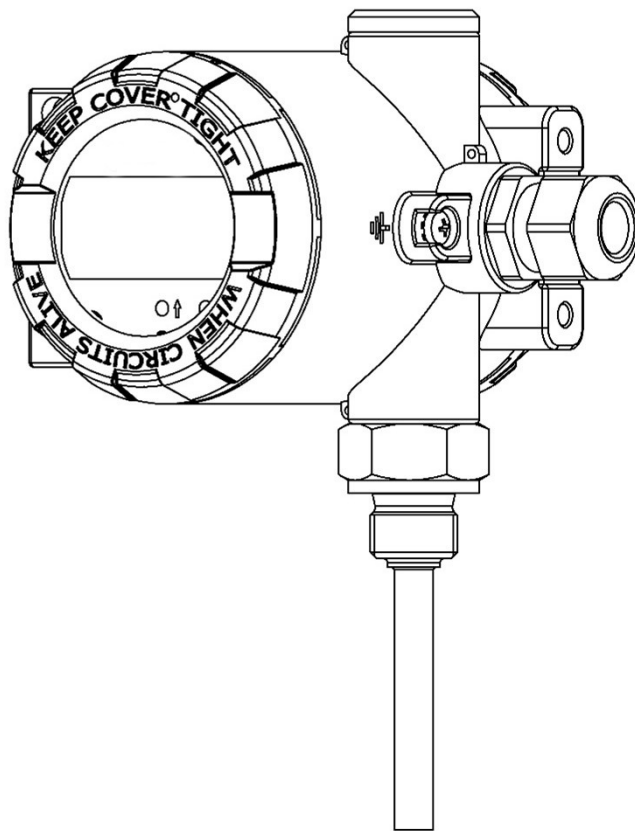


EXPLOSION-PROOF DEVICE MANUAL

SMART TEMPERATURE TRANSMITTERS

D72



DELTA MOBREY LTD.

Hudson House, Albany Park Camberley Surrey, GU16 7PL, UK.





T+44 (0)1252 729140

F+44 (0)1252 729168

E sales@delta-mobrey.com

W www.delta-mobrey.com

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 device.
	Waste of electrical and electronic equipment disposal information.

BASIC REQUIREMENTS AND SAFE USE

- The manufacturer will not be liable for damage resulting from incorrect installation, failure to maintain the device in a suitably functional condition, or use of the device other than for its intended purpose.
- Installation should be carried out by qualified personnel having the necessary authorisation to install electrical and pressure measuring devices. The installer is responsible for performing the installation in accordance with these instructions and with the electromagnetic compatibility and safety regulations and standards applicable to the type of installation.
- In systems with pressure transmitters there exists, in case of leakage, a risk to personnel on the side where the medium is under pressure. All safety and protection requirements must be observed during installation, operation and inspections.
- If a device is not functioning correctly, disconnect it and send it for repair to the manufacturer or to a firm authorised by the manufacturer.



- In order to minimise the risk of malfunction and associated risks to personnel, the device is not to be installed or used in particularly hostile conditions, where the following risks occur:
- Possibility of mechanical impacts, excessive shocks and vibration;
 - Excessive temperature fluctuation;
 - Condensation of water vapour, 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 in the production of transmitters may precede a paper updating for the user. The current user manuals are available at <http://www.delta-mobrey.com>

This explosion-proof construction manual IOM-D72-Ex D consists of two chapters:

CHAPTER 1. INTRINSICALLY SAFE CONSTRUCTION Exi, applies only to transmitters in explosion-proof version: intrinsically safe and contains information related to the intrinsically safe version of the transmitter.

CHAPTER 2. FLAMEPROOF CONSTRUCTION Exd, applies only to explosion-proof transmitters: flameproof Exd and contains the most important information related to the flameproof of transmitters.

TABLE OF CONTENTS

CHAPTER 1. INTRINSICALLY SAFE CONSTRUCTION Ex i	5
1. INTRODUCTION	5
2. SAFETY	5
3. COMPLETE DELIVERY CHECKLIST	5
4. IDENTIFICATION MARKS	5
5. TRANSMITTER DESIGN	6
6. ELECTROSTATIC HAZARDS	7
7. SPECIAL CONDITIONS FOR SAFE USE	7
8. EX MARKING	7
8.1. Standards used for assessment.....	7
8.2. Explosion-proof marking of transmitters in accordance with the ATEX Directive and IECEx requirements	7
9. TRANSMITTERS IN EXPLOSION HAZARD AREA	8
9.1. D72 transmitter in explosion hazard zone.....	8
9.2. D72 Safety transmitter in explosion hazard zone	9
9.1. LI-24ALW transmitter in explosion hazard zone	8
9.2. LI-24ALW Safety transmitter in explosion hazard zone	9
10. PERMISSIBLE PARAMETERS OF TRANSMITTERS	10
10.1. Power supply	10
10.2. The permissible output parameters for the transmitters with a cable temperature sensor:.....	11
10.3. Ambient temperature range and temperature classes.....	12
10.3.1. Measurement of transmitter operating temperature (T _p) with sensor screwed into the enclosure. ...	12
10.3.2. The transmitter temperature of the temperature class (T**) for gases and the maximum surface temperature (T*) for combustible dusts.	12
11. CONNECTION AND OPERATION OF TRANSMITTERS	14
CHAPTER 2. FLAMEPROOF CONSTRUCTION Ex d	17
1. INTRODUCTION	17
2. SAFETY	17
3. COMPLETE DELIVERY CHECKLIST	17
4. IDENTIFICATION MARKS	17
5. TRANSMITTER DESIGN	19
6. ELECTROSTATIC HAZARDS	19
7. SPECIAL CONDITIONS FOR SAFE USE	19
8. EX MARKING	19
8.1. Standards used for assessment.....	19
8.2. Explosion-proof marking of transmitters in accordance with the ATEX Directive and IECEx requirements	19
9. TRANSMITTERS IN EXPLOSION HAZARD AREA	20
9.1. LI-24ALW transmitter in explosion hazard zone	20
9.2. LI-24ALW Safety transmitter in explosion hazard zone	21

10. PERMISSIBLE PARAMETERS OF TRANSMITTERS.....	22
10.1. Power supply.....	22
10.2. The permissible output parameters for the transmitters with a cable temperature sensor.....	22
10.3. Permissible ambient temperature range and temperature classes	22
10.3.1. Maximum surface temperature for transmitters with a sensor screwed into the enclosure	23
10.3.2. Measurement of operating temperature T_p of transmitters with a sensor screwed into the enclosure	23
10.3.3. The transmitter temperature of the temperature class (T^{**}) for gases and the maximum surface temperature (T^*) for combustible dusts	23
11. CONNECTION AND OPERATION OF TRANSMITTERS.....	24
12. ADDITIONAL INFORMATION	28
12.1. Additional information.....	28
12.2. History of revisions.....	28

LIST OF DRAWINGS

Figure 1. 1. Example of a nameplate for a transmitter with a direct sensor.	6
Figure 1. 2. Example of a transmitter nameplate for use with an independent remote sensor.	6
Figure 1. 3. D72 temperature transmitter with a cable temperature sensor.	8
Figure 1. 4. D72 temperature transmitter with a sensor screwed into the enclosure.	9
Figure 1. 5. Temperature transmitter with a cable temperature sensor or with a sensor screwed into the enclosure.	9
Figure 1. 6. The principle of power supply from a source with linear characteristics.	11
Figure 1. 7. The principle of power supply from a source with a trapezoidal characteristic.	11
Figure 1. 8. Determination of the temperature of transmitter.....	13
Figure 1. 9. Connection of the transmitter in Exi version.	14
Figure 1. 10. Installation of cable entries and blinding plugs (example).....	15
Figure 2. 1. An example of a nameplate for a transmitter with a direct sensor.	18
Figure 2. 2. An example of a transmitter nameplate without sensor for mounting with an external independent remote or direct sensor.	18
Figure 2. 3. D72 temperature transmitter with a cable temperature sensor.	20
Figure 2. 4. D72 temperature transmitter with a sensor screwed into the enclosure.	21
Figure 2. 5. Temperature transmitter D72 Safety with a cable temperature sensor or with a sensor screwed into the enclosure.	21
Figure 2. 6. Determination of the temperature of transmitter with sensor screwed into the enclosure.	24
Figure 2. 7. Connection of the transmitter in Exd version.....	25
Figure 2. 8. Installation of cable entries and blinding plugs (example).....	26
Figure 2. 9. Flameproof joints of transmitter.....	27
Figure 2. 10. The flameproof joints of the temperature sensors.....	28

LIST OF TABLES

Table 1. 1. Power supply voltage.....	10
Table 1. 2. Permissible input parameters in the power supply circuit (terminals "+", "-") for D72, D72 with sensors transmitters.	10
Table 1. 3. Permissible input parameters in the power supply circuit (terminals "+", "-") for D72 Safety transmitters.	10
Table 2. 1. Supply voltage for transmitters Exd.	22
Table 2. 2. Ambient temperature range and temperature classes for Exd transmitters.	22
Table 2. 3. List of equivalent cable entries.....	26
Table 2. 4. List of equivalent blinding plugs.	26

CHAPTER 1. INTRINSICALLY SAFE CONSTRUCTION

Ex i

1. INTRODUCTION

This chapter 1 of the manual applies only to the transmitters of the series: D72, D72 with sensors, D72 Safety in explosion-proof version: intrinsically safe Exi.

The manual contains the most important information related to the intrinsically safe version of the transmitters in accordance with the ATEX Directive and IECEx requirements. When installing and using the explosion-proof transmitters, refer to this explosion-proof device instruction IOM-D72-EX D and, additionally, the IOM-D72 instruction manual.

2. SAFETY



- The installation and commissioning of the transmitter and any operation should only be carried out after careful reading of this user manual.
- 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 transmitter 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 transmitters. If the device is malfunctioning, disconnect it.
- 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) IOM-D72-EX D explosion-proof device manual;
- e) IOM-D72 user manual.

Items b), c), d), e) are available at www.delta-mobrey.com

4. IDENTIFICATION MARKS

Ex transmitters are delivered with a nameplate containing specific data:

1. Logo or manufacturer's name;
2. CE mark;
3. Notified body number;
4. Product QR code;
5. Transmitter type;
6. Measuring range;
7. Supply voltage value;
8. Permissible range of ambient temperature;
9. Output signal;
10. Type of measuring sensor (measuring element);
11. Sensor version;
12. Type of process connector;
13. Electrical connection cable entry thread;
14. Serial number;

- 15. Year of manufacture;
- 16. Caution" symbol. See the relevant information in the user's manual;
- 17. IP protection rating;
- 18. Identification of the explosion-proof version type. (see **ch.1, no. 8.2**);
- 19. Manufacturer's address;
- 20. Input signal (types of measuring inputs).
- 21. „Version SA" version with gas surge arrester.

