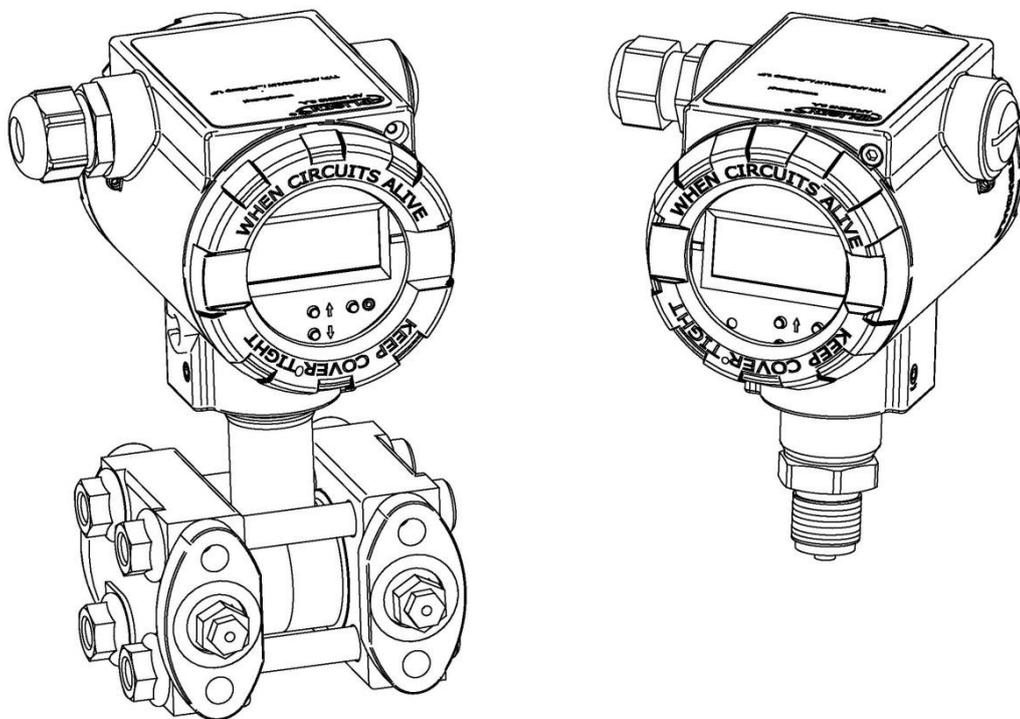




EXPLOSION-PROOF DEVICE MANUAL

SMART PRESSURE TRANSMITTERS
APC-2000ALW, APC-2000ALW SAFETY, APC-2000ALW/L
SMART PRESSURE DIFFERENTIAL TRANSMITTERS
APR-2000ALW, APR-2000ALW SAFETY,
APR-2000ALW with diaphragm seals,
APR-2000ALW/G, APR-2000ALW/L, APR-2200ALW/L
SMART LEVEL PROBES
APR-2000YALW



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 user documentation is updated. Up-to-date user manuals are available on the manufacturer's website:

www.aplisens.com.

TABLE OF CONTENTS

1. INTRODUCTION	5
2. SAFETY	5
3. COMPLETE DELIVERY CHECKLIST	5
4. IDENTIFICATION MARKS	6
5. TRANSMITTER DESIGN	6
6. ELECTROSTATIC HAZARDS	6
7. SPECIAL CONDITIONS OF USE	7
7.1. Special conditions according to certificates: KDB 19 ATEX 0011X, IECEx KDB 19.0003X and ExVeritas 22UKEX1415X.	7
7.2. Special conditions according to certificates: FTZÚ 08 ATEX 0020X and IECEx FTZÚ 14.0026X.....	7
8. TRANSMITTER PROTECTION LEVEL (EPL) AND HAZARDOUS AREAS	8
9. INTRINSICALLY-SAFE Exi TRANSMITTERS ACCORDING TO CERTIFICATES KDB 19 ATEX 0011X, IECEx KDB 19.0003X AND ExVeritas 22UKEX1415X	9
9.1. Approvals	9
9.2. Standards used for assessment.....	9
9.3. Transmitter explosion-proofing designations according to certificates KDB 19 ATEX 0011X, IECEx KDB 19.0003X and ExVeritas 22UKEX1415X.....	9
9.4. Minimum supply voltage.....	10
9.5. Load resistance.....	10
10. INTRINSICALLY-SAFE Exi TRANSMITTERS ACCORDING TO CERTIFICATES FTZU 08 ATEX 0020X AND IECEx FTZU 14.0026X	10
10.1. Standards used for assessment	10
10.2. Transmitter explosion-proofing designations according to certificates FTZU 08 ATEX 0020X and IECEx FTZU 14.0026X	10
10.3. Minimum supply voltage.....	11
10.4. Load resistance.....	11
11. PERMISSIBLE PARAMETERS OF Exi TRANSMITTERS	11
11.1. Linear power supply example.....	12
11.2. Trapezoidal power supply example.....	12
11.3. Orthogonal power supply example.....	12
12. CONNECTING Exi TRANSMITTERS AND PROBES	13
13. FLAMEPROOF Exd TRANSMITTERS ACCORDING TO CERTIFICATES KDB 19 ATEX 0011X, IECEx KDB 19.0003X and ExVeritas 22UKEX1415X	14
13.1. Approvals	14
13.2. Standards used for assessment.....	14
13.3. Transmitters explosion-proofing designations according to certificates KDB 19 ATEX 0011X, IECEx KDB 19.0003X and ExVeritas 22UKEX1415X.....	14
14. PERMISSIBLE PARAMETERS OF Exd TRANSMITTERS	15

