, 8d, 8f.
Where the connectors are as in figures. 6a, 7a, 8c or 8e gaskets are used with each transmitter.
The socket shown as in figure 7c, 8d and 8f can be obtained from the manufacturer.
The material of the seal is selected based on the pressure value and the type and temperature of the medium.
If the pressure is applied via a flexible plastic tube, the transmitter should be mounted on a support with Red Ø6-M reduction.
In case of metal pipes, the used connections should comply with PN-82/M-42306.

The types of the impulse tubes are to be selected depending on the measured value of the pressure and the medium temperature.

8.2. The **PRE–28.SMART** transmitters can be mounted directly on rigid impulse lines.
To connect the basic versions of transmitters, with two M20 x 1.5 stubs (P-type connector), one can use (for example) straight connecting elements with nuts.
If the pressure is carried via a flexible plastic tube, use an reduction elements "Red Ø6-M" (M20x1,5 / Ø6).
The **PRE–28.SMART** transmitters can be installed using the Assembly Kit, on a ø25 pipe or on a flat surface using an angle bracket (figure 13).

The **PRE–28.SMART** with connecting cover (C-type connector) are designed for installation on 3-valve or 5-valve manifolds, to a 2" pipe or to a flat surface using a fastener C2. (fig. 14) or "U" (fig. 15).

8.3. The **PCE-28.SMART** series transmitters can operate in any position.
When installed on an object with a high-temperature medium, it is advantageous to mount the transmitter in a horizontal position with the cable gland pointing downwards or to the side, in such a way that the transmitter is kept away from the stream of rising hot air.
Examples of the use of Aplisens assembly components to isolate the **PCE–28.SMART** transmitters from high temperature media are shown in figure 16.
The **PCE-28.SMART** series transmitters with radiator must be installed in a horizontal position.
When the measurement range is small, the reading can be affected by the position of the transmitter and by the configuration of the impulse lines and the way in which they are filled with liquid.
This error can be corrected using the zero-setting function.

8.4. In selecting assembly components, it may be helpful to consult information on Aplisens connection elements, reduction elements, sockets, valves, reduction clamps and signal tubes.
Information on this subject can be found in the catalogue cards "FITTING ACCESSORIES".

Transmitters with flange diaphragm seals are to be installed on the corresponding counter flanges on the facility. It is recommended that the user matches the screw joints material to the pressure, temperature, flange material and seal to ensure tightness of the flange joint in the expected operating conditions.
Coarse-threaded screws complying with ISO 261 are to be used for flanges used in the **PCE-28.SMART, PRE-28.SMART** transmitters.
Additional data concerning the diaphragm seals are specified in the catalogue cards "DIAPHRAGM SEALS".

Pressure may be transmitted to the installed device only after checking that it has a measurement range which properly corresponds to the value of the measured pressure, that gaskets have been properly selected and fitted, and the connector has been properly screwed tight.
Attempts to undo the screws or fixing connector pipes on a transmitter under pressure may cause the medium to leak and create hazards for the personnel.
When disassembling the transmitter, it is necessary to disconnect it from the process pressure or bring the pressure to atmospheric level, and to take particular care and precautions in case of media which are highly reactive, caustic, explosive or otherwise hazardous to personnel.
If necessary, rinse out this part of the system.

9. ELECTRICAL CONNECTION

9.1. General recommendations

It is recommended that twisted pair cabling be used for the signal lines. If the transmitter and signal line are subject to a large amount of electromagnetic interference, then screened twisted pair cable should be used.
The signal wires should not run alongside network power supply cables or near to large electrically powered devices.
The devices used together with the transmitters should be resistant to electromagnetic interference from the transmission line in accordance with compatibility requirements.
It is also beneficial to use anti-interference filters on the primary side of the transformers, the power supplies used for the transmitters and apparatus used in conjunction with them.

9.2. Connections for transmitters with PD-type connector

The **PCE-28.SMART** series transmitters fitted with **PD** type connectors are to be connected as shown in fig.2a. To make the connections, remove the terminal block from the contact pins together with its cover.
Then remove the block from its cover, levering it off with the end of a screwdriver inserted into the slot provided for this purpose. Connect the wires to the block.

Where the isolation of the wires in the cable gland is ineffective (for example, when single wires are used) the opening of the gland should be carefully sealed with an elastic sealing compound to obtain IP65 ingress protection. It is useful to form the segment of the signal wire leading to the PG-11 cable gland into a protective loop to prevent condensation from running down in the direction of the gland.

9.3. Connections for transmitters with terminal box (PZ-type connector)

The transmitters with **PZ**-type connectors should be connected by linking the signal wires to a terminal block, as shown in figure 2b. Carefully screw in the cover and cork of the packing gland, making sure that the wire is tightly packed. Where necessary, the packing gland should be further sealed as described in 9.2.

9.4. Connections for transmitters with PK, PM12 or SG-type connector

The **PCE-28.SMART** series transmitters with **PK** connector or **PCE-28.SMART** transmitter with **PM12, SG** connector should be connected via a terminal box, in which the transmitter's cable is joined to the remainder of the signal line.
The terminal box must not be completely airtight, as the transmitter must be able to "breathe" through a capillary in the connector cable.

9.5. Protection from excess voltage

9.5.1. The transmitters and probes may be in danger from excess voltage caused by connection faults or atmospheric electrical discharge.
Protection from excess voltage between the wires of the transmission line is provided by TVS diodes installed in all types of transmitter (see the table, column 2).
In order to protect against excess voltage between the transmission line and the casing or earth (not prevented by the diodes connected between the transmission wires), additional protection is provided in the form of plasma surge arresters (see the table, column 3) and in special Ex marked on the rating plate, "Exi SA version".

Internal protection of transmitters and probes:

1	2	3
Type of transmitter	Protection between wires (TVS diodes) – permitted voltage	Protection between wires and earth and/or casing – type of protection, permitted voltage
PCE-28.SMART series.	68V DC	Plasma surge arresters - 230V DC (for normal and Exi S.A. version) (not applicable Exi version)

Additionally, is possible use an external protective device, e.g. the UZ-2 Aplisens.
During a strong overvoltage stroke between the wires of the line, TVS protection diode may be damaged (damaged diode does not protect the electrical system of the transmitter).
Symptoms of damage:

- if the transmitter is connected to supply, the input current exceeds 20 mA, and the voltage on the transmitter electrical input is low, less than 1V. In the extreme case, after burn of the circuit board or wires inside the transmitter, the current is 0mA , and is full supply voltage at the transmitter input;
- the measured transducer input resistance is approximately 10 Ω in the case of short circuit, or infinity in the case of the burnout of the transmitter internal connections.

