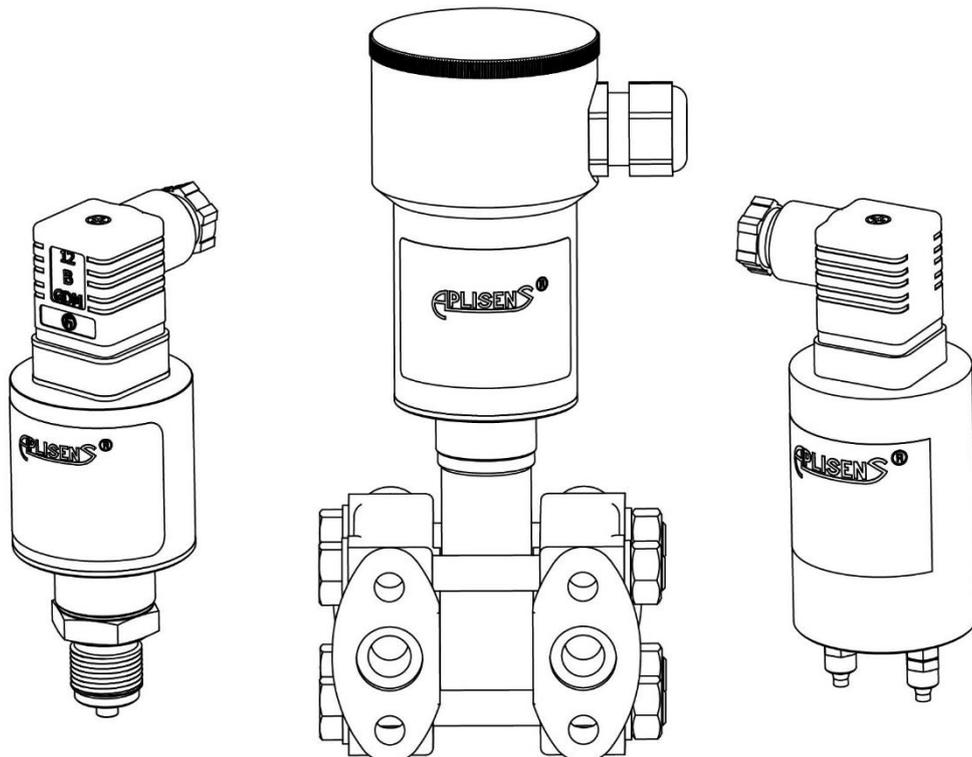


# APLISENS<sup>®</sup>

## USER'S MANUAL

PRESSURE TRANSMITTERS  
**APCE-2000**

DIFFERENTIAL PRESSURE TRANSMITTERS  
**APRE-2000, APRE-2000G**



PRODUCT CODE – see: → 5.2. Transmitter identification.

The QR code or ID number identifies the transmitter and provides quick access to the following documentation on the manufacturer’s website: user’s manual, explosion-proof device user manual, technical information, declarations of conformity and copies of certificates.

### APCE-2000

ID:0059 0001 0001 0000 0000 0000 0001 32  
<https://www.aplisens.pl/ID/005900010001000000000000000132>



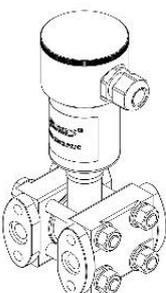
### APCE-2000 (Exi)

ID:0059 0002 0001 0000 0000 0001 0001 49  
<https://www.aplisens.pl/ID/005900020001000000000001000149>



### APRE-2000

ID:0060 0001 0001 0000 0000 0000 0001 29  
<https://www.aplisens.pl/ID/006000010001000000000000000129>



### APRE-2000 (Exi)

ID:0060 0002 0001 0000 0000 0001 0001 46  
<https://www.aplisens.pl/ID/006000020001000000000001000146>



### APRE-2000G

ID:0061 0001 0001 0000 0000 0000 0001 26  
<https://www.aplisens.pl/ID/006100010001000000000000000126>



### APRE-2000G (Exi)

ID:0061 0002 0001 0000 0000 0001 0001 43  
<https://www.aplisens.pl/ID/006100020001000000000001000143>



## 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 an Ex type 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 a suitable technical condition of the device 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 I&C equipment. The installer is responsible for performing the installation in accordance with manual as well as with the electromagnetic compatibility and safety regulations and standards applicable to the type of installation.

In systems with I&C equipment, in case of leakage, there is a danger to staff due to the medium under pressure. All safety and protection requirements must be observed during installation, operation and inspections.

If a malfunction occurs, the device should be disconnected and handed over to the manufacturer for repair.



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 hazards occur:

- possible mechanical impacts, excessive shocks and vibration;
- excessive temperature fluctuation;
- water vapour condensation, dusting, icing.

Changes made to the manufacturing of products may be introduced before the paper version of the manual is updated. The up-to-date manuals are available on the manufacturer's website: [www.aplisens.com](http://www.aplisens.com).

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# 1. INTRODUCTION

## 1.1. Purpose of the document

The subject of manual are smart pressure transmitters **APCE-2000**, smart differential pressure transmitters **APRE-2000**, **APRE-2000G**, hereinafter referred jointly to as the transmitters. The manual applies to the following versions: standard, intrinsically safe Exi.

Within the meaning of Directive 2014/68/EU (PED), the transmitters are designed to category I, module A. PED marking does not apply to additional equipment of the transmitters, i.e. separators, valves, connectors, impulse tubes, etc. In the manufacturer's EU declarations of conformity, the transmitters as designed above have the CE markings. The transmitters with permissible overload of 200 bar and lower are manufactured in accordance with good engineering practice according to article 4 point 3 of Directive 2014/68/EU.

The manual contains data, tips and general recommendations for safe installation and operation of the transmitters, as well as troubleshooting in case of possible failure.

The manual does not cover explosion protection issues.



Data on the **APCE-2000**, **APRE-2000**, **APRE-2000G** transmitters in intrinsically safe version according to IECEx and ATEX are included in the appendices marked in Instructions for the explosion-proof safe device EN.IX.APCE.APRE.

## 1.2. Trademarks

HART® is a registered trademark of FieldComm Group.

Windows® is a registered trademark of Microsoft Corporation.