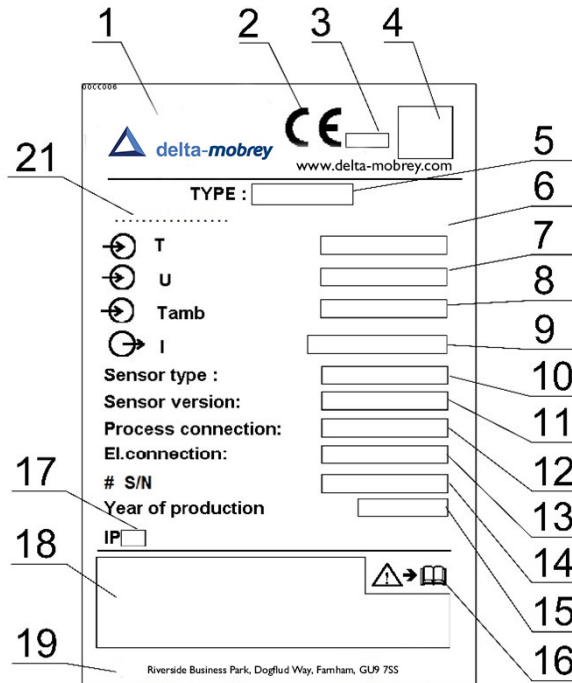


Figure 1. 1. Example of a nameplate for a transmitter with a direct sensor.

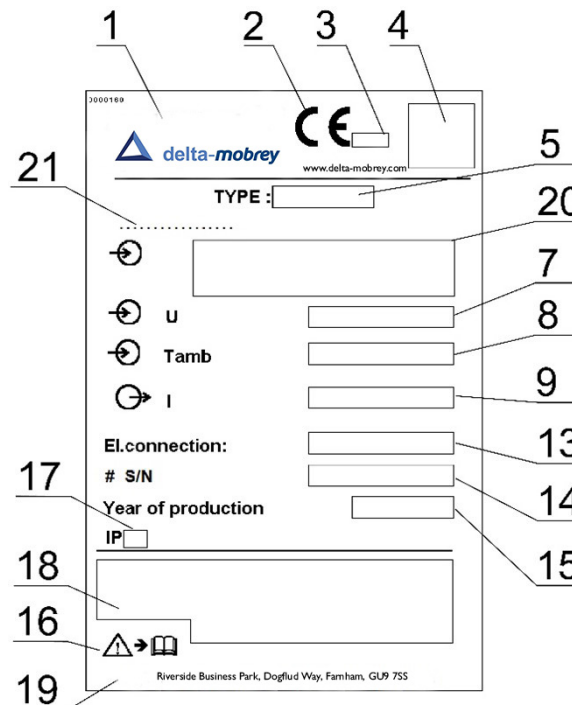


Figure 1. 2. Example of a transmitter nameplate for use with an independent remote sensor.

5. TRANSMITTER DESIGN

The transmitter housing is made of die-cast aluminum alloy or steel 1.4401 (316). It consists of a body and two screw-on covers, one of which is equipped with a glass window. A transmitter enclosure has holes for installing a

cable entry with M20x1.5 or ½"NPT thread (via adaptor). The housing is equipped with an internal and external earthing terminal. Inside the casing there is an electronic system transforming the signal from the measuring sensor into a unified output signal. Depending on the transducer type, the following ways to connect the transducer to the sensor are possible: remotely (connection with a cable), or directly (temperature sensor pre-assembled with the transducer).

Transmitters in aluminum enclosures are allowed for II and III group, and transmitters in steel enclosures are allowed for I, II and III group.

6. ELECTROSTATIC HAZARDS

The paint, plastic nameplate is a non-conducting layer applied on a conducting base of an enclosure. 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. When performing connection and maintenance activities in the hazardous area, the possibility of electrostatic discharge should be eliminated. Do not wipe the transmitter dry.

7. SPECIAL CONDITIONS FOR SAFE USE

- This Operating Instructions must be taken into account during installation
- Version of device with surge arrester, marked as "SA", does not meet the 500V rms test required by EN 60079-11:2012. This must be taken into account when device is installing.
- For the medium temperature $T_m > T_a$ temperature of the temperature class T^{**} and the maximum surface temperature T^* should be set according to the ch.1 p.10.3.2.
- In explosion hazardous areas, transmitters in lacquered aluminum casing, as well as transmitters fitted with plastic tags, should be installed in a manner that prevents electrostatic charging in accordance with ch.1 p.6.




8. EX MARKING

8.1. Standards used for assessment

The transmitters are manufactured in compliance with the following standards:

EN IEC 60079-0; (IEC 60079-0:2017 ed. 7.0),
 EN 60079-11:2012; (IEC 60079-11:2011 ed. 6.0),
 EN 50303:2000.

8.2. Explosion-proof marking of transmitters in accordance with the ATEX Directive and IECEx requirements

Transmitter type	Marking the type of explosion-proof construction, marking of the certificate	
	ATEX	IECEx
D72 with remote mount sensor	 II 2(1)G Ex ia [ia Ga] IIC T4/T5/T6 Gb II 1D Ex ia IIIC T105°C Da I M1 Ex ia I Ma (with 1.4401 (316) enclosure only) FTZU 20 ATEX 0028X	Ex ia [ia Ga] IIC T4/T5/T6 Gb Ex ia IIIC T105°C Da Ex ia I Ma (with 1.4401 (316) enclosure only) IECEx KDB 19.0005X
D72 with direct mount sensor	 II 1/2G Ex ia IIC T4/T5/T6 Ga/Gb II 1D Ex ia IIIC T105°C Da I M1 Ex ia I Ma (with 1.4401 (316) enclosure only) FTZU 20 ATEX 0028X	Ex ia IIC T4/T5/T6 Ga/Gb Ex ia IIIC T105°C Da Ex ia I Ma (with 1.4401 (316) enclosure only) IECEx KDB 19.0005X
D72 Safety (<i>available soon</i>) without sensor (for mounting an external remote or direct sensor)	 II 2(1)G Ex ia [ia Ga] IIC T4 Gb II 1D Ex ia IIIC T105°C Da I M1 Ex ia I Ma (with 1.4401 (316) enclosure only) ATEX	Ex ia [ia Ga] IIC T4 Gb Ex ia IIIC T105°C Da Ex ia I Ma (with 1.4401 (316) enclosure only) IECEx

For the temperature of the medium $T_m > T_a$, the temperature class T^{**} of the transmitter for gases and the maximum surface temperature T^* in the presence of combustible dust depends on the temperature of the medium.

As standard, the transmitters are manufactured for explosive gas atmospheres. A customer can also order a transmitter for explosive dust atmospheres and for mining applications.

9. TRANSMITTERS IN EXPLOSION HAZARD AREA

9.1. D72 transmitter in explosion hazard zone

EPL protection level [Ga], Gb and device category 2 (1) G means that the transmitter can be installed in hazardous zone 1 or 2, and the cable temperature sensor can be installed in zone 0. EPL protection level Da means that the transmitter it can be installed in the hazardous zone 20, 21 or 22 (fig. 1.3).

The temperature class of the transmitter for the gases and the maximum permissible surface temperature in the presence of combustible dust is defined as in chapter 1. p.10.3 and in accordance with the specifications (shown in the User Manual) of the temperature sensor.

The transmitters designed for use with a cable temperature sensor are provided with an intrinsically safe output on the sensor's side.

Sensors installed in the zone '0' should meet the following requirements:

- for a "simple apparatus" – according to section 5.7 in EN 60079-11:2012;
- the requirements relating to the operating parameters, e.g. resistance to operating pressure, temperature, resistance to chemical and mechanical stress.

A cable temperature sensor that meets the above requirements can be purchased either from Delta Mobrey or another manufacturer. In the dust explosion hazard zone, cable temperature sensors installed by the recipient should be certified and have a marking appropriate to the zone in which they will be used.

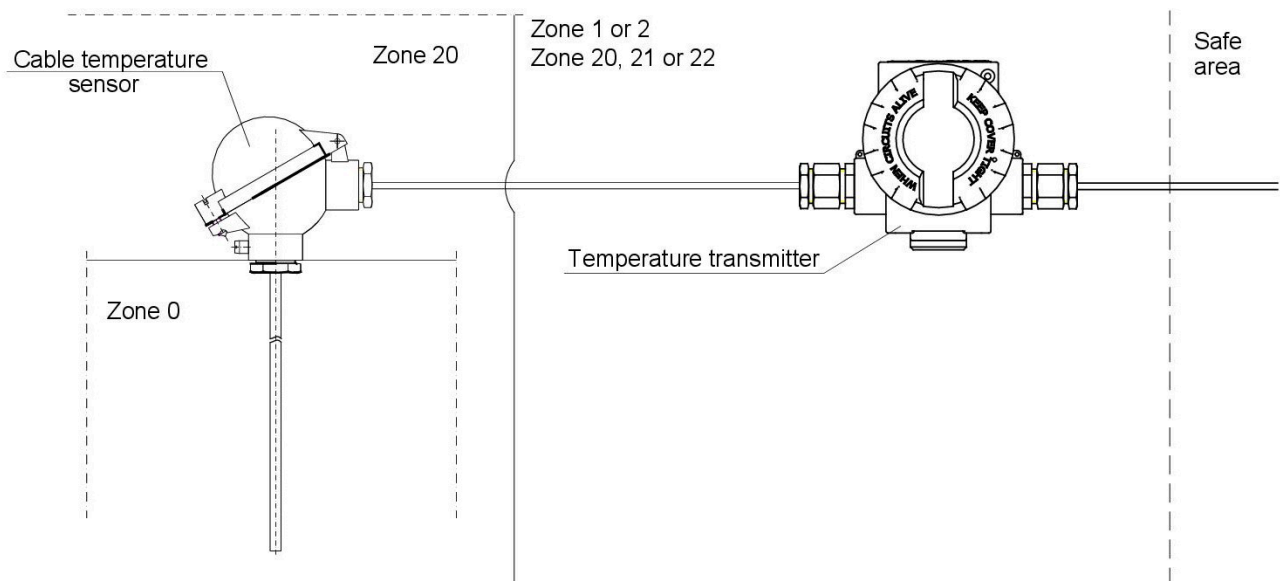


Figure 1. 3. D72 temperature transmitter with a cable temperature sensor.

If the sensor screwed into the housing is installed, the transmitter has EPL Ga / Gb protection level and category 1 / 2G, which means that the transmitter works on the border of zones 0 and 1, the process connection (sensor) can connect to zone 0, and the transmitter can be installed in the hazard zone 1 or 2. EPL protection level Da means that the transmitter with the process connection (sensor) can be installed in the hazardous area 20, 21 or 22 (Fig. 1.4).

Temperature class T ** of the transmitter with a sensor screwed into the enclosure for gases and the maximum surface temperature T * in the presence of flammable dusts depends on the temperature of the medium; see chapter 1. p. 10.3.