Damage of the gas arrester, much less likely to damage to the diode, it may also reveal in short circuit or in reduction of transmitter input resistance.

i Insulation test voltage: 500V AC or 750V DC, relates to transmitters without gas arresters.

9.6. Earthing

The transmitters are equipped with internal and external earth terminals.

10. SETTING AND REGULATION

The **PCE-28.SMART** series transmitters are factory calibrated to the range stated in the order or to the basic range.
After installation, the transmitter's zero-point may drift and require adjustment.
This applies particularly in cases where the measurement range is small, where the impulse lines are filled with a separating liquid or where **PCE-28.SMART** series transmitters are used with remote diaphragm seals.

10.1. Transmitter Range, Definitions

10.1.1. The maximum range of absolute or differential pressure which the transmitter can measure is called the **"basic range"** (for specifications of basic ranges see p.5.1).
The width of the basic range is the difference between the upper and lower limits of the basic range.
The internal characteristic conversion curve for the basic range is coded in the transmitter's memory.
This is the reference curve used when making any adjustments which affect the transmitter's output signal.

10.1.2. When the transmitter is in use the term **"set range"** is used. The set range is the range whose lower end-point corresponds to an output current of 4mA and whose upper end-point corresponds to a current of 20mA (or 20mA and 4mA respectively when the conversion curve is inverted).
The set range may cover the whole of the basic range or only a part of it.
The width of the set range is the difference between its upper and lower end-points.
The transmitter may be set to any range within the basic range of pressure values, subject to the restrictions set out in the table in p.5.1.

10.2. Configuration and Calibration

10.2.1. The transmitter has features which enable metrological and identification parameters to be set and altered. The configurable metrological parameters affecting the transmitter's output current include the following:

a) unit in which the measured pressure is expressed on the display,
b) upper end-point of the set range,
c) lower end-point of the set range,
d) time constant,
e) type of characteristic curve: linear or radical.

Parameters of an informational nature which cannot be altered include the following:

f) upper limit of the maximum range,
g) lower limit of the maximum range,
h) minimum range.

10.2.2. Other identification parameters, not affecting the output signal, include: device address, device type code, factory identification code, factory device code, number of preambles (3÷20), UCS, TSD, program version, electronics version, flags, factory number, label tag, description tag, date tag, message, record number, sensing module number.
The process of setting the parameters listed in p.10.2.1 and p.10.2.2 is called **"Configuration".**

10.2.3. It is possible to carry out a **"pressure zeroing"** procedure, for example in order to compensate for measurement deviation caused by a change in position when the transmitter is installed.
The transmitter may also be **calibrated**, by taking readings with the input pressure controlled using a standard device. These process and zero-point adjustments are called **"Calibration".**

10.2.4. Configuration and Calibration of the transmitter are carried out using an Aplisens KAP-03 communicator, certain Hart communicators or a PC with Hart/RS232 or Hart/USB/Bluetooth converter and Aplisens "Raport2" software.
Together with the "RAPORT2" configuration software there is an „INTERVAL LINEARIZATION" software supplied to enable the input of 21-point nonlinear functional characteristics to the transmitter.
A description of the functions of the KAP communicator is contained in the KAP Communicator Operating Manual.

A list of Hart protocol commands implemented for PCE-28.SMART transmitters are contained in the IO.HART operating instructions available at www.aplisens.pl

After configuration it is important to protect the transducers using command HART [247]. During work transmitter should be safe prior to entries. This prevents accidental or intentional changes configurational data. The protection function is accessible in KAP-03 communicator, "Raport 2" software, as well as, in applying DD or DMT programs libraries.

11. SERVICES AND SPARE PARTS.

11.1. Periodic service

Periodic service should be made in accordance with the user regulations. During service, the pressure connectors should be checked for loose connections and leaks, the diaphragm seals should be checked for tarnishing and corrosion, and the electrical connectors should be checked with regard to tightness the state of the gaskets, packing glands, and. If necessary check the transmitter measure characteristic by following the procedures for "Calibration" and, where appropriate, "Configuration".

11.2. Unscheduled inspections

If the transmitters are installed in a location where they may be exposed to mechanical damage, excess pressure, hydraulic impulses or excess voltage, or the diaphragm may be in danger from sedimentation, crystallization or erosion, inspections should be carried out as required.
Where it is found that the signal in the transmission line is absent or its value is incorrect, a check should be made on the line and its terminal connections.
Check whether the values of the supply voltage and load resistance are correct.
If a communicator is connected to the power supply line of the transmitter, a fault in the line may be indicated by the message "No response" or "Check connection".
If the line is in order, check the operation of the transmitter.

11.3. Cleaning the Diaphragm Seal, Overloading Damage

11.3.1. Sediment and dirt which have formed on the diaphragm in the course of operation must not be removed by mechanical means, as this may damage both the diaphragm and the transmitter itself.
The only permitted method is the dissolving of sediment.

11.3.2. Sometimes transmitters malfunction due to damage caused by overloading, e.g. in case of:

- application of excessive pressure;
- freezing or solidification of the medium;
- action of a hard object, such as a screwdriver, on the diaphragm.

Usually in such cases the symptoms are such that the output current falls below 4mA or rises above 20mA, and the transmitter fails to respond to input pressure**.**

11.4. Spare parts.

The following transmitter parts may need replacing due to damage or normal wear:
PD connector – terminal block with angular cover and seal, connector base with seal, rating plate, case.

Other parts, due to their special characteristics and anti-explosive requirements, may be replaced only by the manufacturer or an authorized firm.

12. PACKING, STORAGE AND TRANSPORT

13.1. The transmitters should be packed singly or in sets, in such a way as to protect them from damage during transportation.
The transmitters should be stored in multiple packs under cover, in a place free of vapours and reactive substances, with temperature and humidity not exceed the limits specified in p.5.1.2.
Transmitters with uncovered diaphragm or seal connectors, stored without packaging, should have covers to prevent damage to the diaphragm.
During transportation, the transmitters should be packed and secured so as to prevent them from shifting.
Any means of transport may be used, provided direct atmospheric effects are eliminated.

13.2. The **PCE-28P.SMART** probes are individually packed. Individually packed probes are bound in packages containing several probes. Storage and transport as above.

