

**Instruction**

**MI 023-103 en**

IECEX LR54/LR64/LR74 R01a  
02/2019

**LR54, LR64 and LR74 Free Space Radar  
24 GHz Radar (FMCW) Level Transmitters**

Supplementary Instructions

IECEX supplement

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## 1.1 Scope of the document

These instructions are applicable only to the explosion-protection version of the radar level transmitter. For all other data, use the Handbook. If you do not have these documents, please contact the nearest office or download them from the manufacturer's internet site.

**NOTICE!**

*The information in these supplementary instructions only contains the data applicable to explosion protection. The technical data for the non-Ex version in the Handbook shall be valid in its current version, provided that it is not rendered invalid or replaced by these supplementary instructions.*

**WARNING!**

*Installation, commissioning and maintenance may only be carried out by "Personnel trained in explosion protection".*

## 1.2 Device description

LRx4 is a series of devices that includes the LR54 Free Space Radar, LR64 Free Space Radar and LR74 Free Space Radar. They are 2-wire level transmitters that use FMCW (Frequency-Modulated Continuous Wave) radar technology.

The LR54 Free Space Radar and LR74 Free Space Radar measure level, volume, distance to surface and reflectivity of liquids, pastes and slurries. They are suitable for installation on storage tanks, process tanks and stilling wells.

The LR64 Free Space Radar measures level, volume, distance to surface, and reflectivity of solid particles, granulates and powders. It is suitable for installation on storage tanks and silos.

Measurements are displayed via a DTM (device type manager) for remote communication or on an optional integrated display screen with wizard-driven setup.

The level transmitter is approved for use in potentially explosive atmospheres when equipped with the appropriate options.

## 1.3 Standards and approvals



### **DANGER!**

*In compliance with the IECEx scheme rules, the IECEx version of the device described in these Supplementary Instructions agrees with International Standards IEC 60079-0:2011, IEC 60079-1:2014, IEC 60079-11:2011, IEC 60079-26:2014 and IEC 60079-31:2014. The Ex ia, Ex db ia / Ex ia tb and Ex ic versions are certified for use in hazardous areas by Kiwa ExVision B.V. under certificate of conformity IECEx KIWA 19.0008X.*



### **WARNING!**

*Carefully read the IECEx certificate of conformity. Obey the boundary conditions.*

You can download the certificate from our internet site.

## 1.4 Equipment protection levels (EPL)

### 1.4.1 Ex ia-approved devices

The Ex ia-approved device has the markings that follow for Gas Groups:

#### **LR54 Free Space Radar and LR64 Free Space Radar PP Drop antenna and PP accessories**

- Ex ia IIC T6...T5 Ga/Gb

#### **LR54 Free Space Radar and LR64 Free Space Radar All other versions**

- Ex ia IIC T6...T4 Ga/Gb

#### **LR74 Free Space Radar All versions**

- Ex ia IIC T6...T3 Ga/Gb

The Ex ia-approved device is suitable for use in potentially explosive atmospheres of all flammable substances in Gas Groups IIA, IIB and IIC. It is certified for applications requiring EPL Ga/Gb or EPL Gb equipment, when fitted with the appropriate options. It agrees with temperature classes T6 thru T1 (Gas Groups) if the temperature limits are obeyed. For more data, refer to *Ambient and process connection temperatures* on page 17.

EPL Ga/Gb equipment is used in zone 0, but it is installed in the boundary wall between zone 0 and zone 1 (the antenna is in zone 0 and the signal converter is in zone 1). EPL Gb equipment is used in zone 1.



### **WARNING!**

*Make sure that the installation of the device between zone 0 and zone 1 agrees with IEC 60079-26.*

The Ex ia-approved device has the markings that follow for Dust Groups:

**DANGER!**

*Markings for Dust Groups are only applicable to devices with the aluminium housing option.*

**LR54 Free Space Radar and LR64 Free Space Radar  
PP Drop antenna and PP accessories**

- Ex ia IIIC T85°C...T100°C Da/Db

**LR54 Free Space Radar and LR64 Free Space Radar  
All other versions**

- Ex ia IIIC T85°C...T130°C Da/Db

**LR74 Free Space Radar  
PTFE Drop antenna and Horn / Drop / Hygienic antenna with EPDM gasket**

- Ex ia IIIC T85°C...T150°C Da/Db

**LR74 Free Space Radar  
All other versions**

- Ex ia IIIC T85°C...T200°C Da/Db

The Ex ia-approved device is suitable for use in potentially explosive atmospheres of all flammable substances in Dust Groups IIIA, IIIB and IIIC. It is certified for applications requiring EPL Da/Db or EPL Db equipment, when fitted with the appropriate options.

EPL Da/Db equipment is used in zone 20, but it is installed in the boundary wall between zone 20 and zone 21 (the antenna is in zone 20 and the signal converter is in zone 21). EPL Db equipment is used in zone 21.

### 1.4.2 Ex db ia- and Ex ia tb-approved devices

**DANGER!**

*Ex db ia and Ex ia tb protection concepts are not applicable to devices with the stainless steel housing option.*

The Ex db ia-approved device has the markings that follow for Gas Groups:

**LR54 Free Space Radar and LR64 Free Space Radar  
PP Drop antenna and PP accessories**

- Ex db ia IIC T6...T5 Ga/Gb

**LR54 Free Space Radar and LR64 Free Space Radar  
All other versions**

- Ex db ia IIC T6...T4 Ga/Gb

**LR74 Free Space Radar  
All versions**

- Ex db ia IIC T6...T3 Ga/Gb

The Ex db ia-approved device is suitable for use in potentially explosive atmospheres of all flammable substances in Gas Groups IIA, IIB and IIC. It is certified for applications requiring EPL Ga/Gb or Gb equipment, when fitted with the appropriate options. It agrees with temperature classes T6 thru T1 (Gas Groups) if the temperature limits are obeyed. For more data, refer to *Ambient and process connection temperatures* on page 17.

EPL Ga/Gb equipment is used in zone 0, but it is installed in the boundary wall between zone 0 and zone 1 (the antenna is in zone 0 and the signal converter is in zone 1). EPL Gb equipment is used in zone 1.

The Ex ia tb-approved device has the markings that follow for Dust Groups:

**LR54 Free Space Radar and LR64 Free Space Radar  
PP Drop antenna and PP accessories**

- Ex ia tb IIIC T85°C...T100°C Da/Db

**LR54 Free Space Radar and LR64 Free Space Radar  
All other versions**

- Ex ia tb IIIC T85°C...T130°C Da/Db

**LR74 Free Space Radar  
PTFE Drop antenna and Horn / Drop / Hygienic antenna with EPDM gasket**

- Ex ia tb IIIC T85°C...T150°C Da/Db

**LR74 Free Space Radar  
All other versions**

- Ex ia tb IIIC T85°C...T200°C Da/Db

The Ex ia tb-approved device is suitable for use in potentially explosive atmospheres of all flammable substances in Dust Groups IIIA, IIIB and IIIC. It is certified for applications requiring EPL Da/Db or EPL Db equipment, when fitted with the appropriate options.

EPL Da/Db equipment is used in zone 20, but it is installed in the boundary wall between zone 20 and zone 21 (the antenna is in zone 20 and the signal converter is in zone 21). EPL Db equipment is used in zone 21.



### 1.4.3 Ex ic devices

The Ex ic-approved device has the markings that follow for Gas Groups:

**LR54 Free Space Radar and LR64 Free Space Radar  
PP Drop antenna and PP accessories**

- Ex ic IIC T6...T5 Gc

**LR54 Free Space Radar and LR64 Free Space Radar  
All other versions**

- Ex ic IIC T6...T4 Gc

**LR74 Free Space Radar  
All versions**

- Ex ic IIC T6...T3 Gc

The Ex ic-approved device is suitable for use in potentially explosive atmospheres of all flammable substances in Gas Groups IIA, IIB and IIC. It is designed for applications requiring EPL Gc equipment, when fitted with the appropriate options. It agrees with temperature classes T6 thru T1 (Gas Groups) if the temperature limits are obeyed. For more data, refer to *Ambient and process connection temperatures* on page 17.

EPL Gc equipment is used in zone 2.

The Ex ic-approved device has the markings that follow for Dust Groups:

**DANGER!**

*Markings for Dust Groups are only applicable to devices with the aluminium housing option.*

**LR54 Free Space Radar and LR64 Free Space Radar  
PP Drop antenna and PP accessories**

- Ex ic IIC T85°C...T100°C Dc

**LR54 Free Space Radar and LR64 Free Space Radar  
All other versions**

- Ex ia IIIC T85°C...T130°C Dc

**LR74 Free Space Radar  
PTFE Drop antenna and Horn / Drop / Hygienic antenna with EPDM gasket**

- Ex ia IIIC T85°C...T150°C Dc

**LR74 Free Space Radar  
All other versions**

- Ex ic IIC T85°C...T200°C Dc

The Ex ic-approved device is suitable for use in potentially explosive atmospheres of all flammable substances in Dust Groups IIIA, IIIB and IIIC. It is certified for applications requiring EPL Dc equipment, when fitted with the appropriate options.

EPL Dc equipment is used in zone 22.

## 1.5 IECEx nameplate

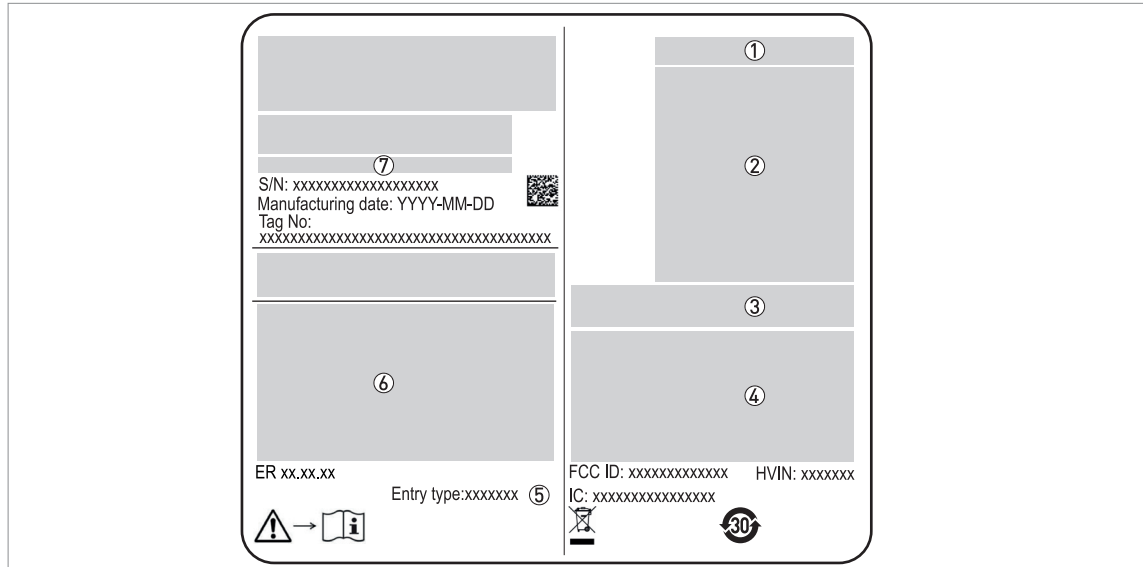


Figure 1-1: Nameplate on the signal converter housing

- ① IECEx certification number
- ② Types of device protection including approved Gas Groups, temperature classes and equipment protection level  
Types of device protection including approved Dust Groups, maximum surface temperature and equipment protection level
- ③ **Ex ia or Ex ic approvals:** Intrinsically-safe circuit data. Refer to ⑥ for the input voltage range.  
**Ex db ia or Ex ia tb approvals:** Maximum voltage in accordance with IEC 60079-0. Refer to ⑥ for the input voltage range.
- ④ WARNING: Potential electrostatic charging hazard – see instructions  
For more data, refer to *Electrostatic discharge* on page 13.
- ⑤ Cable entry type and size (M20×1.5, ½ NPT)
- ⑥ Input voltage range and maximum current (4...20 mA passive – HART)
- ⑦ Type code – for more data, refer to "Order code" in the handbook

## 2.1 Special conditions

This device can be installed on the applicable auxiliary equipment: a bypass chamber, a stilling well or a communicating pipe.