14.1. Ambient temperature range and temperature classes..... 15

14.2. Power supply, connection and operation of Exd transmitters 16

15. ADDITIONAL INFORMATION..... 19

15.1. Additional information..... 19

15.2. History of revisions 19

LIST OF DRAWINGS

Figure 1. Sample transmitter nameplate with common Exi and Exd designation6

Figure 2. Transmitter installation in potentially explosive areas.8

Figure 3. Principle of power supply from a linear source..... 12

Figure 4. Principle of power supply from a trapezoidal source. 12

Figure 5. Connecting Exi transmitters and probes 13

Figure 6. Connecting Exd transmitters and probes 16

Figure 7. Installation of cable entries and blinding plugs 17

LIST OF TABLES

Table 1. Minimum supply voltage of an Exi transmitter according with certificates KDB 19 ATEX 0011X, IECEx KDB 19.0003X and ExVeritas 22UKEX1415X. 10

Table 2. Minimum supply voltage of an Exi transmitter according with certificates FTZU 08 ATEX 0020X and IECEx KDB 14.0026X..... 11

Table 3. Permissible input parameters of an Exi transmitter..... 11

Table 4. Ambient temperature range and temperature classes for Exd transmitters 15

Table 5. Maximum supply voltage for Exd transmitters 16

Table 6. List of equivalent cable entries 18

Table 7. List of equivalent blinding plugs 18

1. INTRODUCTION

This manual is only applicable to the APC-2000ALW, APC-2000ALW Safety, APR-2000ALW, APR-2000ALW Safety, APR-2000ALW with diaphragm seals, APR-2000ALW/G and APR-2000YALW series transmitters in Ex (explosion-proof), Exi (intrinsically safe), Exd (flameproof), and both Exi and Exd variants. 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 on intrinsically safe and flameproof transmitters compliant with ATEX directive and IECEx requirements. If explosion-proof transmitters are installed, refer to this manual and also:

- EN.IO.APC.APR.ALW.SFT manual for APC-2000ALW Safety, APR-2000ALW Safety series transmitters,
- EN.IO.APC.APR.ALW manual for APC-2000ALW, APR-2000ALW, APR-2000ALW/G and APR-2000YALW series transmitters.

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:

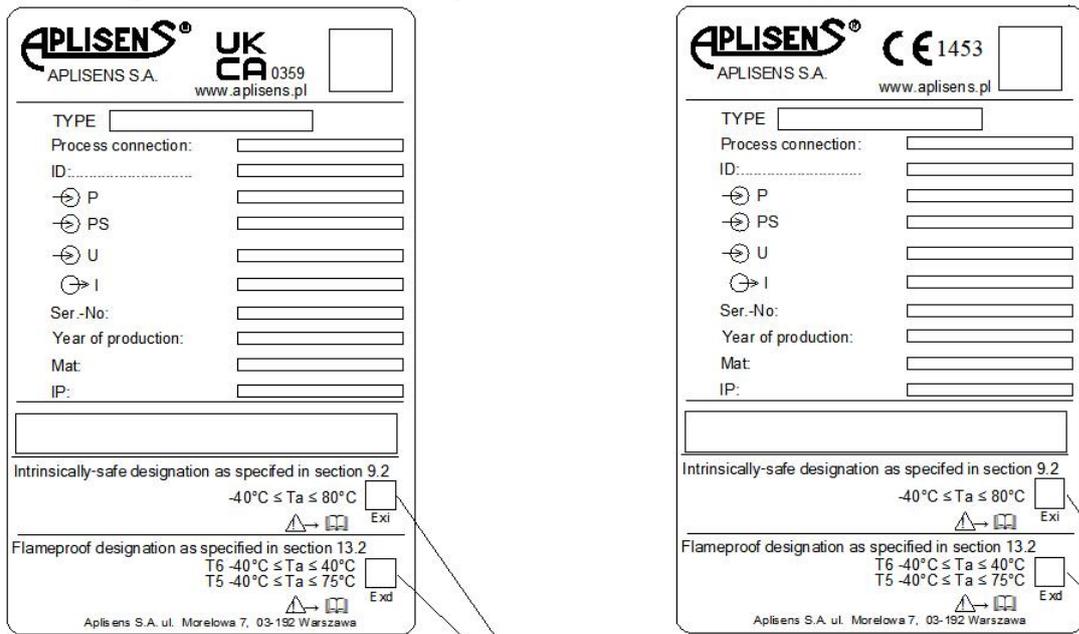
- a) Product Certificate, which also constitutes a warranty card.
- b) Declaration of Conformity.
- c) Certificate copy (on request).
- d) EN.IX.APC.APR.ALW explosion-proof device manual.
- e) EN.IO.APC.APR.ALW.SFT user manual or EN.IO.APC.APR.ALW user manual.

