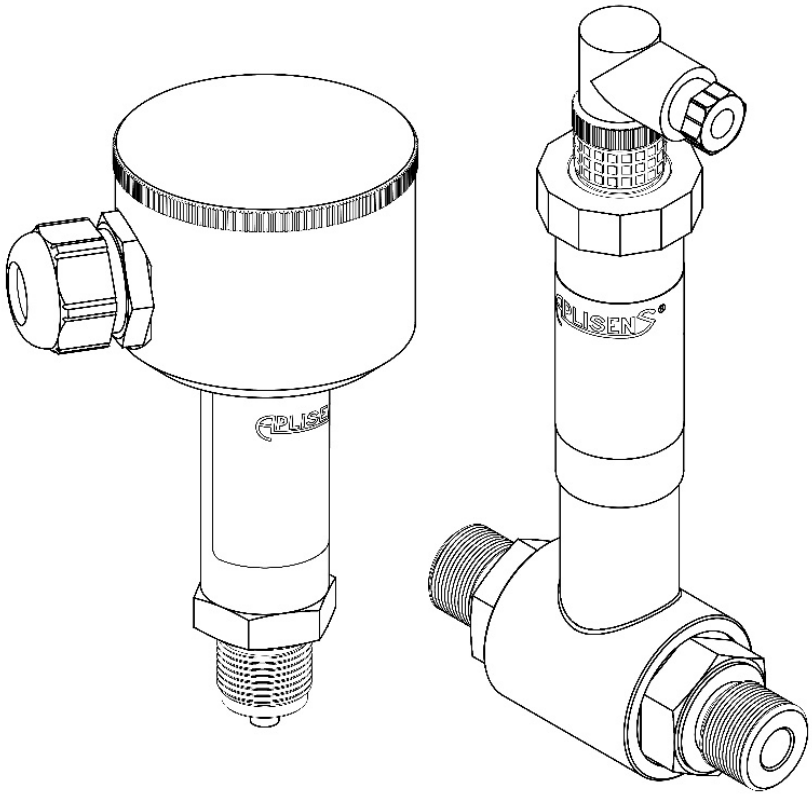
USER'S MANUAL

SMART PRESSURE AND DIFFERENTIAL PRESSURE TRANSMITTERS

PCE-28.SMART, PRE-28.SMART



APLISENS S.A., 03-192 Warsaw, Morelowa 7 St.
tel. +48 22 814 07 77; fax +48 22 814 07 78
www.aplisens.com, e-mail: export@aplisens.com

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, declarations of conformity and copies of certificates.

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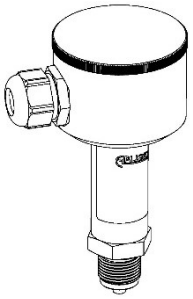

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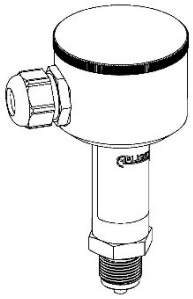

PRE-28.SMART

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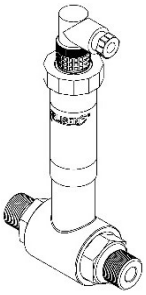

PRE-28.SMART Exi

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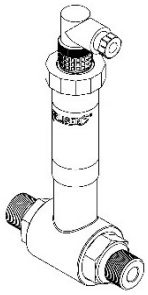

Symbols used

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 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.

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1. INTRODUCTION

1.1. Purpose of the document

The subject of manual are smart pressure transmitters **PCE-28.SMART**, smart differential pressure transmitters **PRE-28.SMART** hereinafter referred jointly to as the transmitters. The manual applies to the following versions: standard, intrinsically safe Exi.

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 **PCE-28**, **PRE-28** transmitters and **PCE-28P** probes in intrinsically safe version according to IECEx and ATEX are included in the appendices marked in Explosion-proof Device User Manual EN.IX.PCE.PRE.28.SMART.

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.

