



DRX400 Supplementary Instructions

DR5400
DR6400
DR7400

Supplementary Instructions for ATEX applications



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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 Quick Start and Handbook. If you do not have these documents, please contact the nearest office or download them from the manufacturer's internet site.



INFORMATION!

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

DRx400 is a series of devices that includes the DR5400, DR6400 and DR7400. They are 2-wire level transmitters that use FMCW (Frequency-Modulated Continuous Wave) radar technology.

The DR5400 and DR7400 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 DR6400 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 European Directive 2014/34/EU (ATEX 114), the ATEX version of the device described in these Supplementary Instructions conforms to European Standards EN 60079-0:2012+A11, EN 60079-1:2014, EN 60079-11:2012, EN 60079-26:2015 and EN 60079-31: 2014. The Ex ia, Ex db ia and Ex ia tb versions are certified for use in hazardous areas by Kiwa ExVision B.V. under the EU-Type Examination Certificate KIWA 19ATEX0005 X. The Ex ic version is certified for use in hazardous areas by Kiwa ExVision B.V. under the Type Examination Certificate KIWA 19ATEX0006 X. For more data, refer to the manufacturer's declaration. You can download the manufacturer's declaration from our internet site.



WARNING!

Carefully read the ATEX approval certificates. Obey the boundary conditions.

You can download the certificates from our internet site.

1.4 Device categories

1.4.1 Ex ia-approved devices

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

DR5400 and DR6400

PP Drop antenna and PP accessories

- II 1/2 G Ex ia IIC T6...T5 Ga/Gb

DR5400 and DR6400

All other versions

- II 1/2 G Ex ia IIC T6...T4 Ga/Gb

DR7400

All versions

- II 1/2 G 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 Category 1/2 G and EPL Ga/Gb or Category 2 G and 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.

Category 1/2 G 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). Category 2 G equipment is used in zone 1.



WARNING!

Make sure that the installation of the device between zone 0 and zone 1 agrees with EN 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.

DR5400 and DR6400

PP Drop antenna and PP accessories

- II 1/2 D Ex ia IIIC T85°C...T100°C Da/Db

DR5400 and DR6400

All other versions

- II 1/2 D Ex ia IIIC T85°C...T130°C Da/Db

DR7400

PTFE Drop antenna and Horn / Drop / Hygienic antenna with EPDM gasket

- II 1/2 D Ex ia IIIC T85°C...T150°C Da/Db

DR7400

All other versions

- II 1/2 D 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 Category 1/2 D and EPL Da/Db or Category 2 D and EPL Db equipment, when fitted with the appropriate options.

Category 1/2 D 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). Category 2 D 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:

DR5400 and DR6400

PP Drop antenna and PP accessories

- II 1/2 G Ex db ia IIC T6...T5 Ga/Gb

DR5400 and DR6400

All other versions

- II 1/2 G Ex db ia IIC T6...T4 Ga/Gb

DR7400

All versions

- II 1/2 G 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 Category 1/2 G and EPL Ga/Gb or Category 2 G and 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.

Category 1/2 G 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). Category 2 G equipment is used in zone 1.

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

DR5400 and DR6400

PP Drop antenna and PP accessories

- II 1/2 D Ex ia tb IIIC T85°C...T100°C Da/Db

DR5400 and DR6400

All other versions

- II 1/2 D Ex ia tb IIIC T85°C...T130°C Da/Db

DR7400

PTFE Drop antenna and Horn / Drop / Hygienic antenna with EPDM gasket

- II 1/2 D Ex ia tb IIIC T85°C...T150°C Da/Db

DR7400

All other versions

- II 1/2 D 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 Category 1/2 D and EPL Da/Db or Category 2 D and EPL Db equipment, when fitted with the appropriate options.

Category 1/2 D 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). Category 2 D 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:

DR5400 and DR6400

PP Drop antenna and PP accessories

- II 3 G Ex ic IIC T6...T5 Gc

DR5400 and DR6400

All other versions

- II 3 G Ex ic IIC T6...T4 Gc

DR7400

All versions

- II 3 G 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 Category 3 G and 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.

Category 3 G 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.

