



EXPLOSION-PROOF DEVICE MANUAL

SMART PRESSURE TRANSMITTER

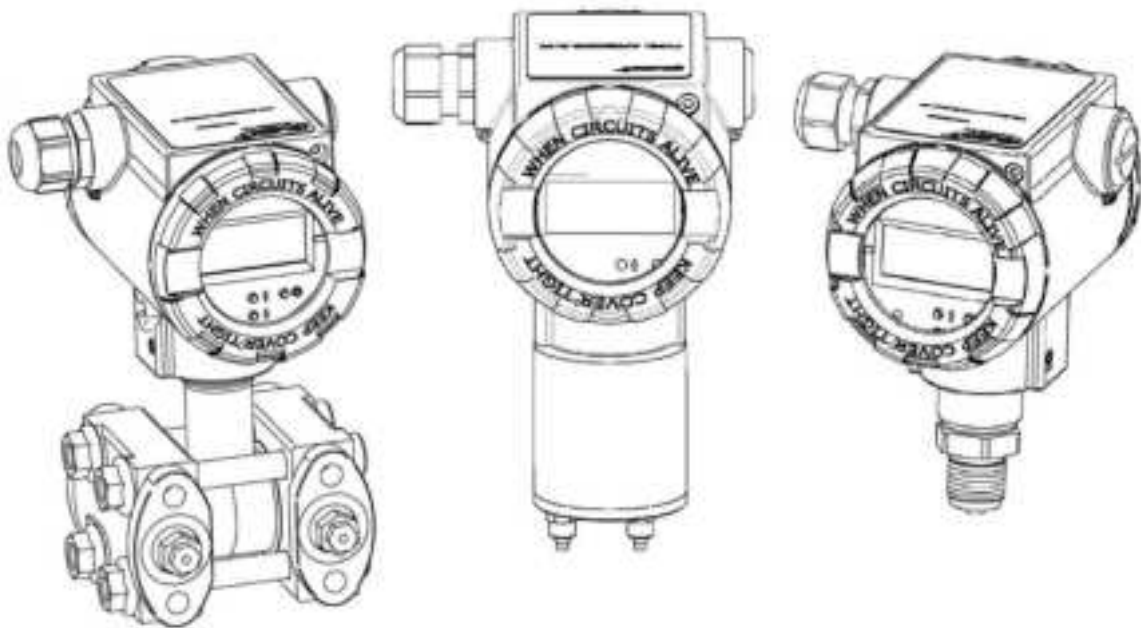
APC-2000ALM

SMART PRESSURE DIFFERENTIAL TRANSMITTERS

APR-2000ALM, APR-2000ALM/G

SMART LEVEL PROBE

APR-2000YALW



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Symbols used

Symbol	Description
	Warning about the necessity follow strictly the information provided in the documentation in order to ensure safety and full functionality of the device.
	Information particularly useful for device installation and operation.
	Information particularly useful for Ex device installation and operation.
	Waste of electrical and electronic equipment disposal information.

BASIC REQUIREMENTS AND OPERATION SAFETY



The manufacturer shall not be liable for any damage resulting from incorrect installation, failure to maintain the device in proper condition, or device use other than intended.

Installation should be carried out by qualified staff having the required authorization to install electrical and I&C equipment. The fitter is responsible for performing the installation in accordance with this manual and with the electromagnetic compatibility and safety regulations and standards applicable to the type of installation.

If leakage in systems with I&C equipment occurs, pressurized medium poses a threat to the personnel. All safety and protection requirements must be observed during transmitter installation, operation and inspections.

If a malfunction occurs, the device should be removed and sent for repair to the manufacturer or a facility authorized by the manufacturer.



In order to minimize the risk of malfunction and associated risks to staff, do not install or use the device in particularly adverse conditions, where the following hazards occur:

- Possible mechanical impacts, excessive shocks and vibration;
- Excessive temperature fluctuation;
- Water condensation, dust, icing.



Explosion-proof installations should be made with special care and in accordance with standards and regulations applicable to this type of installations.