Google Play® is a service registered and managed by Google® Inc.

## 1.3. Transmitter set range

The figure below shows the transmitter set range and limits related to allowable set range, digital processing range and saturation limits of A/D pressure measurement transducer. As standard, values of 4 mA / 20 mA currents are assigned to LRV/URV points. In order to obtain reverse characteristics, it is possible to reverse the assignment so that the LRV/URV points are assigned to 20 mA / 4 mA currents.

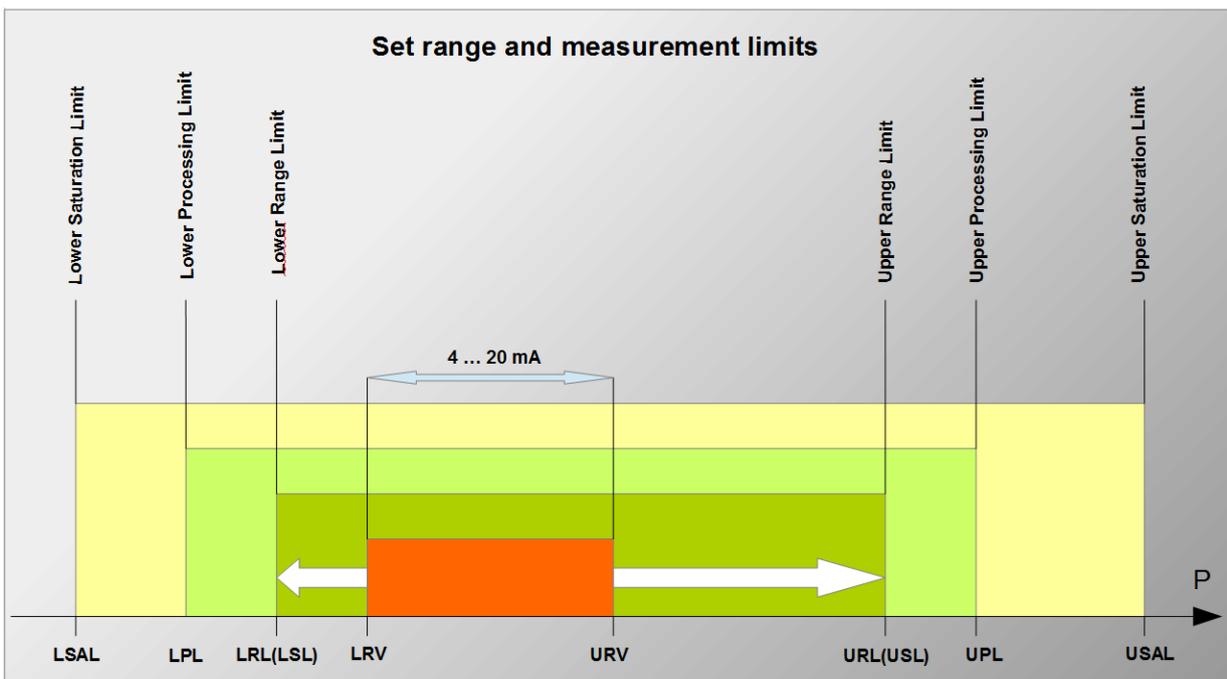


Figure 1. Set range and measurement limits

## 1.4. Definitions and abbreviations

**Table 1.** Definitions and abbreviations

Item no.	Abbr.	Meaning
1	<b>LRV</b>	"Lower Range Value" – the value of the set range expressed in physical units corresponding to the current of 4,000 mA, i.e. 0% of the output setpoint. The set range cannot exceed the set range limits. The minimum width of the set range <b>[(URV-LRV)]</b> is limited to 10% of the base range <b>(URL-LRL)</b> .
2	<b>URV</b>	"Upper Range Value" – the value of the set range expressed in physical units corresponding to the current of 20,000 mA, i.e. 100% of the output setpoint. The set range cannot exceed the set range limits. The minimum width of the set range <b>[(URV-LRV)]</b> is limited to 10% of the base range <b>(URL-LRL)</b> .
3	<b>LRL LSL</b>	"Lower Range Limit" or "Lower Sensor Limit" - lower limit of set range expressed in physical units. Value <b>(URL-LRL)</b> or <b>(USL-LSL)</b> is referred to as the base transmitter range.
4	<b>URL USL</b>	"Upper Range Limit" or "Upper Sensor Limit" – upper limit of set range expressed in physical units. Value <b>(URL-LRL)</b> or <b>(USL-LSL)</b> is referred to as the base transmitter range.
5	<b>LPL</b>	"Lower Processing Limit" – lower limit of digital processing of measured value. The transmitter digitally processes a measurement up to 50% of the base range width below the lower limit of set range <b>LRL (LSL)</b> . After reaching the <b>LPL</b> and when below this value up to <b>LSAL</b> , the transmitter freezes the refreshing of digital value of the measurement.
6	<b>UPL</b>	"Upper Processing Limit" – upper limit of digital processing of measured value. The transmitter digitally processes a measurement up to 50% of the base range width above the upper limit of set range <b>URL (USL)</b> . After reaching the <b>UPL</b> and when above this value up to <b>USAL</b> , the transmitter freezes the refreshing of digital value of the measurement.
7	<b>LSAL</b>	"Lower Saturation Limit" - lower limit of the A/D transmitter processing range. The lower limit of the A/D transmitter saturation is on the pressure / differential pressure scale below the <b>LPL</b> point and is associated with the minimum pressure, at which the analogue-digital pressure measurement transmitter reaches the lower limit of the processing capacity. The exact determination of this pressure is not possible, however usually the pressure does not exceed the pressure corresponding to 200% of the base range width <b>(URL-LRL)</b> below the lower limit of the digital processing of measured <b>LPL</b> value.
8	<b>USAL</b>	"Upper Saturation Limit" - upper limit of the A/D transmitter processing range. The upper limit saturation point of A/D transmitter is on the pressure / differential pressure scale above the <b>UPL</b> point and is associated with the maximum pressure at which the analogue-digital pressure measurement transmitter reaches the upper limit of the processing capacity. The exact determination of this pressure is not possible, however usually the pressure does not exceed the pressure corresponding to 200% of the base range width <b>(URL-LRL)</b> above the upper limit of the digital processing of measured <b>UPL</b> value.
9	<b>AL_L</b>	Low current alarm.
10	<b>AL_H</b>	High current alarm.
11	<b>I_AL</b>	The alarm current set by the transmitter controller in the current loop.