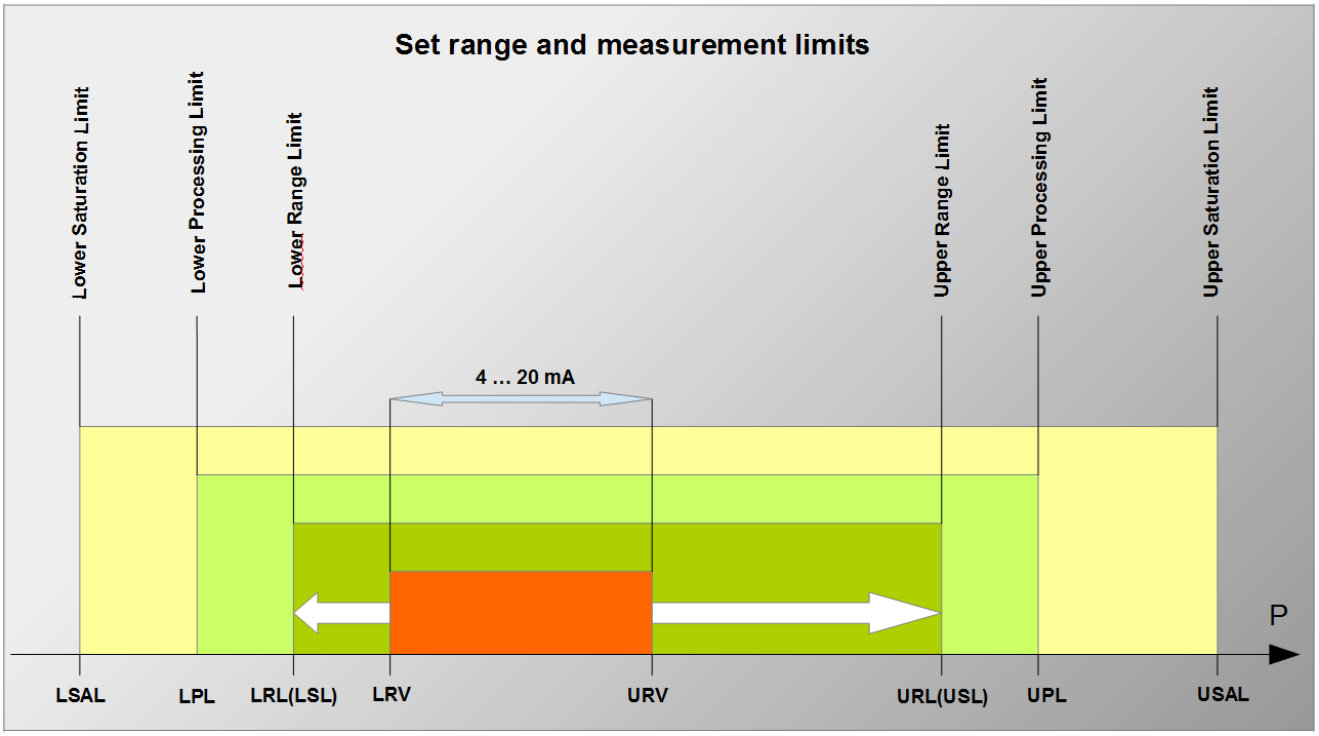

Figure 1. Set range and measurement limits

1.4. Definitions and abbreviations

Table 1. Definitions and abbreviations

Item no.	Abbr.	Meaning
1	**LRV**	"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 **|(URV-LRV)|** is limited to 10% of the base range **(URL-LRL)**.
2	**URV**	"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 **|(URV-LRV)|** is limited to 10% of the base range **(URL-LRL)**.
3	**LRL LSL**	"Lower Range Limit" or "Lower Sensor Limit" - lower limit of set range expressed in physical units. Value **(URL-LRL)** or **(USL-LSL)** is referred to as the base transmitter range.
4	**URL USL**	"Upper Range Limit" or "Upper Sensor Limit" – upper limit of set range expressed in physical units. Value **(URL-LRL)** or **(USL-LSL)** is referred to as the base transmitter range.
5	**LPL**	"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 **LRL (LSL)**. After reaching the **LPL** and when below this value up to **LSAL,** the transmitter freezes the refreshing of digital value of the measurement.
6	**UPL**	"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 **URL (USL)**. After reaching the **UPL** and when above this value up to **USAL**, the transmitter freezes the refreshing of digital value of the measurement.
7	**LSAL**	"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 **LPL** 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 **(URL-LRL)** below the lower limit of the digital processing of measured **LPL** value.
8	**USAL**	"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 **UPL** 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 **(URL-LRL)** above the upper limit of the digital processing of measured **UPL** value.
9	**AL_L**	Low current alarm.
10	**AL_H**	High current alarm.
11	**I_AL**	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 CH 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.

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 a 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

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

APLISENS S.A.	**Logo and name of manufacturer**
CE	CE mark
CE 1453	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 *)
P	Measuring range
U	Supply voltage values
	Output signal
Tamb	Permissible range of ambient temperature
PS	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 version

*) - in place of the serial number, the information "On sensor" may be placed.
In this case, the serial number should be read from the transmitter sensor housing.