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 EN.IO.APC.APR.ALW.SFT or EN.IO.APC.APR.ALW and also the following:

- Designation of explosion-proof design type, certificate number.
- Parameter values, e.g. Ui, li, Ci, Li for Exi transmitters.
- Year of manufacture.
- “SA Version” inscription — isolated power supply for intrinsically safe transmitters with overvoltage protection in which ground isolated power supply should be used.



For a transmitter with common Exi and Exd designation, the box indicating the intended Exi or Exd explosion proof protection type should be permanently marked before the transmitter is installed

For a transmitter with common Exi and Exd designation, the box indicating the intended Exi or Exd explosion proof protection type should be permanently marked before the transmitter is installed

Figure 1. Sample transmitter nameplate with common Exi and Exd designation

5. TRANSMITTER DESIGN

The basic transmitter components are: an enclosure 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 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 and diaphragm seals coated with PTFE form a non-conducting layer applied on a conducting base of enclosure 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

7.1. Special conditions according to certificates: KDB 19 ATEX 0011X, IECEx KDB 19.0003X and ExVeritas 22UKEX1415X.

- a) The maximum temperature of the external heating source cannot heat the transmitter above the maximum declared ambient temperature.
- b) The flameproof joints are not intended to be repaired.
- c) In hazardous zones of dust explosion, transmitters with painted enclosures, as well as transmitters equipped with plastic marking plates 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.
- d) In hazardous zones of explosion, diaphragm separators covered PTFE layer, should be installed in places and in a way prevents electrostatic charging.
- e) The diaphragm separator containing titanium elements must be protected against mechanical impacts.
- f) An intrinsically safe transmitter version with surge arrester, marked on the nameplate as "SA" does not meet the requirements of clause 10.3 of EN 60079-11 (500Vrms). The device should be installed in accordance with the instructions.
- g) In the case of use a transmitter with a nameplate containing various types of explosion-proof execution, the type of protection must be permanently marked on the nameplate before installation, accordance to the instructions.
- h) In the device version including the flameproof enclosure, the diaphragm should not be subject on damage during installation and exploitation of the transmitter. The transmitter diaphragm is made of stainless steel, Hastelloy alloy or tantalum and must be exposed to medium that could cause its damage.

7.2. Special conditions according to certificates: FTZÚ 08 ATEX 0020X and IECEx FTZÚ 14.0026X

- a) Versions of transmitter with surge arrester marked on plate "SA", do not meet the requirements of Section 10.3 of the standard EN 60079-11:2012 (500 Vrms). This must be taken into account when installing the equipment.
- b) Under certain extreme circumstances in dust explosive atmospheres, the device with painting of aluminum enclosure and with plastic tables and with elements of diaphragm seals covered by PTFE may store an ignition-capable level of electrostatic charge. The device shall not be installed in a location where the external conditions are conducive to the buildup of electrostatic charge.
- c) If the diaphragm seal contains titan parts, it must be protected against mechanical drops.
- d) Galvanically separated part of apparatus placed into measuring head is electrically connected with mass of enclosure. It should be taken into account when installing the apparatus with remote measuring head on cable.

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 (21) or 2 (22), and transmitter process connectors can connect to Zone 0 (20). Gb (Db) EPL protection level means that the transmitter and process connector can be installed in Zone 1 (21) or 2 (22). Da EPL protection level means that the transmitter and process connector can be installed in Zone 20 or 21. Transmitters for mining applications Mb should be turned off if explosion hazard occurs.