## 2. SAFETY



- The installation and start-up of the device and any activities related to operation shall be carried out after thorough examination of the contents of user's manual and the instructions related thereto.
- Installation and maintenance should be carried out by qualified staff having the required authorizations to install electrical and measuring devices.
- The device shall be used according to its intended purpose in line with the permissible parameters specified on the nameplate (→ 5.2. Transmitter identification).
- The protection elements used by the manufacturer to ensure transmitter safety may be less effective if the device is operated in a manner not consistent with its intended purpose.
- Before installing or disassembling the device, it is absolutely necessary to disconnect it from the power source.
- No repairs or alterations to the transmitter electronic system are permitted. Assessment of damages and possible repair may only be performed by the manufacturer or authorized representative.
- Do not use instruments if damaged. In case of malfunction, the device must be put out of operation.
- In case of transmitters equipped with factory-mounted process connector of C and CR type, it is unacceptable to loosen the fixing screws of the connector cover.

## 3. TRANSPORT AND STORAGE

### 3.1. Delivery check

After receiving the delivery, please refer to the general terms and conditions of contracts available on the manufacturer website:

[https://aplisens.com/ogolne\\_warunki\\_umow.html](https://aplisens.com/ogolne_warunki_umow.html).

### 3.2. Transport

Transport of transmitters shall be carried out with the use of covered means of transport, in original packages with diaphragm provided with protection. The packaging shall be protected against movement and direct impact of atmospheric factors.

### 3.3. Storage

Transmitters shall be stored in a factory packaging, in an indoor room without vapours and aggressive substances, protected against mechanical impact at an air temperature and relative humidity not exceeding the permissible ambient and operating parameters in accordance with data sheet.

In case of transmitters with exposed diaphragm or separator connections, stored without packing, covers should be installed to protect the diaphragm from damage.

## 4. GUARANTEE

General terms and conditions of guarantee are available on the manufacturer's website:

[www.aplisens.com/ogolne\\_warunki\\_gwarancji](http://www.aplisens.com/ogolne_warunki_gwarancji).



The guarantee shall be repealed if the device is used against its intended use, failure to comply with user's manual or interference with the structure of the device.

## 5. IDENTIFICATION

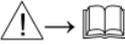
### 5.1. Manufacturer's address

APLISENS S.A.  
03-192 Warsaw  
Morelowa 7 St.  
Poland

### 5.2. Transmitter identification

Depending on the version of the transmitter, the nameplates may differ in the amount of information and parameters.

**Table 2.** Symbols occurring on the transmitter nameplate

	Logo and name of manufacturer
	CE mark
	CE with number notified body
03-192 WARSZAWA Morelowa 7 Poland tel.: +48 22 814 07 77	Manufacturer's address
	QR code
TYPE:	Transmitter, electrical and process connection type
ID	Transmitter model ID
# S/N	Transmitter serial number
	Measuring range
	Supply voltage values
	Output signal
	Permissible range of ambient temperature
	Permissible static Pressure
IP	IP protection rating
Year of production	Year of production
	Note about the obligation to read the manual
//The lower part of the nameplate//	Special execution
Aplisens S.A. ul. Morelowa 7, 03-192 Warszawa	Manufacturer address

### 5.3. CE mark, declaration of conformity

The device has been designed to meet the highest safety standards, has been tested and has left the factory in a condition that is safe for operation. The device complies with the applicable standards and regulations listed in the EU Declaration of Conformity and has CE marking on nameplate.

## 6. INSTALLATION

### 6.1. General recommendations



It is recommended that in case of a gaseous medium, the transmitters should be installed above the measuring point so that condensate may flow to the point from which the measured pressure is collected, while in case of liquid medium or steam, it should be installed below the point of pressure intake. The configuration of impulse tubes and valve connection system should be selected taking into account the measurement conditions.

For low measurement ranges, there may be an influence of transmitter's position and influence of impulse lines position and liquid filling method on output signal. Any possible misalignment of the signal should be corrected by resetting the transducer after mounting (→ [8.3. Correction of impact of transmitter mounting position on site – pressure reset](#)).

#### 6.1.1. Installation instructions for transmitters with distance separators

The protection of the separator diaphragm can only be removed shortly before installation. Hydrostatic pressure of the manometric liquid column in the transmitter-separator system may cause incorrect indication of the measured value. After installation, the transmitter must be pressure-reset. Do not clean or touch separator diaphragms using hard or pointy objects.



Separators with pressure transmitter form a closed, calibrated system filled with gauge fluid. The opening for filling the device with gauge fluid is sealed and must not be opened. When choosing a mounting location, it is necessary to ensure sufficient stress relief of the capillaries tension in order to avoid excessive bending. Incorrect installation of the sealing may result in incorrect measurement indications. Special attention must be paid when selecting correct dimensions of the sealing.



As standard, the separators are not provided with the gaskets.

## 7. ELECTRICAL CONNECTION

### 7.1. Cable connection to transmitter internal terminals



All connection and installation operations shall be performed with disconnected supply voltage and other external voltages, if used.



Failure to provide proper connection of the transmitter may result in danger. Risk of electric shock and/or ignition in potentially explosive atmospheres.

#### 7.1.1. Connection of transmitters with PD-type connector

In order to properly connect the wires, unscrew and remove the terminal block with its cover from the contact pins. Remove the block from the cover, undermining it with the end of the screwdriver inserted into the slot provided for this purpose. Connect the wires to the cube as shown in the picture below. Rotation of the electrical connector by 90° realize by appropriately mounting the terminal block in the cover of connector. It is advantageous to form the conduit in the form of a drip loop to prevent condensation from running down towards the gland.

