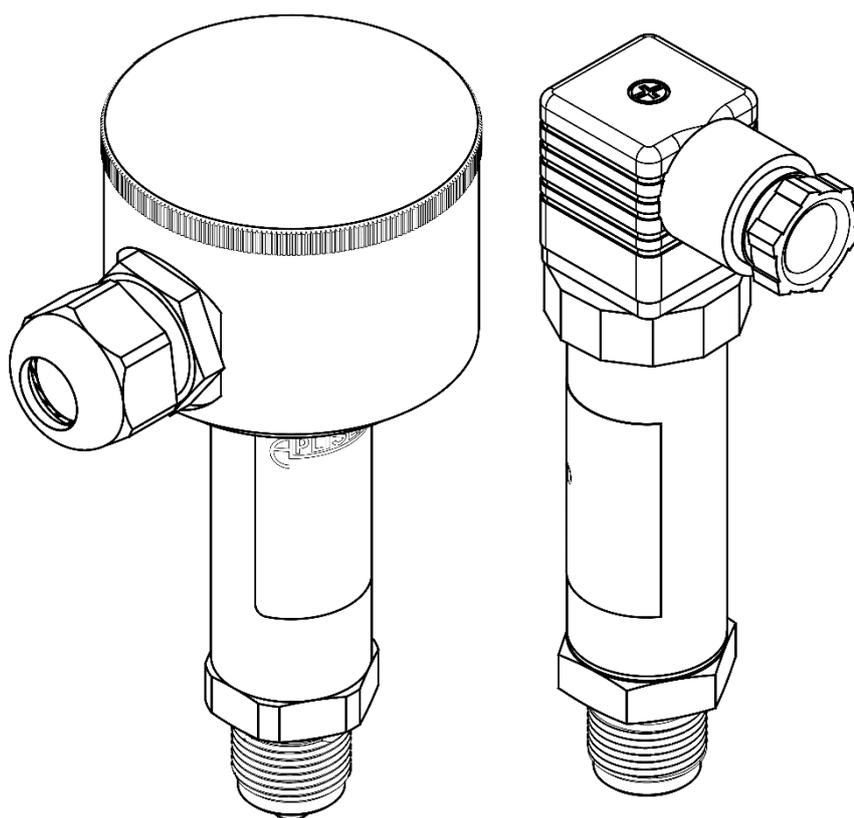


APLISENS[®]

USER'S MANUAL

PRESSURE TRANSMITTERS **PC-29A, PC-29B**



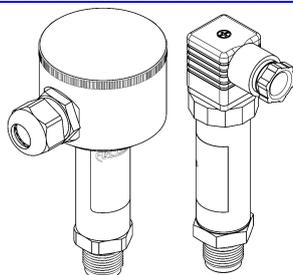
PRODUCT CODE – see: (→ [Transmitter identification](#)).

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.

PC-29A

ID: 0033 0001 0000 0000 0000 0000 0001 38

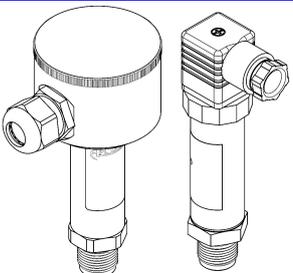
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PC-29A (Exi)

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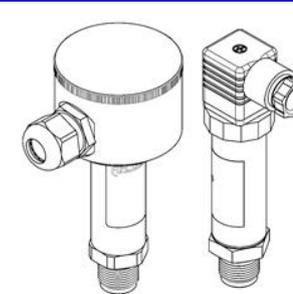
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PC-29B

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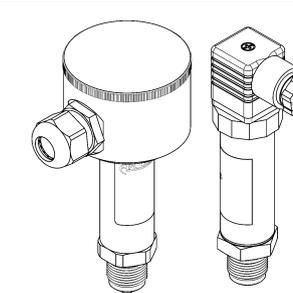
<https://www.aplisens.pl/ID/003400010000000000000000000135/>



PC-29B (Exi)

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<https://www.aplisens.pl/ID/003400020000000000000000000152/>



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.