Changes can be made in the manufacturing before the paper version of the manual is updated. The up-to-date user manuals are available on the manufacturer's website: www.aplisens.com.

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1. INTRODUCTION

This manual is only applicable to the APC-2000ALM, APR-2000ALM, APR-2000ALM, APR-2000ALM/G series transmitters in Ex (explosion-proof): Exd (flameproof). The transmitters are identified with model ID on nameplates and also as specified in section 4. Ex information are included in the “Product Certificate”. Model ID indicates type and version of transmitter. The manual contains most important information about intrinsically safe and flameproof transmitters compliant with ATEX directive and IECEx requirements. During installation and use of explosion-proof transmitters, refer to this manual and also EN.IO.APC.APR.ALM manual.

2. SAFETY

- Read this manual carefully before installing, commissioning and operating the transmitter.
- Installation and maintenance should be carried out by qualified staff having the required authorization to install electrical and measuring devices.
- The transmitter should be used as intended within permissible parameters.
- Power source must be disconnected before installing or removing the transmitter.
- No repairs or alterations to the transducer electronic system are permitted. Only the manufacturer or a facility authorized by the manufacturer may assess damages and repair the device (if possible).
- Do not use damaged instruments. In case of failure, the device must be disconnected.
- If the equipment is used in Ex zones, the technical requirements specified in this manual and applicable local (national) regulations must be followed.



3. COMPLETE DELIVERY CHECKLIST

The user receives the following with the transmitter:

- a) product Certificate, which also constitutes a warranty card.
- b) declaration of conformity.
- c) certificate copy (on request).
- d) EN.IX.APC.APR.ALM explosion-proof device manual.
- e) EN.IO.APC.APR.ALM user manual.

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

4. IDENTIFICATION MARKS.

Ex transmitters are delivered with a nameplate which contains data specified in EN.IO.APC.APR.ALM and also the following:

- a) designation of explosion-proof design type, certificate number.
- b) year of manufacture.

5. TRANSMITTER DESIGN

The basic transmitter components are: an housing made of 316 (1.4401) stainless steel or aluminum, measuring head where a pressure signal is converted to an electrical signal, and an electronic module converting the signal from the head to an output signal. Transmitters in aluminum housings are allowed for II and III group, and transmitters in steel housings are allowed for I, II and III group.

6. ELECTROSTATIC HAZARDS

The paint, plastic nameplate and diaphragm seals coated with PTFE form a non-conducting layer applied on a conducting base of housing or diaphragm seals. Transmitters with this design in a dust-explosion zone should be installed in a place where electrostatic charging is impossible, in particular by contact with electrically charged dust falling off or blown from neighboring devices.

7. SPECIAL CONDITIONS OF USE

- a) In hazardous zones of dust explosion, transmitters with painted housings, as well as transmitters equipped with plastic nameplates and diaphragm separator elements covered PTFE layer, should be installed in places and in a way that prevents electrostatic charging, in accordance with the instructions.
- b) The diaphragm separator containing titanium elements must be protected against mechanical impacts.
- c) The diaphragm in contact with the medium must not be exposed to an environment that could damage it.
- d) Power supply of the transmitters should be compliant with the overvoltage category II (or better) in accordance with EN 60664-1 standard.
- e) Flameproof joints are not intended for repair.

8. TRANSMITTER PROTECTION LEVEL (EPL) AND HAZARDOUS AREAS

Ga/Gb (Da/Db) EPL protection level means that the transmitter can be installed in Zone 1 or 2, and transmitter process connections can connect to Zone 0. EPL Db protection level means that the transmitter and process connection can be installed in Zone 21 or 22. Transmitters for mining applications Mb should be turned off if explosion hazard occurs.