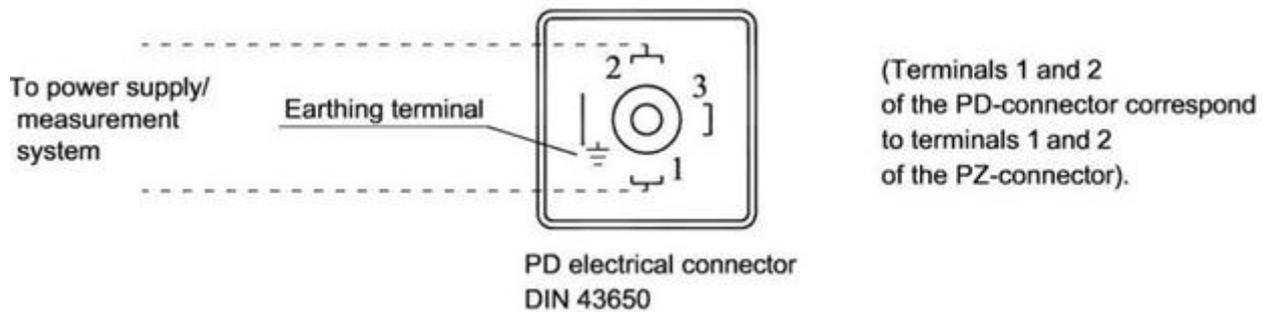
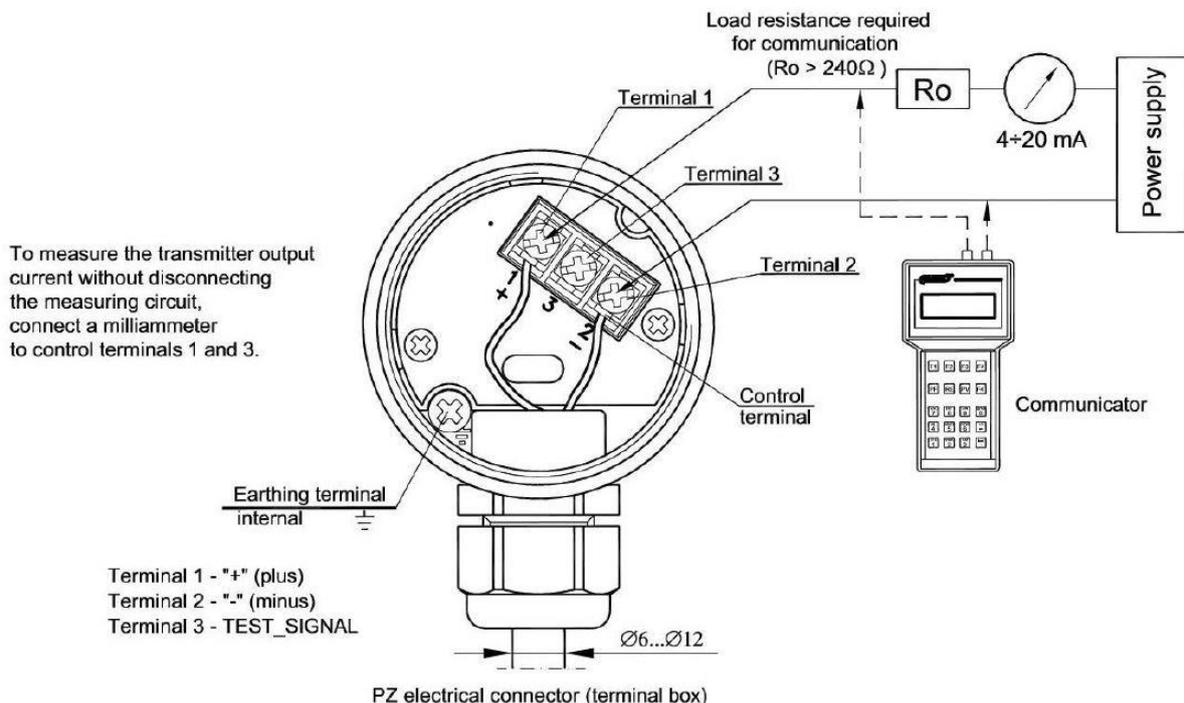


Figure 2. Electrical connection of transmitter with PD connection

#### 7.1.2. Connection of transmitters with PZ-type connector

The electrical connection of the transmitters should be made by connecting the signal wires to the transmitter terminals. Screw on the cover and the stuffing plug of the gland carefully, making sure that the gasket is tightly compressed on the conduit. There is a terminal block installed inside equipped with additional control terminals connected to terminals 1, 2, 3.



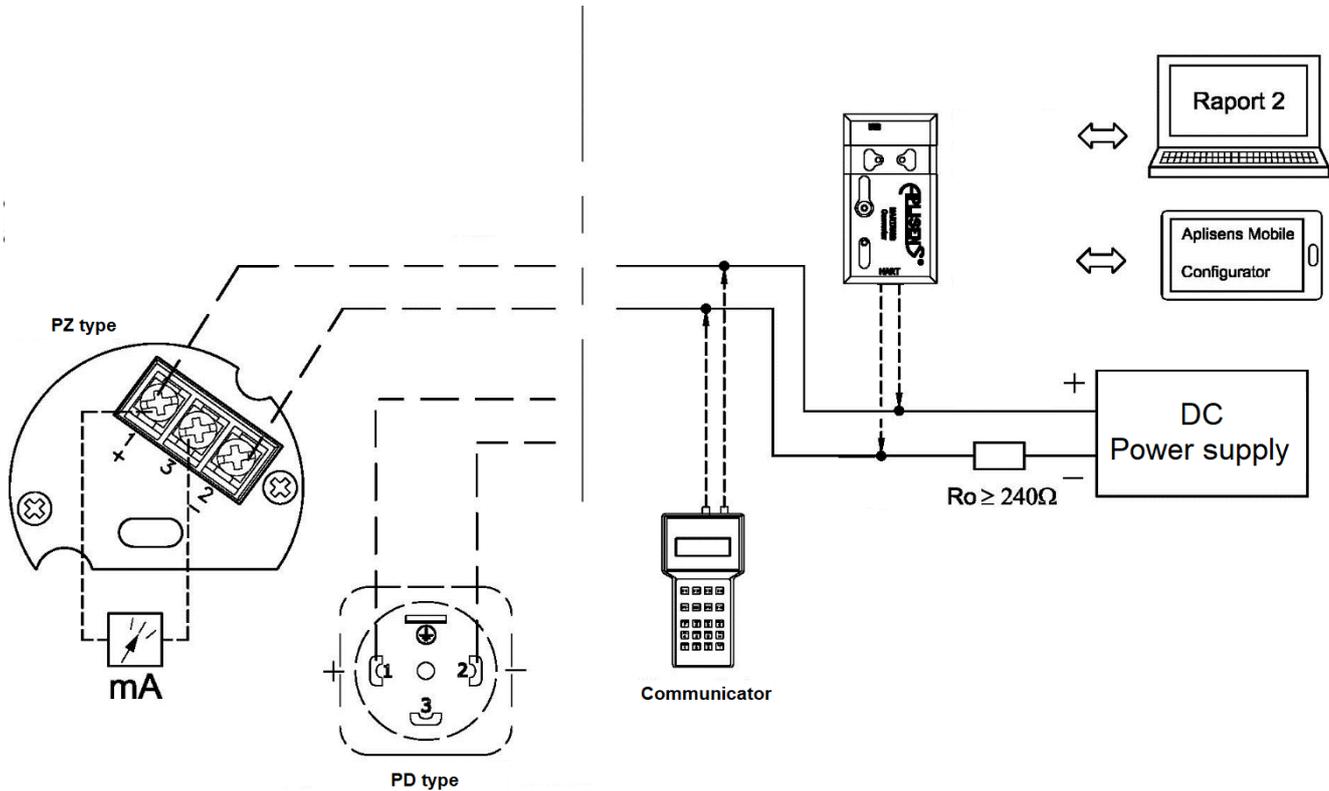
**Figure 3.** Electrical connection of transmitter with PZ connection