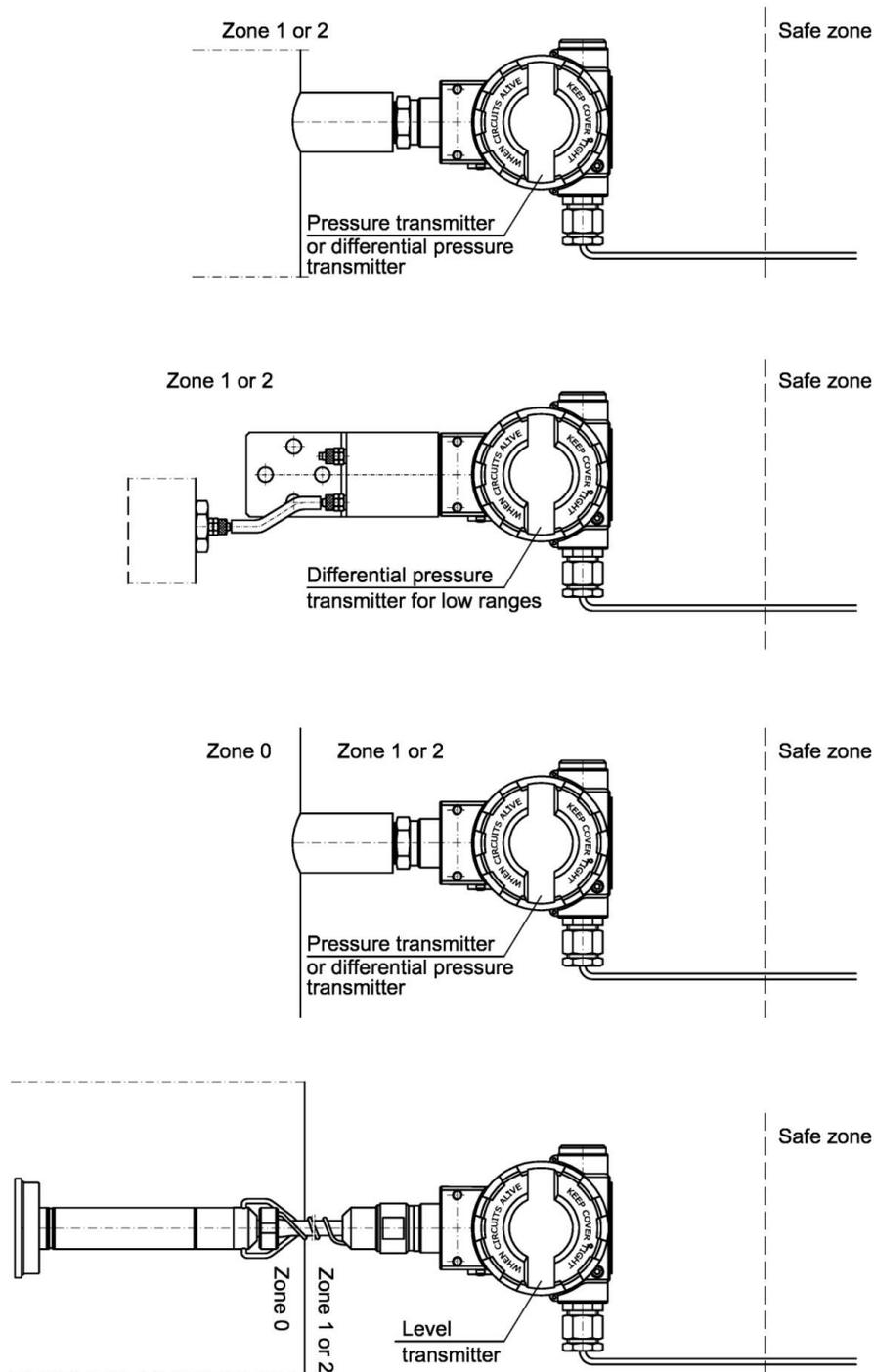


Figure 2. Transmitter installation in potentially explosive areas.

9. INTRINSICALLY-SAFE Exi TRANSMITTERS ACCORDING TO CERTIFICATES KDB 19 ATEX 0011X, IECEX KDB 19.0003X AND ExVeritas 22UKEX1415X

9.1. Approvals

The transmitters are ATEX, IECEX and UKEX approved confirmed by type examination certificates.

9.2. 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 60079-11:2012 (IEC 60079-11:2011 ed. 6.0).

9.3. Transmitter explosion-proofing designations according to certificates KDB 19 ATEX 0011X, IECEX KDB 19.0003X and ExVeritas 22UKEX1415X

The following ATEX and IECEX markings apply only to intrinsically safe transmitters marked with the type:

ATEX:



II 1/2G Ex ia IIC T5/T4 Ga/Gb

II 1D Ex ia IIIC T105°C Da

I M1 Ex ia I Ma

(for the version with 1.4401 (316) steel enclosure)

KDB 19 ATEX 0011X

IECEX:

Ex ia IIC T5/T4 Ga/Gb

Ex ia IIIC T105°C Da

Ex ia I Ma

(for the version with 1.4401 (316) steel enclosure)

IECEX KDB 19.0003X

UKEX:



II 1/2G Ex ia IIC T5/T4 Ga/Gb

II 1D Ex ia IIIC T105°C Da

I M1 Ex ia I Ma

(for the version with 1.4401 (316) steel enclosure)

ExVeritas 22 UKEX 1415X



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.



Transmitters with common Exi and Exd designation, as presented in Figure 1, become intrinsically safe transmitters when Exi field is permanently marked.

9.4. Minimum supply voltage

Table 1. Minimum supply voltage of an Exi transmitter according with certificates KDB 19 ATEX 0011X, IECEx KDB 19.0003X and ExVeritas 22UKEX1415X.