TABLE OF CONTENTS

1. INTRODUCTION	5
1.1. Purpose of the document	5
2. SAFETY	5
3. TRANSPORT AND STORAGE	5
3.1. Delivery check.....	5
3.2. Transport.....	5
3.3. Storage	5
4. GUARANTEE	6
5. IDENTIFICATION	6
5.1. Manufacturer's address	6
5.2. Transmitter identification	6
6. INSTALLATION	7
6.1. General recommendations	7
6.1.1. Installation instructions for transmitters with distance separators	7
7. ELECTRICAL CONNECTION	8
7.1. Cable connection to transmitter internal terminals	8
7.1.1. Connection of transmitters with PD type connector	8
7.1.2. Connection of transmitters with PZ type connector	8
7.1.3. Connection of transmitters with PK, PKD and SG type connector (cable connection)	8
7.1.4. Specifications of electrical switching terminals	8
7.1.5. Cabling specification	8
7.1.6. Equipotential bonding	8
7.2. Overvoltage protection	9
7.3. Transmitter power supply	9
7.3.1. Transmitter supply voltage.....	9
7.3.2. Resistance load in power supply line	9
7.4. Final inspection of cabling	9
8. START-UP	10
9. MAINTENANCE	10
9.1. Periodic inspections	10
9.2. Non-periodic inspections	10
9.3. Cleaning/washing	10
9.4. Diaphragm cleaning	10
9.5. Spare parts.....	10
9.6. Repair	10
9.7. Returns	11
10. SCRAPPING, DISPOSAL	11
11. HISTORY OF REVISIONS	11
Explosion-proof device manual	12

LIST OF TABLES

Table 1. Symbols appearing on the transmitter's nameplate.....	6
Table 2. Electrical connections.	8
Table 3. Permissible transmitter supply voltages.	9

1. INTRODUCTION

1.1. Purpose of the document

The subject of manual are low voltage pressure transmitters **PC-29A**, **PC-29B** hereinafter referred jointly to as the transmitters. The manual applies to the following versions: standard, intrinsically safe. 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 of the **PC-29A**, **PC-29B** transmitters in intrinsically safe version acc. to IECEx and ATEX are included in the explosion-proof device manual marked as EN.IX.PC.PRE.29.A.B.

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 (→ [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.

3. TRANSPORT AND STORAGE

3.1. Delivery check

After receiving the delivery of the equipment, it is necessary to:

- make sure that the packaging and its contents were not damaged during transport;
- check the completeness and correctness of the received order, and make sure no parts are missing.

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.

Allowable range of storage temperature:

- PC-29A(B) -40 ÷ 80°C (-40...176°F);

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 1. Symbols appearing on the transmitter's nameplate

	Logo and name of manufacturer
	CE mark
	CE with number notified body
	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

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 the case of the gaseous medium, it is recommended to install the transmitters above the measurement point so that the condensate may flow to the place where the measured pressure is taken, whereas in the case of the liquid medium or vapour, it should be installed below the place where the pressure is taken. The configuration of the impulse lines and the valve connection system should be selected taking into consideration 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 transmitter after mounting.

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. 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. It is possible to make a special transmitter with "breathing" through the capillary in the cable.

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

Electrical connections of transmitters equipped with PK, PKD and SG 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.

Table 2. Electrical connections.

Connection for voltage version			
Connector connection		Cable connection	
Connector number	Type of connector	Wire colour	Type of connector
1	+	Red	+
2	Voltage	Black	-
3	-	Blue	Voltage
	SHIELDED CABLE	Green	SHIELDED CABLE

7.1.4. Specifications of electrical switching terminals

Internal electrical switching terminals are suitable for conductors with the cross-section from 0,5 to 2,5 mm².

7.1.5. Cabling specification

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

7.1.6. Equipotential bonding

When using a cable in the screen, connect the screen on one side at the transmitters power supply point.

7.2. Overvoltage protection

Transmitters can be exposed to switching overvoltage or those resulting from lightning discharges. Protection against overvoltage between transmission line wires is provided by transil diodes installed in all types of transmitters.

For protection against surges between the transmission line and earth or housing (which are not protected by diodes connected between the line conductors), additional protection is provided by gas surge arresters. Additionally an external protective device can be used e.g. UZ-2 system manufactured by APLISENS or other.