### 7.1.3. Connection of transmitter with the option of using HART communication

The transmitter allows to use the local HART communication. To do this you can use a HART communicator unit or modem connected to a computer. For more information on communication, see → 9. OPERATION.



In order to communicate with the intelligent transducer (via the HART protocol), before connecting the local communicator or modem, check if the  $R_o$  resistance, seen from the transducer terminals towards the power source, is  $R_o \geq 240 \Omega$ .



**Figure 4.** Electrical connection 4 ... 20 mA of HART to transmitter in standard version

The converter may also be operated using **Aplisens Mobile Configurator** installed on smartphones with Android system and connected using wireless communication.

The software is available on Google Play®:

<https://play.google.com/store/apps/details?id=com.aplisens.mobile.amc>.

**7.2. Transmitter power supply**

**7.2.1. Transmitter supply voltage**



Power cables may be live.  
There is a risk of electric shock and/or explosion.



Installation of the transmitter in explosion-risk atmospheres must comply with national standards and regulations.  
All explosion protection data is given in manual EN.IX.APCE.APRE.

**Table 3.** Permissible transmitter supply voltages

Version		Output signal	Minimum supply voltage	Maximum supply voltage
Standard	APCE-2000 APRE-2000 APRE-2000G	4 ... 20mA	7,5 V DC	55 V DC
Exi	APCE-2000 APRE-2000 APRE-2000G	4 ... 20mA	7,5* V DC	30 V DC

\*For standard transmitter operation up to 20,5 mA.

**7.2.2. Resistance load in power supply line**

The power line resistance, power source resistance and other additional serial resistances increase the voltage drops between the power source and the transmitter terminals. The maximum current of standard or Exi transmitters under normal operation conditions is 20,500 mA, but during high alarm the value of current I\_max is 22,000 mA.

The maximum resistance value in the power circuit (along with the power cables resistance) is defined by the formula:

$$R_{Omax} [\Omega] = \frac{(U_{zas} - U_{Pmin}) [V]}{0,0225 [A]}$$

where:

U<sub>zas</sub> – voltage at the supply terminals of the 4 ... 20 mA current loop [V].

U<sub>Pmin</sub> – minimum supply voltage of the transmitter → 7.2.1. Transmitter supply voltage.

**7.2.3. Uninterruptible current measurement in 4 ... 20 mA current loop**

The transmitter with PZ connector is capable of continuous current measurement in the current loop using an ammeter. In order to maintain the current measurement error below 0,05%, the internal resistance of the ammeter shall be less than 10 Ω.

**7.2.4. Specifications of electrical switching terminals**

Internal electrical switching terminals are suitable for conductors with the cross-section from 0,5 to 2,5 mm<sup>2</sup>.

**7.2.5. Cabling specification**

Aplisens S.A. recommends using two-wire screened twisted pair cable (connect the screen on one side at the point where the transmitter is powered).

### 7.3. Earthing

Transmitters with PD connections have a ground terminal in the connector, which should not be used for protective grounding or for connecting the equalizing conductor; it is only used for functional grounding. The transmitters with PZ connection are equipped with internal (in Ex version also external) grounding terminals, to which functional or equipotential grounding conductors can be connected.

If the transmitter has a galvanic connection via the process connection to a well-grounded metal pipe or vessel, additional functional grounding is not necessary. The grounding terminals in electrical connections are as functional grounding. They should be used when the transmitter is not grounded through the head connection stub. If it is impossible to ground the cable shield at the power supply point and the converter grounded through the head connector, the grounding clamps can be used to connect the cable shield. Functional grounding is to ensure the correct operation of the anti-interference suppression unit of the transmitter. In standard installations, i.e. when the transmitter is grounded through the pipeline, and the possible cable shield is connected to the transmitter's power supply and measurement system, the functional grounding terminal should not be used.

### 7.4. Equipotential bonding

When using an intrinsically safe transmitter with an additional overvoltage protection, having the designation "SA version" on the plate, the transmitter should be powered from a galvanically separated power source or, if this is not possible, equipotential bonding of the transmitter and the power supply device should be ensured by means of equipotential bonding conductors. In this respect the locally applicable regulations must be observed.

### 7.5. Overvoltage protection

Transmitters in standard version are fitted with overvoltage protection. In addition, an external protective device such as the APLISENS UZ-2 system or other.

In intrinsically safe transmitters, in order to increase the resistance to excessive surge, it is possible to use the overvoltage protection SA version. Transmitters with integrated overvoltage protection SA should be connected in accordance with → [7.4. Equipotential bonding](#).