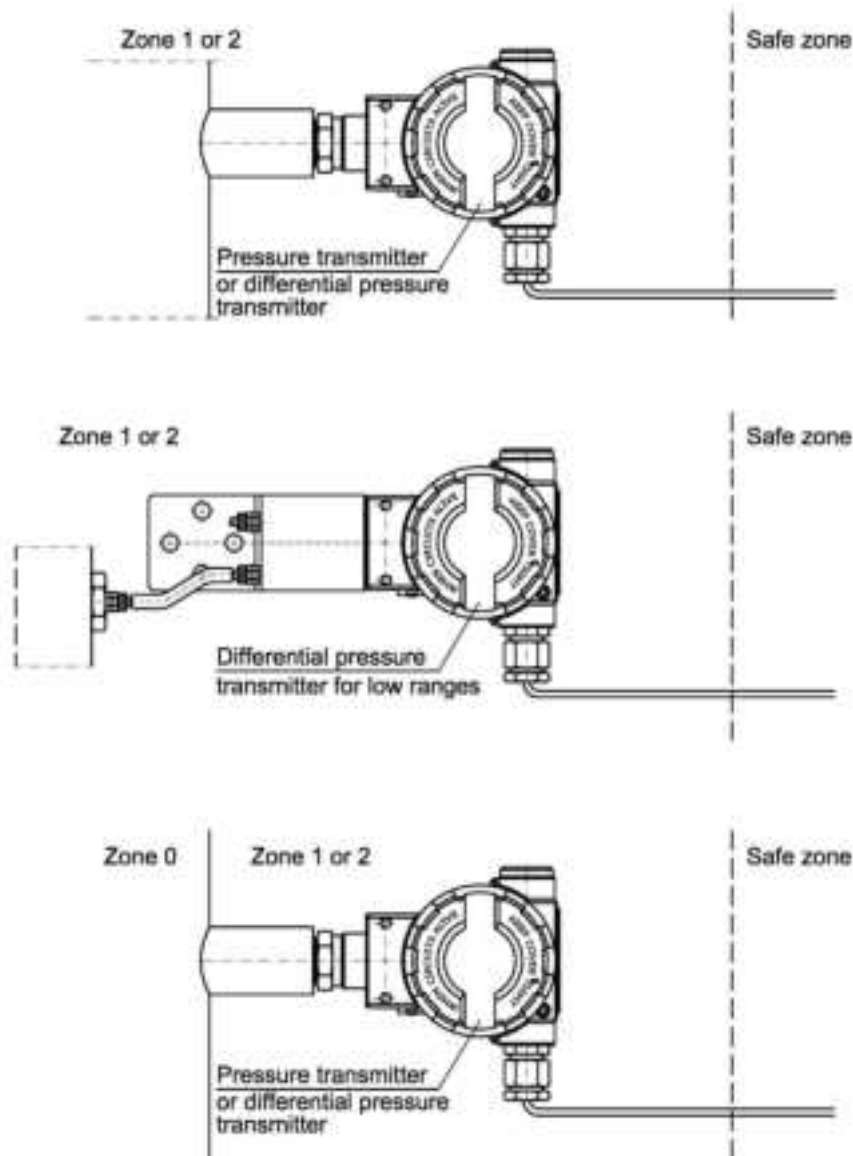


Figure 1. Transmitter installation in potentially explosive areas

9. FLAMEPROOF Exd TRANSMITTERS ACCORDING TO CERTIFICATES JSHP 24 ATEX 0040X and IECEx JSH 24.0009X

9.1. Approvals

The transmitters are ATEX and IECEx certified, which is confirmed by type examination certificates.

9.2. Standards used for assessment

The transmitters are manufactured in compliance with the following standards:

EN 60079-0:2018 (IEC 60079-0:2017 ed. 7.0)

EN 60079-11:2012 (IEC 60079-11:2011 ed. 6.0)

EN 60079-1:2014 (IEC 60079-1:2014 ed. 7.0)

EN 60079-31:2014

IEC 60079-31:2022 ed. 3.0

EN 60079-26:2015 (IEC 60079-26:2014 ed. 3.0)

9.3. Transmitters explosion-proof (Exd) designations according to certificates JSHP 24 ATEX 0040X and IECEx JSH 24.0009X

The following ATEX and IECEx markings apply only to flameproof transmitters marked with the type:

ATEX:



II 1/2G Ex ia/db IIC T5 Ga/Gb

II 2G Ex db ia IIC T5 Gb

II 2D Ex ia/tb IIIC T100°C Db

I M2 Ex db ia I Mb

JSHP 24 ATEX 0040X

(for the APR-2000ALW/G)

(for the version with 316 steel housing)

IECEx:

Ex ia/db IIC T5 Ga/Gb

Ex db ia IIC T5 Gb

Ex ia/tb IIIC T100°C Db

Ex db ia I Mb

IECEx JSH 24.0009X

(for the APR-2000ALW/G)

(for the version with 316 steel housing)

10. PERMISSIBLE PARAMETERS OF Exd TRANSMITTERS

10.1. Ambient temperature range and temperature classes

Table 1. Ambient temperature range and temperature classes for Exd transmitters

Operating temperature range		Temperature class and maximum surface temperature
Ambient temperature	Process temperature at the transmitter diaphragm	
$-40^{\circ}\text{C}^* \leq T_a \leq 75^{\circ}\text{C}$	$-40^{\circ}\text{C} \div 75^{\circ}\text{C}$	T5/T100°C

*) for special version -50°C



If the medium temperature can exceed $T_{a\max}$, separating elements, such as diaphragm separators, siphon tubes, etc., should be used. The transmitter operating temperature T_p must meet the $T_p \leq T_{a\max}$ condition.

10.2. Power supply, connection and operation of Exd transmitters



Connect the transmitter according to the electrical diagram (Figure 2). The transmitter electrical connections in potentially explosive zones should be made by personnel having necessary knowledge and experience in this area. The transmitters should be properly grounded by means of a grounding terminal. If the transmitter has metal contact with grounding structural elements or piping, separate transmitter grounding is not necessary.



Transmitter and equipment in the transmitter measurement loop must be connected in compliance with explosion-proof standards and conditions for application in explosion risk zones. If these rules are not followed, explosion can occur and people can be exposed to danger.

Termination resistor $120\ \Omega$, which is by default included in the transmission system using a jumper between „Digital” terminals A and B (Aplisens PP Modbus boxes are factory equipped with resistor $120\ \Omega$), should be used at all transmission speeds (especially @1152200 bps).