Minimum supply voltage for transmitters with backlight off	Minimum supply voltage for transmitters with backlight on *)
11.5 V	14.5 V
*) Backlight can only be turned on at transmitter manufacturing stage	

9.5. Load resistance

- a) For a linear power supply from a barrier

$$R_{o \max[\Omega]} = \frac{U_{app} - 11.5 V - (R_w * 0.02066 A)}{0.02066 A}$$

- b) For power supply from a trapezoidal or orthogonal source.

$$R_{o \max[\Omega]} = \frac{U_{app} - 11.5 V}{0.02066 A}$$

R_w – barrier resistance;

U_{app} – minimum voltage of the barrier used

10. INTRINSICALLY-SAFE Exi TRANSMITTERS ACCORDING TO CERTIFICATES FTZU 08 ATEX 0020X AND IECEx FTZU 14.0026X

10.1. 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).

10.2. Transmitter explosion-proofing designations according to certificates FTZU 08 ATEX 0020X and IECEx FTZU 14.0026X

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

ATEX:



II 1/2G Ex ia IIC T4/T5 Ga/Gb

II 1/2G Ex ia IIB T4/T5 Ga/Gb

(version with PTFE-shielded cable or with PTFE covered separator)

II 1D Ex ia IIIC T115°C Da

I M1 Ex ia I Ma

(for the version with 1.4401 (316) steel enclosure)

FTZU 08 ATEX 0020X

IECEX:

Ex ia IIC T4/T5 Ga/Gb

Ex ia IIB T4/T5 Ga/Gb

(version with PTFE-shielded cable or with PTFE covered separator)

Ex ia IIIC T115°C Da

Ex ia I Ma

(for the version with 1.4401 (316) steel enclosure)

IECEX FTZU 14.0026X



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.

10.3. Minimum supply voltage

Table 2. Minimum supply voltage of an Exi transmitter according with certificates FTZU 08 ATEX 0020X and IECEX KDB 14.0026X

Minimum supply voltage
10.5 V

10.4. Load resistance

- a) For a linear power supply from a barrier

$$R_{o\ max[\Omega]} = \frac{U_{app} - 10.5\ V - (R_W * 0.022\ A)}{0.022\ A}$$

- b) For power supply from a trapezoidal or orthogonal source.

$$R_{o\ max[\Omega]} = \frac{U_{app} - 10.5\ V}{0.022\ A}$$

R_w – barrier resistance;

U_{app} – minimum voltage of the barrier used

11. PERMISSIBLE PARAMETERS OF Exi TRANSMITTERS

Table 3. Permissible input parameters of an Exi transmitter

Linear power supply	Orthogonal power supply		Trapezoidal power supply
U _i = 30 V	U _i = 24 V	U _i = 24 V	U _i = 24 V, U _q =48 V
I _i = 0.1 A	I _i = 0.025 A	I _i = 0.05 A	I _i = 0.05 A
P _i = 0.75 W	P _i = 0.6 W	P _i = 1.2 W	P _i = 0.7 W
C _i = 2.5 nF			
L _i = 18 μH			
-40°C ≤ T _a ≤ +80°C (T5)	-40°C ≤ T _a ≤ +80°C (T5)	-40°C ≤ T _a ≤ +80°C (T4)	-40°C ≤ T _a ≤ +80°C (T5)



Supply power to transmitters from supply and measurement devices with applicable intrinsic safety certificates whose parameters of outputs to a hazard zone should not exceed the permissible transmitter power supply parameters specified above.

11.1. Linear power supply example

For example, linear power supply is provided by a typical barrier with the following parameters

$U_o = 28V$; $I_o = 0.1A$; $P_o = 0.7W$; $R_w = 280\Omega$.

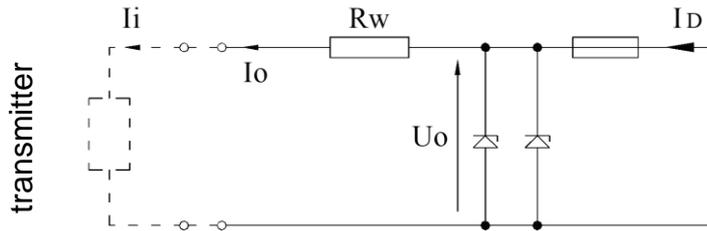


Figure 3. Principle of power supply from a linear source.

11.2. Trapezoidal power supply example

$U_o = 24V$; $I_o = 50mA$; $P_o = 0.7W$

An example of trapezoidal power supply is shown in Figure 4.

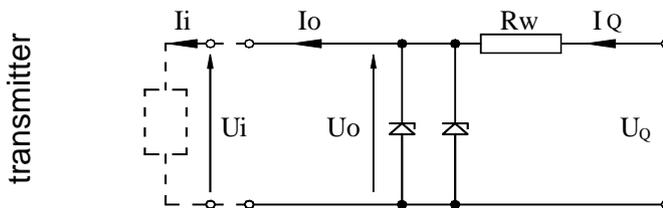


Figure 4. Principle of power supply from a trapezoidal source.