### 7.6. Final inspection of cabling

After completing the electrical installation of the transmitter it is necessary to check the following:

- Does the supply voltage measured at the transmitter terminals at maximum set current match the range of supply voltage specified on the transmitter nameplate?
- Is the transmitter connected according to the information given in section → [7.1. Cable connection to transmitter internal terminals](#)?
- Are all the screws tightened?
- Are the transmitter covers tightened?
- Are the cable gland and the gland plug tightened?

## 8. START-UP

As standard, the transmitter is adjusted to a set range equal to the base range, unless a specific set range is provided in the order. The base range and the basic unit of the transmitter can be read out from its nameplate (→ 5.2. Transmitter identification).



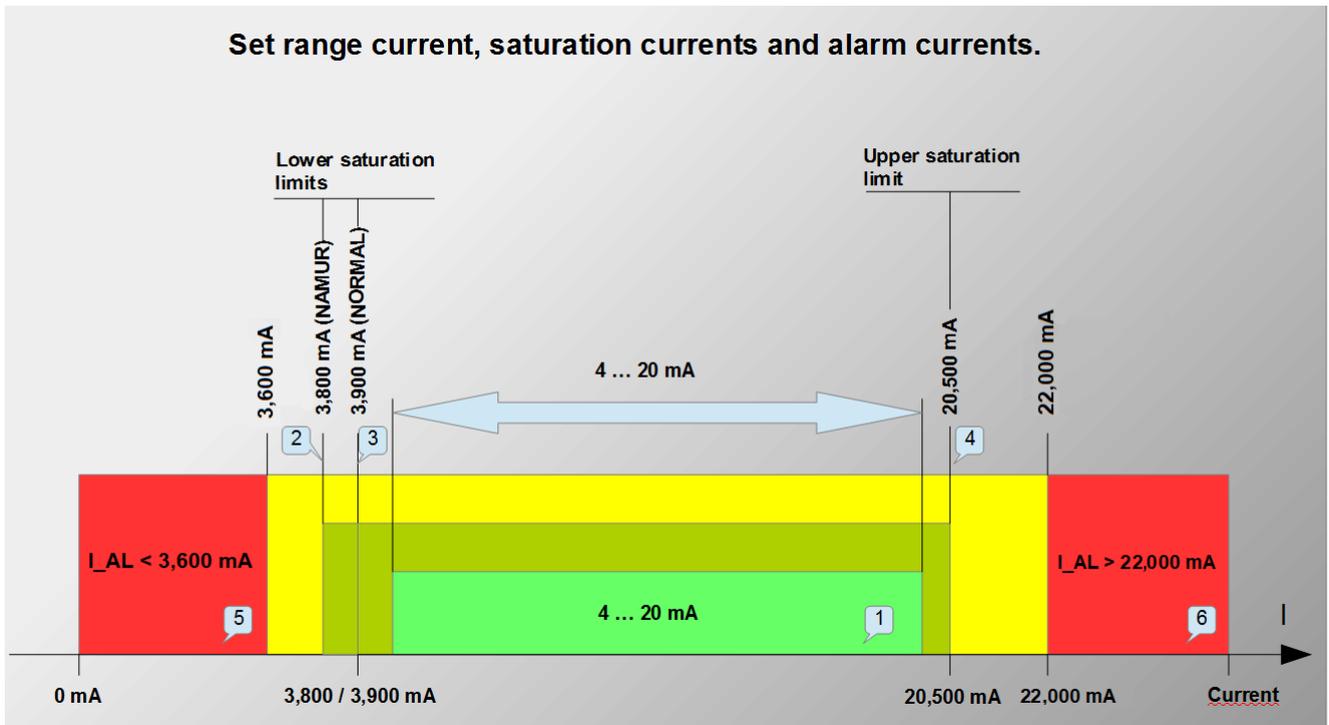
The transmitter should be use within the allowable pressure limits. Risk of injury due to component breakage after exceeding the maximum permitted operating pressure.

The working position of APCE(RE)-2000 transmitters (except APRE-2000G) can be any. For low measuring ranges, the position of the transmitter and the method of laying and filling the impulse lines with liquid affect the indications. This error can be corrected by performing a reset after installation.

### 8.1. Alarm configuration

Transmitters has a developed internal diagnostics, which monitors the work of their electronic circuits, process and environmental parameters. For transmitters in standard or Exi version, diagnosed dangerous states or malfunctions of the internal transmitter systems result in setting the alarm current depending on the configuration  $I_{AL} < 3,600 \text{ mA}$  or  $I_{AL} > 22,000 \text{ mA}$ . The user has an option of enabling/disabling of the current alarms. Current alarms are disabled by default.

The figure below shows the normal operation ranges of the transmitter process output and the ranges of saturation and alarm currents.



**Figure 5.** Set range current, saturation currents, alarm currents of transmitters in standard or Exi version

- 1 - Set 4 ... 20 mA current area is corresponding to setpoint 0...100% of the process output.
- 2 - Lower saturation current of 3,800 mA for NAMUR mode.
- 3 - Lower saturation current of 3,900 mA for NORMAL mode.
- 4 - Upper saturation current of 20,500 mA for NAMUR and NORMAL mode.
- 5 - Alarm current area  $AL_L < 3,600 \text{ mA}$  for internal diagnostic alarms.
- 6 - Alarm current area  $AL_H > 22,000 \text{ mA}$  for internal diagnostic alarms.

## 8.2. Configuration of operating mode

Before starting the work with the transmitter, the following parameters must be configured:

- basic unit of transmitter;
- processing characteristics;
- the beginning of the set LRV range;
- the end of the set URV range;
- damping time constant;
- NORMAL/NAMUR analogue output operation mode;
- analogue output operation mode in alarm status AL\_L/AL\_H;
- transmitter tag (TAG/LONG\_TAG);
- setting of the settings change lock password.

## 8.3. Correction of impact of transmitter mounting position on site – pressure reset

Once the transmitter is mounted in a target location, it must be reset. This operation will eliminate the possible influence of the mounting position on the indication of pressure / differential pressure. In order to do so:

- In case of relative pressure transmitter without pressure supplied (vented), perform the pressure reset operation using the local MENU or HART communication.
- In the case of a differential pressure transmitter, at compensated pressures on the L and H supply, perform the pressure reset operation by means of local MENU or HART communication.
- In case of absolute pressure transmitter the resetting is only possible with an absolute pressure calibration device.