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

In order to avoid measurement errors caused by the accumulation of condensate (in gas installations) or gas bubbles (in liquid installations) in impulse lines, assembly solutions using constructions based on available engineering knowledge should be used. For a gaseous medium, this may mean installing the transmitters above the pressure measuring point, and for liquids below this point.

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

Loosen the screw in the upper part of the connector and the nut that connects the connector to the transmitter housing, the cable outlet can be set in any direction. It is advantageous to form the conduit in the form of a drip loop to prevent condensation from running down towards the gland. Connect the cables in accordance with the marking on the transducer and ➔ Table 3. Connection for current version (depending on the version).
A correctly assembled PD connection should have tightened: the gland nut, the connection nut to the steel housing and the screw connecting both parts of the connector.

7.1.2. Connection of transmitters with PZ type connector

The electrical connection of the transmitters with the connector 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.

7.1.3. Connection of transmitters with PK, PKD, SG and PM12 type connector (cable connection)

Electrical connections of transmitters equipped with PK, PKD, PM12 type connectors are made through a terminal box with a gland in which the converter cable connects to the further part 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. For PM12 without cable and connector version (IP65)- connection as at ➔ Figure 2. Electrical connection 4…20 mA of HART to transmitter in standard version

Table 3. Connection for current version

Connection for current version			
Connector connection		**Cable connection**	
Connector number	Type of connector	Wire colour	Type of connector
1	+	Red	+
2	-	Black	-
3	Not supported	Green	SHIELDED CABLE
⏚	SHIELDED CABLE		

7.1.4. Connection of transmitter with the option of using local 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 or a smartphone.