13. GUARANTEE

Manufacturer warrants under the conditions specified in the Product Certificate which is also a guarantee card

14. ADDITIONAL INFORMATION

The manufacturer reserves the right to make constructional and technological changes which do not lower the quality of the transmitters.

14.1. Related documents

- "KAP-03 – Communicator Operating Manual" supplied with the Aplisens communicator.
- "Raport2" software.
- „RAPORT 2" and converter HART/RS232 - User's manual.

14.2. Related standards

PN-EN 60529:2003	Degrees of protection provided by enclosures. (IP Code)
PN-EN61010-1	Safety requirements for electrical equipment for measurement, control and laboratory use. General requirements.
PN-82/M-42306	Screwed connectors of pressure gauges.
PN-81/M-42009	Automatics and industrial measurements. The packing, the storage and transport of devices. General requirements.
PN-EN 1092-1:2004 (U)	Flanges and their joints – Circular flanges for pipes, valves, fittings and accessories. – Part 1: Steel flanges.

15. FIGURES

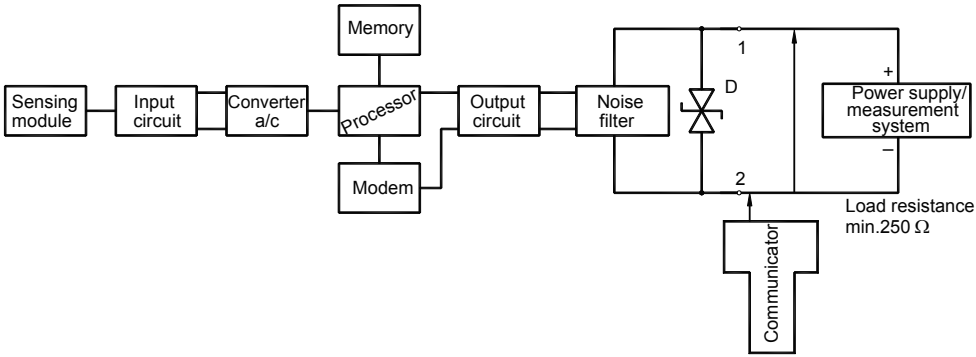


Fig.1. PCE-28.SMART series transmitters – block diagram.

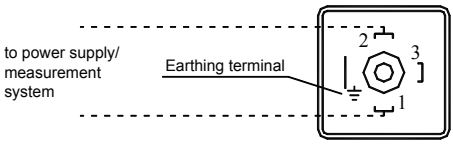


Fig. 2a

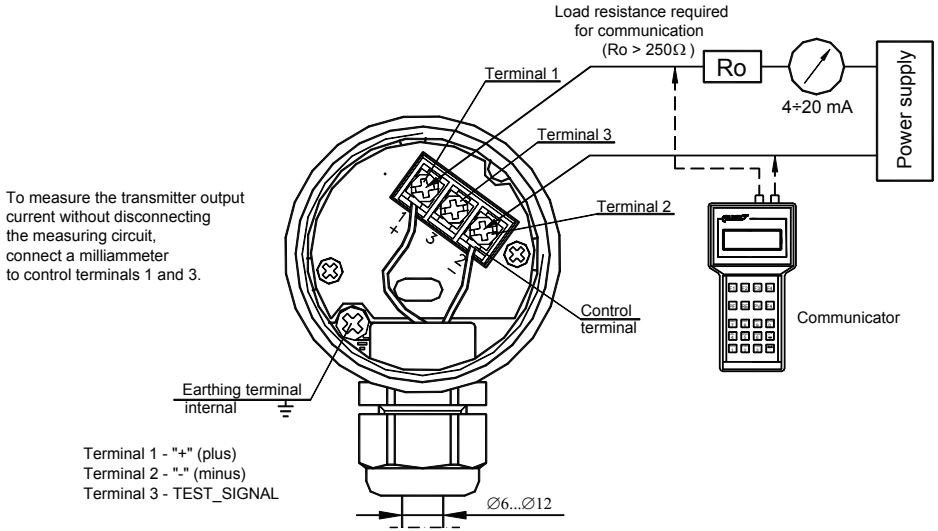


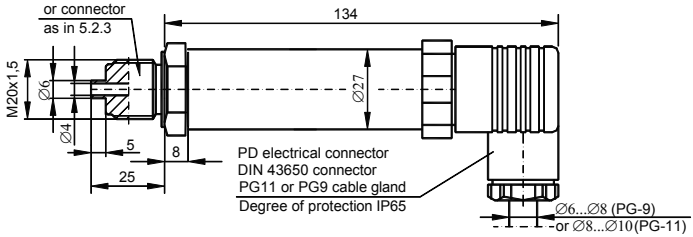
Fig. 2b

Connecting the communicator

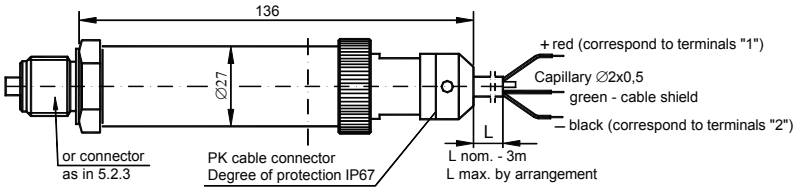
If the resistance (Ro) seen from the transmitter to the line direction is greater than > 250 Ω, is possible communicate to the transmitter via a connection to measurement line.
(Ro = line resistance + load).
If Ro < 250Ω, there will be no communication and resistance in the line should be increased to at least 250 Ω.
Communicator should be connected to current loop as at Fig. 2b.
It may be made both: in connecting box or to transmitter terminals.

The voltage fall on installed Ro resistor should be considered by establishing the voltage supply in transducer measured line (see p. 5.1.1.); necessary to verify isn't resistance sum in current loop exceed (see fig.2b).

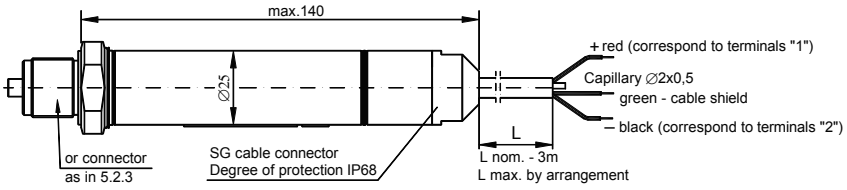
Fig.2. Electrical connections**.** PCE-28.SMART series transmitters.