## 9. OPERATION

### 9.1. Remote configuration of setpoints (HART)

The transmitter allows to read out and configure the parameters via HART communication using 4 ... 20 mA loop as a physical layer for FSK BELL 202 modulation.

### 9.2. Local HART communication

The transmitter allows to use the local HART communication. To do this you can use a HART communicator unit or modem interoperating with a computer or a smartphone. In order to establish communication, it is necessary to connect the communicator or modem to terminals.

### 9.3. Compatible configuration software

- Raport 2 Aplisens under control of Windows 7 or Windows 10.
- Aplisens Mobile Configurator under control of the Android system.
- Every software from other companies accepting DDL and DTM libraries.

### 9.4. Compatible devices

The following devices may be used to communicate with the transmitter:

- Aplisens S.A. KAP-03, KAP-03Ex communicator.
- Communicators from other companies, including those using DDL and DTM libraries.
- PC computers equipped with HART modem (e.g. HART/USB converter by Aplisens S.A.) with Windows7 or Windows10 operating system with installed Raport 2.
- PC computers equipped with HART modem using software from other companies, accepting DDL and DTM libraries.
- Smartphones with Android system, using a converter providing wireless communication (e.g. HART/USB converter by Aplisens S.A.) using Aplisens Mobile Configurator. The software is available on Google Play under the link:

<https://play.google.com/store/apps/details?id=com.aplisens.mobile.amc>.

### 9.5. Method of connecting communication devices

The method of connecting communication devices locally to the transmitter is described in section → 7.1.3. [Connection of transmitter with the option of using HART communication](#). For remote communication, the HART modem should be connected in parallel to the 4 ... 20 mA line. The resistance between the power supply and the modem connection point must be greater than 240 Ω. It is also required to observe the guidelines on the minimum load resistance  $R_{L\_MAX}$  described in section → 7.2.2. [Resistance load in power supply line](#). When using measuring cards with a built-in HART master, it is necessary to observe the instructions provided by the card manufacturer.

## 10. MAINTENANCE

### 10.1. Periodic inspections

Periodic inspections shall be carried out in accordance with applicable standards. During the inspection, the condition of the pressure (absence of loosened elements and leaks) and electrical (check of connections reliability and condition of gaskets and glands) connectors, condition of separating diaphragms (tarnish, corrosion) and stability of fixing of the housing and mounting bracket (if used) shall be checked. Check the processing characteristics by performing the operations specific for the CALIBRATION and possibly CONFIGURATION procedure.

### 10.2. Non-periodic inspections

If the transmitter at the installation site has been exposed to mechanical damage, pressure overload, hydraulic pulses, overvoltage, deposits, medium crystallization, undercutting of the diaphragm, or incorrect operation of the transmitter is detected, the device should be inspected. Check the condition of the diaphragm, clean it, check the electrical functionality of the transmitter and the processing characteristics.



If there is no signal in the transmission line or its value is improper, check the supply line, connection status on terminal blocks, connectors, etc. Check if the supply voltage and load resistance are correct.

### 10.3. Cleaning/washing

To remove impurities from the external surfaces of the transmitter wipe it with a cloth dampened in water.

#### 10.3.1. Diaphragm cleaning

The only possible method of cleaning the transmitter diaphragms is to dissolve the sludge produced.



Do not remove deposits and impurities from the transmitter diaphragms, which are formed during operation, mechanically using tools, since the diaphragms and the transmitter can be damaged.

### 10.4. Spare parts

Parts of the transmitter that may be worn or damaged and thus replaced:

- Transmitter with PD connector: terminal block with angular cover and gasket, connector base with gasket;
- Transmitter with PZ connector: cover gasket and gland, electrical connection plate with a cover.



Other parts in the case of ATEX, PED type of transmitter may be replaced only by the manufacturer or an authorized representative.

### 10.5. Repair

Faulty or non-operational transmitter shall be provided to the manufacturer.

### 10.6. Returns

In the following cases, the transmitter should be returned directly to the manufacturer:

- need for repair;
- need for factory calibration;
- replacement of improperly selected/shipped transmitter.

## 11. SCRAPPING, DISPOSAL



Worn or damaged devices shall be scrapped in accordance with WEEE Directive (2012/19/EU) on waste electrical and electronic equipment or returned to the manufacturer.

## 12. HISTORY OF REVISIONS

Revision No.	Document revision	Description of changes
-	01.A.001/2023.09	Initial document version. Prepared by DFBD, DCF.

## Instructions for the explosion-proof device

### EN.IX.APCE.APRE



SMART PRESSURE TRANSMITTER type APCE-2000  
 SMART DIFFERENTIAL PRESSURE TRANSMITTERS  
 type APRE-2000, APRE-2000G  
 Ex VERSIONS

#### 1. Introduction

This instruction applies only to the APCE-2000, APRE-2000, APRE-2000G, intrinsically safe (Exi) transmitters designed in accordance with ATEX Directive, provided with the rating plate as specified in section and information about Exi design in the Product Certificate. The appendix contains supplementary information relating intrinsically safe versions of transmitters. During installation and use of Ex transmitters, reference should be made to EN.IO.APCE.APRE.2000 in conjunction with EN.IX.APCE.APRE.

#### 2. Use of APCE-2000, APRE-2000, and APRE-2000G transmitters in hazardous areas

The transmitters are designed and manufactured in accordance with the requirements of the following standards: EN 60079-0:2018, EN 60079-11:2012, EN 50303:2004.

The transmitters may operate in potentially explosive areas in accordance with the rating of the explosion protection design:



I M1 Ex ia I Ma  
 II 1/2G Ex ia IIC T4/T5/T6 Ga/Gb  
 II 1D Ex ia IIIC T110°C Da  
 KDB 12ATEX 0077X

#### 3. Identifying marks

Intrinsically safe transmitters are provided with a rating plate containing the information specified in EN.IO.APCE.APRE → 5. IDENTIFICATION and also at least the following:

- CE mark and number of notified body: 1453.
- "Ex" mark, designation of explosion protection design, certificate number.
- Values of parameters such as: Ui, li, Pi, Ci, Li.
- Marking of electrical and process connections.
- Year of manufacture.