If $U_o > \frac{U_Q}{2}$, U_Q , I_o , P_o have the following relations: $P_o = \frac{U_Q * I_o}{4}$

If $U_o \leq 1/2U_Q$, U_Q , I_o , P_o have the following relations: $P_o = \frac{U_o(U_Q - U_o)}{R_w}$

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

11.3. Orthogonal power supply example

$U_o = 24 V$ $I_o = 25 mA$ $P_o = 0.6 W$

$U_o = 24 V$ $I_o = 50 mA$ $P_o = 1.2 W$

Orthogonal power supply means that the voltage of an intrinsically safe power adapter does not change until the current limiter is activated.

The level of protection of orthogonal power supply adapters is usually “ib”. A transmitter supplied from such power adapter is usually an “ib” intrinsically safe device.

An example of power supply in practice: A stabilized power adapter with $U_o = 24 V$, “ib” protection level and current limited to

$I_o = 25 mA$.

12. CONNECTING Exi TRANSMITTERS AND PROBES



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

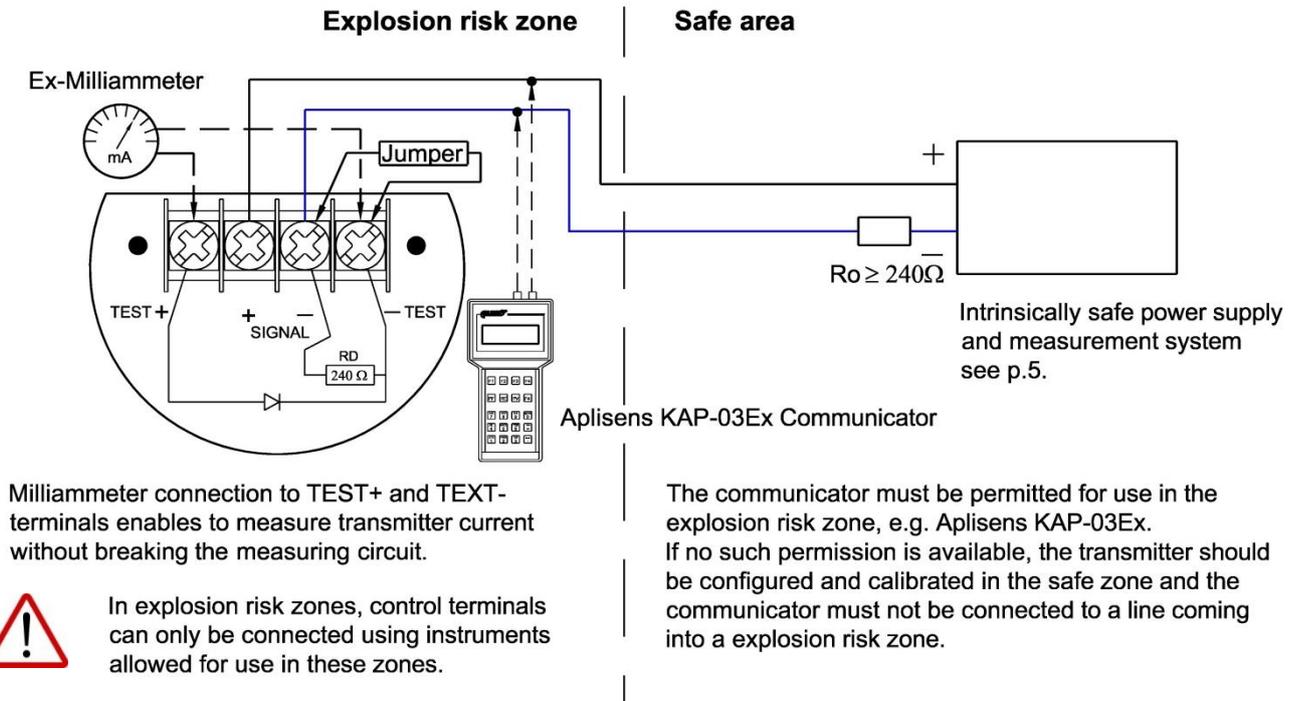


Figure 5. Connecting Exi transmitters and probes



The transmitter is equipped with an additional communication resistor $R_D=240\Omega$. <SIGNAL -> and <TEST -> terminals are short-circuited in factory. R_D resistor is used when the transmitter need to be communicated with locally (from its terminals) and a $R_o < 240 \Omega$. <SIGNAL -> and <TEST -> terminals must be open-circuited then.



If the medium temperature can exceed $T_a=80^\circ\text{C}$, separating elements, such as diaphragm separators, siphon tubes, etc., should be used. The transmitter operating temperature T_p must meet the $T_p \leq T_a$ condition.



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



For APC-2000ALW / L, APR-2000ALW / L and APR-2200ALW / L transmitters, equalization of the electric potential between the transmitter housing and the measuring head remote from the transmitter should be ensured.