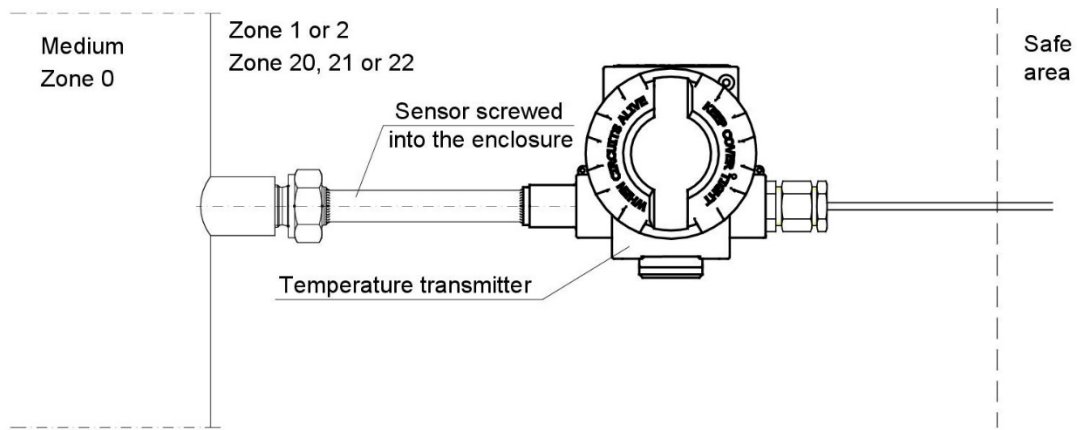


Figure 1. 4. D72 temperature transmitter with a sensor screwed into the enclosure.

Types of sensors for direct mounting with a transmitter proposed by Delta Mobrey: WS, WN, LS, LN (according to the current catalog card). Sensors for direct mounting installed by the customer should be approved to the zone in which they will be used and provide a degree of protection of at least IP 66.

9.2. D72 Safety transmitter in explosion hazard zone (available soon)

The D72 Safety transmitter is delivered without a sensor as a standard. The user should install a certified sensor suitable for the zone in which it will be installed, ensuring a protection degree of at least IP 66.

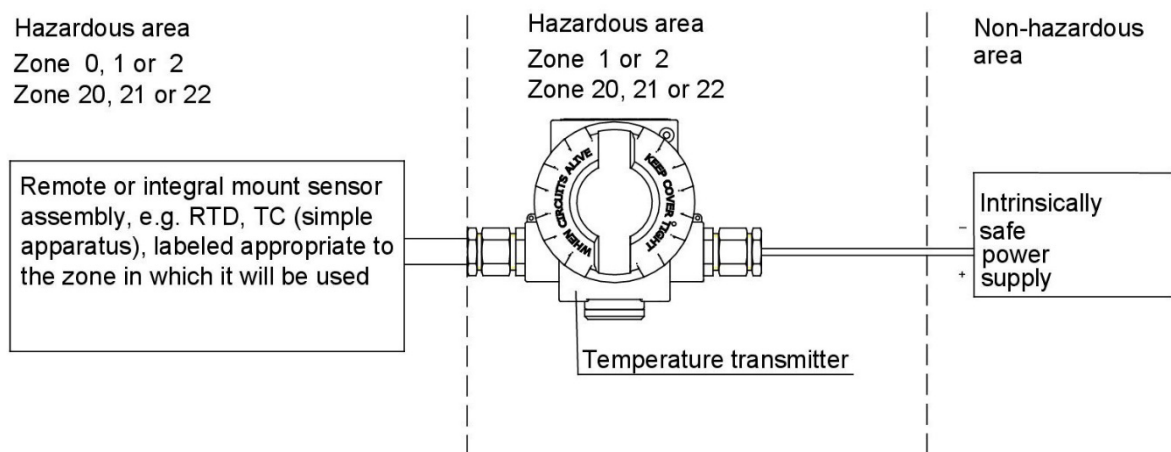


Figure 1. 5. Temperature transmitter with a cable temperature sensor or with a sensor screwed into the enclosure.



The electrical system for connecting transmitters should meet installation requirements of applicable standards.



No repairs or alterations to the transmitter electrical system are permitted. Only the manufacturer or a facility authorized by the manufacturer may assess damages and repair the device (if possible).



A transmitter enclosure has holes for installing a cable entry with M20x1.5 or 1/2 NPT thread. In transmitters used in dust explosion zones, the cable glands and blanking plugs installed by the customer should be certified and have a designation proper to dust zones where the transmitters are used.

10. PERMISSIBLE PARAMETERS OF TRANSMITTERS

10.1. Power supply



Connections between the transmitter and other devices in the transmitter's measuring loop should be made in accordance with the applicable standards and the conditions for use in hazardous areas. Failure to follow the rules may cause an explosion and the resulting hazard to people.

Table 1. 1. Power supply voltage.

Transmitter type	Minimum supply voltage	Maximum supply voltage
D72, D72 with sensors	13,5 V DC *	30 V DC according to the table 1.2
D72 Safety (available soon)	12,5 V DC *	30 V DC according to the table 1.3

* Min. power supply voltage with the backlight off. When the display backlight is on, increase the min. supply voltage of 3V.



The transmitters should be supplied from supply - measuring devices provided with relevant safety certificates, which output parameters to the hazardous area should not exceed the power input parameters for transmitters as specified below. It is responsibility of the user to provide power supply compliant with the requirements below.

Table 1. 2. Permissible input parameters in the power supply circuit (terminals "+", "-") for D72, D72 with sensors.

Linear power supply		Rectangular power supply	Trapezoidal power supply	
$U_i=30V$	$U_i=30V$	$U_i=24V$	$U_i=24V, U_Q=48V$	$U_i=24V, U_Q=48V$
$I_i=0,1A$	$I_i=0,1A$	$I_i=0,025A$	$I_i=0,05A$	$I_i=0,05A$
$P_i=0,75W$	$P_i=0,5W$	$P_i=0,6W$	$P_i=0,6W$	$P_i=0,5W$
$C_i=2,5nF$	$C_i=2,5nF$	$C_i=2,5nF$	$C_i=2,5nF$	$C_i=2,5nF$
$L_i=18\mu H$	$L_i=18\mu H$	$L_i=18\mu H$	$L_i=18\mu H$	$L_i=18\mu H$
$-40^{\circ}C \leq T_a \leq +80^{\circ}C$ (T4) $-40^{\circ}C \leq T_a \leq +70^{\circ}C$ (T5)	$-40^{\circ}C \leq T_a \leq +40^{\circ}C$ (T6)	$-40^{\circ}C \leq T_a \leq +80^{\circ}C$ (T5)	$-40^{\circ}C \leq T_a \leq +80^{\circ}C$ (T5)	$-40^{\circ}C \leq T_a \leq +40^{\circ}C$ (T6)

$T_m > T_a$ °C & T*, T** in accordance with ch.1. p.10.3.1 and ch.1. p.10.3.2

T_a – ambient temperature

T_m – temperature of the measured medium

T^* – maximum surface temperature in the presence of combustible dusts

T^{**} – temperature class

The temperature of the temperature class of the transmitter T^{**} with an installed sensor (for gases) and the maximum surface temperature in the presence of combustible dust T^* , when $T_m > T_a$, which is determined by the so called operating temperature T_p based on way of measuring determined in ch.1. p. 10.3.1 and ch.1. p. 10.3.2.

Table 1. 3. Permissible input parameters in the power supply circuit (terminals "+", "-") for D72 Safety transmitters.

Linear power supply	Rectangular power supply	Trapezoidal power supply
$U_i=30V$	$U_i=24V$	$U_i=24V, U_Q=48V$
$I_i=0,1A$	$I_i=0,025A$	$I_i=0,05A$
$P_i=0,75W$	$P_i=0,6W$	$P_i=0,6W$
$C_i=25nF$	$C_i=25nF$	$C_i=25nF$
$L_i=910\mu H$	$L_i=910\mu H$	$L_i=910\mu H$
$-40^{\circ}C \leq T_a \leq +75^{\circ}C$ (T4)	$-40^{\circ}C \leq T_a \leq +75^{\circ}C$ (T4)	$-40^{\circ}C \leq T_a \leq +75^{\circ}C$ (T4)

10.1.1. Supply from a power source with linear output characteristic

$U_i=30V$; $I_i=0,1A$; $P_i=0,75W$

For example, linear power supply is provided by a typical barrier with the following parameters $U_o = 28 \text{ V}$; $I_o = 0,093 \text{ A}$; $R_w = 300 \Omega$.

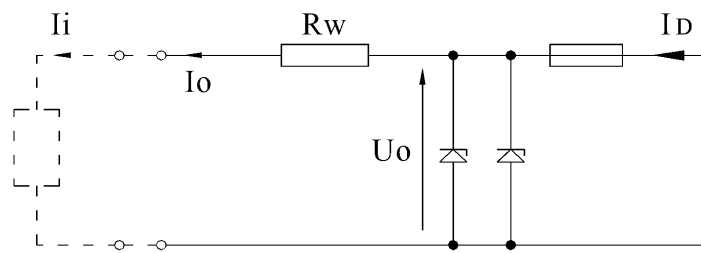


Figure 1. 6. The principle of power supply from a source with linear characteristics.

10.1.2. Supply from a power source with trapezoidal output characteristic

$U_o = 24 \text{ V}$; $I_o = 50 \text{ mA}$; $P_o = 0,6 \text{ W}$

An example of trapezoidal power supply is shown in Figure 1. 7.

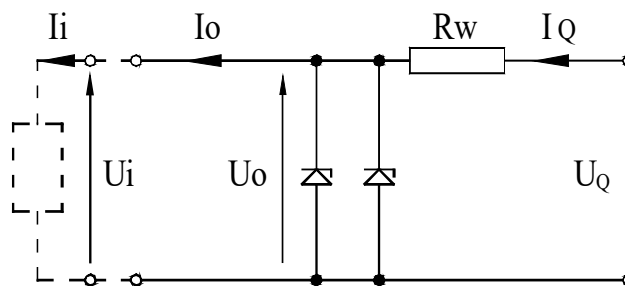


Figure 1. 7. The principle of power supply from a source with a trapezoidal characteristic.

If $U_o > \frac{U_Q}{2}$, then U_Q, I_o, P_o are related as follows:

$$P_o = \frac{U_Q \times I_o}{4}$$

If $U_o \leq \frac{U_Q}{2}$ then U_Q, I_o, P_o are related as follows:

$$P_o = \frac{U_o(U_Q - U_o)}{R_w}$$

Resistance R_w :

$$R_w = \frac{U_Q}{I_o}$$

10.1.3. Supply from a power source with rectangular output characteristic

$U_o = 24 \text{ V}$; $I_o = 25 \text{ mA}$; $P_o = 0,6 \text{ W}$

The supply from a power source with rectangular output characteristic means that the voltage of an intrinsically safe power supply unit remains constant until a current limiter is activated. The level of protection of power supply with rectangular output characteristic units is usually 'ib'. Transmitters supplied from such supply units are also intrinsically safe devices with safety level 'ib'.

Practical example of rectangular supply:

stabilised power supply unit with $U_o = 24 \text{ V}$ and protection level 'ib', value of the current limited to $I_o = 25 \text{ mA}$.

10.2. The permissible output parameters for the transmitters with a cable temperature sensor:

The permissible output parameters for the Intrinsically safe transmitters **D72** with a cable temperature sensor: $U_o = 6,6 \text{ V}$; $I_o = 9,8 \text{ mA}$; $P_o = 16,2 \text{ mW}$; $L_o = 400 \text{ mH}$; $C_o = 3,5 \mu\text{F}$ (for IIC), $C_o = 480 \mu\text{F}$ (for IIB), $C_o = 1000 \mu\text{F}$ (for IIA).