#### 4. User information

Together with the ordered intrinsically safe transmitters, user receives:

- a) Product Certificate, which is also a warranty card.
- b) Declaration of Conformity.
- c) Copy of certificate – on request.
- d) User Manual numbered: "EN.IO.APCE.APRE.2000" with "EN.IX.APCE.APRE".

Items b), c) and d) are accessed at [www.aplisens.pl](http://www.aplisens.pl)

## 5. Permitted input parameters (based on data from the KDB 12ATEX 0077X and certificates and certification documentation)

Permissible input parameters for power supply with linear output characteristic:

$U_i = 30\text{ V}$ ;  $I_i = 0,1\text{ A}$ ;  $P_i$  - according to table below.

Permissible input parameters for power supply with trapezoidal and rectangular output characteristic:

$U_i = 24\text{ V}$ ;  $I_i = 0,1\text{ A}$ ;  $P_i$  - according to table below.

$P_i$ [W]	$T_a$ [°C]	Temperature class
0,75	50	T6
	70	T5
	80	T4, group I
1,2	40	T6
	60	T5
	80	T4, group I

$T_a$  – ambient temperature of mounted transmitter (for example at tank).

Input inductance and capacity:  $C_i = 11\text{ nF}$ ;  $L_i = 0,611\text{ mH}$

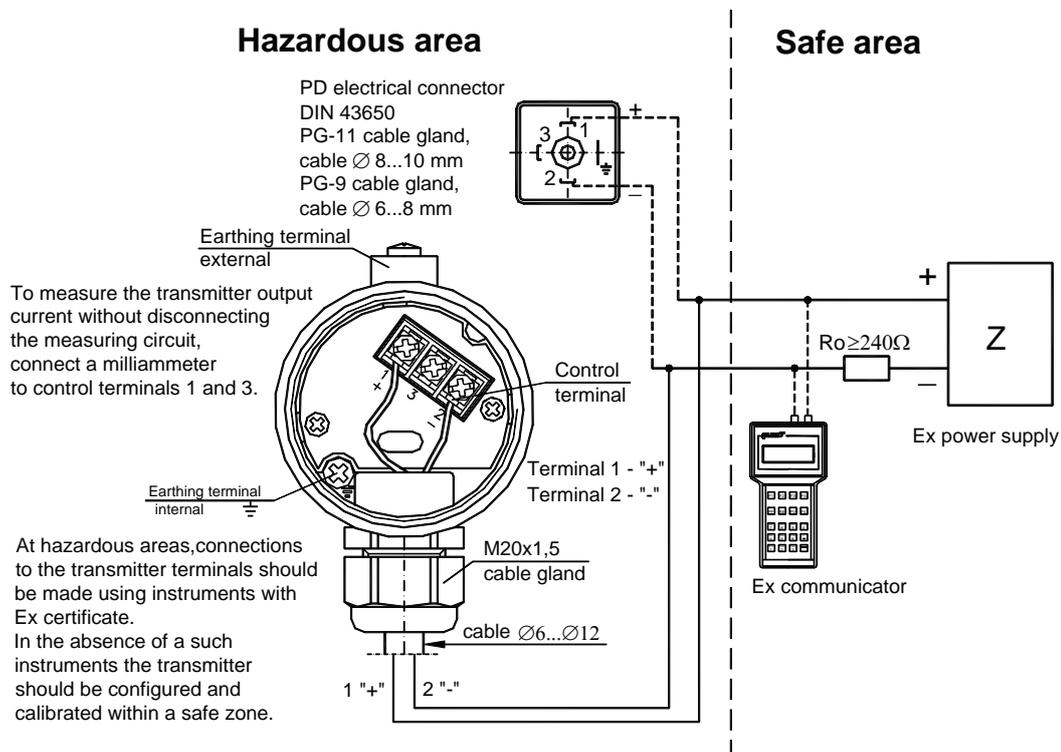
The dependence of transmitter temperature class from temperature  $T_a$  [°C] and delivered power  $P_i$  [W] for all kinds of power supplies was introduced in Table No 1, where:

## 6. How to connect Ex transmitters

Connection between transmitter and other devices in the measuring loop should be made in accordance with the requirements of intrinsically safe standards and instructions for use in hazard areas. Non-compliance with the intrinsic safety requirements may cause the transmitter to explode and hazard to human safety and health.



No repairs or other interventions in the electrical system of the transmitter are allowed. Damage assessment and possible repair may only be made by the manufacturer or an entity authorized by him.



## 7. Basic requirements according to EN 60079-25 for type A and B leads used to connect the transmitter to the power supply and measurement circuit

Basic requirements according to PN-EN 60079-25:2011 for type A and B cables used to connect the transmitter with the power supply and measurement circuit.

Thickness of insulation according to type of material, but not less than 0,2 mm.

Insulation strength:

- $2 U_N$  but not less than 500 V AC for the wire;
- 500 V AC between the cable screen and the connected wires;
- 1000 V AC between two groups of wires, each of which contains half the connected wires of the cable.

Multiwire cable must not carry any circuit which is not an intrinsically safe circuit.

The cable must not carry circuits with a maximum voltage exceeding 60 V. The cables should be protected from damage, for example using channels, shielding pipes, cable racks, durable fastenings etc.

## 8. Electrostatic hazards

Plastic nameplate and teflon layer covering the transducer diaphragm separator elements constitute a non-conductive layer applied to a conductive substrate. Such transmitters in dust explosion hazard zones should be installed in a place where electrostatic charging is impossible, in particular by contact with electrically charged dust falling off or blown from devices operating nearby.

## 9. Special conditions of use

- a) The version of the transmitter with a surge arrester, marked on the rating plate as "SA", does not meet the requirements of point 10.3. of the PN-EN 60079-11 (500 Vrms) standard. This must be taken into account when installing the equipment (EN.IO.APCE.APRE → [7.4. Equipotential bonding](#)).
- b) Transmitters with a plate made of plastic, transducers with teflon-coated elements of diaphragm seals, for group III should be installed in a way preventing electrostatic charging (EN.IX.APCE.APRE → [8. Electrostatic hazards](#)).