7.3. Transmitter power supply

7.3.1. 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.PC.PR.29.A.B.

Table 3. Permissible transmitter supply voltages.

Type of transmitter	Power supply	Output signal
PC-29A standard version	8 ÷ 16 V DC	0 ÷ 5 V
	8 ÷ 16 V DC	0,5 ÷ 4,5 V
PC-29A Exi version	8 ÷ 16 V DC	0 ÷ 5 V
	8 ÷ 16 V DC	0,5 ÷ 4,5 V
PC-29B standard version	3,3 ÷ 5,6 V DC	0 ÷ 2,5 V
	4,5 ÷ 5,6 V DC	0 ÷ 3,3 V
PC-29B Exi version	3,3 ÷ 5,6 V DC	0 ÷ 2,5 V
	4,5 ÷ 5,6 V DC	0 ÷ 3,3 V

Power supply current consumption approximately 2.5mA (if the transmitter operates in pulse mode, wait 150 ms after supplying it).

7.3.2. 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 resistance value in the power circuit (along with the power cables resistance) cannot be greater than:

$$R_{L_MAX} \geq 20 \text{ k}\Omega$$

7.4. 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 (→ [Cable connection to transmitter internal terminals](#))?;
- Are the transmitter covers tightened?;
- Are the cable gland and the gland plug tightened?.

8. START-UP

The base range and the basic unit can be read out from the transmitter's nameplate (→ [Transmitter identification](#)).



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

9. MAINTENANCE

9.1. 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 possibly CONFIGURATION procedure.

9.2. 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.

9.3. Cleaning/washing

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

9.4. 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.

9.5. 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.

9.6. Repair

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

9.7. 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.

10. 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.

11. HISTORY OF REVISIONS

Revision No.	Document revision	Description of changes
-	DTR.PC.PR-29.02	Initial document version. Prepared by DKD.
1	DTR.PC.PR-29.03	Changed the electrical connections and power supply voltage. Level probes were added. Prepared by DKD.
2	01.A.001./06.16	Changed of technical specifications. Prepared by DKD.
3	01.A.001/2022.03	Changed of software, power supply, figures. Editorial changes. Prepared by DBFD.
4	02.A.002/2022.08	The types PC-29S, PR-29S, PC-29PS have been added to the EN.IX.PC.PR.29.A.B device manual. Prepared by DCF.

Explosion-proof device manual

EN.IX.PC.PR.29.A.B

PRESSURE TRANSMITTERS TYPE: PC-29A/XX/YY, PC-29B/XX/YY, PC-29S/XX/YY,
 TRANSMITTERS-LEVEL PROBES TYPE: PC-29PA/YY, PC-29PB/YY, PC-29PS/YY,
 DIFFERENTIAL PRESSURE TRANSMITTERS TYPE: PR-29A/XX/YY, PR-29B/XX/YY, PR-29S/XX/YY
 LEVEL PROBES TYPE: SG-25A, SG-25B,
 INTRINSICALLY SAFE VERSION acc. to ATEX i IECEx.

1. Introduction

The instruction applies to PC-29A/XX/YY, PC-29B/XX/YY, PC-29S/XX/YY, PR-29A/XX/YY, PR-29B/XX/YY, PR-29S/XX/YY, PC-29PA/YY, PC-29PB/YY, PC-29PS/YY transmitters and SG-25A, SG-25B probes in intrinsically safe version according to ATEX and IECEx marked on the rating plate. Extensions XX, YY after the marking product types apply to the types of pressure (XX) and electrical (YY) connections and will not occur later in the documentation.

The document contains supplementary information relating to the Ex version transmitters. During installation and use of Ex transmitters it is necessary to use user's manual EN.IO.PC.29.A.B with „Explosion-proof device manual EN.IX.PC.PR.29.A.B”. In the case of Ex transmitters with diaphragm seals, the "IO.SEPARATORS" manual should also be used.

2. Using transmitters in hazardous area

The transmitters are produced in accordance with the requirements of the following standards:
 EN IEC 60079-0:2018, EN 60079-11:2012, EN 50303:2000.

IEC 60079-0:2017, IEC 60079-11:2011.