## 2.2 Precautions

### 2.2.1 General notes

**WARNING!**

*When you install the device, obey the conditions in the IECEx certificate of conformity. These conditions include:*

- *The special conditions for safe use.*

*You can download the certificate from our internet site.*

**DANGER!**

*This installation must agree with IEC 60079-14: Explosive atmospheres – Part 14: Electrical installations design, selection and erection.*

**DANGER!**

*The device contains a PTFE boundary wall (unless the device has a hygienic antenna option) between the process and the signal converter. Do not use the device if the PTFE part is not resistant to corrosion by the tank product.*

**Make sure that:**

- you can get access to the device,
- there is sufficient space around the device for inspections,
- you can see the device nameplate, and
- there are no external forces applied on the device.



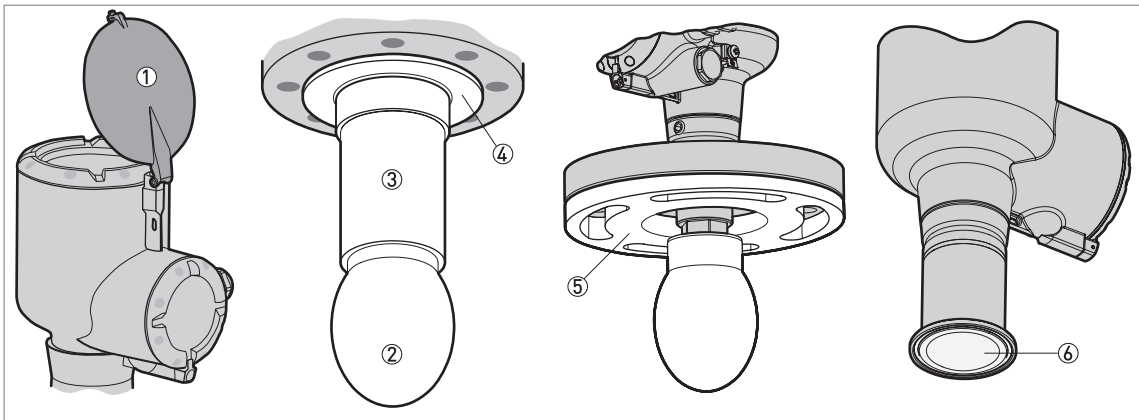


Figure 2-2: Risk of ESD

- ① Sun cover
- ② Drop antenna
- ③ **LR54 Free Space Radar and LR74 Free Space Radar:** Extension protection (option for the Drop antenna with one or more antenna extensions)
- ④ **LR54 Free Space Radar and LR74 Free Space Radar:** Flange plate protection (option for the Drop antenna)
- ⑤ **LR64 Free Space Radar:** Slanted flange (option for the Drop antenna)
- ⑥ **LR74 Free Space Radar:** Hygienic antenna

### 2.2.3 Optional purging system

This option is applicable to:

- devices that have horn antennas, and
- gas and dust atmospheres

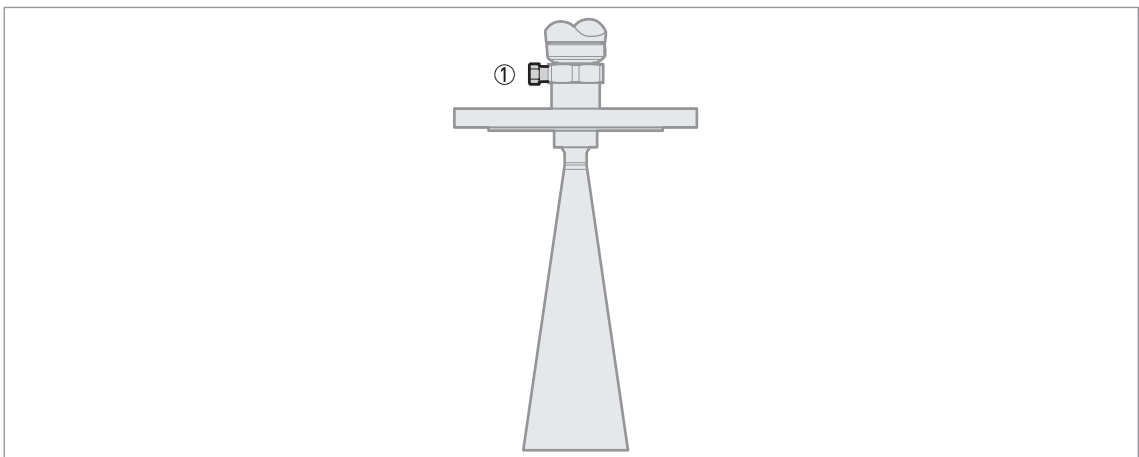


Figure 2-3: Purging system

- ① NPTF purging connection

**NOTICE!**

*If delivered with the device, the purging connection is plugged with a 1/4 NPTF or 1/8 NPTF screw and engaged on a minimum of 3½ threads.*

**CAUTION!**

*If the 1/4 NPTF or 1/8 NPTF screw is removed from the purging connection, make sure that the installation agrees with the Ex requirements for the purging system.*

Connection and operation of the purging connection are the responsibility of the user. The operator is also responsible for selection of a suitable fluid to purge the device.

**Devices installed in a gas atmosphere**

- The purging fluid temperature must be less than the ignition temperature of the gas or vapour atmosphere

**Devices installed in a dust atmosphere**

- **Dust clouds:** The purging fluid temperature must be less than 2/3 of the ignition temperature
- **Dust layers (thickness <5 mm / 0.2'')**: The difference between the purging fluid temperature and the ignition temperature must be more than +75°C / +135°F

**WARNING!**

*If the two conditions are applicable, then use the worst condition.*

*For data about dust layers thicker than 5 mm / 0.2'', refer to regulations given in EN 60079-14: Explosive atmospheres – Part 14: Electrical installations design, selection and erection.*

**Devices installed in a gas or dust atmosphere**

- The purging fluid temperature must be between the minimum and maximum limits for the gasket (for more data, refer to the handbook) and the type of antenna (for more data, refer to *Ambient and process connection temperatures* on page 17)

### 2.2.4 Optional heating/cooling system

This option is applicable to:

- devices that have horn antennas, and
- gas atmospheres

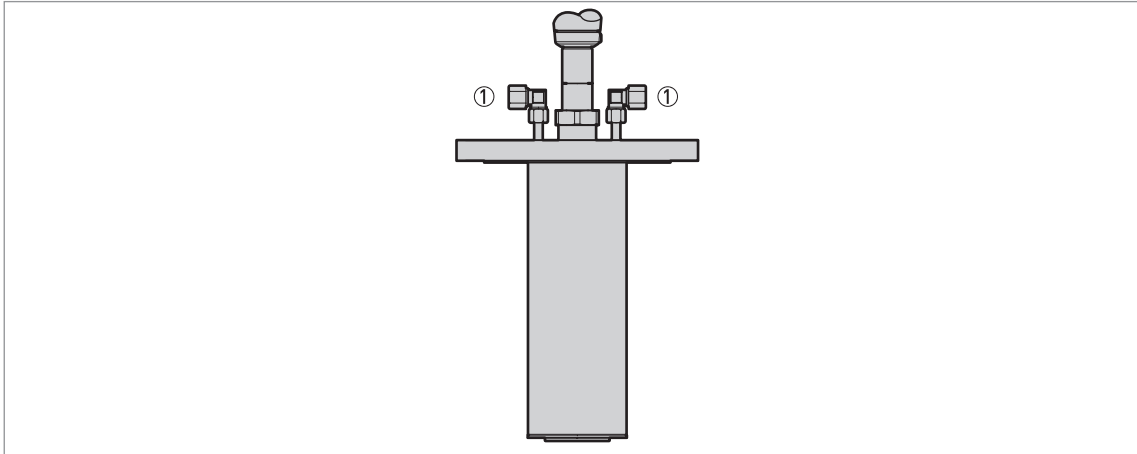


Figure 2-4: Heating/cooling system

① G 1/2 heating/cooling system connection

The operating pressure of the heating/cooling system must not be more than 6 barg / 87 psig.  
The process pressure must not be more than 2 barg / 29 psig.

The heating/cooling fluid temperature must be less than the ignition temperature of the gas or vapour atmosphere

The heating/cooling fluid temperature must be between the minimum and maximum limits for the gasket (for more data, refer to the handbook) and the type of antenna (for more data, refer to *Ambient and process connection temperatures* on page 17)



## 2.3 Operating conditions

The allowable ambient temperature and related process connection temperature range for the device depends on the temperature classes and maximum surface temperature marked on the nameplate.

### 2.3.1 Ambient and process connection temperatures



**WARNING!**

*The gasket temperature must be in the approved limits. For more data, refer to "Pressure and temperature ranges" in the Installation chapter of the handbook. The type of gasket and gasket material must agree with the process.*



**WARNING!**

*The reference point for the process temperature is the flange facing (flanges), the thread stop (threaded connections) or the facing (hygienic connections) of the device. In the tables that follow, this reference point will be referred to as the "process connection temperature".*



**WARNING!**

*An explosive atmosphere is a mixture of air and flammable gases, vapour, mist or dust in atmospheric conditions. If you do not use the device in these conditions ( $T_{atm} = -20...+60^{\circ}\text{C}$  and  $p_{atm} = 0.8...1.1\text{ barg}$ ), do an analysis of the risk of ignition.*

*$T_{atm}$  = atmospheric temperature and  $p_{atm}$  = atmospheric pressure.*



**WARNING!**

*Make sure that the maximum process connection temperature and maximum ambient temperature are not more than the values given in the tables.*

The tables that follow are applicable in these conditions:

- Device installation must agree with the instructions given in the handbook.
- Make sure that the device temperature does not increase because of other heat sources (sunlight, adjacent system components etc.). The device must not be operated above the maximum permitted ambient temperature.
- Do not put insulation around the signal converter. Make sure that the airflow around the signal converter is sufficient. It is permitted to have insulation on the pipe or stilling well and the process connection.