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

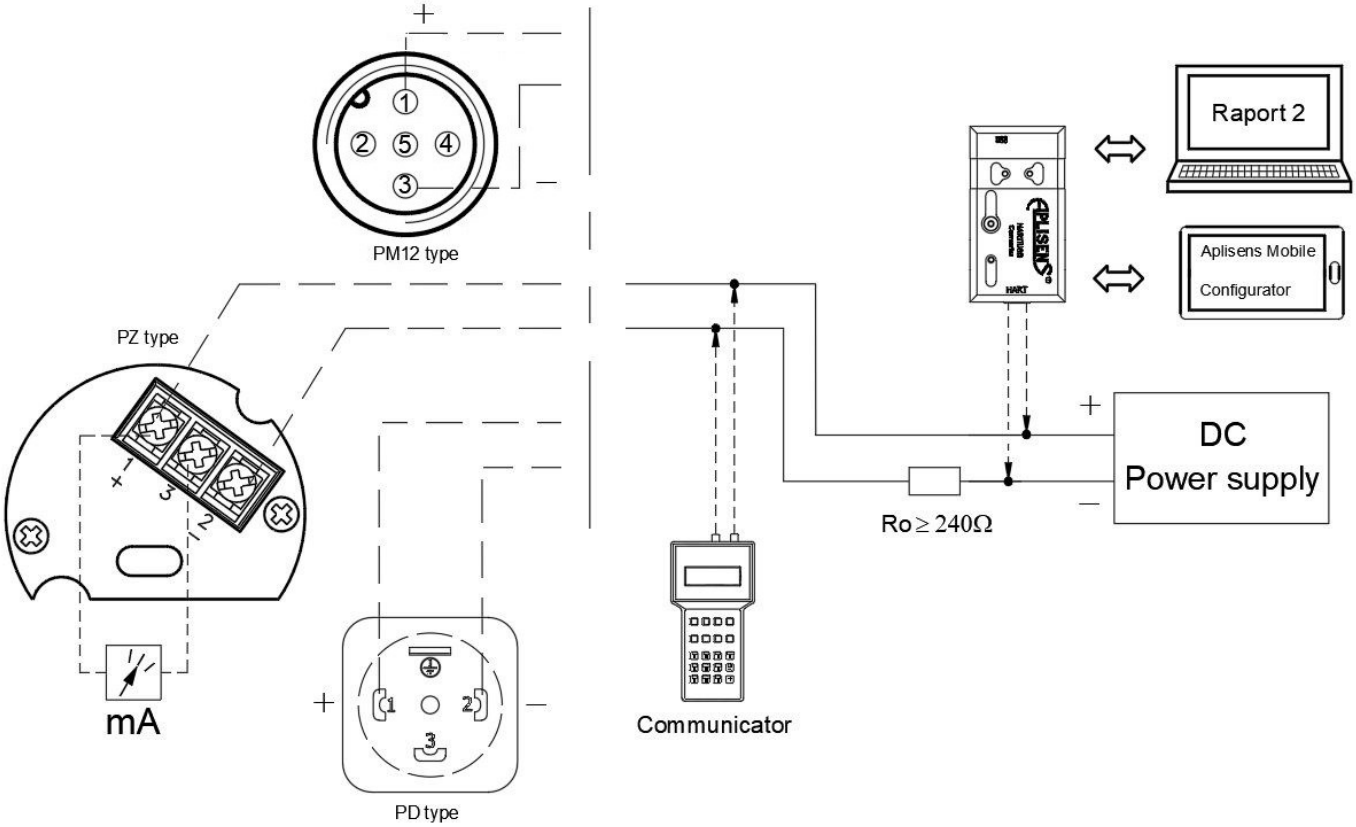

Figure 2. Electrical connection 4…20 mA of HART to transmitter in standard version

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.

7.1.5. Cabling specification

Aplisens S.A. recommends using two-wire screened twisted pair cable. The outer diameter of the cable shell from 6 to 8 mm (for cable gland PG-9) or from 8 to 10 mm (for cable gland PG-11) is recommended.

7.2. 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. In transmitters with PK, PKD, SG, PM12 cable connections, the cable screens are brought out and remain at the user's disposal. The screen of the cable should be connected on one side with the earthing point of the measuring system.

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.

7.3. Overvoltage protection

Transducers may be exposed to oversea or lightning. Surge protection between transmission line cables is provided by transil diodes installed in all types of transducers.
In order to protect against surges between the transmission line and the ground or housing (which are not protected by diodes connected between the line lines), additional protection in the form of surge gas stops shall be applied. In addition, an external protective device such as the APLISENS UZ-2 system or other.

7.4. Shielding

In the case of using a cable in the screen, connect the screen on one side at the point where the transmitter is powered.

7.4.1. Uninterruptible current measurement in 4…20 mA current loop

The transmitter 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.

7.4.2. Specifications of electrical switching terminals

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

7.5. Equipotential bonding

The transmitter in intrinsically version 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.

7.6. Transmitter power supply

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 appendix.

Table 4. Permissible transmitter supply voltages

Version and type of transmitter		Output signal	Minimum supply voltage	Maximum supply voltage
Standard Version	– **PCE(PRE)-28.SMART**	**4…20 mA**	**7,5 V DC**	**55 V DC**
Exi Version	– **PCE(PRE)-28.SMART**	**4…20 mA**	**7,5* V DC**	**30 V DC**
*For standard version 20,5 mA output.				

7.6.1. 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 transmitters under normal operation conditions is defined as I_max = 20,500 mA , but during high alarm the value of current is defined as I max = 22,000 mA.
The maximum resistance value in the power circuit (along with the power cables resistance) is defined by the formula:

$$R_{Lmax} = \frac{(U_{sup} - U_{min})}{0{,}022\ A}$$

where:
U_{sup} – voltage at the supply terminals of the 4…20 mA current loop [V];
U_{min} – minimum supply voltage of transmitter.

7.7. Final inspection of cabling

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

- that the supply voltage measured at the transmitter terminals at maximum set current match the range of supply voltage specified on the transmitter nameplate;
- that the transmitter is connected according to the information given in section ➔ 7.1. Cable connection to transmitter internal terminals;
- if all the screws tightened (depending on the version);
- if the transmitter covers tightened (depending on the version);
- if the cable gland and the gland plug tightened (depending on the version).

8. START-UP

The base range and the basic unit of the transmitter can be read out from its nameplate (➔ 5.2 Transmitter identification).

Use the transmitter within the allowable pressure limits. Risk of injury due to component breakage after exceeding the maximum permitted operating pressure.

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 mA or I_AL > 22,000 mA. The user has an option of enabling/disabling of the current alarms. Current alarms are disabled by default. The figures below shows the normal operation ranges of the transmitter process output and the ranges of saturation and alarm currents.