Transmitters PC-29A, PC-29B, PC-29S, PR-29A, PR-29B, PR-29S, PC-29PA, PC-29PB, PC-29PS may operate in areas where there is a risk of explosion, in accordance with the rating of the explosion protection design:

	ATEX:	IECEX:
	II 1/2G Ex ia IIC T4/T5/T6 Ga/Gb	Ex ia IIC T4/T5/T6 Ga/Gb
	I M1 Ex ia I Ma	Ex ia I Ma
	FTZÚ 10 ATEX 0295X	IECEX FTZÚ 11.0004X

The transmitters with PKD electrical connection are permitted only for potentially explosive gas atmospheres and are marked:

	ATEX:	IECEX:
	II 1/2G Ex ia IIC T4/T5/T6 Ga/Gb	Ex ia IIC T4/T5/T6 Ga/Gb
	FTZÚ 10 ATEX 0295X	IECEX FTZÚ 11.0004X

The PC-29S transmitters in the special version are marked with:

	ATEX:
	I M1 Ex ia I Ma
	FTZÚ 10 ATEX 0295X

The SG-25A, SG-25B probes may operate in areas where there is a risk of explosion, in accordance with the rating of the explosion protection design:

	ATEX:	IECEX:
	II 1G Ex ia IIB T4/T5/T6 Ga	Ex ia IIB T4/T5/T6 Ga
	I M1 Ex ia I Ma	Ex ia I Ma
	FTZÚ 10 ATEX 0295X	IECEX FTZÚ 11.0004X

3. Permissible input parameters



The transmitters should be powered via the power supplier and measurement devices provided with the relevant intrinsic-safe certificates. The parameters of their outputs to the danger zone should not exceed the limit power supply parameters specified in points 3.1 and 3.2.

The output current of the power supply and measurement device, in a short circuit, should not exceed the value given in points 3.1 and 3.2 (depending on version).

3.1. Power supply PC-29A, PC-29S, PC-29PA, PC-29PS, PR-29A, PR-29S, SG-25A:

- for circuit of power supply: terminals 1 – 3 or red and black wires – for SG-25A.

Power supply with a „linear” characteristic: $U_i = 16 \text{ V DC}$, $I_i = 0.2 \text{ A}^*$, $P_i = 0.8 \text{ W}^*$.

^{*}) for the PC-29S transmitter in the special version $I_i = 0.03 \text{ A}$, $P_i = 0.2 \text{ W}$ (only linear characteristic)

Power supply with a “trapezoidal” and “rectangular” characteristic: $U_i = 12 \text{ V DC}$, $I_i = 0.05 \text{ A}$, $P_i = 0.6 \text{ W}$, $-40^\circ\text{C} \leq T_a \leq 80^\circ\text{C}$ and T4; $-40^\circ\text{C} \leq T_a \leq 70^\circ\text{C}$ and T5; $-40^\circ\text{C} \leq T_a \leq 45^\circ\text{C}$ and T6, $C_i = 10 \text{ nF}$, $L_i = 10 \mu\text{H}$,

The parameters C_i and L_i of the PC-29S transmitter in a special version take into account the capacity and inductance of the connecting cable up to 6 meters long.

- for circuit of output signal – terminals 2 - 3: or blue and black wires - for SG-25A

$U_o = U_i$, $I_o = I_i$, $P_o = P_i$,

$L_o = 0.55 \text{ mH}$, $C_o = 0.3 \mu\text{F}$.