### LR54 Free Space Radar and LR64 Free Space Radar

Temperature class for EPL Ga/Gb, EPL Gb or EPL Gc	Maximum surface temperature for EPL Da/Db, EPL Db or EPL Dc	Maximum ambient temperature		Maximum process connection temperature (max. process temperature)
		Aluminium housing	Stainless steel housing	
		[°C]		
T6	T85°C	+60	+60	+60
		+44	+35	+85
T5	T100°C	+75	+75	+75
		+59	+50	+100
T4 ①	T130°C ①	+57	+46	+115
		+48	+31	+130

① Max. process connection temperature is +100°C, if the PP Drop antenna and PP accessories are used

Temperature class for EPL Ga/Gb, EPL Gb or EPL Gc	Maximum surface temperature for EPL Da/Db, EPL Db or EPL Dc	Minimum ambient temperature		Minimum process connection temperature (min. process temperature)
		Aluminium housing	Stainless steel housing	
		[°C]		
All classes ①	All surface temperatures ①	-40	-40	-40
		-33	-30	-50

① Min. process connection temperature is -20°C, if a Kalrez® 6375 gasket is used. Min. process connection temperature is -40°C, if an FKM/FPM gasket is used. Min. process connection temperature is -40°C, if the PP Drop antenna and PP accessories are used.

## LR74 Free Space Radar

Temperature class for EPL Ga/Gb, EPL Gb or EPL Gc	Maximum surface temperature for EPL Da/Db, EPL Db or EPL Dc	Maximum ambient temperature		Maximum process connection temperature (max. process temperature)
		Aluminium housing	Stainless steel housing	
		[°C]		
T6	T85°C	+60	+60	+60
		+54	+51	+85
T5	T100°C	+75	+75	+75
		+69	+66	+100
T4	T135°C	+72	+67	+115
		+68	+61	+135
T3 ①	T200°C ①	+64	+55	+150
		+58	+45	+180
		+54	+38	+200

① Max. process connection temperature is +150°C, if the device has a Metallic Horn, Drop or hygienic antenna with an EPDM gasket or a PTFE Drop antenna

Temperature class for EPL Ga/Gb, EPL Gb or EPL Gc	Maximum surface temperature for EPL Da/Db, EPL Db or EPL Dc	Minimum ambient temperature		Minimum process connection temperature (min. process temperature)
		Aluminium housing	Stainless steel housing	
		[°C]		
All classes ①	All surface temperatures ①	-40	-40	-40
		-37	-36	-50

① Min. process connection temperature is -15°C, if the device has a hygienic antenna with an FKM/FPM gasket. Min. process connection temperature is -20°C, if a Kalrez® 6375 gasket is used. Min. process connection temperature is -30°C, if a Metaglas® feedthrough is used. Min. process connection temperature is -30°C, if the device has a hygienic antenna with an EPDM gasket. Min. process connection temperature is -40°C, if the device has a Horn or Drop antenna with an FKM/FPM gasket.

### 3.1 General notes

**WARNING!**

- *De-energize the circuit.*
- *Use the applicable cable glands for the cable entry openings in the housing (M20×1.5 or ½ NPT). For the cable entry size, refer to the device nameplate.*
- ***Ex d-approved devices:*** *Use heat-resistant cables and cable glands certified for continuous operation above +90° C.*

## 3.2 Terminal compartment

### 3.2.1 How to open the terminal compartment



**WARNING!**

- Do not blow dust with compressed air if it collects on the housing. Clean the device with a damp cloth before you remove the terminal compartment cover.
- Make sure that no dust goes into the electrical compartment after you open the cover.

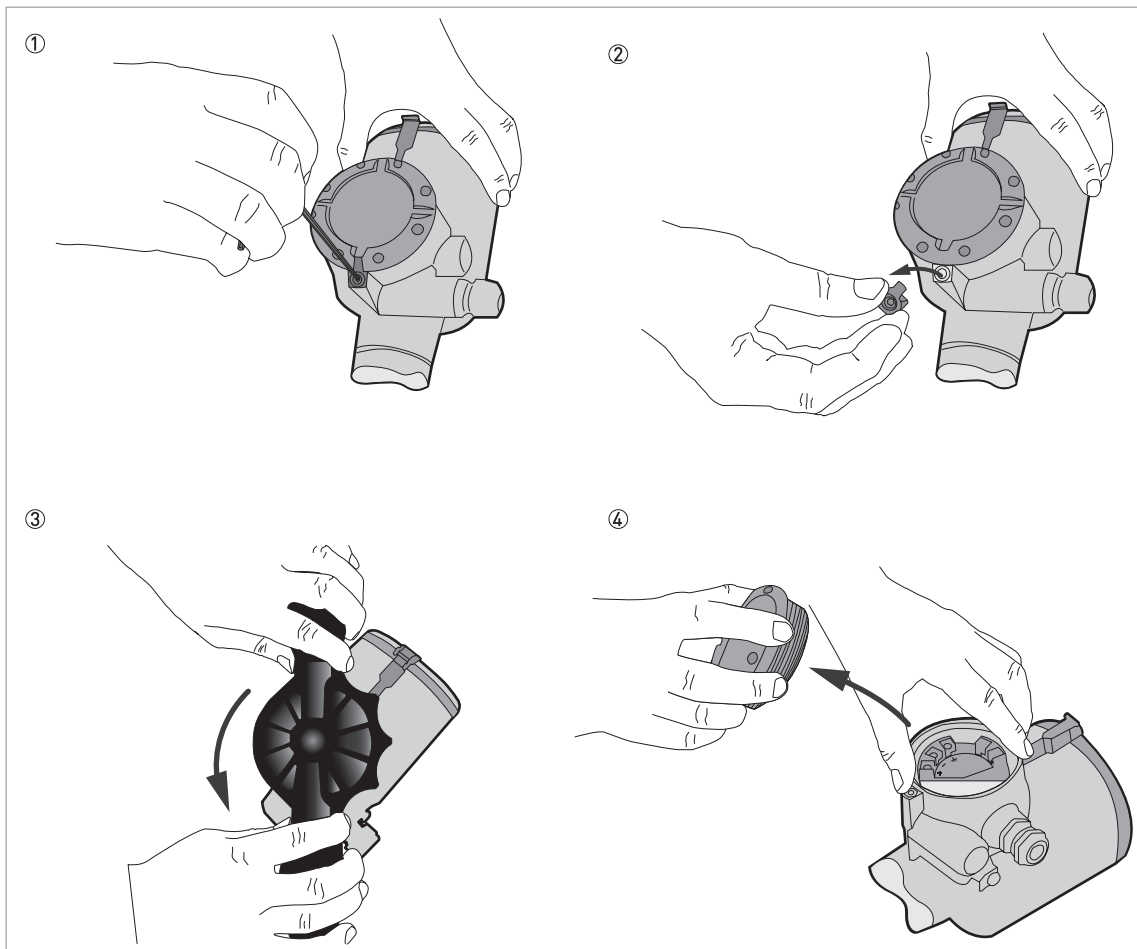


Figure 3-1: How to open the terminal compartment cover

**Equipment needed**

- Wrench (supplied)
- 3 mm Allen wrench (not supplied)



- Use the 3 mm Allen wrench to remove the cover stop.

- Use the wrench to remove the cover.

For more data about the procedure, refer to the handbook.

### 3.2.2 How to close the terminal compartment

**DANGER!****Ex d applications**

Make sure that the terminal compartment is sealed and its cover is fully engaged. An explosion can cause death or injury to personnel and/or damage to equipment. Obey the instructions that follow:

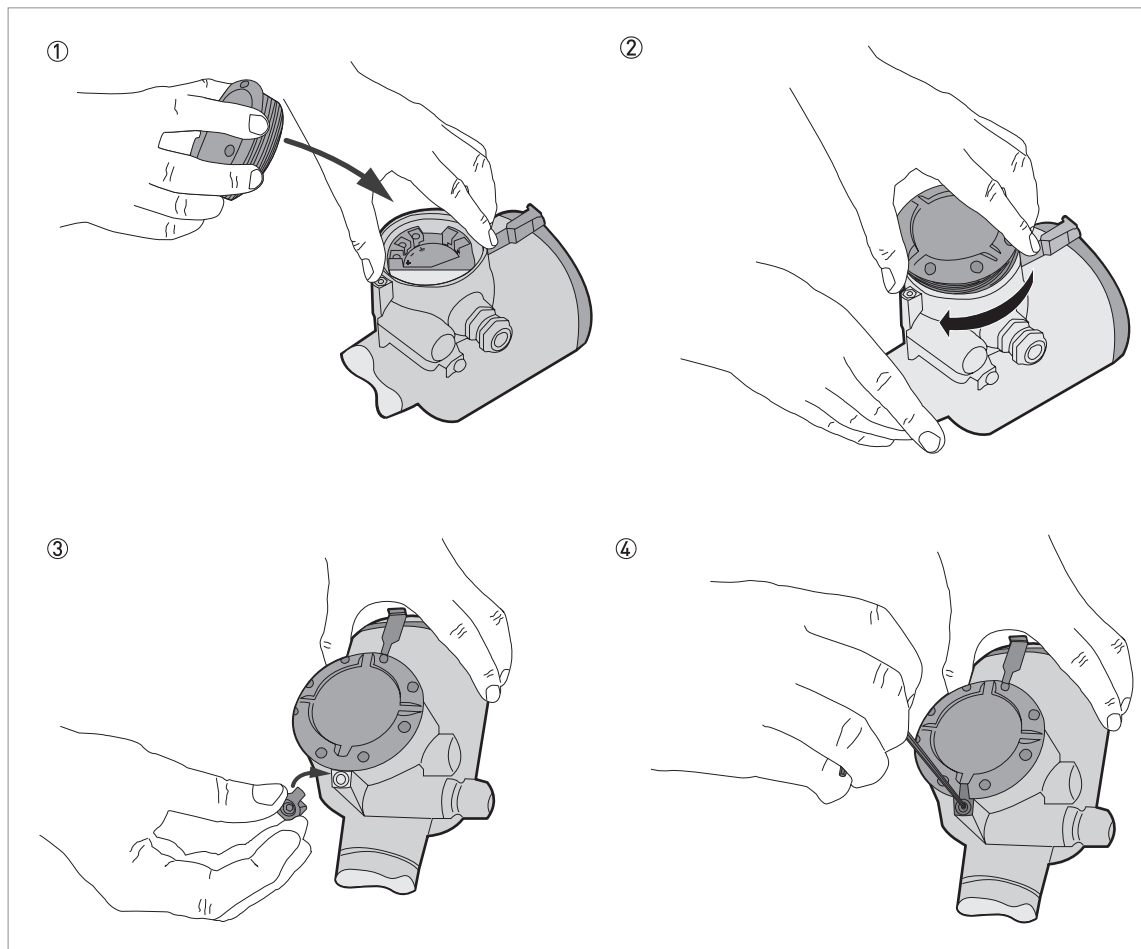


Figure 3-2: How to close the terminal compartment cover

**Equipment needed**

- Wrench (supplied)
- 3 mm Allen wrench (not supplied)



- Attach the cover. Make sure that a slot on the top of the cover is correctly aligned with the hole for the cover stop.
- Attach the cover stop (make sure that there is also a spring washer and a socket head screw). Tighten the screw with a 3 mm Allen wrench.

### 3.3 Terminal tightening capacity

The terminal tightening capacity for current output terminals is:

Type of wire	Terminal tightening capacity	
	[mm <sup>2</sup> ]	[AWG]
Flexible or rigid	2.5	13

### 3.4 Equipotential bonding system

Connect the device to the equipotential bonding system for the hazardous location.

**You can use 2 terminals to connect the device to the equipotential bonding system:**

- a ground connection in the terminal compartment and
- an external ground terminal adjacent to the cable entries

You can also use the process connection to connect the device to the equipotential bonding system. Make sure that there is a good electrical connection to the process connection (flange, thread etc.).