The permissible output parameters for the Intrinsically safe transmitters **D72 Safety (will be available soon)** with a cable temperature sensor:

$U_o=6\text{ V}$; $I_o=3,3\text{ mA}$; $P_o=19,8\text{ mW}$; $L_o=2\text{ mH}$; $C_o=2,5\text{ }\mu\text{F}$.

10.3. Ambient temperature range and temperature classes

The temperature class of transmitter depends on the input power, ambient and measured medium temperature. For transmitters used with media temperature that is no higher than permitted environmental temperature values $T_m \leq T_a$ the temperature class should be taken according to table 1.2 for D72, D72 with sensors, transmitter or Table 1.3 for D72 Safety transmitter (*will be available soon*). In this case, the maximum surface temperature of the transmitter for combustible dusts is 105°C .

For transmitters that measure temperature greater than permitted T_a value ($T_m > T_a$), the effect of heat transfer from the medium temperature whose temperature is measured to the transmitter should be taken into account by measuring the increase in the transmitter's temperature due to the higher temperature of the medium. The method of determining the temperature class (T^{**}) for gases and the maximum surface temperature (T^*) for combustible dusts for the temperature of medium $T_m > T_a$ is described in ch.1. p.10.3.1 „Measurement of transmitter operating temperature (T_p) with mounted direct sensor”.

10.3.1. Measurement of transmitter operating temperature (T_p) with sensor screwed into the enclosure.

In the case of transmitters used for the medium temperature measuring at $T_m > T_a$ the temperature of the hottest spot on the connection surface (T_{pp}) which might be in contact with an explosive atmosphere and the temperature of the enclosure (T_{po}) should be measured. The T_{pp} and T_{po} temperatures should be determined for the maximum medium and ambient temperature. When calculating T_{po} , $\Delta T_e=20\text{K}$ should be added to account for the effect of additional heat transfer due to the input power in case of malfunction. The higher value of T_{pp} and $T_{po}+20\text{K}$ should be taken as the operating temperature of the transmitter (T_p).

10.3.2. The transmitter temperature of the temperature class (T^{**}) for gases and the maximum surface temperature (T^*) for combustible dusts.

The temperature of the transmitter temperature class T^{**} for gases should be determined from the following equation:

$$T^{**} \geq T_p + 5\text{K for temperature classes T5, T6}$$

$$T^{**} \geq T_p + 10\text{K for temperature classes T1...T4}$$

T_p – operating temperature of the transmitter as determined in chap. 1. p. 10.3.1.

The maximum temperature T^* of the transmitter's surface which might be in contact with dust cloud must not exceed $2/3$ of the minimum ignition temperature of the dust cloud T_{CL} .

$$T^* \geq T_p \quad T^* = 2/3 T_{CL}$$

T_{CL} – the minimum ignition temperature of the expected dust cloud

The maximum surface temperature T^* of the transmitter, for a dust layer of 5 mm thickness:

$$T^* \geq T_p, \text{ where } T^* = T_{5\text{mm}} - 75\text{K},$$

$T_{5\text{mm}}$ - minimum ignition temperature of a dust layer of 5 mm thickness.

The maximum surface temperature of the transmitter in the case of coal dust deposition must not exceed 150°C .

The temperature of the enclosure T_{po} during operation must not exceed 80°C .

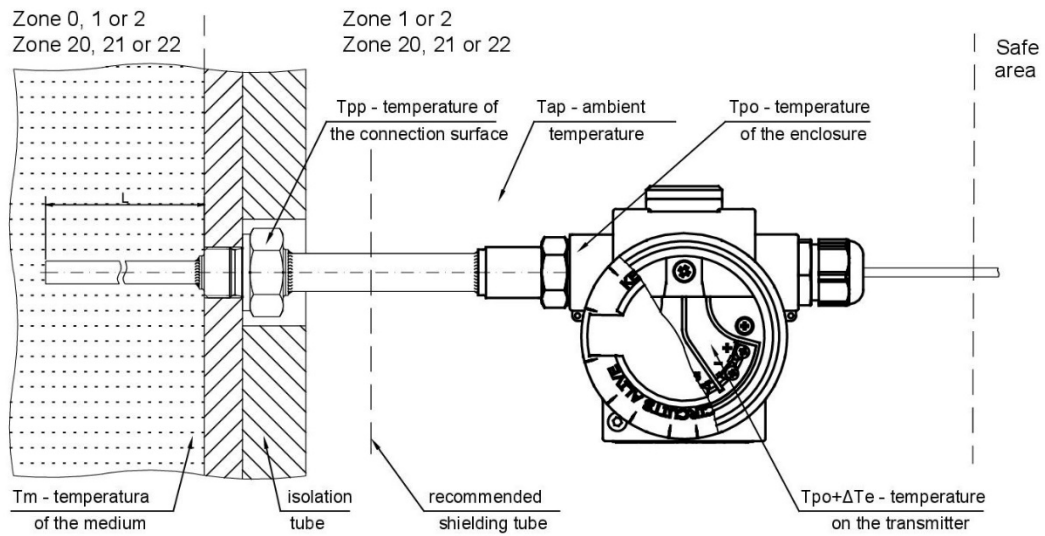


Figure 1. 8. Determination of the temperature of transmitter.

Note 1:



If the temperature of the medium exceeds the ambient temperature T_a , the temperature class of the sensor or the maximum surface temperature can be taken as the maximum temperature of the medium (T_p) specified for the technological process. In this case it is not necessary to T_p measure.

Note 2:



In case of measurements for non-explosive media, the temperature of the medium can be greater than the temperature of the temperature class or the maximum surface temperature for a given outside explosive mixture, provided that the heat of the medium will not be transferred to any surface of the sensor installed in potentially explosive atmosphere due to the risk of explosion of gases or vapours (in contact with the explosive mixture) above the maximum permissible temperature (T_p) (see chap.1. p. 10.3.1).



System designer is responsible for selecting the sensor and the method of its installation so that the temperature of the hottest surfaces of the transmitter under extreme operating conditions is less than the temperature of the temperature class for a given substance (gas, mist, vapour).

11. CONNECTION AND OPERATION OF TRANSMITTERS



User should read and understand this User Manual before attempting to connect and use the transmitter.



The transmitter should be connected in accordance with the wiring diagram shown in Figure 1.9. In potentially explosive atmosphere the transmitter must only be installed by qualified personnel who are familiar with the national and international laws, directives and standards that apply to this area. Transmitters should be grounded via a ground terminal. If the transmitter is in contact with metal structural parts or pipes connected to a system of equalization cables, no additional earthing of the transmitter is required.



Connections between the transmitter and other devices in the transmitter's measuring loop should be made in accordance with the applicable intrinsic safety standards and the conditions of use in hazardous areas. Non-observance of the intrinsic safety rules may cause an explosion and the related hazard to people.

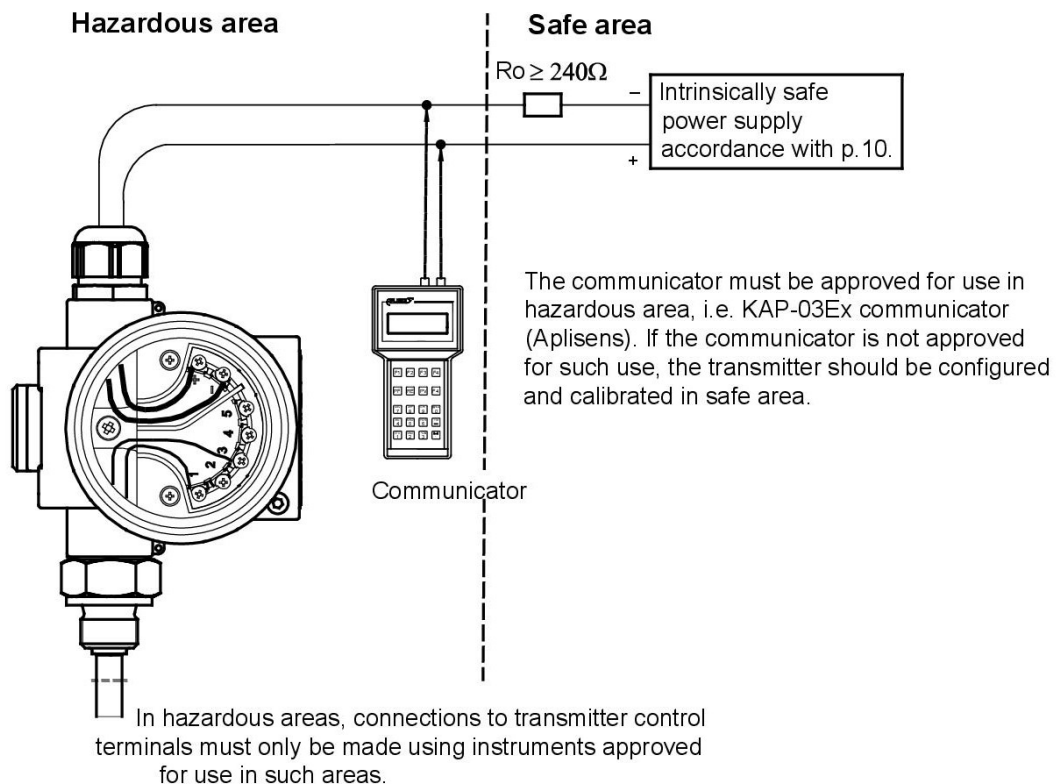


Figure 1. 9. Connection of the transmitter in Exi version.

When connecting the transmitter to the electrical system, the type and diameter of the connection cable should correspond to the cable gland installed. Compact cables of circular cross-section, shielded or non-shielded, with or without a protective layer, with thermoplastic, thermosetting or elastomeric sheath and non-hydroscopic fillers should be used. Cables should be laid in e.g. cable trays, protective tubes, cable ducts, firmly attached, etc. to protect them from mechanical damage.



“Version SA” transmitters should be supplied from devices equipped with galvanically isolated power supply. If galvanically isolated power supply is not possible, the transmitter or metal parts connected to it should be properly grounded, for instance with an equipotential wiring or an equipotential bonding between the transmitter and the negative pole of power supply barrier.



In order to secure the side covers against loosening, unscrew the hex socket screws pressing the screw heads against the edges of the covers.



No repairs or alterations to the transmitter enclosure elements and electrical system are permitted. Only the manufacturer or a facility authorized by the manufacturer may assess damages and repair the device (if possible).

On account of the material of the enclosure (a light alloy with a high percentage of aluminum) user is required to ensure that the transmitter is not exposed to mechanical damage of the enclosure at the place of installation. If the transmitter is to be used for measurements in the presence of strong chemical agents, an enclosure made of steel 1.4401 (316) is recommended.



The transmitter's enclosure is provided with two openings for threaded (M20x1.5 or 1/2 NPT-via adaptor). Upon consulting with the manufacturer, customer may purchase a transmitter with or without a cable gland. Typically, transmitters supplied to customers are not provided with cable glands. 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 1.10) before the transmitter is installed. If such transmitter is delivered without a cable gland, the customer is obliged to install a cable gland with at least IP66 protection and operation temperature range suitable for the installation site. In transmitters used in dust explosion zones, the cable glands installed by the customer should be certified and have a designation proper to dust zones where the transmitters are used. As a blanking plug, an Delta Mobrey plug supplied with the transmitter can be used. With cable glands 1/2" NPT, use LOCTITE 577 or SWAK MS-PTS-50. When connecting, make sure that the cable type and diameter is suitable for the cable gland used and temperature in the installation site.