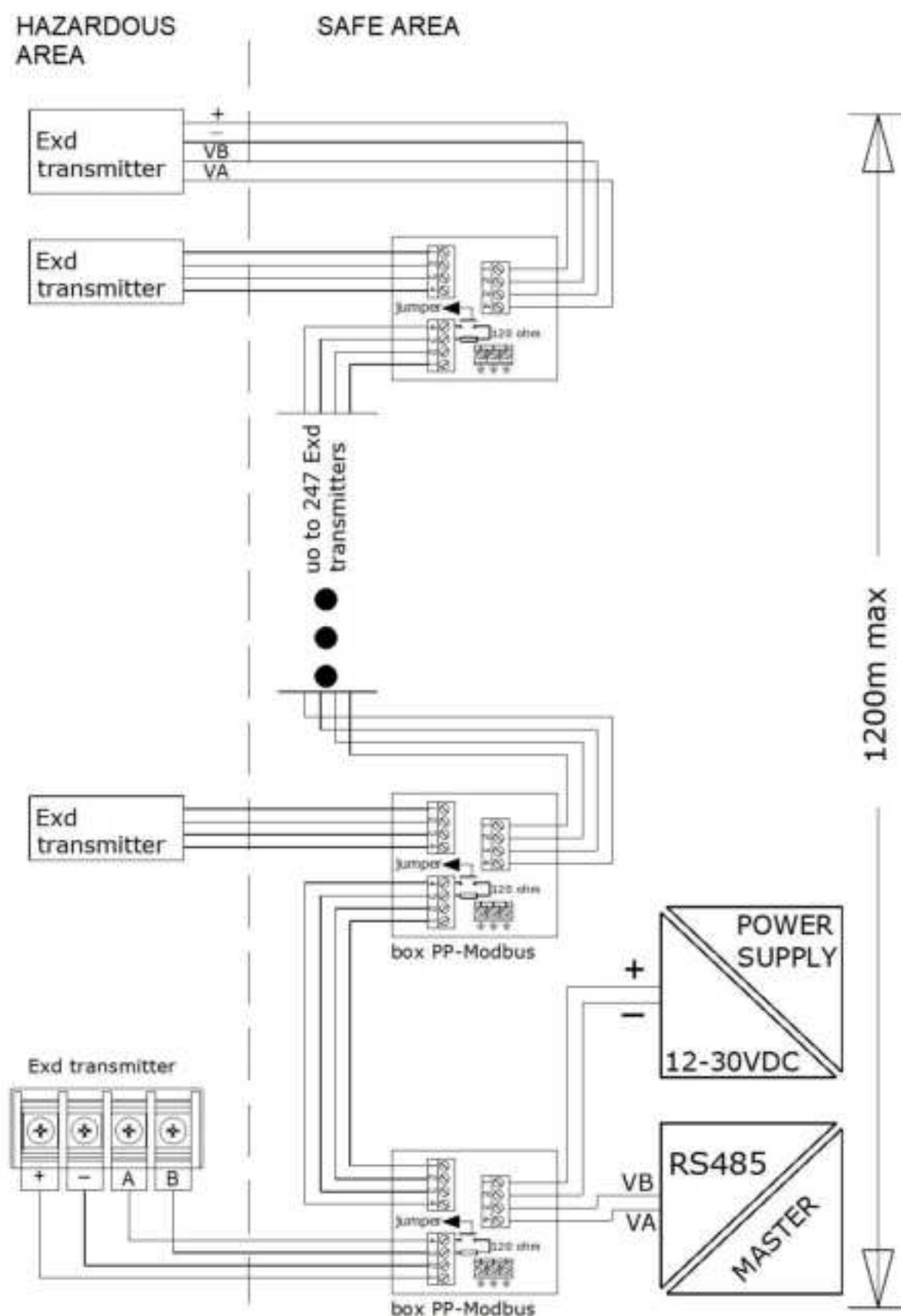


Figure 2. Connecting Exd transmitters and probes



The transmitters should be supplied with maximum voltage specified in the table below (24 VDC rating) from transformer power supplies or other devices providing at least reinforced insulation between primary and secondary winding, where voltages not exceeding 250 VAC occur. It is responsibility of the user to provide power supply compliant with the requirements above.

Table 2. Maximum supply voltage for Exd transmitters

Maximum supply voltage
30 VDC



In an explosion risk zone, do not remove the cover of supplied transmitter and do not connect to the terminals, and do not change the position of local indicator (display).



In order to secure the side covers against loosening, unscrew the hex socket screws pressing the screw heads against the edges of the covers. The method of locking the covers against unscrewing and the possible method of sealing the transmitter are presented in figure below.