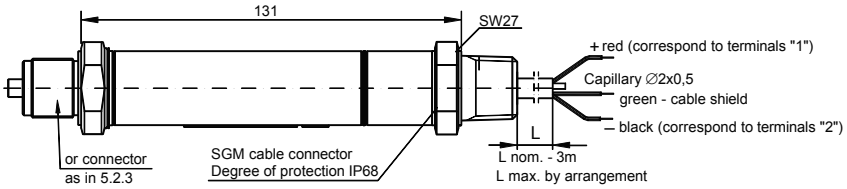
PCE-28.SMART transmitter with PD connector



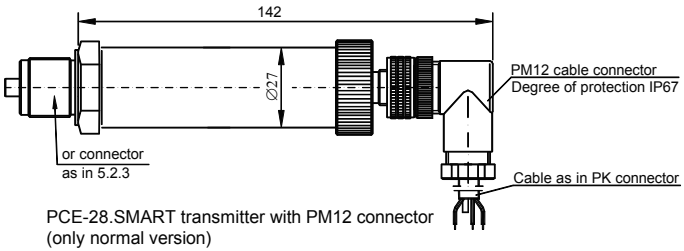
PCE-28.SMART transmitter with PK connector



PCE-28.SMART transmitter with SG connector



PCE-28.SMART transmitter with SGM connector (1/2"NPT)



PCE-28.SMART transmitter with PM12 connector
(only normal version)

Fig.3. PCE-28.SMART pressure transmitter with PD, PK SG, PM12 connector.

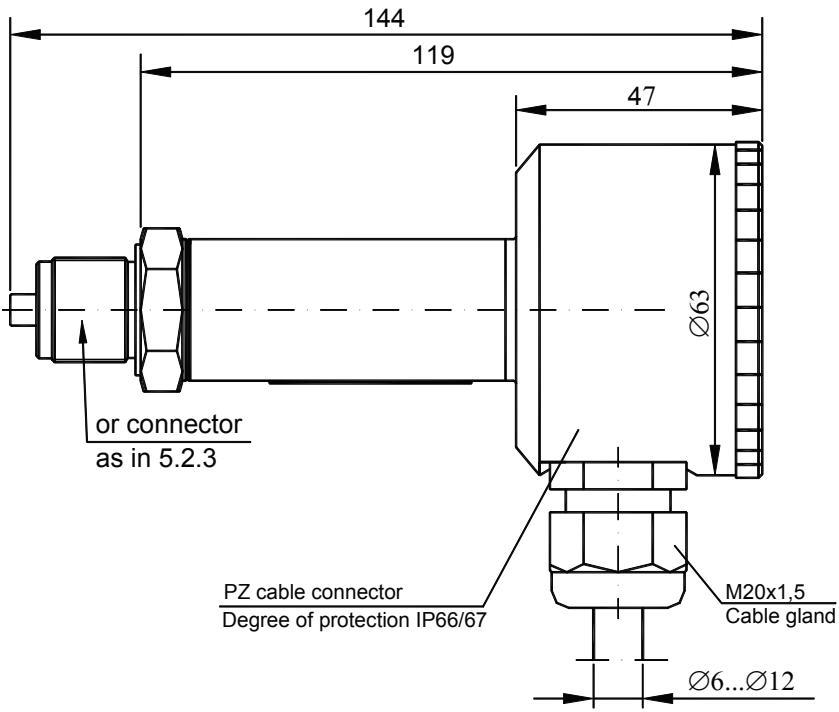


Fig.4. PCE-28.SMART pressure transmitter with PZ connector.

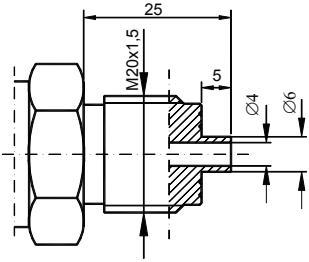


Fig.5a. M-type connector with M20x1.5 thread

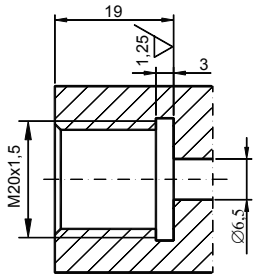


Fig.5b. Socket for use with transmitters with M-type connector.

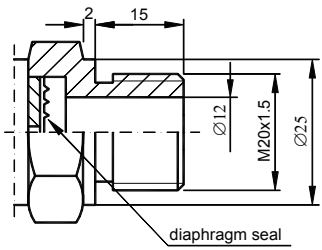


Fig.6a. P-type connector with M20x1.5 thread

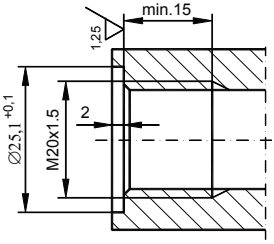


Fig.6b. Socket for use with transmitters with P-type connector P.

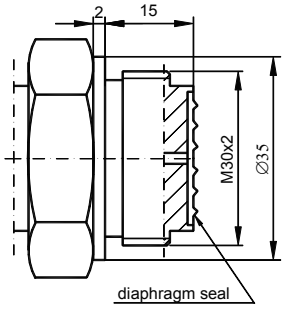


Fig.7a. CM30x2-type connector with flush diaphragm with M30x2 thread,

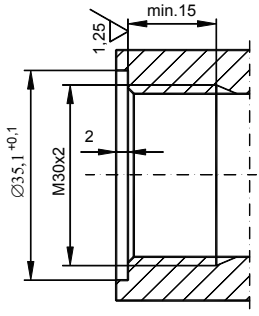


Fig.7b. Socket for use with transmitters with CM30x2-type connector with flush diaphragm.

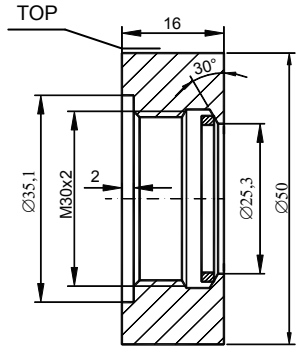


Fig.7c. Weldable fitting ring for use with transmitters with CM30x2-type connector
Material: 316Lss
Sealing: teflon

Order code Socket CM30x2

The ring in Fig. 7c must be welded in place with the word TOP upwards

Fig.5. M-type connector with M20x1.5 thread.
Fig.6. P-type connector with M20x1.5 thread.
Fig.7. CM30x2-type connector with flush diaphragm with M30x2 thread.