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).



“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.



A transmitter enclosure has two holes for installing a cable entry and blinding plug with M20x1.5 or 1/2 NPT thread. Transmitters with common Exi and Exd designation, as presented in Figure 1, become intrinsically safe transmitters when Exi field is permanently marked. 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.

13. FLAMEPROOF Exd TRANSMITTERS ACCORDING TO CERTIFICATES KDB 19 ATEX 0011X, IECEX KDB 19.0003X and ExVeritas 22UKEX1415X

13.1. Approvals

The transmitters are ATEX, IECEX and UKEX approved confirmed by type examination certificates.

13.2. 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 60079-31:2013 ed. 2.0)
- EN 60079-26:2015 (IEC 60079-26:2014 ed. 3.0)

13.3. Transmitters explosion-proofing designations according to certificates KDB 19 ATEX 0011X, IECEX KDB 19.0003X and ExVeritas 22UKEX1415X.

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

ATEX:



II 1/2G Ex ia/db IIC T6/T5 Ga/Gb
 II 1/2D Ex ia/tb IIIC T105°C Da/Db
 I M2 Ex db ia I Mb (for the version with 1.4401 (316) steel enclosure)
 KDB 19 ATEX 0011X



II 2G Ex ia/db IIC T6/T5 Gb
 II 2D Ex ia/tb IIIC T105°C Db
 I M2 Ex db ia I Mb (for the version with 1.4401 (316) steel enclosure)
 KDB 19 ATEX 0011X

IECEX:

Ex ia/db IIC T6/T5 Ga/Gb
Ex ia/tb IIIC T105°C Da/Db
Ex db ia I Mb (for the version with 1.4401 (316) steel enclosure)
IECEX KDB 19.0003X

Ex ia/db IIC T6/T5 Gb
Ex ia/tb IIIC T105°C Db
Ex db ia I Mb (for the version with 1.4401 (316) steel enclosure)
IECEX KDB 19.0003X

UKEX:



II 1/2G Ex ia/db IIC T6/T5 Ga/Gb
II 1/2D Ex ia/tb IIIC T105°C Da/Db
I M2 Ex db ia I Mb (for the version with 1.4401 (316) steel enclosure)
ExVeritas 22 UKEX 1415X



II 2G Ex ia/db IIC T6/T5 Gb
II 2D Ex ia/tb IIIC T105°C Db
I M2 Ex db ia I Mb (for the version with 1.4401 (316) steel enclosure)
ExVeritas 22 UKEX 1415X



Transmitters with common Exi and Exd designation, as presented in Figure 1, become flameproof transmitters when Exd field is permanently marked.

14. PERMISSIBLE PARAMETERS OF Exd TRANSMITTERS

14.1. Ambient temperature range and temperature classes

Table 4. Ambient temperature range and temperature classes for Exd transmitters

Operating temperature range		Temperature class and maximum surface temperature
Ambient temperature	Process temperature	
$-40^{\circ}\text{C} \leq T_a \leq 40^{\circ}\text{C}$	$-40^{\circ}\text{C} \div 40^{\circ}\text{C}$	T6/T105°C
$-40^{\circ}\text{C} \leq T_a \leq 75^{\circ}\text{C}$	$-40^{\circ}\text{C} \div 75^{\circ}\text{C}$	T5/T105°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.

14.2. Power supply, connection and operation of Exd transmitters



Connect the transmitter according to the wiring diagram (Figure 6). The transmitter electrical connections in potentially explosive zones should be made by personnel having necessary knowledge and experience in this respect. 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 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.