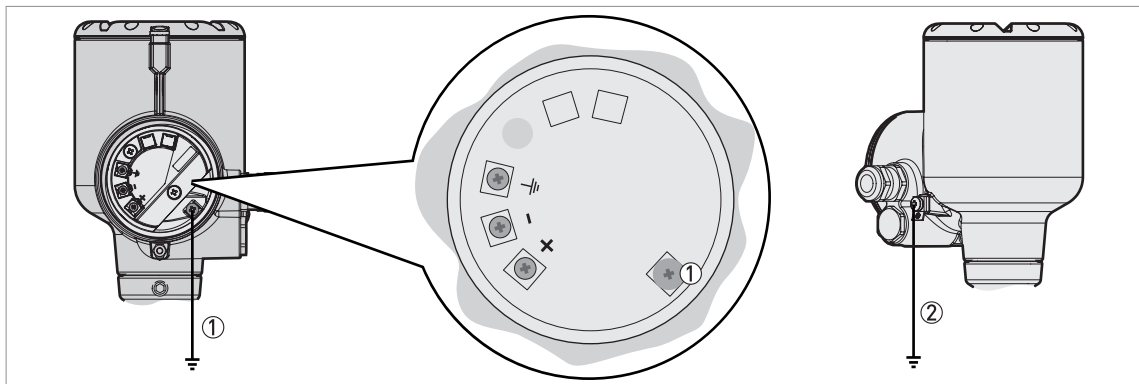


Figure 3-3: Examples of terminals for the equipotential bonding system

- ① Internal terminal
- ② External terminal (on the housing)

### Ex ia- and Ex ic-approved devices

The device electronics are isolated with a rating of 500 V<sub>RMS</sub>.

### Ex db ia- or Ex ia tb-approved devices

The device does not agree with the 500 V<sub>RMS</sub> dielectric strength requirement. Obey all the instructions given in the "Electrical connections" chapter.

## 3.5 Ex ia and Ex ic equipment

### 3.5.1 How to connect the electrical cables

Refer to the handbook for data about the device terminals.

Cable glands are supplied on customer demand. If you supply the cable glands, this part must have a degree of ingress protection IP<sub>≥6X</sub> (IEC 60529). IP<sub>≥6X</sub> is only applicable for the aluminium housing. We recommend that you use a part that has a degree of ingress protection IP<sub>≥68</sub>. Make sure that the cable gland is sealed.



#### Obey the instructions that follow:

- Electrical wires must agree with applicable standards (e.g. IEC 60079-14).
- Use the electrical connection procedure in the Handbook.
- Put the electrical wires in position and safely attach them to prevent damage. The electrical wires must also be a sufficient distance from hot surfaces.
- Make sure that unused electrical wires are safely connected to the ground potential of the hazardous area. If this is not possible, make sure that each of the unused electrical wires are safely isolated (other electrical wires, ground etc.) and rated for a test voltage  $\geq 500$  V<sub>RMS</sub>.
- If it is necessary, make sure the electrical wire insulation gives good protection from corrosion.
- Connect only to separate certified, intrinsically-safe circuits. Make sure that the electrical circuit characteristics are not more than the values that follow.
- Do not remove more than 6 mm / 0.2" of insulation from the wire.

### 3.5.2 Maximum intrinsically-safe values for the electrical circuit

Output	Intrinsically-safe values for the electrical circuit				
	U <sub>i</sub>	I <sub>i</sub>	P <sub>i</sub>	C <sub>i</sub>	L <sub>i</sub>
	[V]	[mA]	[mW]	[nF]	[μH]
4...20 mA passive – HART	≤30	≤130	≤1000	=10	~ 0

### 3.5.3 Supply voltage

Current output terminals	Minimum voltage at output terminals [V DC]	Maximum voltage at output terminals [V DC]
Terminals + / -	12	30



## 3.6 Ex db ia / Ex ia tb equipment

### 3.6.1 General notes

Ex db ia- and Ex ia tb-approved equipment have two separate compartments. The electronics in the electronics block compartment are Ex ia-approved and the terminal compartment is Ex db / Ex tb-approved.

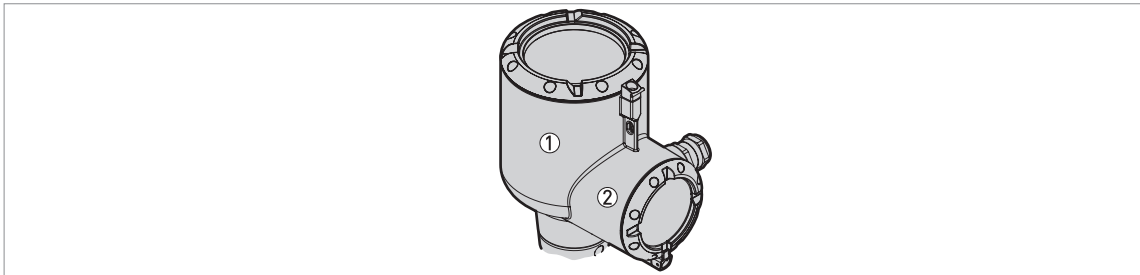


Figure 3-4: Compartments in Ex db ia- and Ex ia tb-approved equipment

- ① Electronics block (Ex ia) compartment
- ② Terminal (Ex db / Ex tb) compartment



**DANGER!**

*If you must open the electronics block compartment to remove the electronics blocks for servicing, de-energize the device. It is not necessary to disconnect the wires from the Ex db / Ex tb terminals.*

*If you must open the terminal compartment to remove the terminal block for servicing, de-energize the device first.*

### 3.6.2 How to connect the electrical cables

Cable glands are supplied on customer demand. If you supply the cable glands, this part must have a degree of ingress protection  $IP \geq 6X$  (IEC 60529). We recommend that you use a part that has a degree of ingress protection  $IP \geq 68$ . Make sure that the cable gland is sealed.



**WARNING!**

*Use only Ex d-approved cable glands and adaptors for Ex d applications. Use only Ex t-approved cable glands and adaptors for Ex t applications.*

#### Terminal compartment

- If you connect electrical wires to the terminals in the flameproof terminal compartment, use approved flameproof cable glands (M20×1.5 or ½ NPT). The cable glands must have a test certificate that agrees with IEC 60079-1. Obey the instructions given on the test certificates. Make sure that the tightening capacity of the cable gland is applicable to the diameter of the electrical wire.

- If you use conduits to connect electrical wires to the terminals in the flameproof terminal compartment, obey the instructions that follow. Make sure that the conduits are correctly attached and the flameproof compartment is sealed. The flameproof joint must have a minimum thread length of 8 mm / 0.32". The conduits must have a test certificate that agrees with IEC 60079-1. Use conduit stopping boxes that agree with precautions given in the test certificate and data in standards related to the installation of the conduit.
- If you connect electrical wires to the terminals in the dustproof terminal compartment, use approved flameproof cable glands (M20×1.5 or ½ NPT). The cable glands must have a test certificate that agrees with IEC 60079-31. Obey the instructions given on the test certificates. Make sure that the tightening capacity of the cable gland is applicable to diameter of the electrical wire.

**Obey instructions that follow:**

- Use the electrical connection procedure in the Handbook.
- The electrical wiring must agree with the applicable standards (e.g. IEC 60079-14).
- Do not remove more than 6 mm / 0.2" of insulation from the electrical wire.
- Put the electrical wires in position and safely attach them to prevent damage. The electrical wires must also be a sufficient distance from hot surfaces.
- If it is necessary, make sure that the electrical wire insulation gives good protection from corrosion.
- Make sure that the device is connected to a PELV (protective extra-low voltage) circuit.
- Make sure that electrical wires for the converter are isolated from the ground of the hazardous area. This data is also applicable to the equipotential bonding conductors (PE).
- Make sure that unused electrical wires and shields are safely connected to the ground potential of the hazardous area. If this is not possible, make sure that each of the unused electrical wires are safely isolated (other electrical wires, ground etc.) and rated for a test voltage  $\geq 1500 V_{RMS}$ .

**Load resistor (4...20 mA - HART output option)**

If the device uses the HART® communication protocol to send data, connect the load resistor to the positive terminal of the power supply in a non-hazardous location and ground the negative connection.

If it is necessary to connect the load resistor to the negative terminal, the loop resistance must not be more than 350 ohms.

**CAUTION!**

*Do not ground the positive connection.*

### 3.6.3 Supply voltage

Current output terminals	Minimum voltage at output terminals [V DC]	Maximum voltage at output terminals [V DC]
Terminals + / -	15	36

**WARNING!**

*The voltage difference between earth potential and the negative input terminal of the device must be less than 13 V. A higher voltage can cause a leakage current. Leakage currents can have an effect on the performance of the device and can cause the operation of fuses in the device. Do this check before energizing the circuit.*

**WARNING!**

*Make sure that it is safe to supply electrical power. Do a start-up check:*



- Are the wetted components (gasket, flange and antenna) resistant to corrosion by the tank product?
- Does the information given on the nameplate agree with the application?
- Did you connect the equipotential bonding system correctly?
- **Ex d applications:** If you supplied the cable glands and adaptors, are these parts Ex d-approved?
- **Ex t applications:** If you supplied the cable glands and adaptors, are these parts Ex t-approved?
- **Ex i applications:** Are you using an intrinsically-safe barrier within the correct parameters? For more data, refer to *Ex ia and Ex ic equipment* on page 24. The electrical circuit characteristics must not be more than the maximum intrinsically-safe values.
- Did you install the correct cable glands? Is the terminal compartment correctly sealed?

## 5.1 Periodic maintenance

In normal operational conditions, no maintenance is necessary. Only the manufacturer can repair the device and replace components. If it is necessary, maintenance must be done by approved personnel (the manufacturer or personnel approved by the manufacturer).



**CAUTION!**

*Do not try to repair flameproof joints. If it is necessary to repair a flameproof joint, speak or write to your supplier.*

*Do not replace an Ex i electronic block with a different block that is from a device which does not have an intrinsically-safe barrier.*

*Do not use connectors in the signal converter housing or open the cover to change the device configuration when there is an explosive atmosphere. Maintenance can only be carried out by "Personnel trained in explosion protection".*

## 5.2 Keep the device clean

**Obey these instructions:**

- Keep the device clean to prevent dust contamination.
- Do not blow dust with compressed air.
- Clean the device with a damp cloth.



**DANGER!**

*If dirt collects on the device, clean it with a damp cloth.*

*Do not use cleaning agents which can cause damage to the paint, the boundary wall (the PTFE process seal, or the PEEK process seal if the device has a hygienic antenna), the EPDM housing gaskets and the process connection gaskets (FKM/FPM, Kalrez® or EPDM). Also make sure that the cleaning agent does not remove the data printed on the nameplate.*

*If you use the incorrect cleaning agent (i.e. the device is not resistant to corrosion by your cleaning agent), do not use the device in a hazardous location. If aid is necessary, speak or write to the supplier.*

### 5.3 How to remove the device

The installation and removal of the device or the signal converter is a task for approved personnel (operator, fitter, electrician etc.). If you must change the signal converter or all of the device, refer to the procedures in the handbook.