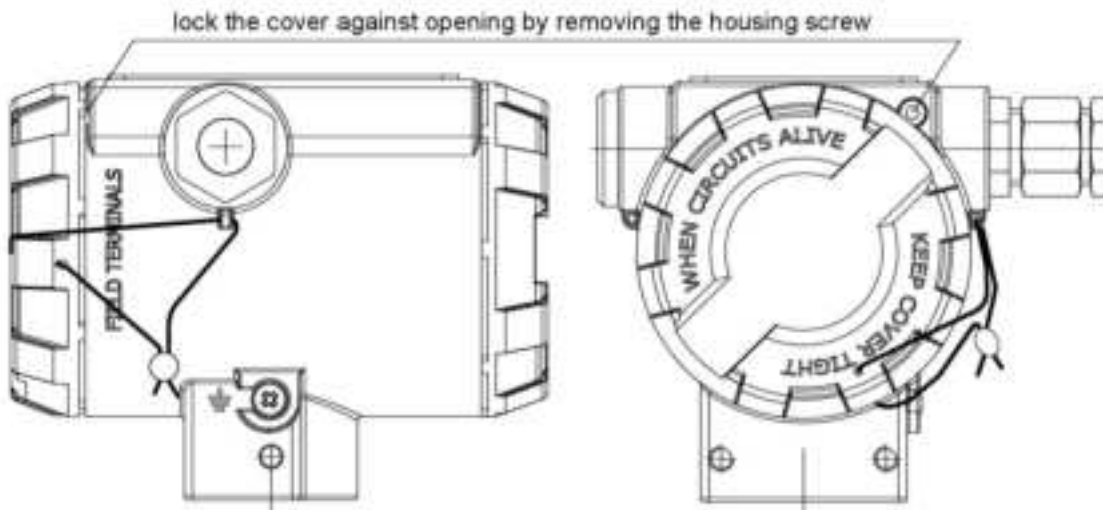


Figure 3. Housing cover and sealing method



No repairs or alterations to the transmitter housing elements and electrical system are permitted. Repairs on flameproof joints are not permitted. Only the manufacturer or a facility authorized by the manufacturer may assess damages and repair the device (if possible).



Due to the type of housing material (light alloy with high aluminum content), the user is obliged to ensure that in the transmitter installation site its housing cannot be hit and, consequently, damaged.

In a transmitter housing there are two holes for installing, one for a cable entry and second for a blinding plug with M20x1.5 or 1/2 NPT thread. As standard, the transmitter is delivered to the customer without cable gland installed. After consultation with the manufacturer, the user can purchase a transmitter with a cable gland, or without a cable gland and the missing cable gland purchase separately. A transport plug is installed in the cable gland place. In such case, the transport plug



should be removed and appropriate cable gland installed (Figure 4) before the transmitter is installed. It is responsibility of the user to install a certified cable gland compliant with the list of equivalent cable glands presented in Table 3. List of equivalent cable entries. As a blinding plug, an Aplisens plug supplied with the transmitter or a certified blinding plug compliant with the list of equivalent blinding plugs in Table 4 can be used. It is allowed to install other types of certified cable entries and blinding plugs about marking Exd IIC Gb, Extb IIIC Db and Exd I Mb with at least IP66 protection and -40°C...75°C temperature range.

Apply LOCTITE 577 on the 1/2 NPT thread of cable gland before installation. When connecting, make sure that the cable type and diameter is suitable for the cable gland used and temperature in the installation site.