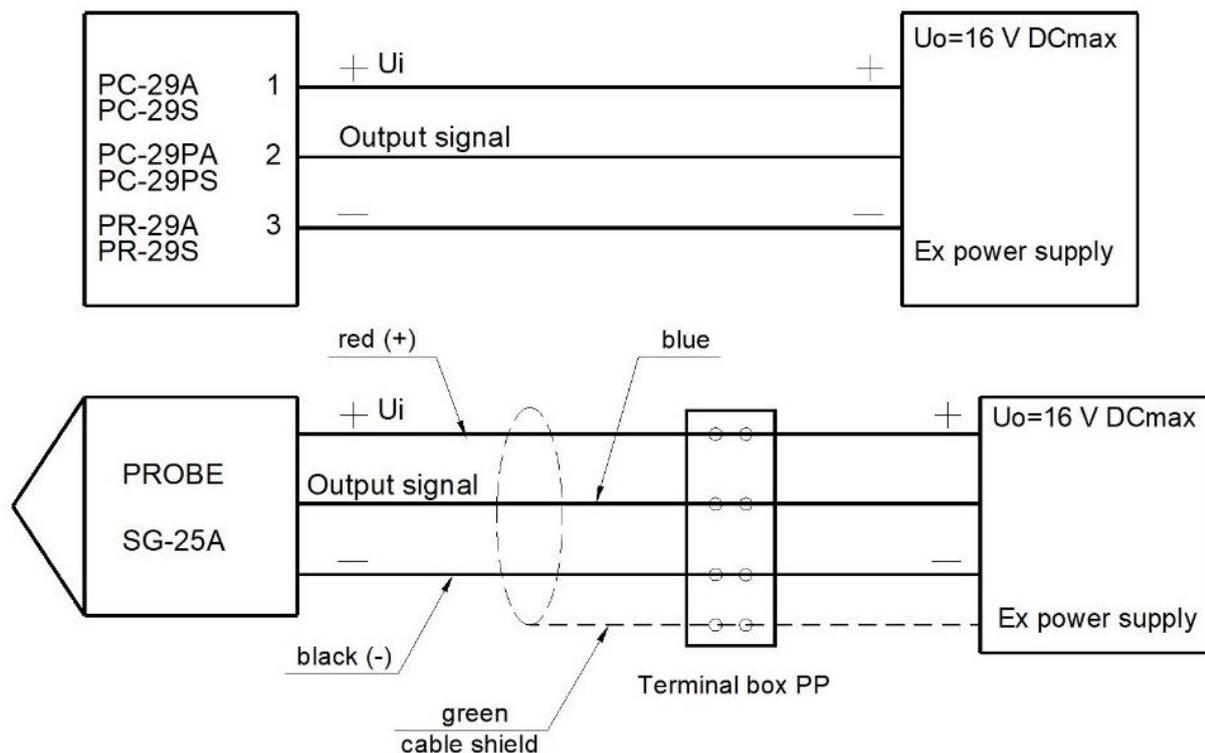


Figure 1. Power supply PC-29A, PC-29S, PC-29PA, PC-29PS, PR-29A, PR-29S, SG-25A with a “linear” characteristic - example.

3.2. Power supply PC-29B, PC-29PB, PR-29B, SG-25B:

- for circuit of power supply - terminals 1 - 3: or red and black wires - for SG-25B

$U_i = 5.6 \text{ V DC}$, $I_i = 0.2 \text{ A}$, $P_i = 0.56 \text{ W}$,

for $-40^\circ\text{C} \leq T_a \leq 80^\circ\text{C}$ and T4, for $-40^\circ\text{C} \leq T_a \leq 70^\circ\text{C}$ and T5, for $-40^\circ\text{C} \leq T_a \leq 45^\circ\text{C}$ and T6

$C_i = 10 \mu\text{F}$, $L_i = 10 \mu\text{H}$,

- for circuit of output signal – terminals 2 - 3: or blue and black wires - for SG-25B

$U_o = 5.6 \text{ V DC}$, $I_o = 0.2 \text{ A}$, $P_o = 0.56 \text{ W}$,

$L_o = 0.55 \text{ mH}$, $C_o = 40 \mu\text{F}$.

3.3. Allowed medium temperature.

Permissible medium temperature T_m at the transducer diaphragm:

- for PC-29A, PC-29B, PC-29S, PC-29PA, PC-29PB, PC-29PS, PR-29A, PR-29S, SG-25A, SG-25B transmitters $-40^{\circ}\text{C} \leq T_m \leq T_a$, T_a - permissible ambient temperature depending on the temperature class.