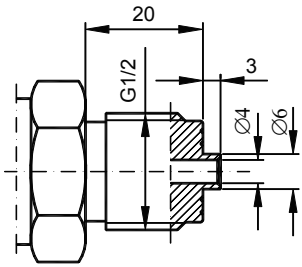


Fig.8a. G1/2-type connector
with G1/2" thread

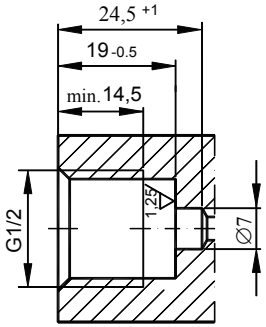


Fig.8b. Socket for use with transmitters
with G1/2-type connector.

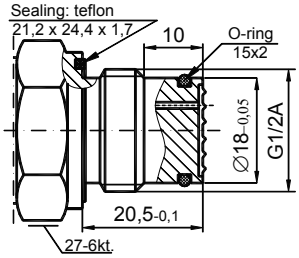


Fig.8c. CG1/2 -type connector
with flush diaphragm
with G1/2" thread,

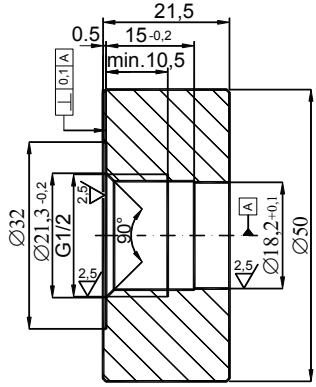


Fig.8d. Weldable fitting ring for use with
transmitters with CG1/2 - type connector
Material – 316Lss
Order code Socket CG1/2

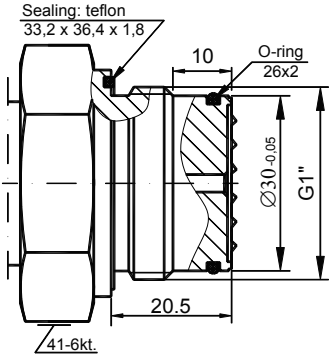


Fig.8e. CG1-type connector
with flush diaphragm with G1" thread,

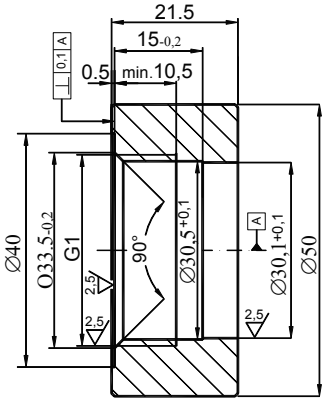


Fig.8f. Weldable fitting ring for use with
transmitters with CG1 - type connector
Material – 316Lss
Order code Socket CG1

Fig.8. G1/2" and G1" Process connections.

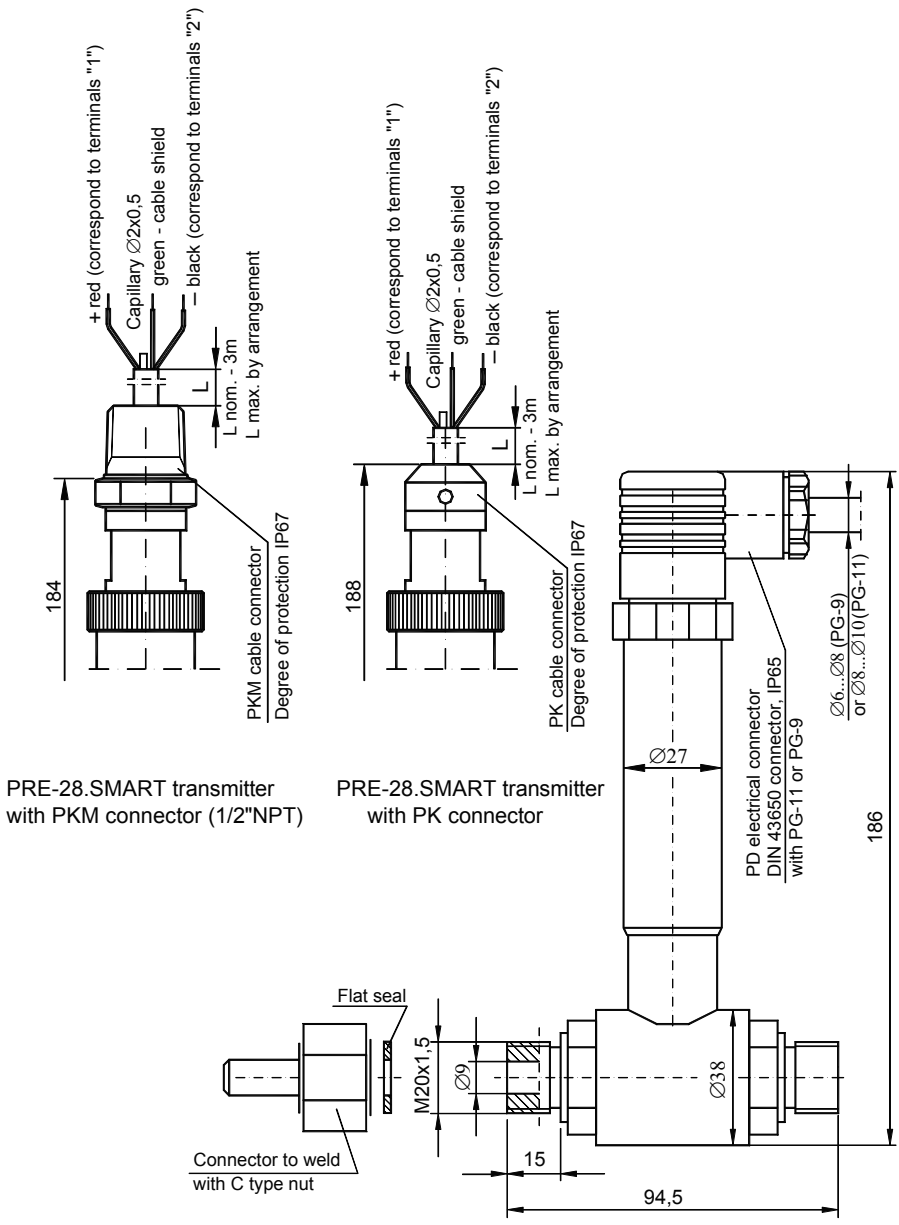


Fig.9. PRE-28.SMART differential pressure transmitter with PD, PK connector.