**If you must do work in a hazardous location:**

- **Ex i-approved devices:** Disconnect the electrical wires. For more data, refer to *How to open the terminal compartment* on page 21.
- **Devices with other Ex protection concepts:** De-energize the device. If necessary, only open the terminal compartment after the time shown on the device label. For more data, refer to *How to open the terminal compartment* on page 21. Disconnect the electrical wires.
- Before you remove the device from the process connection, make sure that the tank is not pressurized. A pressurized tank can cause injury to persons when they do work on it.
- Make sure that all electrical wires are isolated from the ground. This is also applicable to Protective Earth (PE), Functional Earth (FE) and equipotential bonding conductors.

### 5.4 Manufacturer

Schneider Electric Systems USA, Inc.  
38 Neponset Avenue  
Foxboro, MA 02035  
U.S.A.

If you need to return your device for inspection or repair, speak or write to your supplier and obey the instructions that follow.

## 5.5 Returning the device to the manufacturer

### 5.5.1 General information

This device has been carefully manufactured and tested. If installed and operated in accordance with these operating instructions, it will rarely present any problems.

**WARNING!**

*Should you nevertheless need to return a device for inspection or repair, please pay strict attention to the following points:*

- *Due to statutory regulations on environmental protection and safeguarding the health and safety of the personnel, the manufacturer may only handle, test and repair returned devices that have been in contact with products without risk to personnel and environment.*
- *This means that the manufacturer can only service this device if it is accompanied by the following certificate (see next section) confirming that the device is safe to handle.*

**WARNING!**

*If the device has been operated with toxic, caustic, radioactive, flammable or water-endangering products, you are kindly requested:*

- *to check and ensure, if necessary by rinsing or neutralising, that all cavities are free from such dangerous substances,*
- *to enclose a certificate with the device confirming that it is safe to handle and stating the product used.*





**CLEANING STATEMENT**

(Note: Your item will not be serviced unless the following cleaning statement has been signed):

I certify that the above referenced item has been properly purged and cleaned, complies with U.S. Department of Transportation shipping requirements and DOES NOT present a health and/or safety hazard (as defined by OSHA) to our Customer Repair personnel.

Print name: \_\_\_\_\_

Signature: \_\_\_\_\_

Print title: \_\_\_\_\_

Date: \_\_\_\_\_

Please fax the completed form to the Customer Satisfaction Center +1-508-549-4999





Schneider Electric Systems USA, Inc. Global Customer Support  
38 Neponset Avenue Inside U.S.: 1-866-746-6477  
Foxboro, MA 02035 Outside U.S.: 1-508-549-2424  
United States of America <https://pasupport.schneider-electric.com>  
<http://www.schneider-electric.com>

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**Instruction**

**MI 023-104 en**

IECEX LR65/LR75 R01 02/2019

**LR65 and LR75 Free Space Radar  
80 GHz Radar (FMCW) Level Transmitters**

Supplementary Instructions

IECEX supplement

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## 1.1 Scope of the document

These instructions are applicable only to the explosion-protection version of the radar level transmitter. For all other data, use the Handbook. If you do not have these documents, please contact the nearest office or download them from the manufacturer's internet site.

**NOTICE!**

*The information in these supplementary instructions only contains the data applicable to explosion protection. The technical data for the non-Ex version in the Handbook shall be valid in its current version, provided that it is not rendered invalid or replaced by these supplementary instructions.*

**WARNING!**

*Installation, commissioning and maintenance may only be carried out by "Personnel trained in explosion protection".*

## 1.2 Device description

LRx5 is a series of devices that includes the LR65 Free Space Radar and LR75 Free Space Radar. They are 2-wire level transmitters that use FMCW (Frequency-Modulated Continuous Wave) radar technology.

The LR65 Free Space Radar measures level, volume, distance to surface, and reflectivity of solid particles, granulates and powders. It is suitable for installation on storage tanks and silos.

The LR75 Free Space Radar measures level, volume, distance to surface and reflectivity of liquids, pastes and slurries. It is suitable for installation on storage tanks, process tanks and stilling wells.

Measurements are displayed via a DTM (device type manager) for remote communication or on an optional integrated display screen with wizard-driven setup.

The level transmitter is approved for use in potentially explosive atmospheres when equipped with the appropriate options.



## 1.3 Standards and approvals



**DANGER!**

*In compliance with the IECEx scheme rules, the IECEx version of the device described in these Supplementary Instructions agrees with International Standards IEC 60079-0:2011, IEC 60079-1:2014, IEC 60079-11:2011, IEC 60079-26:2014 and IEC 60079-31:2014. The Ex ia, Ex db ia / Ex ia tb and Ex ic versions are certified for use in hazardous areas by Kiwa ExVision B.V. under certificate of conformity IECEx KIWA 19.0008X.*



**WARNING!**

*Carefully read the IECEx certificate of conformity. Obey the boundary conditions.*

You can download the certificate from our internet site.

## 1.4 Equipment protection levels (EPL)

### 1.4.1 Ex ia-approved devices

The Ex ia-approved device has the markings that follow for Gas Groups:

**LR65 Free Space Radar and LR75 Free Space Radar**

**All versions**

- Ex ia IIC T6...T3 Ga/Gb

The Ex ia-approved device is suitable for use in potentially explosive atmospheres of all flammable substances in Gas Groups IIA, IIB and IIC. It is certified for applications requiring EPL Ga/Gb or EPL Gb equipment, when fitted with the appropriate options. It agrees with temperature classes T6 thru T1 (Gas Groups) if the temperature limits are obeyed. For more data, refer to *Ambient and process connection temperatures* on page 14.

EPL Ga/Gb equipment is used in zone 0, but it is installed in the boundary wall between zone 0 and zone 1 (the antenna is in zone 0 and the signal converter is in zone 1). EPL Gb equipment is used in zone 1.



**WARNING!**

*Make sure that the installation of the device between zone 0 and zone 1 agrees with IEC 60079-26.*

The Ex ia-approved device has the markings that follow for Dust Groups:



**DANGER!**

*Markings for Dust Groups are only applicable to devices with the aluminium housing option.*

**LR65 Free Space Radar and LR75 Free Space Radar  
Without distance piece**

- Ex ia IIIC T85°C...T150°C Da/Db

**LR65 Free Space Radar and LR75 Free Space Radar  
With distance piece**

- Ex ia IIIC T85°C...T200°C Da/Db

The Ex ia-approved device is suitable for use in potentially explosive atmospheres of all flammable substances in Dust Groups IIIA, IIIB and IIIC. It is certified for applications requiring EPL Da/Db or EPL Db equipment, when fitted with the appropriate options.

EPL Da/Db equipment is used in zone 20, but it is installed in the boundary wall between zone 20 and zone 21 (the antenna is in zone 20 and the signal converter is in zone 21). EPL Db equipment is used in zone 21.

### 1.4.2 Ex db ia- and Ex ia tb-approved devices



**DANGER!**

*Ex db ia and Ex ia tb protection concepts are not applicable to devices with the stainless steel housing option.*

The Ex db ia-approved device has the markings that follow for Gas Groups:

**LR65 Free Space Radar and LR75 Free Space Radar  
All versions**

- Ex db ia IIC T6...T3 Ga/Gb

The Ex db ia-approved device is suitable for use in potentially explosive atmospheres of all flammable substances in Gas Groups IIA, IIB and IIC. It is certified for applications requiring EPL Ga/Gb or EPL Gb equipment, when fitted with the appropriate options. It agrees with temperature classes T6 thru T1 (Gas Groups) if the temperature limits are obeyed. For more data, refer to *Ambient and process connection temperatures* on page 14.

EPL Ga/Gb equipment is used in zone 0, but it is installed in the boundary wall between zone 0 and zone 1 (the antenna is in zone 0 and the signal converter is in zone 1). EPL Gb equipment is used in zone 1.

The Ex ia tb-approved device has the markings that follow for Dust Groups:

**LR65 Free Space Radar and LR75 Free Space Radar  
Without distance piece**

- Ex ia tb IIIC T85°C...T150°C Da/Db

**LR65 Free Space Radar and LR75 Free Space Radar  
With distance piece**

- Ex ia tb IIIC T85°C...T200°C Da/Db

the Ex ia tb-approved device is suitable for use in potentially explosive atmospheres of all flammable substances in Dust Groups IIIA, IIIB and IIIC. It is certified for applications requiring EPL Da/Db or EPL Db equipment, when fitted with the appropriate options.

EPL Da/Db equipment is used in zone 20, but it is installed in the boundary wall between zone 20 and zone 21 (the antenna is in zone 20 and the signal converter is in zone 21). EPL Db equipment is used in zone 21.

### 1.4.3 Ex ic devices

The Ex ic-approved device has the markings that follow for Gas Groups:

**LR65 Free Space Radar and LR75 Free Space Radar  
All versions**

- Ex ic IIC T6...T3 Gc

The Ex ic-approved device is suitable for use in potentially explosive atmospheres of all flammable substances in Gas Groups IIA, IIB and IIC. It is designed for applications requiring EPL Gc equipment, when fitted with the appropriate options. It agrees with temperature classes T6 thru T1 (Gas Groups) if the temperature limits are obeyed. For more data, refer to *Ambient and process connection temperatures* on page 14.

EPL Gc equipment is used in zone 2.

The Ex ic-approved device has the markings that follow for Dust Groups:

**DANGER!**

*Markings for Dust Groups are only applicable to devices with the aluminium housing option.*

**LR65 Free Space Radar and LR75 Free Space Radar  
Without distance piece**

- Ex ic IIIC T85°C...T150°C Dc

**LR65 Free Space Radar and LR75 Free Space Radar  
With distance piece**

- Ex ic IIIC T85°C...T200°C Dc

The Ex ic-approved device is suitable for use in potentially explosive atmospheres of all flammable substances in Dust Groups IIIA, IIIB and IIIC. It is certified for applications requiring EPL Dc equipment, when fitted with the appropriate options.

EPL Dc equipment is used in zone 22.

## 1.5 IECEx nameplate

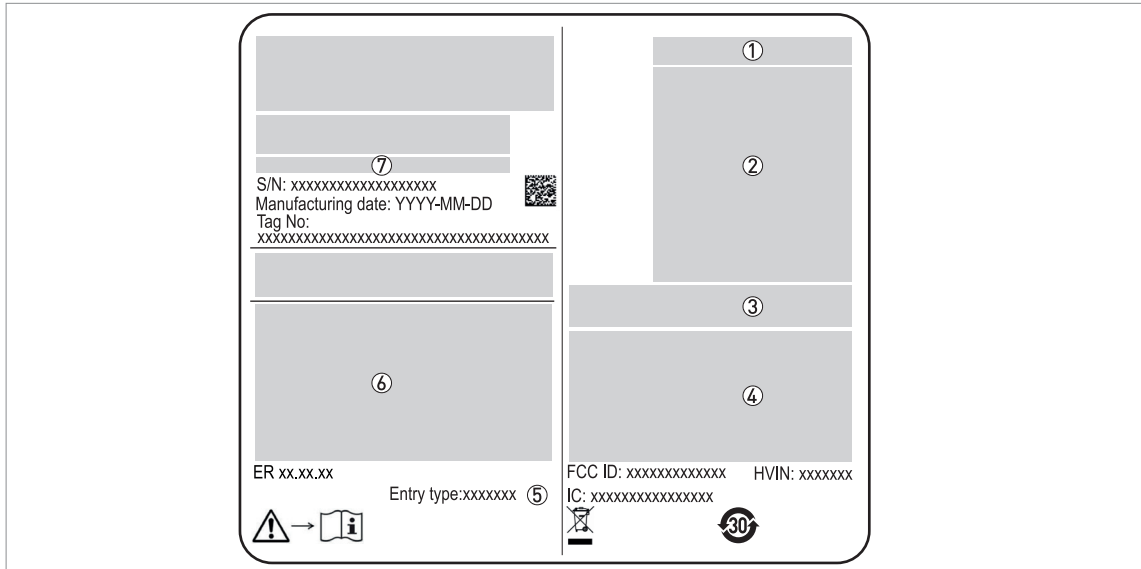


Figure 1-1: Nameplate on the signal converter housing

- ① IECEx certification number
- ② Types of device protection including approved Gas Groups, temperature classes and equipment protection level  
Types of device protection including approved Dust Groups, maximum surface temperature and equipment protection level
- ③ **Ex ia or Ex ic approvals:** Intrinsically-safe circuit data. Refer to ⑥ for the input voltage range.  
**Ex db ia or Ex ia tb approvals:** Maximum voltage in accordance with IEC 60079-0. Refer to ⑥ for the input voltage range.
- ④ WARNING: Potential electrostatic charging hazard – see instructions  
For more data, refer to *Electrostatic discharge* on page 11.
- ⑤ Cable entry type and size (M20×1.5, ½ NPT)
- ⑥ Input voltage range and maximum current (4...20 mA passive – HART)
- ⑦ Type code – for more data, refer to "Order code" in the handbook

## 2.1 Special conditions

This device can be installed on the applicable auxiliary equipment: a bypass chamber, a stilling well or a communicating pipe.