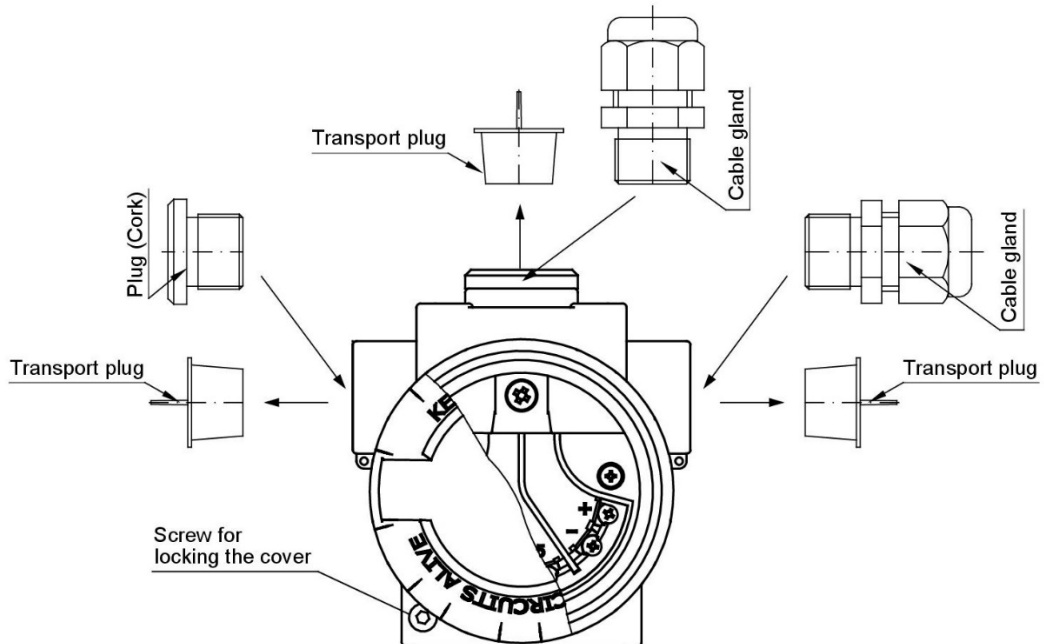


Figure 1. 10. Installation of cable entries and blanking plugs (example).



During routine inspections it should be checked that covers, cable glands and cable connectors are properly tightened. It should be checked if the enclosure and cable show no sign of mechanical damage and if the rating plate is legible. The condition of the sensor and cover should also be checked on a regular basis and it must not show any sign of damage. During maintenance the threads in covers should be lubricated using acid-free vaseline.



The general rules for connecting and using Exi transmitters should conform to the rules and standards for equipment with an intrinsically safe enclosure (as specified in chap. 1. p. 8.1), including:
EN 60079-14: Explosive atmospheres. Electrical installations design, selection and erection.
EN 60079-17: Explosive atmospheres. Electrical installations inspection and maintenance.

CHAPTER 2. FLAMEPROOF CONSTRUCTION Ex d

1. INTRODUCTION

Chapter 2 of the manual applies only to the transmitters of the series: D72 (D72 Safety when released) in explosion-proof version: flameproof Exd.

The manual contains the most important information related to the flameproof version of the transmitters in accordance with the ATEX Directive and IECEx requirements. When installing and using the explosion-proof transmitters, refer to this explosion-proof device instruction IOM-D72-EX D and, additionally, the IOM-D72 instruction manual.

2. SAFETY

- The installation and commissioning of the transducer and any operation should only be carried out after careful reading of this user manual.
- 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 transmitters. If the device is malfunctioning, disconnect it.
- 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 is also constitutes a warranty card;
- b) Declaration of Conformity;
- c) Certificate copy (on request);
- d) IOM-D72-EX D explosion-proof device manual;
- e) IOM-D72 user manual.

Items b), c), d), e) are available at www.delta-mobrey.com

4. IDENTIFICATION MARKS

Ex transmitters are delivered with a nameplate containing specific data:

1. Logo or manufacturer's name;
2. CE mark;
3. Notified body number;
4. Product QR code;
5. Transmitter type;
6. Measuring range;
7. Supply voltage value;
8. Permissible range of ambient temperature;
9. Output signal;
10. Type of measuring sensor (measuring element);
11. Sensor version;
12. Type of process connector;
13. Electrical connection cable entry thread;
14. Serial number;
15. Year of manufacture;

- 16. Caution" symbol. See the relevant information in the user's manual;
- 17. IP protection rating;
- 18. Identification of the explosion-proof version type. (see **ch.2, no. 8.2**);
- 19. Manufacturer's address;
- 20. Input signal (types of measuring inputs).
- 21. „Version SA" version with gas surge arrester.

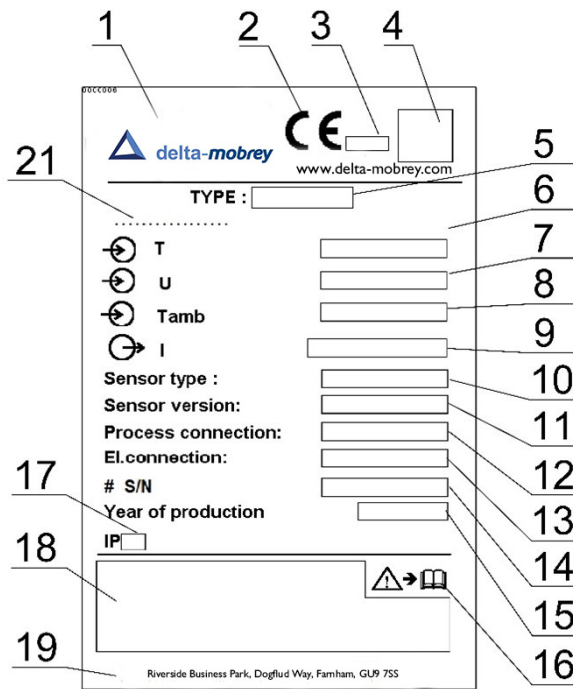


Figure 2. 1. An example of a nameplate for a transmitter with a direct sensor.

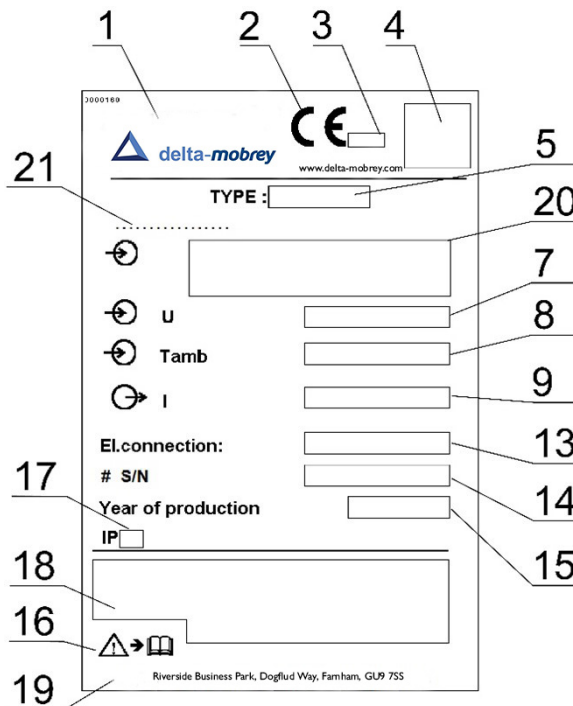


Figure 2. 2. An example of a transmitter nameplate without sensor for mounting with an external independent remote or direct sensor.

5. TRANSMITTER DESIGN

The transmitter housing is made of die-cast aluminum alloy or steel 1.4401 (316). It consists of a body and two screw-on covers, one of which is equipped with a glass window. A transmitter enclosure has holes for installing a cable entry with M20x1.5 or 1/2" NPT thread (via adaptor). Exd certified cable glands should be used. The housing is equipped with an internal and external earth terminal. Inside the casing there is an electronic system transforming the signal from the measuring sensor into a unified output signal. Depending on the transducer type, the following ways to connect the transducer to the sensor are possible: remotely (connection with a cable), or directly (temperature sensor pre-assembled with the transducer).

Transmitters in aluminum enclosures are allowed for II and III group, and transmitters in steel enclosures are allowed for I, II and III group.

6. ELECTROSTATIC HAZARDS

The paint, plastic nameplate is a non-conducting layer applied on a conducting base of an enclosure. 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. When performing connection and maintenance activities in the hazardous area, the possibility of electrostatic discharge should be eliminated. Do not wipe the transmitter dry.

7. SPECIAL CONDITIONS FOR SAFE USE

- Temperature class transmitter with temperature sensor installed directly (T** for gas) or the maximum surface temperature (T* for dust) depends mainly on the process temperature (temperature-controlled medium) and methods of installation on site and should be determined according to chapter 2 point 10.3.
- In hazardous zones of dust explosion, transmitters with painted aluminum enclosures, as well as transmitters equipped with plastic marking plates should be installed in a way that prevents electrostatic charging, in accordance with ch.2 p.6.
- Some of the permitted gaps in flameproof joints are smaller and width of the flameproof joints are greater than the one specified in table 3 EN 60079-1. The relevant information for the user are included in ch.2. p.11.



8. EX MARKING



8.1. Standards used for assessment

The transmitters are manufactured in compliance with the following standards

- EN IEC 60079-0:2018; (IEC 60079-0:2017 ed. 7.0),
- EN 60079-1:2014; (IEC 60079-1:2014 ed. 7.0),
- EN 60079-11:2012; (IEC 60079-11:2011 ed. 6.0),
- EN 60079-31:2014; (IEC 60079-31:2013 ed. 2.0).

8.2. Explosion-proof marking of transmitters in accordance with the ATEX Directive and IECEx requirements

Transmitter type	Marking the type of explosion-proof construction, marking of the certificate	
	ATEX	IECEx
D72 without sensor (for mounting an external remote sensor)	 II 2(1)G Ex db [ia Ga] IIC T6/T5 Gb II 2(1)D Ex tb [ia Da] IIIC T85°C/ T100°C Db I M2 Ex db [ia Ma] I Mb (with 1.4401 (316) enclosure only) KDB 22ATEX0021X	Ex db [ia Ga] IIC T6/T5 Gb Ex tb [ia Da] IIIC T85°C/ T100°C Db Ex db [ia Ma] I Mb (with 1.4401 (316) enclosure only) IECEx KDB 19.0005X
(for mounting an external direct sensor)	 II 2G Ex db IIC T**/T6/T5 Gb II 2D Ex tb IIIC T*/ T85°C/ T100°C Db I M2 Ex db I Mb (with 1.4401 (316) enclosure) KDB 22ATEX0021X	Ex db IIC T**/T6/T5 Gb Ex tb IIIC T*/ T85°C/ T100°C Db Ex db I Mb (with 1.4401 (316) enclosure) IECEx KDB 19.0005X

D72 with direct sensor by Delta Mobrey	 II 2G Ex db IIC T**/T6/T5 Gb II 2D Ex tb IIIC T*/T85°C/ T100°C Db I M2 Ex db I Mb (with 1.4401 (316) enclosure only) KDB 22 ATEX	Ex db IIC T**/T6/T5 Gb Ex tb IIIC T*/T85°C/ T100°C Db Ex db I Mb (with 1.4401 (316) enclosure only) IECEx KDB 22.....
D72 Safety (<i>soon available</i>) without sensor (for mounting an external remote or direct sensor)	 II 2G Ex db IIC T**/T6/T5 Gb II 2D Ex tb IIIC T*/T85°C/ T100°C Db I M2 Ex db I Mb (with 1.4401 (316) enclosure only) KDB 22 ATEX	Ex db IIC T**/T6/T5 Gb Ex tb IIIC T*/T85°C/ T100°C Db Ex db I Mb (with 1.4401 (316) enclosure only) IECEx KDB 22.....