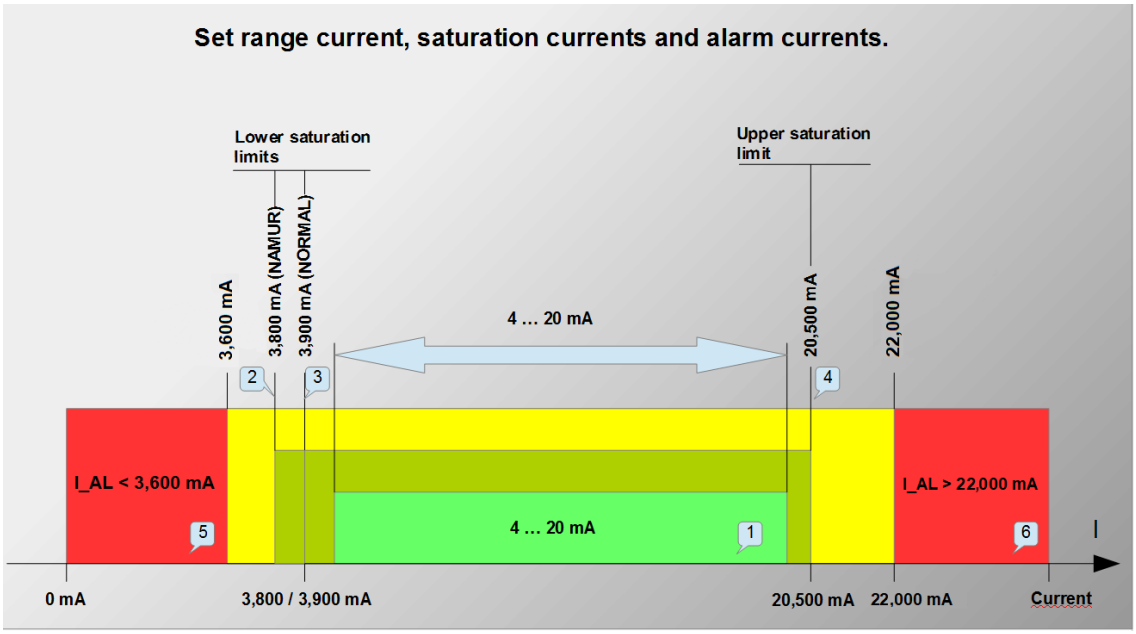

Figure 3. Set range current, saturation currents, alarm currents of transmitters in standard or Exi version

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 mA for internal diagnostic alarms.
6 - Alarm current area AL_H > 22,000 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;
- analog output operation mode in alarm status AL_L / AL_H (applies to transmitters in standard or Exi version);
- alarm mode for indicating environmental events and defects;
- 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 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. Otherwise an attempt to reset the transmitter will display an error.

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.

9.1.1. 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 Raport2.
- 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.

9.1.2. Compatible configuration software

- Raport2 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.

9.1.3. 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.

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 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:

- Transmitters with PD connector- terminal block with angular cover and gasket, and connect or base with gasket.
- In the transmitter with PK, PKD connection - all connections.
- In the transmitter with PZ connector - cover gasket and gland, electrical connection plate with a cover.
- In the transmitter with PM12 connection - PM12 connector.

Other parts in the case of ATEX, 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.001/2021.10	Initial document version. Replaces the revision 01_05.D.005_2020-01. Change of software, power supply, figures. Editorial changes. Prepared by DBFD.
1	01.A.002/2023.07	Editorial changes.
2	01.A.003/2023.11	PM12 connector change, minor editorial changes. Prepared by DBFD.

Explosion-proof Device User Manual

EN.IX.PCE.PRE.28.SMART

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 and IECEx

1. Introduction

Explosion-proof device user manual EN.IX.PCE.PRE.28.SMART applies to pressure transmitters PCE-28.SMART, differentia pressure transmitters PRE–28.SMART and level probe PCE-28P.SMART in intrinsically safe version according to ATEX and IECEx marked on the rating plate as shown in p. 2.. and information about the Ex execution in the product Certificate. During installation and use of Ex transmitters, please refer to the instruction manual EN.IO.PCE.PRE.28.SMART with „Explosion-proof device user manual EN.IX.PCE.PRE.28.SMART”.

2. Using transmitters in danger zones

Transmitters are produced in accordance with the requirements of the following standards::
PN-EN 60079-0:2018-09, PN-EN 60079-11:2012, PN-EN 50303:2004.

The transmitters with PD, PZ, PK, PKM, SG, SGM type electrical connectors may operate in areas where there is a risk of explosion, in accordance with the rating of the explosion protection design:

	ATEX:	IECEx:
	**I M1 Ex ia Ma** **II 1/2G Ex ia IIC T4/T5/T6 Ga/Gb** **II 1D Ex ia IIIC T105ºC Da** **KDB 12 ATEX 0071X**	**Ex ia Ma** **Ex ia IIC T4/T5/T6 Ga/Gb** **Ex ia IIIC T105ºC Da** **IECEx KDB12.0010X**

The transmitters with PM12 and PKD type electrical connectors are permitted only for explosive gas atmosphere, in accordance with the rating of the explosion protection design:

	ATEX:	IECEx:
	**1/2G Ex ia IIC T4/T5/T6 Ga/Gb** **KDB 12 ATEX 0071X**	**Ex ia IIC T4/T5/T6 Ga/Gb** **IECEx KDB12.0010X**