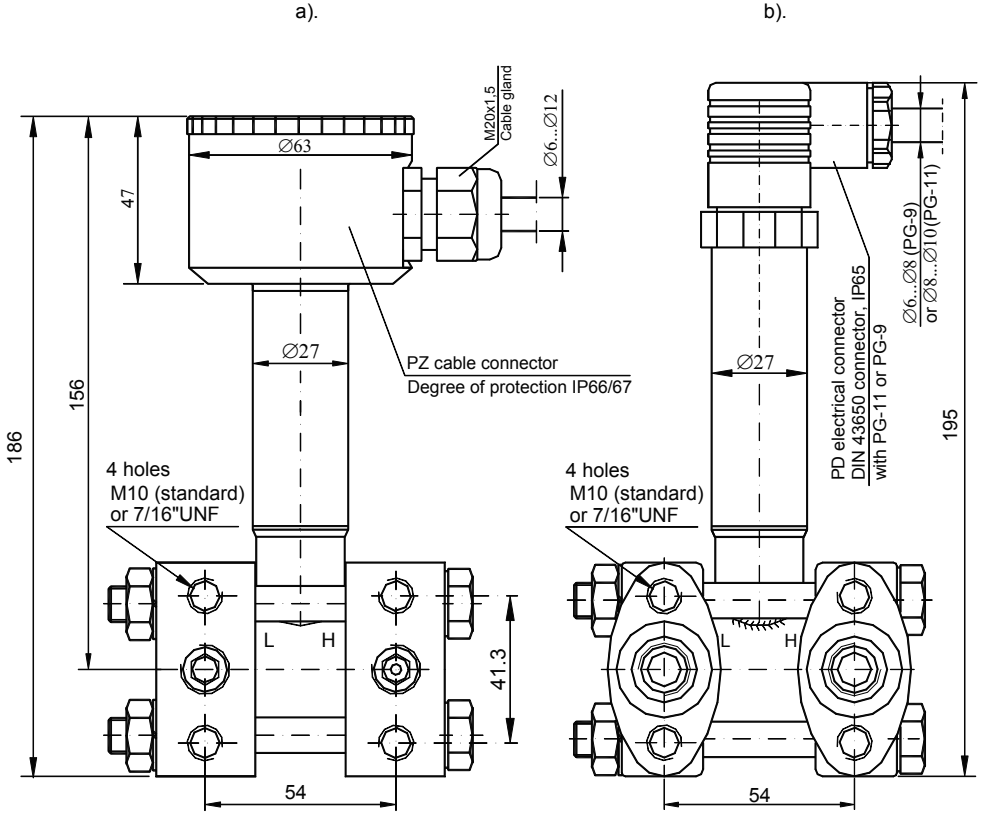


Fig.10. PRE-28.SMART differential pressure transmitter with C-type process connection to be mounted together with valve manifold.
a) PRE-28.SMART differential pressure transmitter with PZ cable connector.
b) PRE-28.SMART differential pressure transmitter with PD cable connector.

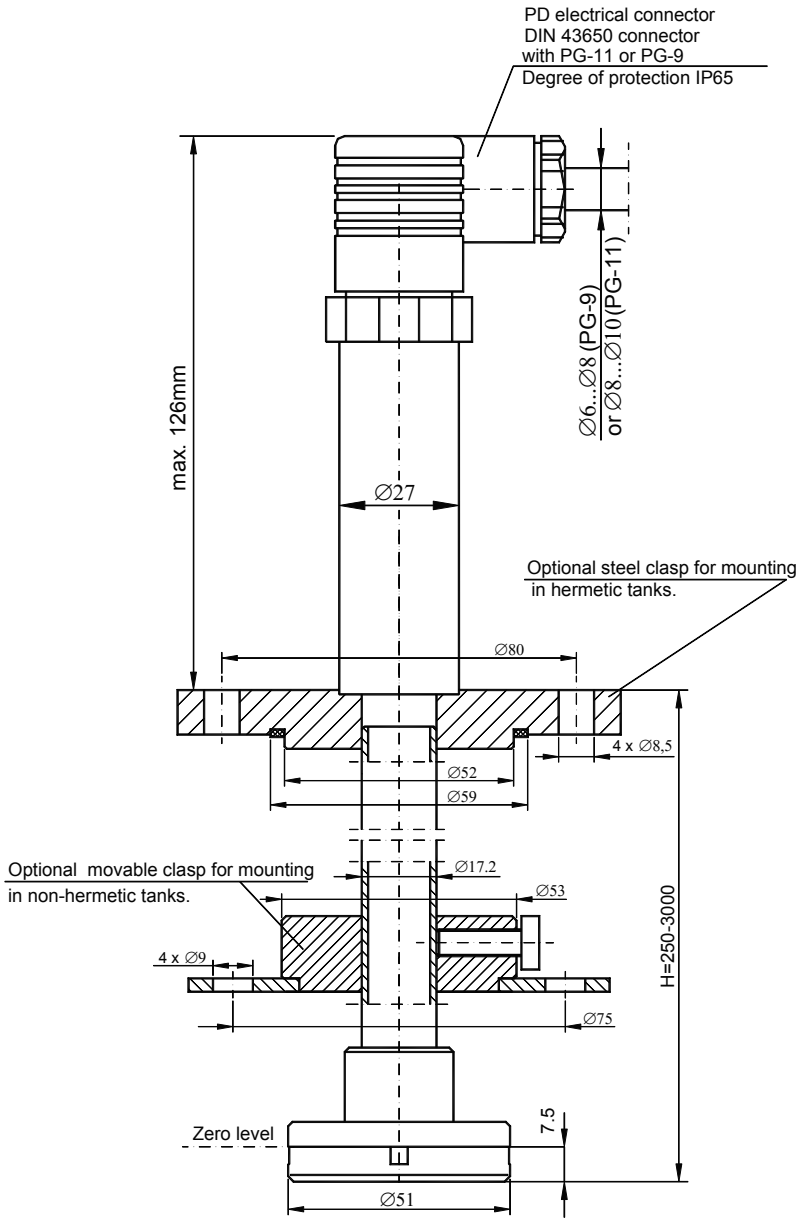


Fig.11. PCE–28P.SMART level probe.