For the temperature of the medium $T_m > T_a$, the temperature class T^{**} of the transmitter for gases and the maximum surface temperature T^* in the presence of combustible dust depends on the temperature of the medium. The D72 transmitter, which is sold without a sensor, has two markings on the rating plate: the marking for a transmitter with a connected cable temperature sensor and the marking with a direct sensor. The marking of the transmitter in this case depends on the type of the connected sensor.

9. TRANSMITTERS IN EXPLOSION HAZARD AREA

9.1. D72 transmitter in explosion hazard zone

EPL protection level [Ga], Gb and [Da], Db and device category 2 (1) G and 2 (1) D means that the transmitter can be installed in hazardous zones 1 and 21 or 2 and 22, and the cable temperature sensor can be installed in zones 0 and 20.

The transmitters designed for Mb mines must be disconnected from the power supply in the event of an explosive atmosphere.

The temperature class of the transmitter with a cable temperature sensor for the gases and the maximum permissible surface temperature in the presence of combustible dust is defined as in chapter 2. p.10.3 and in accordance with the specifications (shown in the User Manual) of the temperature sensor.

The D72 transmitters designed for use with an independent sensor are provided with an intrinsically safe output on the sensor's side.

Sensors installed in the zone '0' should meet the following requirements:

- for a "simple apparatus" – according to section 5.7 in EN 60079-11:2012;
- the requirements relating to the operating parameters, e.g. resistance to operating pressure, temperature, resistance to chemical and mechanical stress.

A cable temperature sensor that meets the above requirements can be purchased either from Delta Mobrey or another manufacturer. In the dust explosion hazard zone, cable temperature sensors installed by the recipient should be certified and have a marking appropriate to the zone in which they will be used.

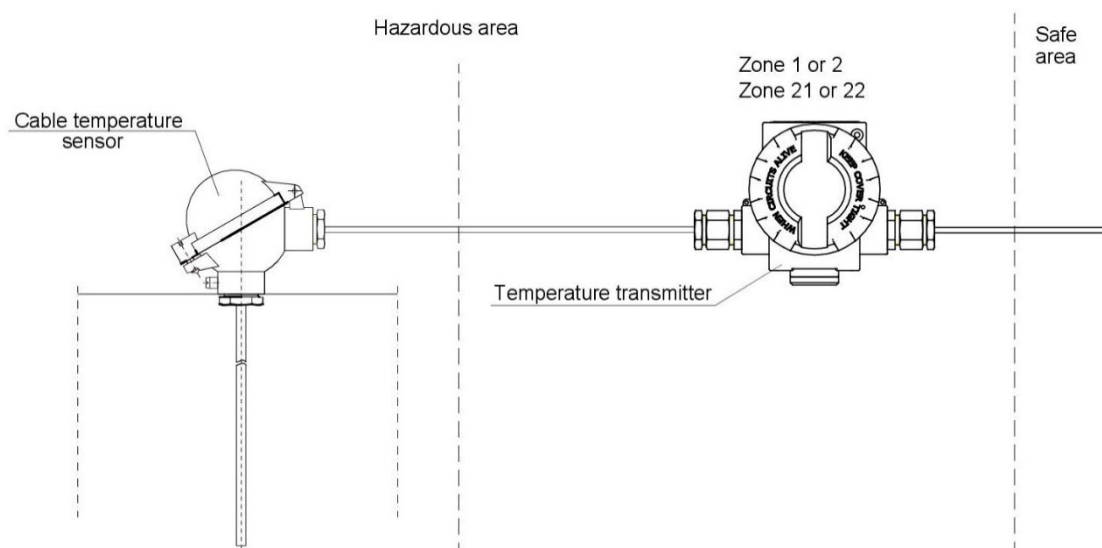


Figure 2. 3. D72 temperature transmitter with a cable temperature sensor.

It is allowed to install certified Exd direct sensors with the marking appropriate to the zone in which they will be used, ensuring a protection degree of at least IP 66.

When a sensor screwed into the housing from Delta Mobrey is installed, the entire transmitter with the sensor has the EPL Gb and Db protection level and 2G and 2D category, which means that the transmitter with the process connection (sensor) can be installed in hazard zone 1 and 21 or 2 and 22 (Fig. 2.4). The transmitters designed for Mb mines must be disconnected from the power supply in the event of an explosive atmosphere.

Temperature class T** of the transmitter with a direct sensor for gases and the maximum surface temperature T* in the presence of combustible dusts depends on the temperature of the medium; see chapter 2. p.10.3 and chapter 2. p. 10.3.1.

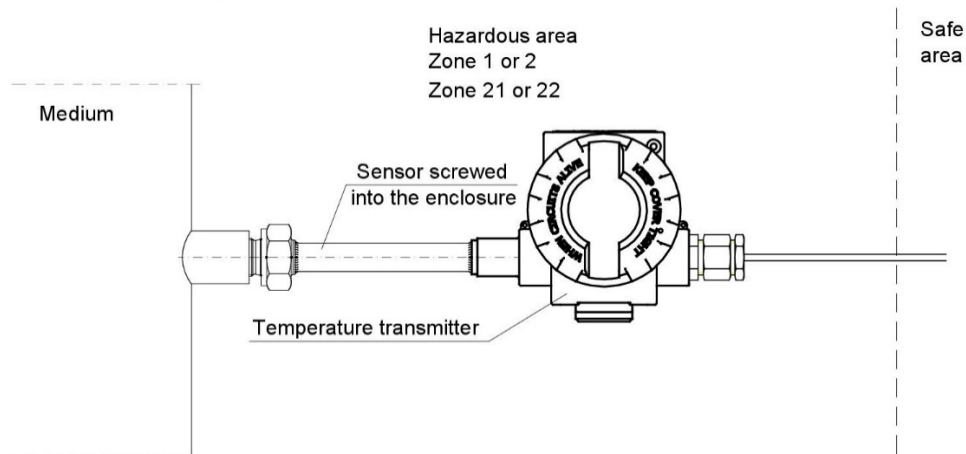


Figure 2. 4. D72 temperature transmitter with a sensor screwed into the enclosure.

Types of sensors for direct mounting with a transmitter proposed by Delta Mobrey: A/B, C/D, E/F, G/H (according to the current catalog card).

9.2. D72 Safety transmitter in explosion hazard zone (soon available)

The D72 Safety transmitter is delivered without a sensor as a standard. The user should install a certified flameproof sensor with a marking appropriate to the zone in which the sensor will be used, ensuring a degree of protection of at least IP 66 (Fig. 2.5). The transmitters designed for Mb mines must be disconnected from the power supply in the event of an explosive atmosphere.

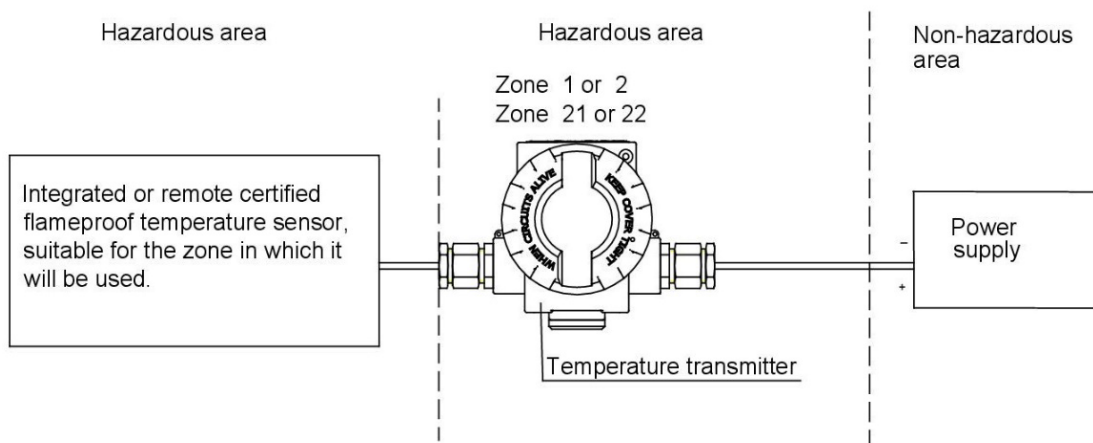


Figure 2. 5. Temperature transmitter **D72 Safety** with a cable temperature sensor or with a sensor screwed into the enclosure.



The electrical system for connecting transmitters should meet installation requirements of applicable standards.



No repairs or alterations to the transmitter electrical system are permitted. Only the manufacturer or a facility authorized by the manufacturer may assess damages and repair the device (if possible).



A transmitter enclosure has holes for installing a cable entry with M20x1.5 or 1/2 NPT (via adaptor) thread. If such a transmitter has been delivered without a cable gland, the customer is obliged to install certified cable glands and blanking plugs with the appropriate marking for the zones in which the transmitters are used, with a protection degree of at least IP66 and the operating temperature range appropriate for the place of installation.

10. PERMISSIBLE PARAMETERS OF TRANSMITTERS

10.1. Power supply



Connections between the transmitter and other devices in the transmitter's measuring loop should be made in accordance with the applicable standards and the conditions for use in hazardous areas. Failure to follow the rules may cause an explosion and the resulting hazard to people.

Transmitters should be supplied with voltage accordance with the table below (nominal voltage 24 VDC) from a transformer based PSU or other devices ensuring at least reinforced insulation between primary and secondary winding where the maximum voltage does not exceed 250 VAC. The responsibility to ensure power supply in accordance with the above requirements lies with the user.

Table 2. 1. Supply voltage for transmitters Exd.

Type transmitter	Maximum supply voltage
D72	45 V DC
D72 Safety	36 V DC

10.2. The permissible output parameters for the transmitters with a cable temperature sensor

Intrinsically safe the permissible output parameters for the transmitters **D72** with a cable temperature sensor: $U_o=6,6$ V; $I_o=9,8$ mA; $P_o=14,5$ mW; $L_o=400$ mH; $C_o=3,5$ μ F (for IIC), $C_o=480$ μ F (for IIB), $C_o=1000$ μ F (for IIA).

The Exd flameproof sensor should be used in the **D72 Safety** transmitters. Sensor supply voltage max. 6V.

10.3. Permissible ambient temperature range and temperature classes

Table 2. 2. Ambient temperature range and temperature classes for Exd transmitters.