- for the PC-29S transmitter in the special version

$-40^{\circ}\text{C} \leq T_m \leq 100^{\circ}\text{C}$

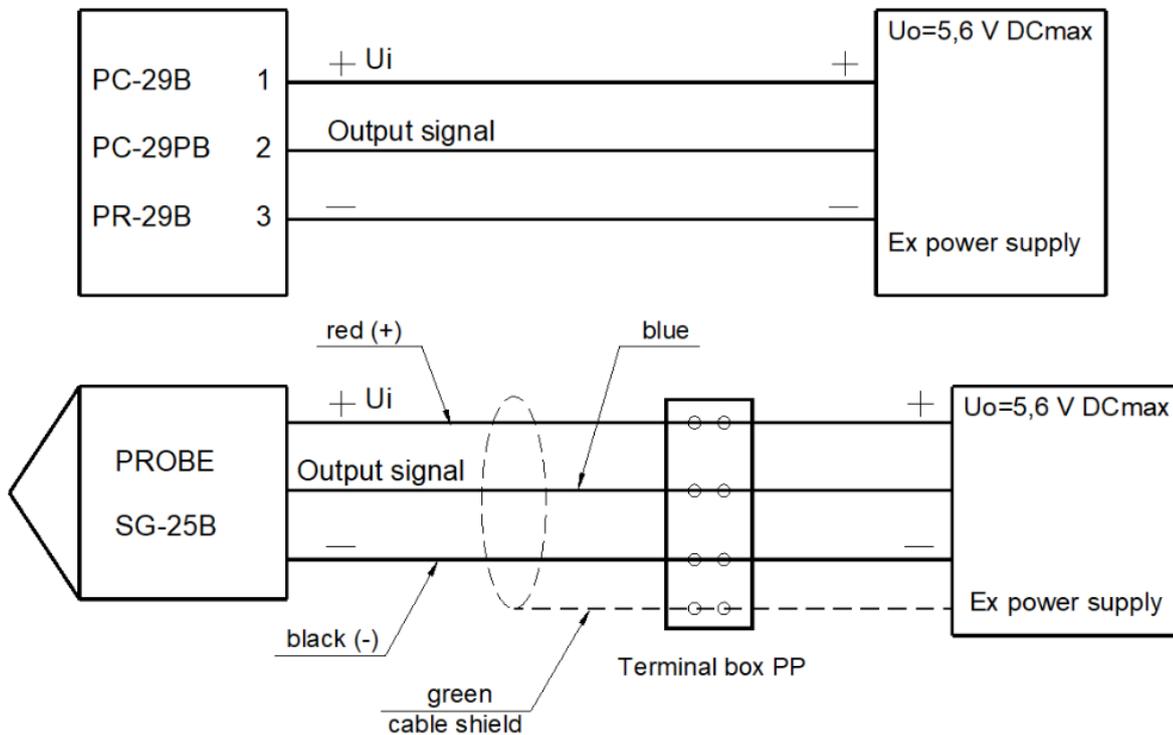


Figure 2. Power supply PC-29B, PC-29PB, PR-29B, SG-25B with a “linear” characteristic - example.