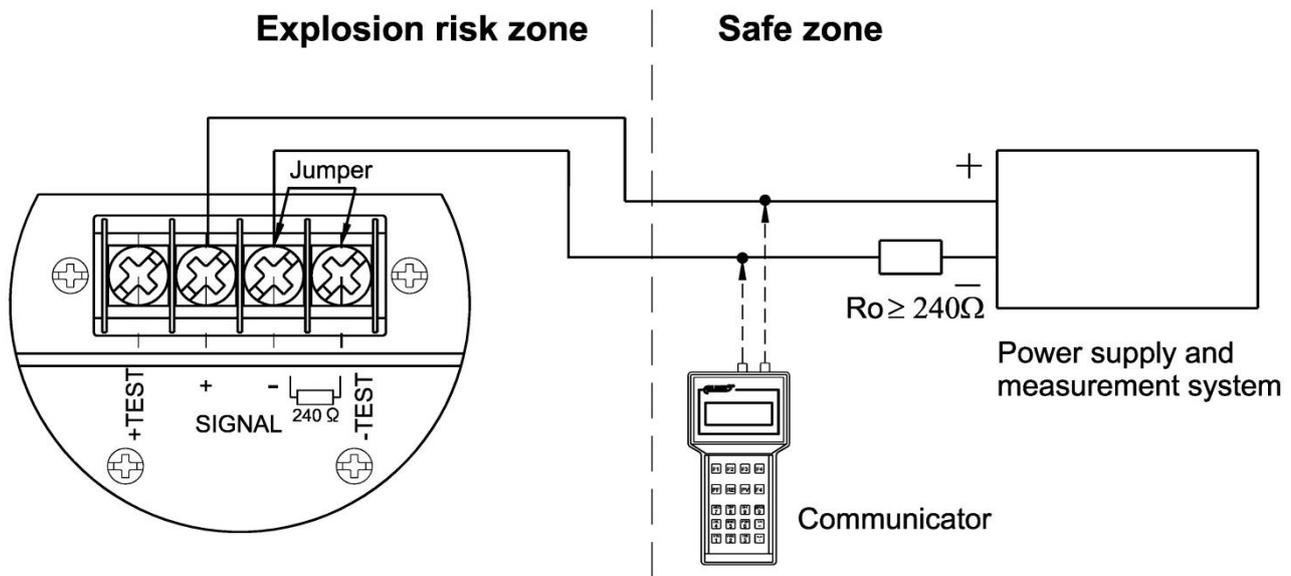


Figure 6. Connecting Exd transmitters and probes



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 enhanced isolation between primary and secondary winding in which voltages not larger than 250 VAC occur. It is responsibility of the user to provide power supply compliant with the requirements above.

Table 5. Maximum supply voltage for Exd transmitters

Maximum supply voltage	
APC-2000ALW Safety, APR-2000ALW Safety	APC-2000ALW, APR-2000ALW, APR-2000ALW/G, APR-2000YALW
36 VDC	55 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).

For transmitter calibration or check outside a risk zone, a communicating device can be connected to <SIGNAL +> and <TEST +> terminals.



The transmitter is equipped with a communication resistor $R_D = 240 \Omega$, which is short-circuited at <SIGNAL -> and <TEST -> terminals in factory. R_D resistor is used when the transmitter need to be communicated with locally (from its terminals) and a $R_o < 240 \Omega$. <SIGNAL -> and <TEST -> terminals must be open-circuited then.



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 the PL.IO.APC.APR.ALW.SFT user manual.



No repairs or alterations to the transmitter enclosure 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 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.



In a transmitter enclosure 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 7**) 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 6. 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 7** 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 or SWAK MS-PTS-50 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.

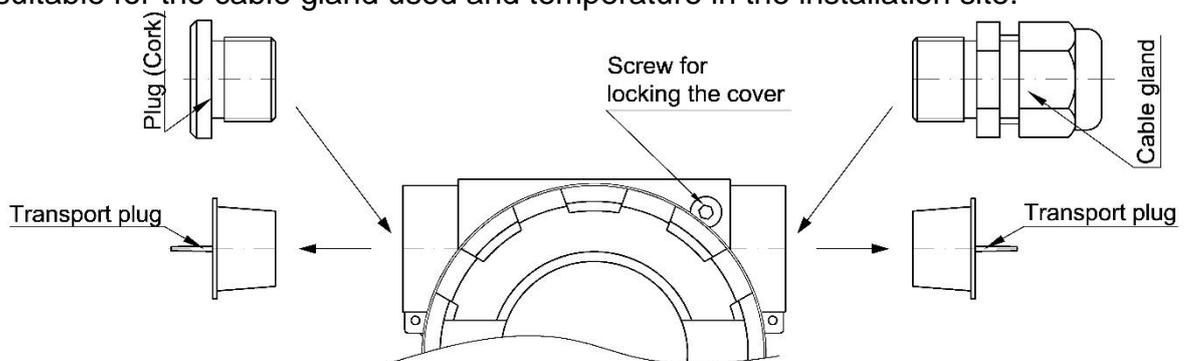


Figure 7. Installation of cable entries and blinding plugs

Table 6. 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 7. 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, LIYCY 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 6**). 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 enclosure 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 enclosure:



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.

15. ADDITIONAL INFORMATION

15.1. Additional information

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

15.2. History of revisions

Revision No	Document revision	Description of changes
-	01.A.001/2019.04	Initial document version. Prepared by DKD, DCF.
1	01.A.002/2019.10	The formulas for trapezoidal power supply have been corrected. Prepared by DCF.
2	01.A.003/2019.10	Addition of markings related to the FTZU 08 ATEX 0020X and IECEx FTZU 14.0026X certificates. Prepared by DCF.
3	01.A.004/2020.07	Change of certificates in tables 6 and 7 and other updates related to the introduction of new manuals EN.IO.APC.APR.ALW.Rev.02.A.005 and EN.IO.APC.APR.ALW.SFT.R .02. A.004. Prepared by DCF.
4	01.A.005/2020.08	New document edition. Prepared by DCF.
5	01.A.006/2022.06	Minor editorial changes. Prepared by DCF.
6	01.A.008/2023.01	Added certificate according to UKCA. Prepared by DCF.