Operating temperature range		Temperature class and maximum surface temperature
Ambient temperature T_a	Process temperature (medium) T_m	
$-40\text{ }^\circ\text{C} \leq T_a \leq 40\text{ }^\circ\text{C}$	$-40\text{ }^\circ\text{C} \div 40\text{ }^\circ\text{C}$	T6/T85 $^\circ\text{C}$
$-40\text{ }^\circ\text{C} \leq T_a \leq 75\text{ }^\circ\text{C}$	$-40\text{ }^\circ\text{C} \div 75\text{ }^\circ\text{C}$	T5/T100 $^\circ\text{C}$

For transmitters with a cable temperature sensor, the temperature class of the transmitter should be read from Table 2. 2.

The temperature class of transmitters with a sensor screwed into the enclosure depends on the input power, the ambient temperature and the temperature of the measured medium. For transmitters used with media temperature $T_m \leq 75^\circ\text{C}$ the temperature class should be taken according to Table 2.2.. The maximum

permissible temperature of the medium must not be greater than the ambient temperature T_a . In this case, the maximum surface temperature of the transmitter is 100°C .

10.3.1. Maximum surface temperature for transmitters with a sensor screwed into the enclosure

For transmitters provided with a sensor screwed into the enclosure for measuring temperatures greater than 75°C , the effects of heat transfer from the medium whose temperature is measured to the transmitter should be taken into account by measuring the increase in the transmitter's temperature due to the higher temperature of the medium. The measurement of the operating temperature T_p of the transmitters should be performed according to Chap. 2. p. 10.3.2. The method for defining the temperature class for gases and the maximum surface temperature for combustible dust for the temperature of the medium $T_m > 75^\circ\text{C}$ is described in Chapter 2. p. 10.3.3. In transmitters with a sensor screwed into the enclosure measuring the temperature not higher than 75°C , the temperature class of the transmitter should be read from Table 2. 2.

10.3.2. Measurement of operating temperature T_p of transmitters with a sensor screwed into the enclosure

In the case of transmitters used for the medium temperature measuring at $T_m > 75^\circ\text{C}$ the temperature of the hottest spot on the connection surface (T_{pp}) which might be in contact with an explosive atmosphere and the temperature of the enclosure (T_{po}) should be measured. The T_{pp} and T_{po} temperatures should be determined for the maximum medium and ambient temperature. When calculating T_{po} , $\Delta T_e = 20\text{K}$ should be added to account for the effect of additional heat transfer due to the input power in case of malfunction. The higher value of T_{pp} and $T_{po} + 20\text{K}$ should be taken as the operating temperature of the transmitter (T_p).

10.3.3. The transmitter temperature of the temperature class (T^{}) for gases and the maximum surface temperature (T^*) for combustible dusts.**

The temperature of the transmitter temperature class T^{**} for gases should be determined from the following equation:

$$T^{**} \geq T_p + 5\text{K} \text{ for temperature classes T5...T6}$$

$$T^{**} \geq T_p + 10\text{K} \text{ for temperature classes T1...T4}$$

T_p – operating temperature of the transmitter as determined in chap. 2. p. 10.3.2.

The maximum temperature T^* of the transmitter's surface which might be in contact with dust cloud must not exceed $2/3$ of the minimum ignition temperature of the dust cloud T_{CL} .

$$T^* \geq T_p \quad T^* = 2/3 T_{CL}$$

T_{CL} – the minimum ignition temperature of the expected dust cloud

The maximum surface temperature T^* of the transmitter, for a dust layer of 5 mm thickness:

$$T^* \geq T_p, \text{ where } T^* = T_{5\text{mm}} - 75\text{K},$$

$T_{5\text{mm}}$ – minimum ignition temperature of a dust layer of 5 mm thickness

The maximum surface temperature of the transmitter in the case of coal dust deposition must not exceed 150°C .

The temperature of the enclosure T_{po} during operation must not exceed 80°C

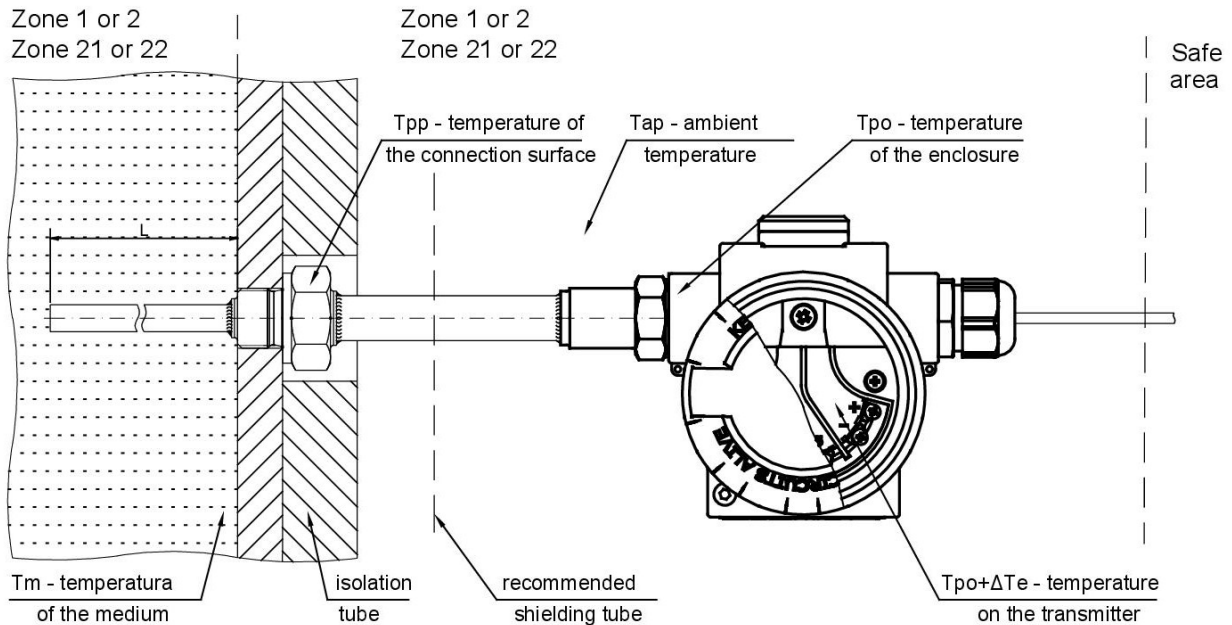


Figure 2. 6. Determination of the temperature of transmitter with sensor screwed into the enclosure.

Note 1:

If the temperature of the medium exceeds the ambient temperature, the temperature class of the sensor or the maximum surface temperature can be taken as the maximum temperature of the medium (T_p) specified for the technological process. In this case it is not necessary to T_p measure.



Note 2:

In case of measurements for non-explosive media, the temperature of the medium can be greater than the temperature of the temperature class or the maximum surface temperature for a given outside explosive mixture, provided that the heat of the medium will not be transferred to any surface of the sensor installed in potentially explosive atmosphere due to the risk of explosion of gases or vapours (in contact with the explosive mixture) above the maximum permissible temperature (T_p) (see chap.2. p. 10.3.2).



System designer is responsible for selecting the sensor and the method of its installation so that the temperature of the hottest surfaces of the transmitter under extreme operating conditions is less than the temperature of the temperature class for a given substance (gas, mist, vapour).



11. CONNECTION AND OPERATION OF TRANSMITTERS



User should read and understand this User Manual before attempting to connect and use the transmitter.



The transmitter should be connected in accordance with the wiring diagram shown in Figure 2.7. In potentially explosive atmosphere the transmitter must only be installed by qualified personnel who are familiar with the national and international laws, directives and standards that apply to this area. Transmitters should be grounded via a ground terminal. If the transmitter is in contact with metal structural parts or pipes connected to a system of equalization cables, no additional earthing of the transmitter is required.



Transmitter and equipment in the transmitter measurement loop must be connected in compliance with explosion proofing 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.

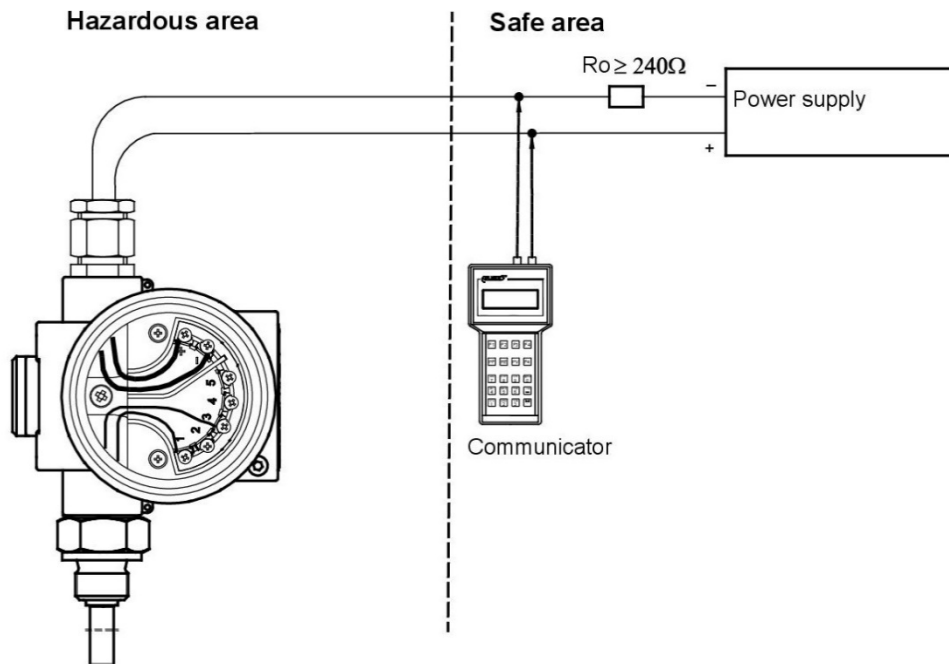


Figure 2. 7. Connection of the transmitter in Exd version.

When connecting the transmitter to the electrical system, the type and diameter of the connection cable should correspond to the cable gland installed. Compact cables of circular cross-section shielded or non-shielded, with or without a protective layer, with thermoplastic, thermosetting or elastomeric sheath and non-hydroscopic fillers should be used. If a different cable needs to be used, it should be agreed with the transmitter's manufacturer so that an appropriate cable entry is installed or individually purchase a cable gland suited to the cable used. The list of equivalent cable entries is given below in Table 2.3. Cables should be laid in e.g. cable trays, protective tubes, cable ducts, firmly attached, etc. to protect them from mechanical damage.



In the hazardous area, do not unscrew the cover of the powered transmitter and do not connect to the terminals or do not change the position of the 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.



No repairs or alterations to the transmitter enclosure elements and electrical system are 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 enclosure material (light alloy with high aluminum content), the user is obliged to ensure that in the transmitter installation site its enclosure cannot be hit and, consequently, damaged. If the transmitter is to be used for measurements in the presence of strong chemical agents, an enclosure made of steel 1.4401 (316) is recommended.