## 2.2 Precautions

### 2.2.1 General notes

**WARNING!**

*When you install the device, obey the conditions in the IECEx certificate of conformity. These conditions include:*

- *The special conditions for safe use.*

*You can download the certificate from our internet site.*

**DANGER!**

*This installation must agree with IEC 60079-14: Explosive atmospheres – Part 14: Electrical installations design, selection and erection.*

**DANGER!**

*The device contains a PEEK boundary wall between the process and the signal converter. Do not use the device if the PEEK part is not resistant to corrosion by the tank product.*

**Make sure that:**

- you can get access to the device,
- there is sufficient space around the device for inspections,
- you can see the device nameplate, and
- there are no external forces applied on the device.



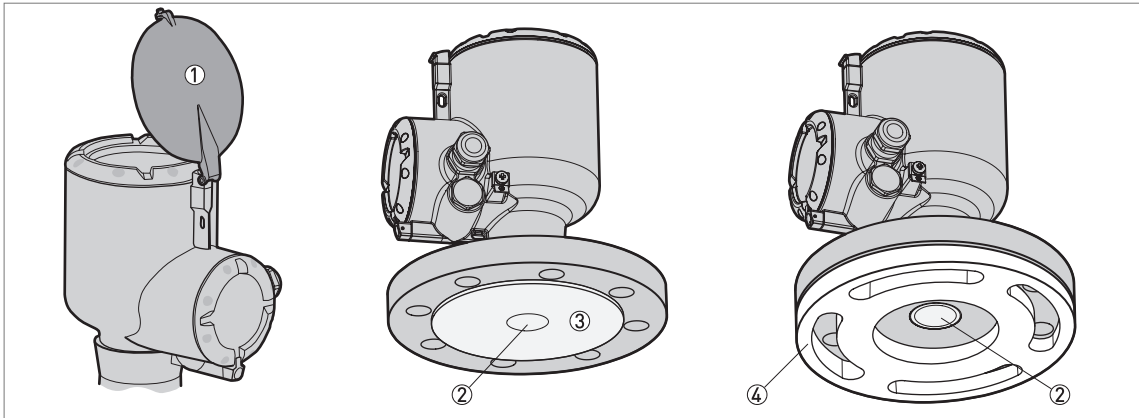


Figure 2-2: Risk of ESD

- ① Sun cover
- ② Lens antenna
- ③ LR75 Free Space Radar: Flange plate protection
- ④ LR65 Free Space Radar: Slanted flange

### 2.2.3 Optional purging system

This option is applicable to:

- LR65 Free Space Radar: all Lens antenna sizes
- LR75 Free Space Radar: devices that have a DN40 or DN70 Lens antenna

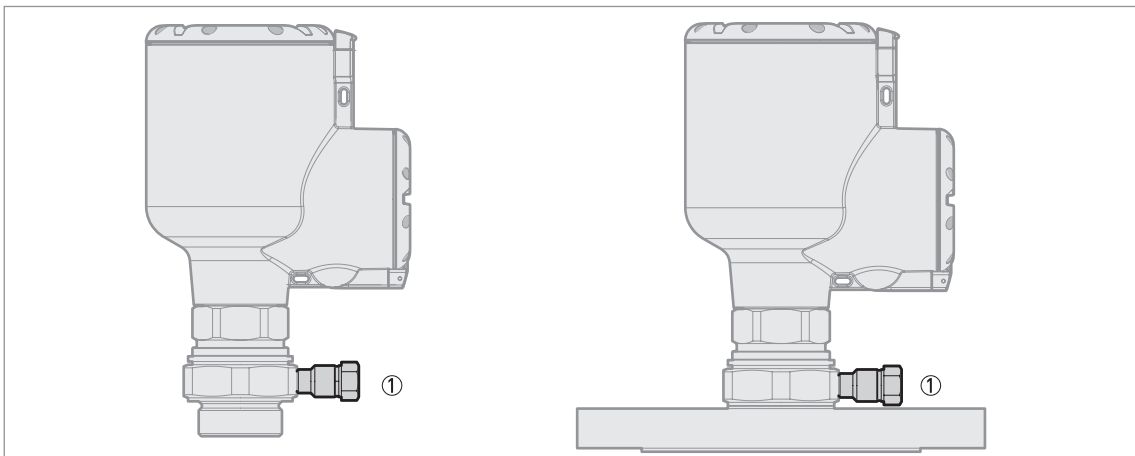


Figure 2-3: Purging system

- ① 1/4 NPT or G 1/4 purging connection



#### **NOTICE!**

*If delivered with the device, the purging connection is plugged with a 1/4 NPTF or G 1/4 screw. The 1/4 NPTF screw is engaged on a minimum of 3 1/2 threads.*



**CAUTION!**

*If the 1/4 NPTF or G 1/4 screw is removed from the purging connection, make sure that the installation agrees with the Ex requirements for the purging system.*

Connection and operation of the purging connection are the responsibility of the user. The operator is also responsible for selection of a suitable fluid to purge the device.

**Devices installed in a gas atmosphere**

- The purging fluid temperature must be less than the ignition temperature of the gas or vapour atmosphere

**Devices installed in a dust atmosphere**

- **Dust clouds:** The purging fluid temperature must be less than 2/3 of the ignition temperature
- **Dust layers (thickness <5 mm / 0.2"):** The difference between the purging fluid temperature and the ignition temperature must be more than +75°C / +135°F

**WARNING!**

*If the two conditions are applicable, then use the worst condition.*

*For data about dust layers thicker than 5 mm / 0.2", refer to regulations given in EN 60079-14: Explosive atmospheres – Part 14: Electrical installations design, selection and erection.*

**Devices installed in a gas or dust atmosphere**

- The purging fluid temperature must be between the minimum and maximum limits for the gasket (for more data, refer to the handbook) and the type of antenna (for more data, refer to *Ambient and process connection temperatures* on page 14)

## 2.3 Operating conditions

The allowable ambient temperature and related process connection temperature range for the device depends on the temperature classes and maximum surface temperature marked on the nameplate.

### 2.3.1 Ambient and process connection temperatures



**WARNING!**

*The gasket temperature must be in the approved limits. For more data, refer to "Pressure and temperature ranges" in the Installation chapter of the handbook. The type of gasket and gasket material must agree with the process.*



**WARNING!**

*The reference point for the process temperature is the flange facing (flanges), the thread stop (threaded connections) or the facing (hygienic connections) of the device. In the tables that follow, this reference point will be referred to as the "process connection temperature".*



**WARNING!**

*An explosive atmosphere is a mixture of air and flammable gases, vapour, mist or dust in atmospheric conditions. If you do not use the device in these conditions ( $T_{atm} = -20...+60^{\circ}\text{C}$  and  $p_{atm} = 0.8...1.1\text{ barg}$ ), do an analysis of the risk of ignition.*

*$T_{atm}$  = atmospheric temperature and  $p_{atm}$  = atmospheric pressure.*



**WARNING!**

*Make sure that the maximum process connection temperature and maximum ambient temperature are not more than the values given in the tables.*

The tables that follow are applicable in these conditions:

- Device installation must agree with the instructions given in the handbook.
- Make sure that the device temperature does not increase because of other heat sources (sunlight, adjacent system components etc.). The device must not be operated above the maximum permitted ambient temperature.
- Do not put insulation around the signal converter. Make sure that the airflow around the signal converter is sufficient. It is permitted to have insulation on the pipe or stilling well and the process connection.

LR65 Free Space Radar and LR75 Free Space Radar  
Without distance piece

Temperature class for EPL Ga/Gb, EPL Gb or EPL Gc	Maximum surface temperature for EPL Da/Db, EPL Db or EPL Dc	Maximum ambient temperature		Maximum process connection temperature (max. process temperature)
		Aluminium housing	Stainless steel housing	
		[°C]		
T6	T85°C	+60	+60	+60
		+48	+43	+85
T5	T100°C	+75	+75	+75
		+63	+58	+100
T4	T135°C	+64	+56	+115
		+55	+43	+135
T3	T150°C	+49	+33	+150

Temperature class for EPL Ga/Gb, EPL Gb or EPL Gc	Maximum surface temperature for EPL Da/Db, EPL Db or EPL Dc	Minimum ambient temperature		Minimum process connection temperature (min. process temperature)
		Aluminium housing	Stainless steel housing	
		[°C]		
All classes ①	All surface temperatures ①	-40	-40	-40
		-35	-33	-50

① Min. process connection temperature is -20°C, if a Kalrez® 6375 gasket is used. Min. process connection temperature is -40°C, if an FKM/FPM gasket is used.



**NOTICE!**

*If the device has the flange plate protection option, the permitted process connection temperature range is -50...+150°C.*

### LR65 Free Space Radar and LR75 Free Space Radar With distance piece

Temperature class for EPL Ga/Gb, EPL Gb or EPL Gc	Maximum surface temperature for EPL Da/Db, EPL Db or EPL Dc	Maximum ambient temperature		Maximum process connection temperature (max. process temperature)
		Aluminium housing	Stainless steel housing	
		[°C]		
T6	T85°C	+60	+60	+60
		+53	+51	+85
T5	T100°C	+75	+75	+75
		+68	+66	+100
T4	T135°C	+70	+68	+115
		+65	+61	+135
T3 ①	T200°C ①	+61	+56	+150
		+53	+46	+180
		+48	+40	+200

① Max. process connection temperature is +150°C, if an EPDM gasket is used

Temperature class for EPL Ga/Gb, EPL Gb or EPL Gc	Maximum surface temperature for EPL Da/Db, EPL Db or EPL Dc	Minimum ambient temperature		Minimum process connection temperature (min. process temperature)
		Aluminium housing	Stainless steel housing	
		[°C]		
All classes ①	All surface temperatures ①	-40	-40	-40
		-37	-36	-50

① Min. process connection temperature is -20°C, if a Kalrez® 6375 gasket is used. Min. process connection temperature is -40°C, if an FKM/FPM gasket is used.