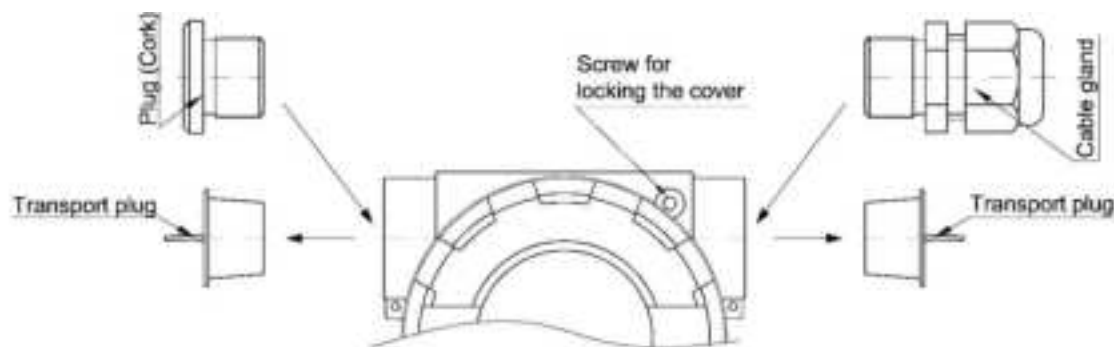


Figure 4. Installation of cable entries and blinding plugs

Table 3. List of equivalent cable entries

Cable entry type	Manufacturer	Thread	Designation	IP	Certificate no.
501/423	Hawke International	M20x1.5 (1/2" NPT)	Exd IIC Gb Extb IIIC Db	67	CML 19ATEX1167X IECEX CML19.0045X CML 21UKEX1161X
501/421	Hawke International	M20x1.5 (1/2" NPT)	Exd IIC Gb Extb IIIC Db	67	Baseefa 06ATEX0058X
501/453/RAC	Hawke International	M20x1.5 (1/2" NPT)	Exd IIC Gb Extb IIIC Db	67	Baseefa 06ATEX0056X
501/453/Universal	Hawke International	M20x1.5 (1/2" NPT)	Exd IIC Gb Extb IIIC Db	67	CML 18ATEX1268X IECEX CML18.0131X CML 21UKEX1132X
ICG/653/Universal	Hawke International	M20x1.5 (1/2" NPT)	Exd IIC Gb Extb IIIC Db	67	Baseefa 06ATEX0058X
ICG/653/Universal/L	Hawke International	M20x1.5 (1/2" NPT)	Exdb IIC Gb Extb IIIC Db	67	Baseefa 06ATEX0058X
A2F, A2FRC	CMP-Products	M20x1.5 (1/2" NPT)	Exd IIC Gb Exta IIIC Da	67	CML 18ATEX1321X IECEX CML18.0179X CML 21UKEX1245X
SS2K	CMP-Products	M20x1.5 (1/2" NPT)	Exd IIC Gb Exta IIIC Da	67	CML 18ATEX1322X IECEX XML18.0178X CML 21UKEX1256X
E1FW, E2FW	CMP-Products	M20x1.5 (1/2" NPT)	Exd IIC Gb Exta IIIC Da Exd I Mb	67	CML 18ATEX1324X IECEX CML18.0181X CML 21UKEX1252X
PX2K, PXSS2K, PX2KX	CMP-Products	M20x1.5 (1/2" NPT)	Exdb IIC Gb Exta IIIC Da Exdb I Mb	67	CML18ATEX1325X IECEX CML18.0182X CML 21UKEX1214X

Table 4. List of equivalent blinding plugs

Plug type	Manufacturer	Thread	Designation	IP	Certificate no.
475, 477	Hawke International	M20x1.5 (1/2" NPT)	Exd IIC Gb Extb IIIC Da Exd I Mb	66	Baseefa 10ATEX0262X
747, 757 and 767	CMP-Products	M20x1.5 (1/2" NPT)	Exd IIC Gb Exta IIIC Da Exd I Mb	67	CML 18ATEX1320X IECEX CML18.0177X CML 21UKEX1238X

Use a shielded or unshielded, non-reinforced cable with compact structure and circular cross-section in an non-hygroscopic sheath made of an elastomer, e.g. YKSLY 2*1, YnTKSYekw 1*2*1, LIICY 2*1.



If a cable of different design has to be used, it should be agreed on with the transmitter manufacturer in order to choose a suitable cable gland or individually purchase a cable gland suited to the cable used. The list of equivalent cable entries is given above (Table 3). The cables should be protected from damage by routing them in cable trays, jacket tubes, cable ladders, by using fixed mounts, etc.



When periodic inspections are performed, the covers tightness, cable entry and cable fixing in the cable entry should be checked. Visually check the housing and cable for mechanical damage, and the nameplate for legibility. The sensor diaphragm should be also included to periodic inspections. There shouldn't be a signs of damage. During maintenance it is recommended to apply acid-free petroleum jelly on threads connection.



The diaphragm should not be exposed to damage during transmitter installation and operation. The transmitter diaphragm is made of stainless steel or Hastelloy and must not be exposed to contact with a medium that may damage it.



The connecting and operating general rules for an Exd transmitters should be compliant with the rules and standards applicable to devices in a flameproof housing: EN 60079-14 – Electrical devices in explosive atmospheres. Part 14: Electrical installations in risk areas (other than mines).

EN 60079-17 – Electrical devices in explosive atmospheres. Part 17: Electrical installations inspection and maintenance in risk areas (other than mines).



Due to possible damage, the transmitter should be protected from heating above 80°C also when explosion hazard does not occur.

11. ADDITIONAL INFORMATION

11.1. Additional information

The manufacturer reserves the right to introduce structural and technological changes to the device, which does not deteriorate its performance.

11.2. History of revisions

Revision No	Document revision	Description of changes
-	01.A.001/2023.10	Initial document version. Prepared by DBFD, DR.