The transmitters with ALW with PM12 or ALM with PM12 type electrical connectors are permitted only for explosive gas atmosphere, in accordance with the rating of the explosion protection design:

	ATEX:	IECEx:
	**1/2G Ex ia IIC T4 Ga/Gb** **KDB 12 ATEX 0071X**	**Ex ia IIC T4 Ga/Gb** **IECEx KDB12.0010X**

The transmitters with ALW with PD or ALM with PD type electrical connectors are approved for gas and dust explosive atmospheres, in accordance with the rating of the explosion protection design:

	ATEX:	IECEx:
	**II 1/2G Ex ia IIC T4/T5/T6 Ga/Gb** **II 1D Ex ia IIIC T105ºC Da** **KDB 12 ATEX 0071X**	**Ex ia IIC T4/T5/T6 Ga/Gb** **Ex ia IIIC T105ºC Da** **IECEx KDB12.0010X**

3. Permissible input parameters (based on data from the KDB 12ATEX 0071X and IECEx KDB12.0010X certificates)

Permissible input parameters for power supply with:
- linear characteristic - Ui = 30V DC; Ii = 0,1A Pi - according to the table below;
- “trapezial” and “rectangular” characteristic - Ui = 24V DC; Ii = 0,1A, Pi - according to the table below.

Ta = -40ºC to the values given in the table below.

Pi[W]	Ta[ºC]	Temperature classification
0,75	50	T6
	70	T5
	80, 75*	T4, and Group I
1,2	40	T6
	65	T5
	80, 75*	T4, and Group I

Ta – maximum ambient temperature, temperature of the measured medium;
* Ambient temperature for transmitter with ALW or ALM connection Ta = -40ºC ÷ 75ºC; T4

Input inductance and capacity: Ci = 11nF; Li = 0,611mH
Transmitter with ALW or ALM connector: Ci = 25nF; Li = 0,61mH
Capacitance and inductance of the cable: Ck = 0,2nF/m; Lk = 1µH/m

4. How to connect Ex transmitters

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.