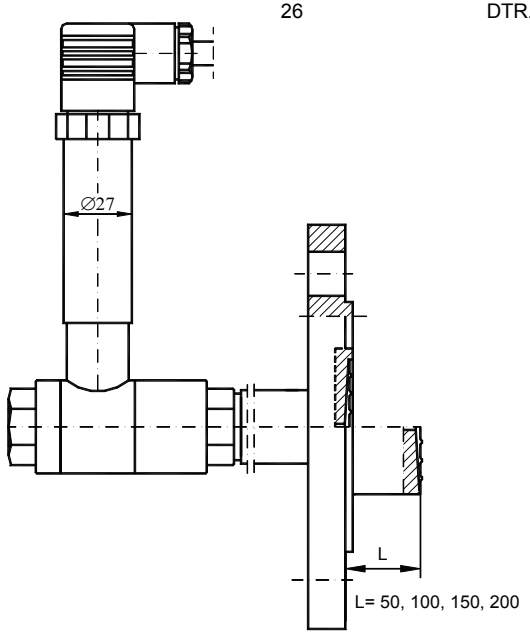


Fig.12. PRE-28.SMART differential pressure transmitter with a single direct diaphragm seal.

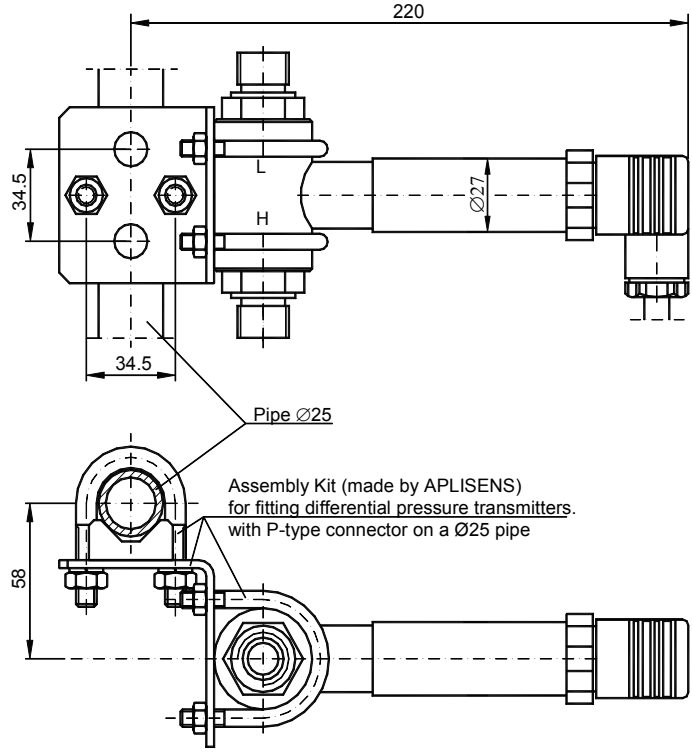


Fig.13. Example: how to install the PRE–28.SMART.

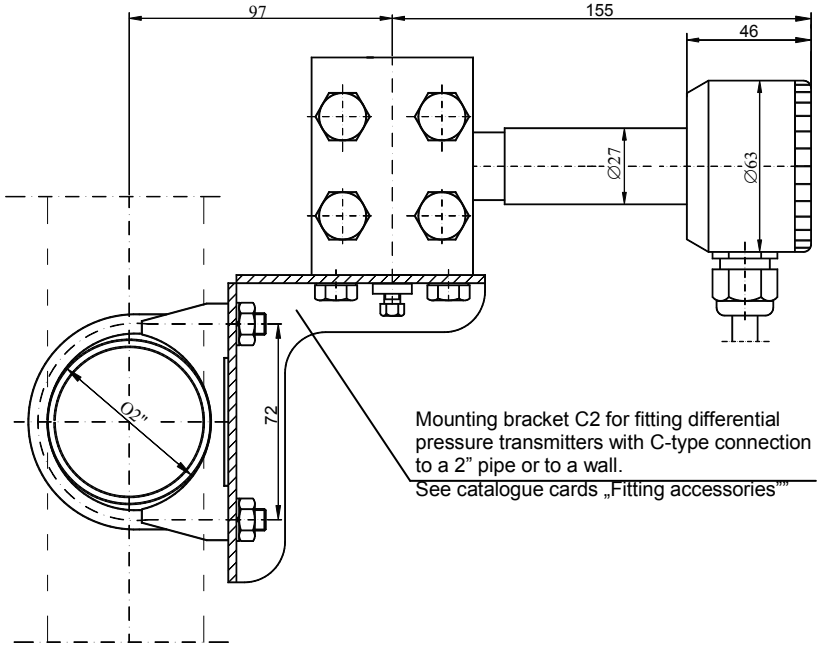


Fig.14. Example: how to install the PRE-28.SMART transmitter on a vertical or horizontal pipe.

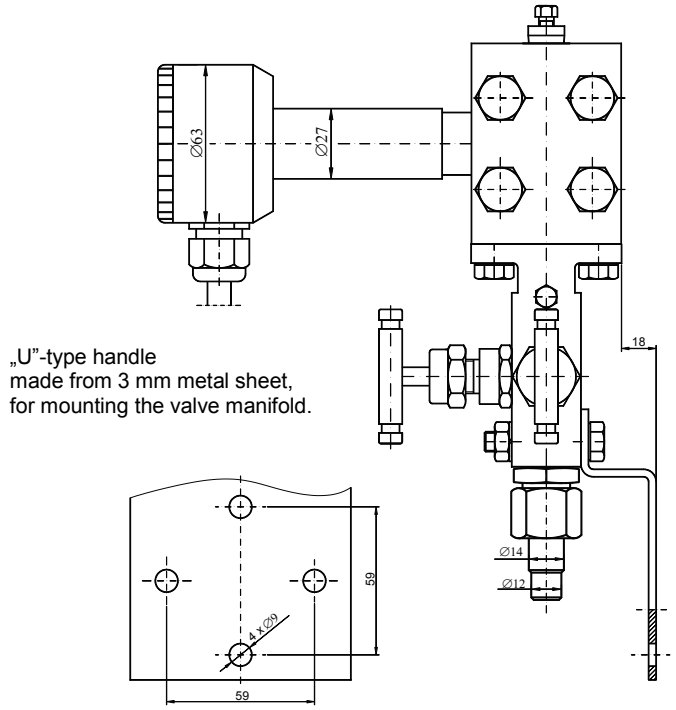


Fig.15. Example: how to install the PRE-28 transmitter with a valve manifold to a wall.