**NOTICE!**

*If the device has the flange plate protection option, the permitted process connection temperature range is -50...+200°C.*

### 3.1 General notes

**WARNING!**

- *De-energize the circuit.*
- *Use the applicable cable glands for the cable entry openings in the housing (M20×1.5 or ½ NPT). For the cable entry size, refer to the device nameplate.*
- ***Ex d-approved devices:*** *Use heat-resistant cables and cable glands certified for continuous operation above +90° C.*

## 3.2 Terminal compartment

### 3.2.1 How to open the terminal compartment



**WARNING!**

- Do not blow dust with compressed air if it collects on the housing. Clean the device with a damp cloth before you remove the terminal compartment cover.
- Make sure that no dust goes into the electrical compartment after you open the cover.

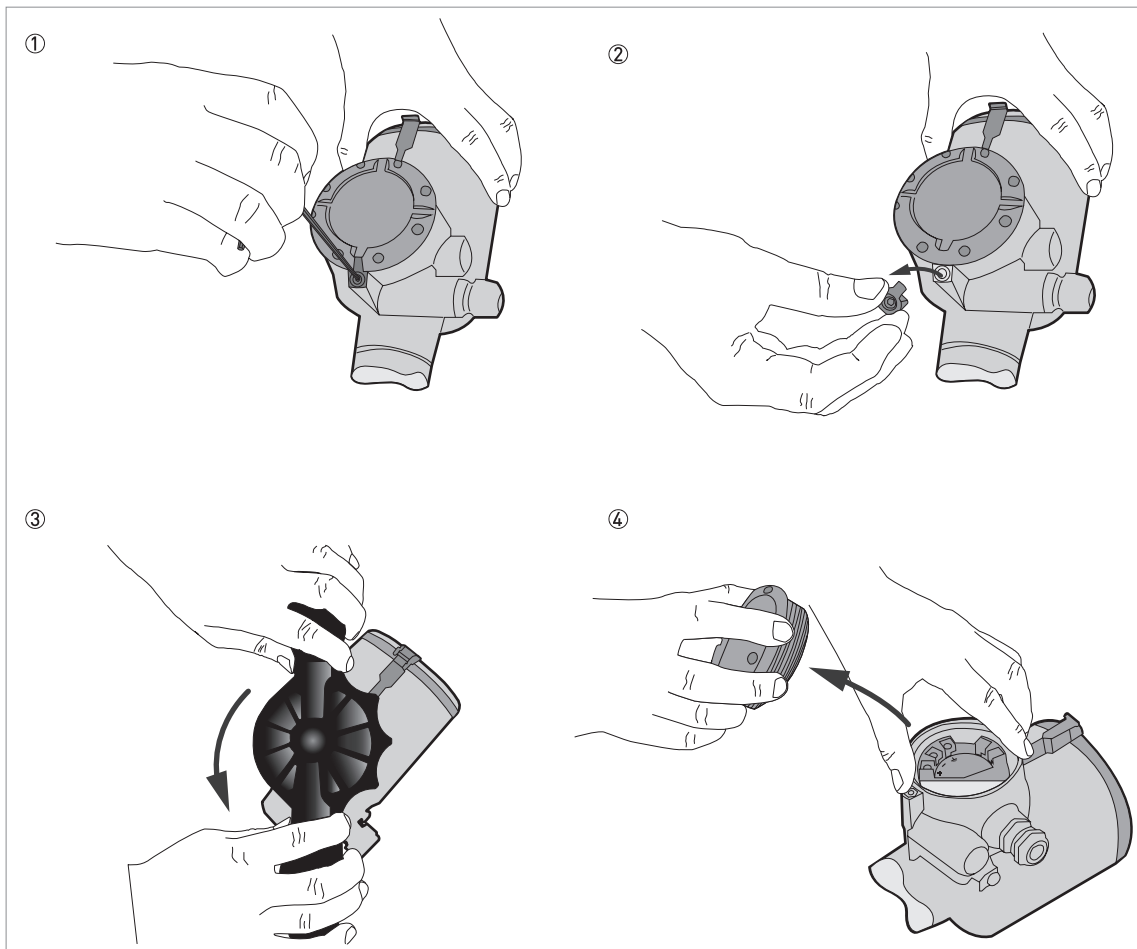


Figure 3-1: How to open the terminal compartment cover

**Equipment needed**

- Wrench (supplied)
- 3 mm Allen wrench (not supplied)



- Use the 3 mm Allen wrench to remove the cover stop.

- Use the wrench to remove the cover.

For more data about the procedure, refer to the handbook.

### 3.2.2 How to close the terminal compartment



**DANGER!**

**Ex d applications**

Make sure that the terminal compartment is sealed and its cover is fully engaged. An explosion can cause death or injury to personnel and/or damage to equipment. Obey the instructions that follow:

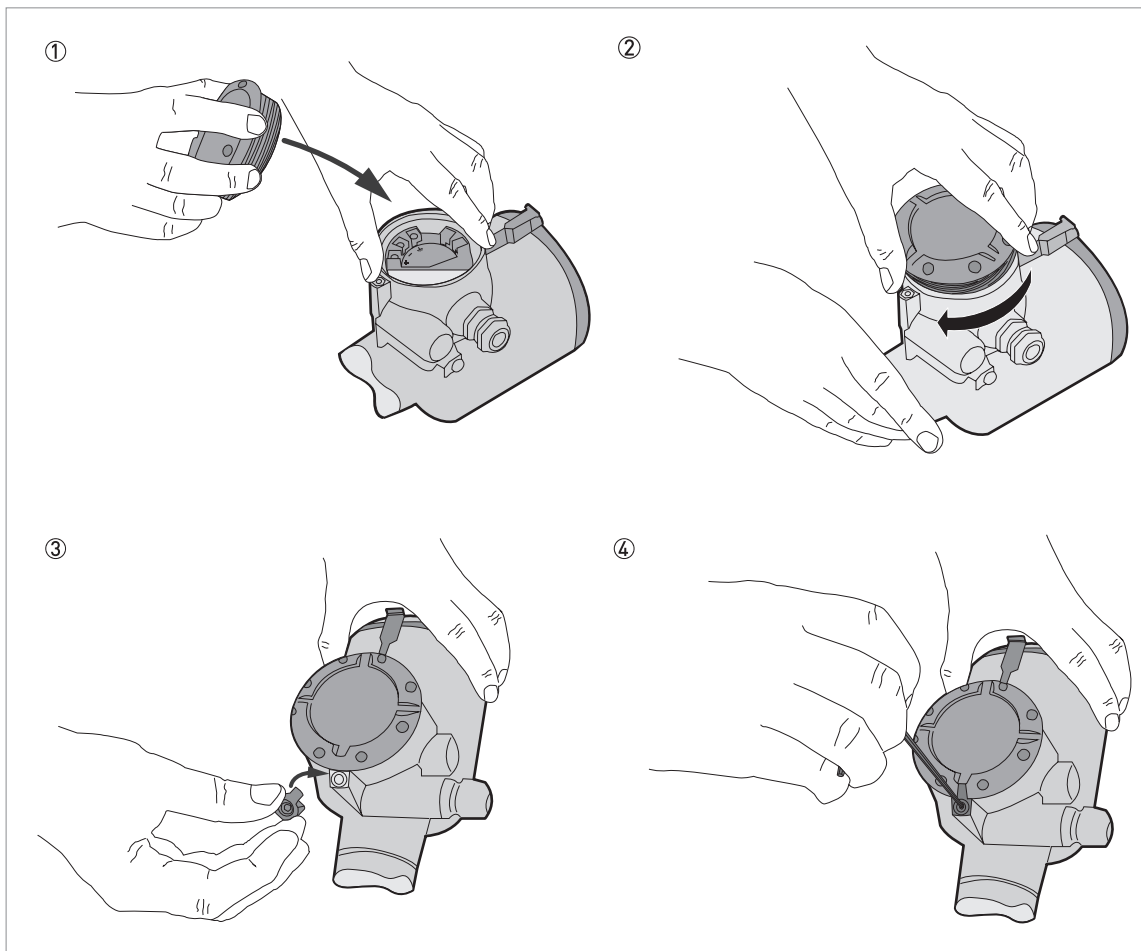


Figure 3-2: How to close the terminal compartment cover

**Equipment needed**

- Wrench (supplied)
- 3 mm Allen wrench (not supplied)



- Attach the cover. Make sure that a slot on the top of the cover is correctly aligned with the hole for the cover stop.
- Attach the cover stop (make sure that there is also a spring washer and a socket head screw). Tighten the screw with a 3 mm Allen wrench.

### 3.3 Terminal tightening capacity

The terminal tightening capacity for current output terminals is:

Type of wire	Terminal tightening capacity	
	[mm <sup>2</sup> ]	[AWG]
Flexible or rigid	2.5	13



### 3.4 Equipotential bonding system

Connect the device to the equipotential bonding system for the hazardous location.

You can use 2 terminals to connect the device to the equipotential bonding system:

- a ground connection in the terminal compartment and
- an external ground terminal adjacent to the cable entries

You can also use the process connection to connect the device to the equipotential bonding system. Make sure that there is a good electrical connection to the process connection (flange, thread etc.).

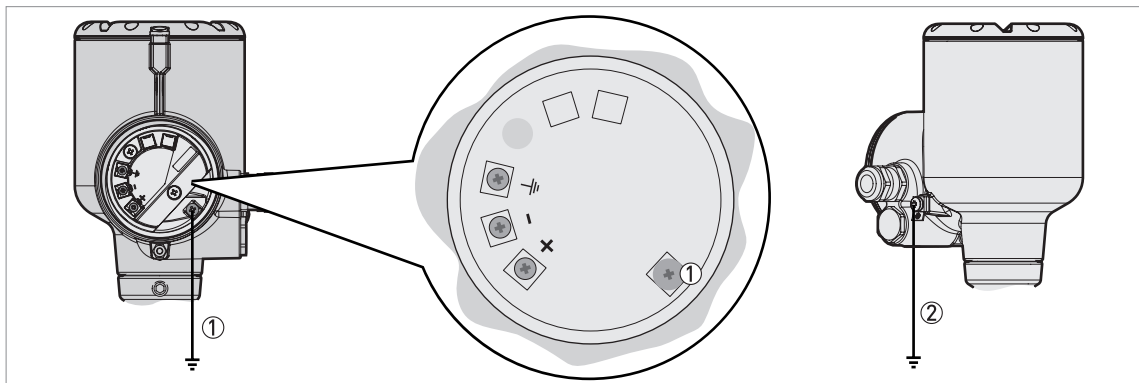


Figure 3-3: Examples of terminals for the equipotential bonding system

- ① Internal terminal
- ② External terminal (on the housing)

#### Ex ia- and Ex ic-approved devices

The device electronics are isolated with a rating of  $500 V_{RMS}$ .

#### Ex db ia- or Ex ia tb-approved devices

The device does not agree with the  $500 V_{RMS}$  dielectric strength requirement. Obey all the instructions given in the "Electrical connections" chapter.

## 3.5 Ex ia and Ex ic equipment

### 3.5.1 How to connect the electrical cables

Refer to the handbook for data about the device terminals.

Cable glands are supplied on customer demand. If you supply the cable glands, this part must have a degree of ingress protection  $IP \geq 6X$  (IEC 60529).  $IP \geq 6X$  is only applicable for the aluminium housing. We recommend that you use a part that has a degree of ingress protection  $IP \geq 68$ . Make sure that the cable gland is sealed.