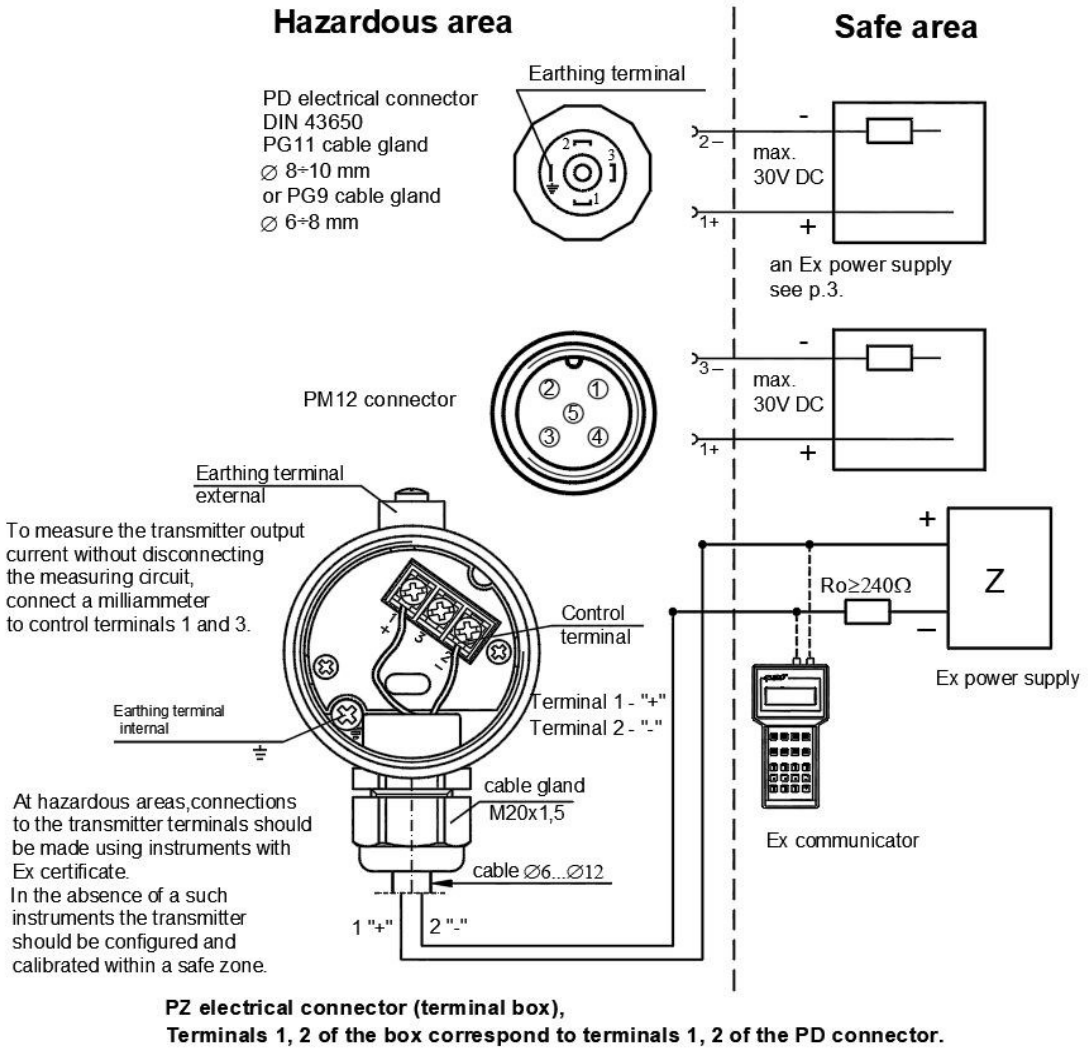

Figure 1. Connection of the transmitter with PD, PM12 and PZ electrical connectors