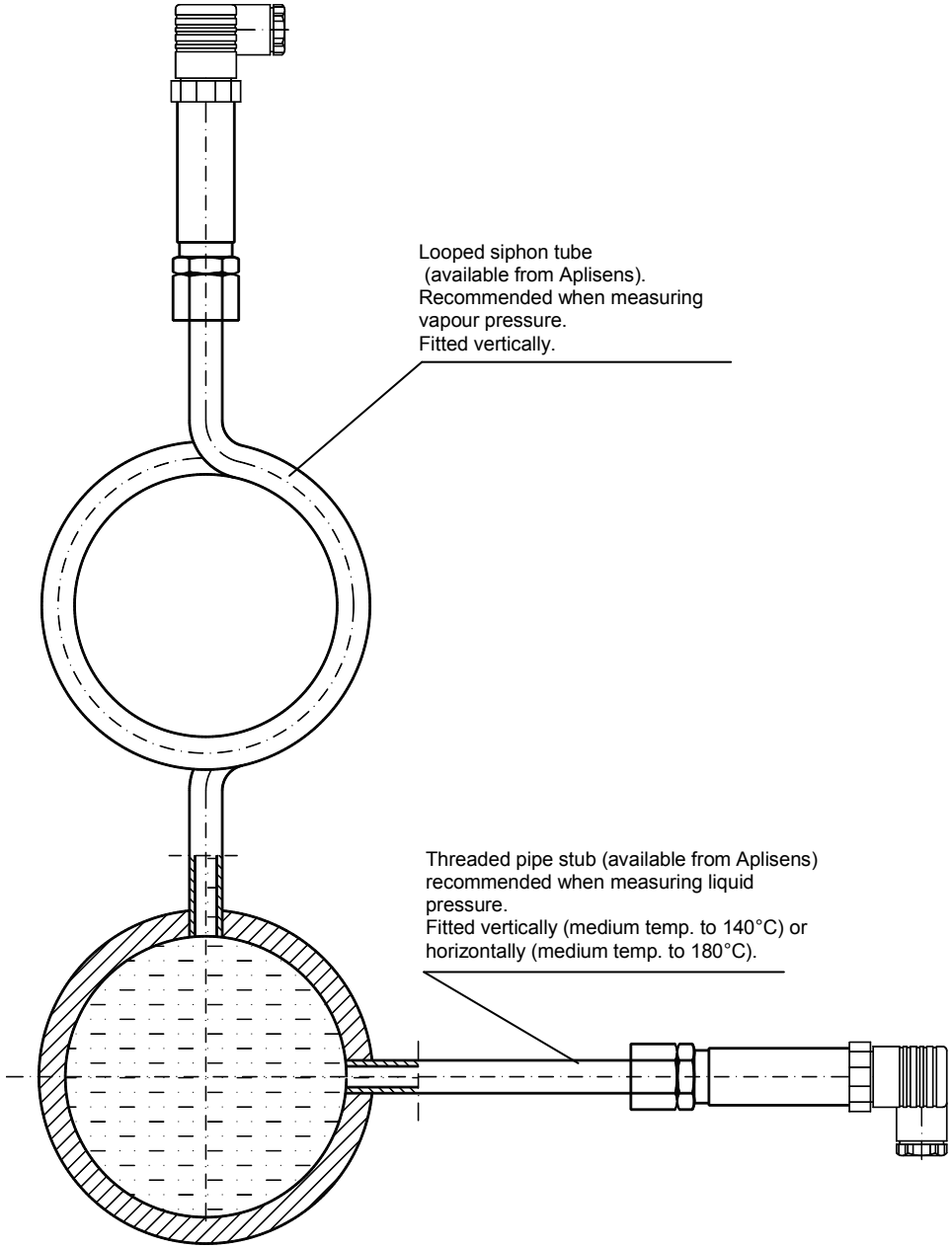


Fig.16. Possible methods of isolating the transmitter from high temperatures.

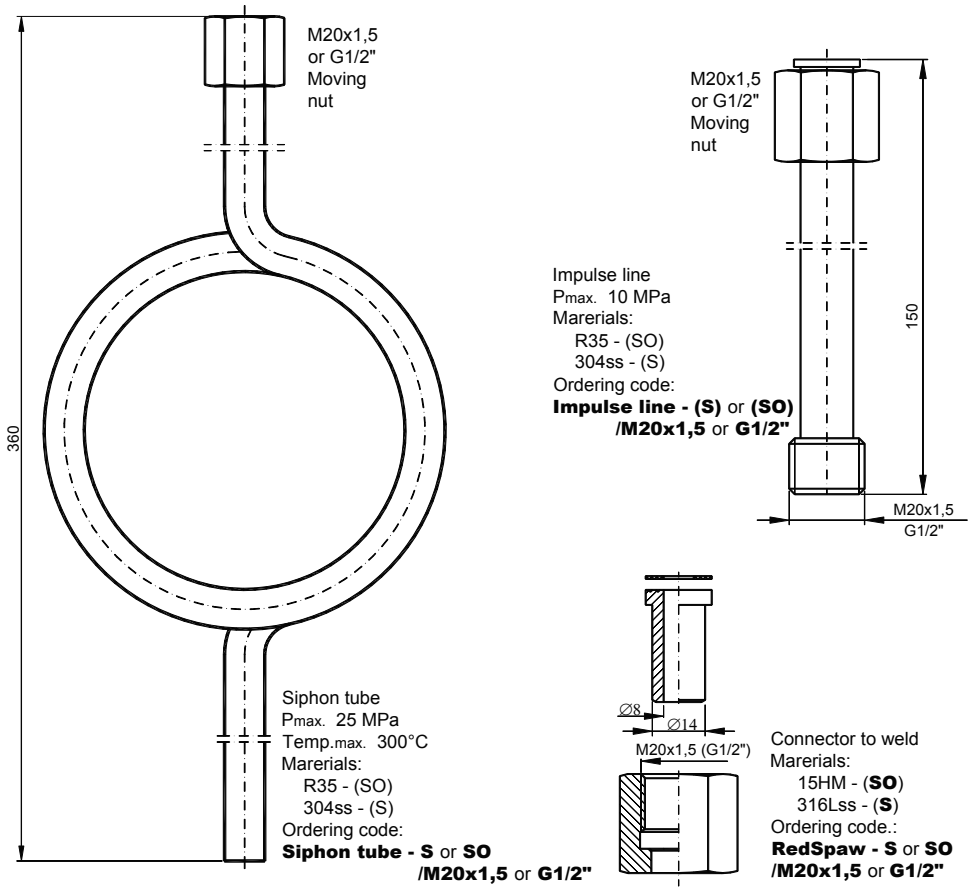


Fig.17. Additional equipment for fitting of pressure transmitters.