4. How to connect Exi 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.

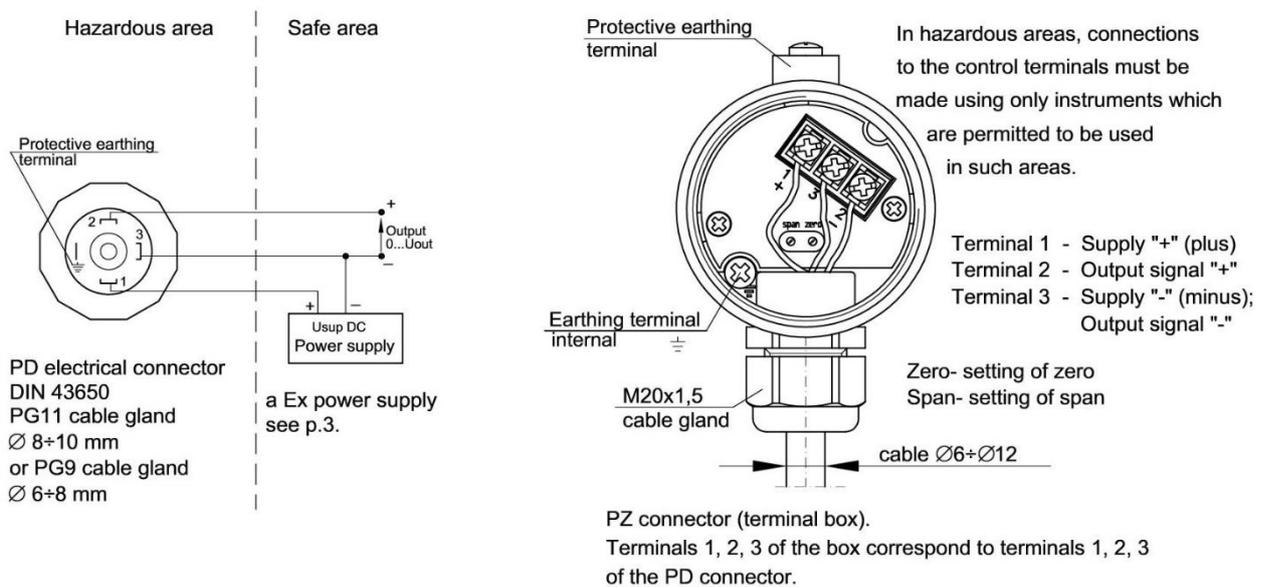


Figure 3. Connection of the transmitter with PZ electrical connectors.

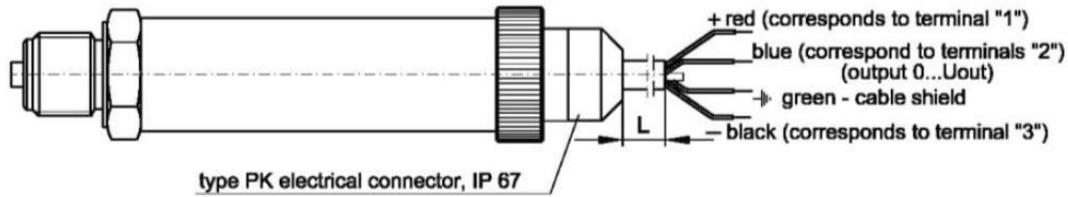


Figure 4. Connection of the transmitter with PK electrical connectors.

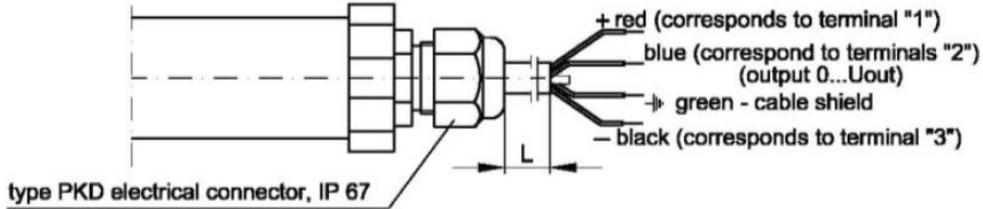


Figure 5. Connection of the transmitter with PKD electrical connectors.

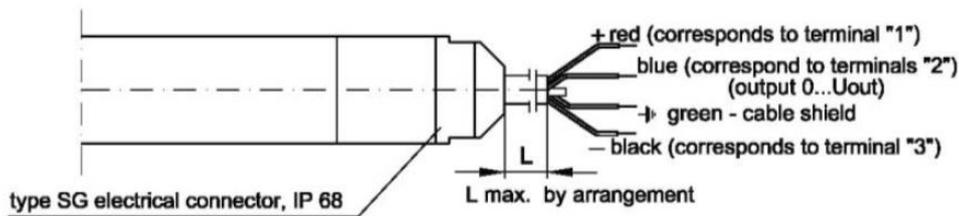


Figure 6. Connection of the transmitter with SG electrical connectors.



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.

5. Special conditions for safe use

Ambient temperature range:

- 40°C ≤ Ta ≤ 80°C for temperature class T4;
- 40°C ≤ Ta ≤ 70°C for temperature class T5;
- 40°C ≤ Ta ≤ 45°C for temperature class T6.

Version of the transmitter with surge arrester, marked on the plate "SA", does not meet the requirements of EN 60079-11 (test of isolation 500 V AC). This must be taken into account during the installation of transmitters.