#### Obey the instructions that follow:

- Electrical wires must agree with applicable standards (e.g. IEC 60079-14).
- Use the electrical connection procedure in the Handbook.
- Put the electrical wires in position and safely attach them to prevent damage. The electrical wires must also be a sufficient distance from hot surfaces.
- Make sure that unused electrical wires are safely connected to the ground potential of the hazardous area. If this is not possible, make sure that each of the unused electrical wires are safely isolated (other electrical wires, ground etc.) and rated for a test voltage  $\geq 500 V_{RMS}$ .
- If it is necessary, make sure the electrical wire insulation gives good protection from corrosion.
- Connect only to separate certified, intrinsically-safe circuits. Make sure that the electrical circuit characteristics are not more than the values that follow.

### 3.5.2 Maximum intrinsically-safe values for the electrical circuit

Output	Intrinsically-safe values for the electrical circuit				
	$U_i$	$I_i$	$P_i$	$C_i$	$L_i$
	[V]	[mA]	[mW]	[nF]	[ $\mu$ H]
4...20 mA passive – HART	$\leq 30$	$\leq 130$	$\leq 1000$	=10	~ 0

### 3.5.3 Supply voltage

Current output terminals	Minimum voltage at output terminals [V DC]	Maximum voltage at output terminals [V DC]
Terminals + / -	12	30

## 3.6 Ex db ia / Ex ia tb equipment

### 3.6.1 General notes

Ex db ia- and Ex ia tb-approved equipment have two separate compartments. The electronics in the electronics block compartment are Ex ia-approved and the terminal compartment is Ex db / Ex tb-approved.

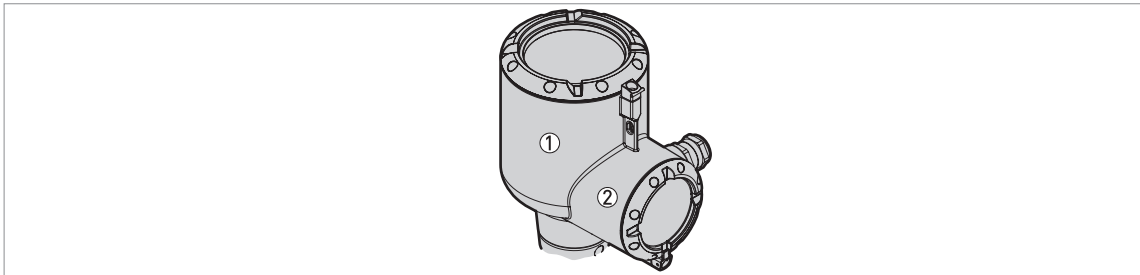


Figure 3-4: Compartments in Ex db ia- and Ex ia tb-approved equipment

- ① Electronics block (Ex ia) compartment
- ② Terminal (Ex db / Ex tb) compartment



**DANGER!**

*If you must open the electronics block compartment to remove the electronics blocks for servicing, de-energize the device. It is not necessary to disconnect the wires from the Ex db / Ex tb terminals.*

*If you must open the terminal compartment to remove the terminal block for servicing, de-energize the device first.*

### 3.6.2 How to connect the electrical cables

Cable glands are supplied on customer demand. If you supply the cable glands, this part must have a degree of ingress protection  $IP \geq 6X$  (IEC 60529). We recommend that you use a part that has a degree of ingress protection  $IP \geq 68$ . Make sure that the cable gland is sealed.



**WARNING!**

*Use only Ex d-approved cable glands and adaptors for Ex d applications. Use only Ex t-approved cable glands and adaptors for Ex t applications.*

#### Terminal compartment

- If you connect electrical wires to the terminals in the flameproof terminal compartment, use approved flameproof cable glands (M20×1.5 or ½ NPT). The cable glands must have a test certificate that agrees with IEC 60079-1. Obey the instructions given on the test certificates. Make sure that the tightening capacity of the cable gland is applicable to the diameter of the electrical wire.

- If you use conduits to connect electrical wires to the terminals in the flameproof terminal compartment, obey the instructions that follow. Make sure that the conduits are correctly attached and the flameproof compartment is sealed. The flameproof joint must have a minimum thread length of 8 mm / 0.32". The conduits must have a test certificate that agrees with IEC 60079-1. Use conduit stopping boxes that agree with precautions given in the test certificate and data in standards related to the installation of the conduit.
- If you connect electrical wires to the terminals in the dustproof terminal compartment, use approved flameproof cable glands (M20×1.5 or ½ NPT). The cable glands must have a test certificate that agrees with IEC 60079-31. Obey the instructions given on the test certificates. Make sure that the tightening capacity of the cable gland is applicable to diameter of the electrical wire.

**Obey instructions that follow:**

- Use the electrical connection procedure in the Handbook.
- The electrical wiring must agree with the applicable standards (e.g. IEC 60079-14).
- Do not remove more than 6 mm / 0.2" of insulation from the electrical wire.
- Put the electrical wires in position and safely attach them to prevent damage. The electrical wires must also be a sufficient distance from hot surfaces.
- If it is necessary, make sure that the electrical wire insulation gives good protection from corrosion.
- Make sure that the device is connected to a PELV (protective extra-low voltage) circuit.
- Make sure that electrical wires for the converter are isolated from the ground of the hazardous area. This data is also applicable to the equipotential bonding conductors (PE).
- Make sure that unused electrical wires and shields are safely connected to the ground potential of the hazardous area. If this is not possible, make sure that each of the unused electrical wires are safely isolated (other electrical wires, ground etc.) and rated for a test voltage  $\geq 1500 V_{RMS}$ .

**Load resistor (4...20 mA - HART output option)**

If the device uses the HART® communication protocol to send data, connect the load resistor to the positive terminal of the power supply in a non-hazardous location and ground the negative connection.

If it is necessary to connect the load resistor to the negative terminal, the loop resistance must not be more than 350 ohms.

**CAUTION!**

*Do not ground the positive connection.*

### 3.6.3 Supply voltage

Current output terminals	Minimum voltage at output terminals [V DC]	Maximum voltage at output terminals [V DC]
Terminals + / -	15	36

**WARNING!**

*The voltage difference between earth potential and the negative input terminal of the device must be less than 13 V. A higher voltage can cause a leakage current. Leakage currents can have an effect on the performance of the device and can cause the operation of fuses in the device. Do this check before energizing the circuit.*

**WARNING!**

*Make sure that it is safe to supply electrical power. Do a start-up check:*



- Are the wetted components (gasket, flange and antenna) resistant to corrosion by the tank product?
- Does the information given on the nameplate agree with the application?
- Did you connect the equipotential bonding system correctly?
- **Ex d applications:** If you supplied the cable glands and adaptors, are these parts Ex d-approved?
- **Ex t applications:** If you supplied the cable glands and adaptors, are these parts Ex t-approved?
- **Ex i applications:** Are you using an intrinsically-safe barrier within the correct parameters? For more data, refer to *Ex ia and Ex ic equipment* on page 22. The electrical circuit characteristics must not be more than the maximum intrinsically-safe values.
- Did you install the correct cable glands? Is the terminal compartment correctly sealed?

## 5.1 Periodic maintenance

In normal operational conditions, no maintenance is necessary. Only the manufacturer can repair the device and replace components. If it is necessary, maintenance must be done by approved personnel (the manufacturer or personnel approved by the manufacturer).

**CAUTION!**

*Do not try to repair flameproof joints. If it is necessary to repair a flameproof joint, speak or write to your supplier.*

*Do not replace an Ex i electronic block with a different block that is from a device which does not have an intrinsically-safe barrier.*

*Do not use connectors in the signal converter housing or open the cover to change the device configuration when there is an explosive atmosphere. Maintenance can only be carried out by "Personnel trained in explosion protection".*

## 5.2 Keep the device clean

**Obey these instructions:**

- Keep the device clean to prevent dust contamination.
- Do not blow dust with compressed air.
- Clean the device with a damp cloth.

**DANGER!**

*If dirt collects on the device, clean it with a damp cloth.*

*Do not use cleaning agents which can cause damage to the paint, the boundary wall (I), the EPDM housing gaskets and the process connection gaskets (FKM/FPM, Kalrez® or EPDM). Also make sure that the cleaning agent does not remove the data printed on the nameplate.*

*If you use the incorrect cleaning agent (i.e. the device is not resistant to corrosion by your cleaning agent), do not use the device in a hazardous location. If aid is necessary, speak or write to the supplier.*

### 5.3 How to remove the device

The installation and removal of the device or the signal converter is a task for approved personnel (operator, fitter, electrician etc.). If you must change the signal converter or all of the device, refer to the procedures in the handbook.

**If you must do work in a hazardous location:**

- **Ex i-approved devices:** Disconnect the electrical wires. For more data, refer to *How to open the terminal compartment* on page 18.
- **Devices with other Ex protection concepts:** De-energize the device. If necessary, only open the terminal compartment after the time shown on the device label. For more data, refer to *How to open the terminal compartment* on page 18. Disconnect the electrical wires.
- Before you remove the device from the process connection, make sure that the tank is not pressurized. A pressurized tank can cause injury to persons when they do work on it.
- Make sure that all electrical wires are isolated from the ground. This is also applicable to Protective Earth (PE), Functional Earth (FE) and equipotential bonding conductors.

### 5.4 Manufacturer

Schneider Electric Systems USA, Inc.  
38 Neponset Avenue  
Foxboro, MA 02035  
U.S.A.

If you need to return your device for inspection or repair, speak or write to your supplier and obey the instructions that follow.



## 5.5 Returning the device to the manufacturer

### 5.5.1 General information

This device has been carefully manufactured and tested. If installed and operated in accordance with these operating instructions, it will rarely present any problems.

**WARNING!**

*Should you nevertheless need to return a device for inspection or repair, please pay strict attention to the following points:*

- *Due to statutory regulations on environmental protection and safeguarding the health and safety of the personnel, the manufacturer may only handle, test and repair returned devices that have been in contact with products without risk to personnel and environment.*
- *This means that the manufacturer can only service this device if it is accompanied by the following certificate (see next section) confirming that the device is safe to handle.*

**WARNING!**

*If the device has been operated with toxic, caustic, radioactive, flammable or water-endangering products, you are kindly requested:*

- *to check and ensure, if necessary by rinsing or neutralising, that all cavities are free from such dangerous substances,*
- *to enclose a certificate with the device confirming that it is safe to handle and stating the product used.*



**CLEANING STATEMENT**

(Note: Your item will not be serviced unless the following cleaning statement has been signed):

I certify that the above referenced item has been properly purged and cleaned, complies with U.S. Department of Transportation shipping requirements and DOES NOT present a health and/or safety hazard (as defined by OSHA) to our Customer Repair personnel.

Print name: \_\_\_\_\_

Signature: \_\_\_\_\_

Print title: \_\_\_\_\_

Date: \_\_\_\_\_

Please fax the completed form to the Customer Satisfaction Center +1-508-549-4999

Schneider Electric Systems USA, Inc. Global Customer Support  
38 Neponset Avenue Inside U.S.: 1-866-746-6477  
Foxboro, MA 02035 Outside U.S.: 1-508-549-2424  
United States of America <https://pasupport.schneider-electric.com>  
<http://www.schneider-electric.com>

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