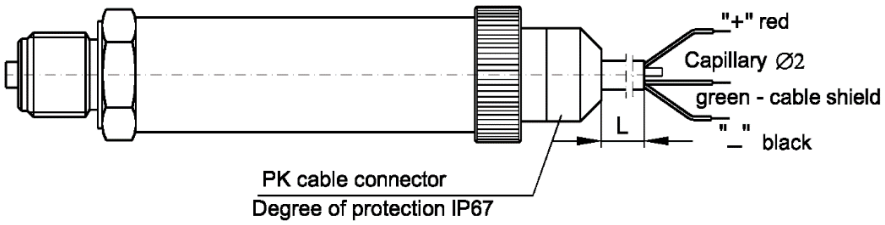

Figure 2. Connection of the transmitter with PK electrical connector

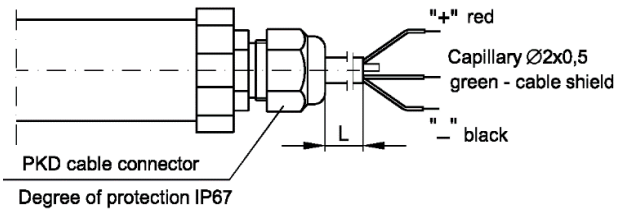

Figure 3. Connection of the transmitter with PKD electrical connector

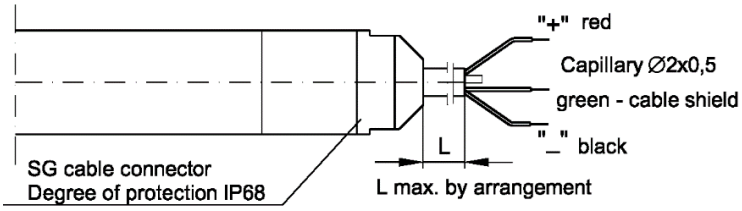

Figure 4. Connection of the transmitter with SG electrical connector

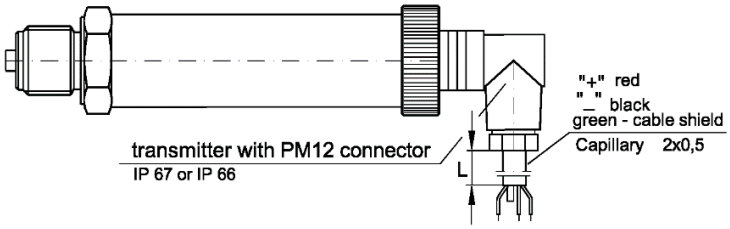

Figure 5. Connection of the transmitter with PM12 electrical connector

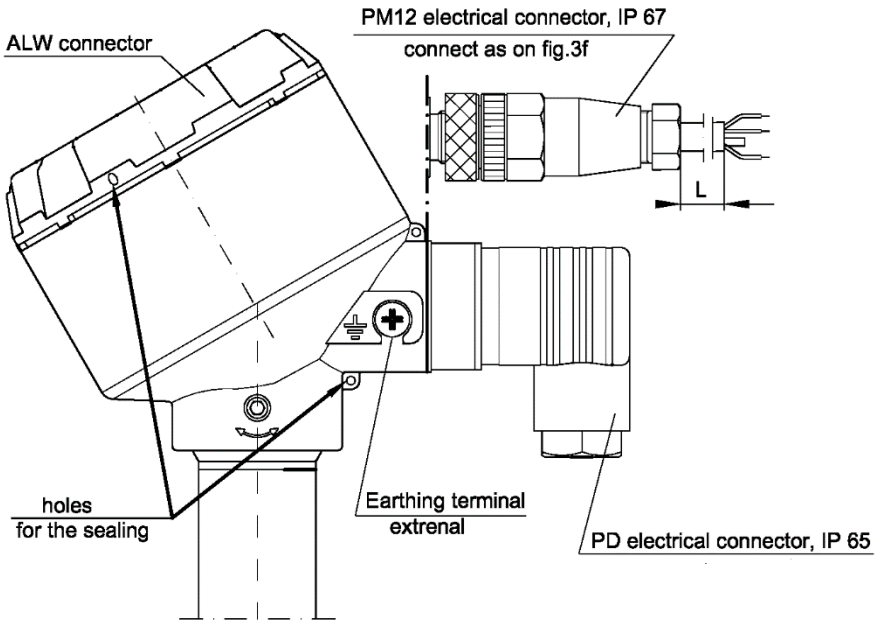

Figure 6. Connection of the transmitter with ALW electrical connector

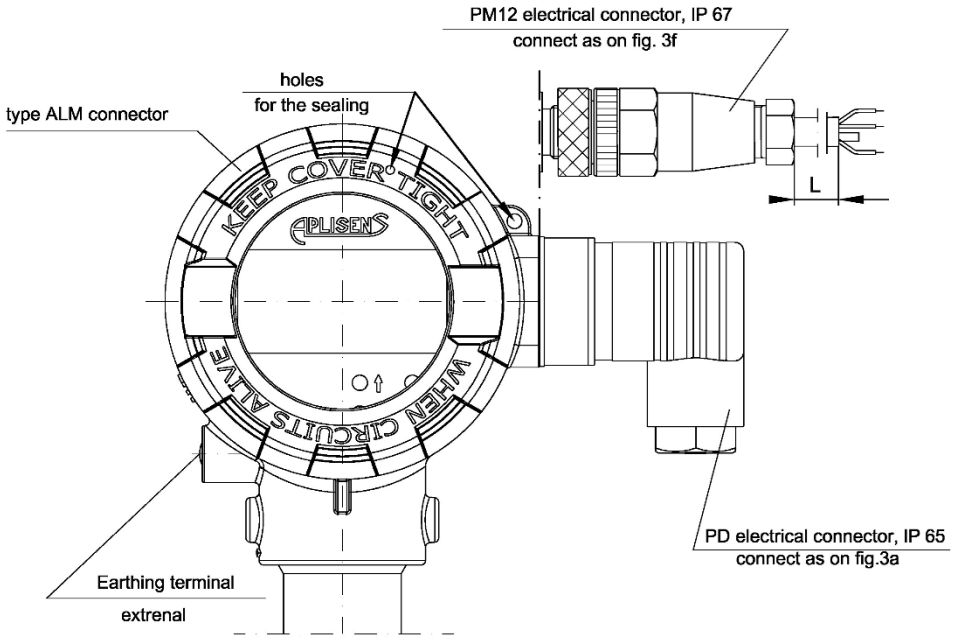

Figure 7. Connection of the transmitter with ALM electrical connector

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 authorised party only.

5. Electrostatic hazards

A plastic nameplate, a light alloy housing varnish, a Teflon layer covering the elements of the transmitter diaphragm seal, a Teflon cable sheath and a heat-shrinkable sheath applied to a metal capillary constitute a non-conductive layer applied to the conductive substrate. Such transmitters, in dust explosion hazard zones, should be installed in a way that prevents electrostatic charging, in particular through contact with electrified dust falling off or blown from devices operating nearby.

6. Special conditions for safe use

a) When installing the transmitters, the requirements of the applicable installation standards must be taken into account.
b) Version of transmitter with surge arrester, marked on the plate “SA”, does not meet the requirements of Section 6.3.13 of the EN 60079-11:2012 (test of isolation 500 V AC). This must be taken into consideration during the installation of transmitter.
c) Transmitters with a plate made of plastic, transmitters with a display (with ALW or ALM connection) and transmitters with Teflon-coated diaphragm seal elements, for group III should be installed in a way that prevents electrostatic charging – see point 5.
d) In case of elements made of titanium are used in the construction of the device, these elements should be protected against direct access during the installation and operation of the transmitter.