The transmitter's enclosure is provided with openings for threaded (M20x1.5 or 1/2 NPT-via adaptor). Upon consulting with the manufacturer, customer may purchase a transmitter with or without a cable glands. Typically, transmitters supplied to customers are not provided with cable glands. 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 2.8) 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 in Table 2.3. As a blanking plug, a Delta Mobrey plug supplied with the transmitter or a certified blanking plug compliant with the list of equivalent blinding plugs in Table 2.4 can be used. It is allowed to install other types of certified cable entries and blanking 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. If a cable gland is installed by the user, the thread M20x1.5 in the cable gland should be lubricated with LOCTITE 243 or another with appropriate properties before installation to protect it against coming loose. With cable glands ½" NPT, use LOCTITE 577 or SWAK MS-PTS-50. When connecting, make sure that the cable type and diameter is suitable for the cable gland used and temperature in the installation site.

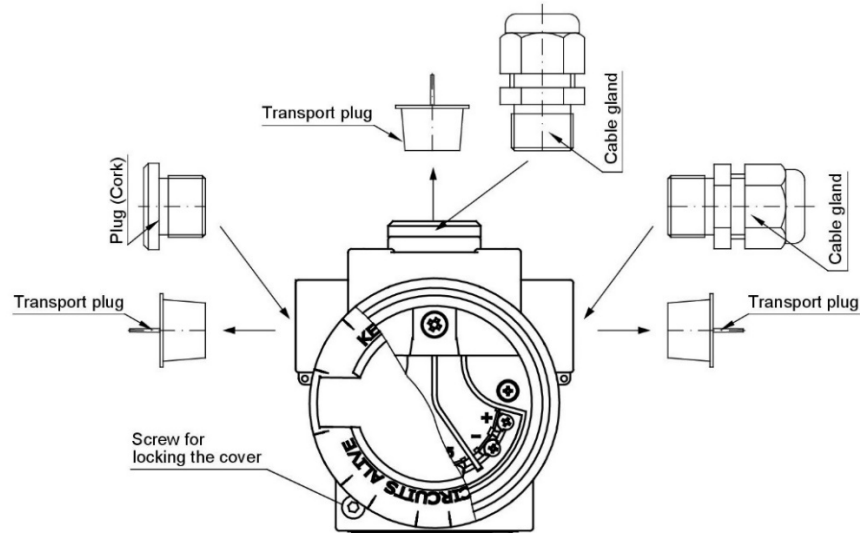


Figure 2. 8. Installation of cable entries and blanking plugs (example).

Table 2. 3. List of equivalent cable entries.

Type of packing glands	Producer	Thread	Marking	IP	Certificate No.
501/423	Hawke International	M20x1.5 (1/2" NPT)	II 2G Ex db IIC Gb II 2D Ex tb IIIC Db	66÷68	CML 19ATEX1167X
501/421	Hawke International	M20x1.5 (1/2" NPT)	II 2G Ex db IIC Gb II 2D Ex tb IIIC Db	66÷68	CML 19ATEX1167X
ICG 623	Hawke International	M20x1.5 (1/2" NPT)	II 2G Ex d IIC Gb II 2D Ex tb IIIC Db	67	Baseefa 06ATEX0058X
501/453/RAC	Hawke International	M20x1.5 (1/2" NPT)	II 2G Ex db IIC Gb II 2D Ex tb IIIC Db	66÷68	CML 19ATEX1167X
501/453/Universal	Hawke International	M20x1.5 (1/2" NPT)	II 2G Ex db IIC Gb II 2D Ex tb IIIC Db	66÷68	CML 18ATEX1268X
ICG/653/Universal	Hawke International	M20x1.5 (1/2" NPT)	II 2G Ex db IIC Gb II 2D Ex tb IIIC Db	66÷68	CML 18ATEX1268X
ICG/653/Universal/L	Hawke International	M20x1.5 (1/2" NPT)	II 2G Ex db IIC Gb II 2D Ex tb IIIC Db	66÷68	CML 18ATEX1268X
A2F, A2FRC	CMP-Products	M20x1.5 (1/2" NPT)	II 2G Ex db IIC Gb II 1D Ex ta IIIC Da	66÷68	CML 18ATEX1321X
SS2K	CMP-Products	M20x1.5 (1/2" NPT)	II 2G Ex db IIC Gb II 1D Ex ta IIIC Da	66÷68	CML 18ATEX1322X
E1FW, E2FW	CMP-Products	M20x1.5 (1/2" NPT)	II 2G Ex db IIC Gb II 1D Ex ta IIIC Da I M2 Ex db I Mb	66÷68	CML 18ATEX1324X
PX2K, PXSS2K, PX2KX	CMP-Products	M20x1.5 (1/2" NPT)	II 2G Ex db IIC Gb II 1D Ex ta IIIC Da I M2 Ex db I Mb	66÷68	CML 18ATEX1325X

Table 2. 4. List of equivalent blinding plugs.

Type of plug	Producer	Thread	Marking	IP	Certificate No.
--------------	----------	--------	---------	----	-----------------

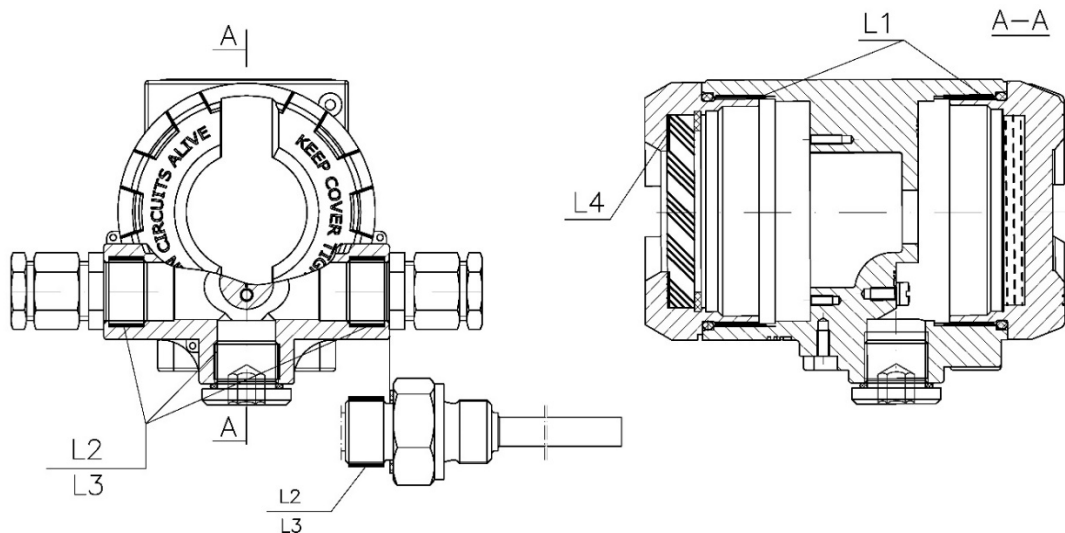
475	Hawke International	M20x1.5 (1/2" NPT)	II 2G Ex d IIC Gb II 2D Ex tb IIIC Db I M2 Ex d I Mb	66	Baseefa 10ATEX0262X
477	Hawke International	M20x1.5 (1/2" NPT)	II 2G Ex d IIC Gb II 2D Ex tb IIIC Db I M2 Ex d I Mb	66	Baseefa 10ATEX0262X
747, 757 i 767	CMP-Products	M20x1.5 (1/2" NPT)	II 2G Ex db IIC Gb II 1D Ex ta IIIC Da I M2 Ex db I Mb	66	CML 18ATEX1320X

For sensors LN and WN from Delta Mobrey, provided only with a measuring insert protection, additional process shields OG2, T1, SW1, SW2, SW1T, SW2T or an additional user shield with walls ≥ 1 mm thick should be installed. The need to install an additional user shield is indicated in an information label.



During routine inspections it should be checked that covers, cable glands and cable connectors are properly tightened. It should be checked if the enclosure and cable show no sign of mechanical damage and if the rating plate is legible. The condition of the sensor and cover should also be checked on a regular basis and it must not show any sign of damage. During maintenance the threads in covers should be lubricated using acid-free vaseline.

Data on the flameproof joints are given in Fig.2.9 and Fig. 2.10.

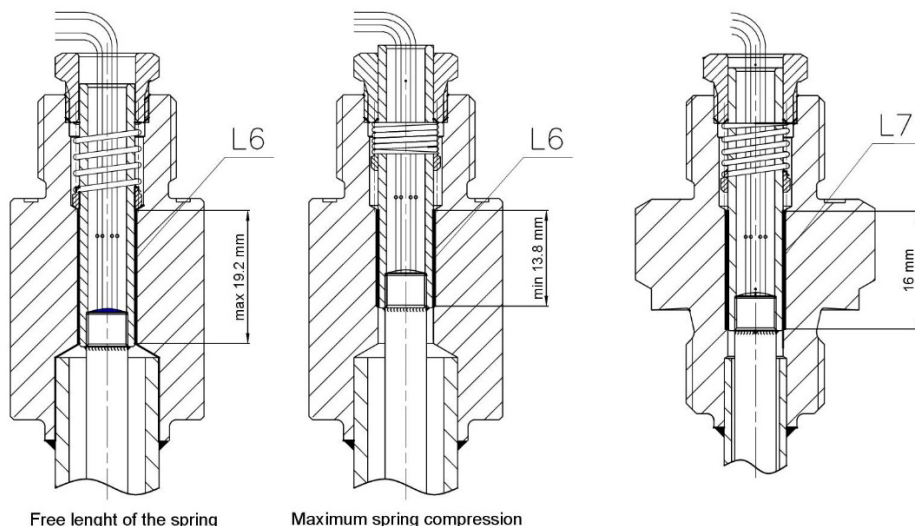


Flameproof joints for group IIC						
No	Length of joint (min. actual) L [mm]	Diameter		D-d [mm]	Quantity of joint	Comments (minimum values acc. to EN 60079-1)
		D [mm]	D [mm]			
L1	12	M72x1,5	M72x1,5		2	min. 5 threads engaged (8)
L2	9	M20x1,5	M20x1,5		3	min. 5 threads engaged
L3	12,7	1/2NPT	1/2NPT		3	min. 5 threads on each surface
L4	10				1	cemented joint min. joint length 10mm

Figure 2. 9. Flameproof joints of transmitter.

Sensors with movable measuring insert

Sensor with a uniform cover



List of the flameproof joints					
No	Length of joint (min. actual) L [mm]	Diameter		D-d [mm]	Comments (minimum values acc. to EN 60079-1)
		D [mm] (hole)	d [mm] (roller)		
L6	min. 13,8 max 19,2	$\varnothing 8^{+0,058}$	$\varnothing 8^{+0,040}_{-0,076}$	0,134	Length of joint min. 12,5mm max. gap 0,15 mm
L7	16,0	$\varnothing 8^{+0,058}$	$\varnothing 8^{-0,076}$	0,134	Length of joint min. 12,5mm max. gap 0,15 mm

Figure 2. 10. The flameproof joints of the temperature sensors.



The general rules for connecting and using Exd transmitters should conform to the rules and standards for equipment with flameproof enclosures (as specified in chap. 2. p. 8.1), including:
 EN 60079-14: Explosive atmospheres. Electrical installations design, selection and erection.
 EN 60079-17: Explosive atmospheres. Electrical installations inspection and maintenance.



Due to the risk of damage, the transmitter must be protected against heating to temperatures above 80°C, even if there is no explosion risk.

12. ADDITIONAL INFORMATION

12.1. Additional information

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

12.2. History of revisions

Revision No	Document revision	Description of changes
0	A	Initial document version. Prepared by AK