DR5400 and DR6400

PP Drop antenna and PP accessories

- II 3 D Ex ic IIIC T85°C...T100°C Dc

DR5400 and DR6400

All other versions

- II 3 D Ex ic IIIC T85°C...T130°C Dc

DR7400

PTFE Drop antenna and Horn / Drop / Hygienic antenna with EPDM gasket

- II 3 D Ex ic IIIC T85°C...T150°C Dc

DR7400

All other versions

- II 3 D 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 Category 3 D and EPL Dc equipment, when fitted with the appropriate options.

Category 3 D equipment is used in zone 22.

1.5 ATEX nameplate

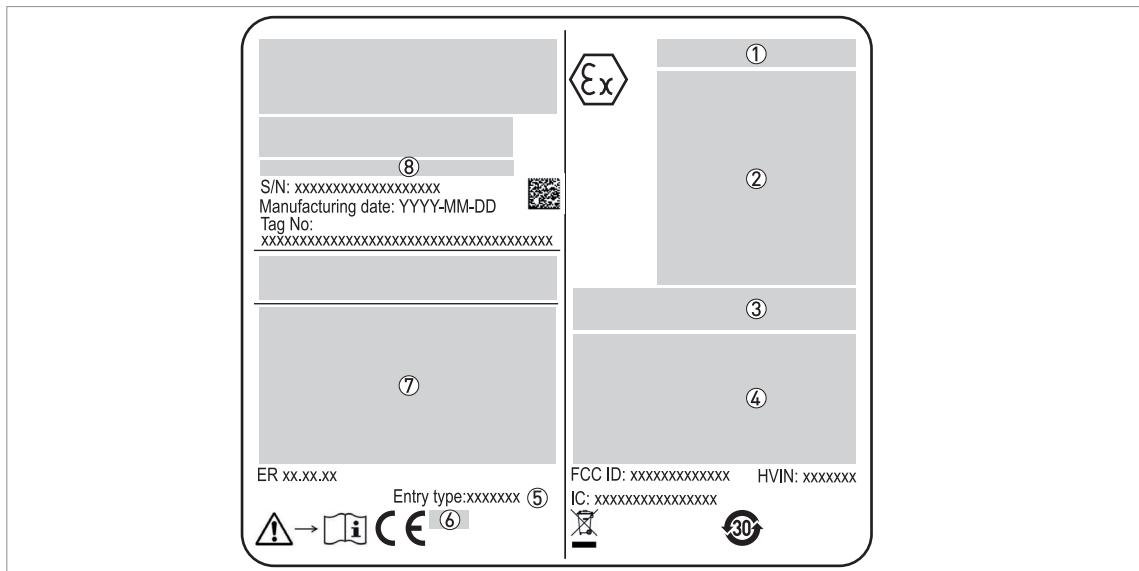


Figure 1-1: Nameplate on the signal converter housing

- ① ATEX certification number
- ② Equipment approval category (explosive atmosphere – gas and dust) and:
 - Types of device protection including approved Gas Groups and 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 ⑦ for the input voltage range.
Ex db ia or Ex ia tb approvals: Maximum voltage in accordance with EN 60079-0. Refer to ⑦ 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 (M20x1.5, 1/2 NPT)
- ⑥ Notified body number (production site). This number is applicable only to equipment with an EU-Type Examination Certificate.
- ⑦ Input voltage range and maximum current (4...20 mA passive – HART)
- ⑧ 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 EU-Type Examination certificate or the Type Examination certificate. These conditions include:

- *The special conditions for safe use.*
- *The Essential Health and Safety Requirements.*

You can download the certificates from our internet site.



DANGER!

This installation must agree with EN 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.

If the DR7400 has the hygienic antenna option, it 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.

2.2.2 Electrostatic discharge



DANGER!

Risk of electrostatic discharge (ESD) from painted surfaces, the plastic sun cover, the hygienic antenna, the Drop antenna, the flange plate protection, the extension protection and the slanted flange.

Do not install in a location where the electrostatic charge can increase. For example:

- locations near ventilation systems,
- locations where there is a risk of an increase in electrostatic charge caused by compressed air and dust,
- locations near machines that use friction,
- locations near systems that apply electrons as a spray (e.g. near electrostatic painting systems), and
- locations near other machines and systems that can have large electrostatic charges.



DANGER!

Make sure that the device and adjacent objects do not rub together.

Make sure that all personnel and equipment are correctly grounded.

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

ESD warning

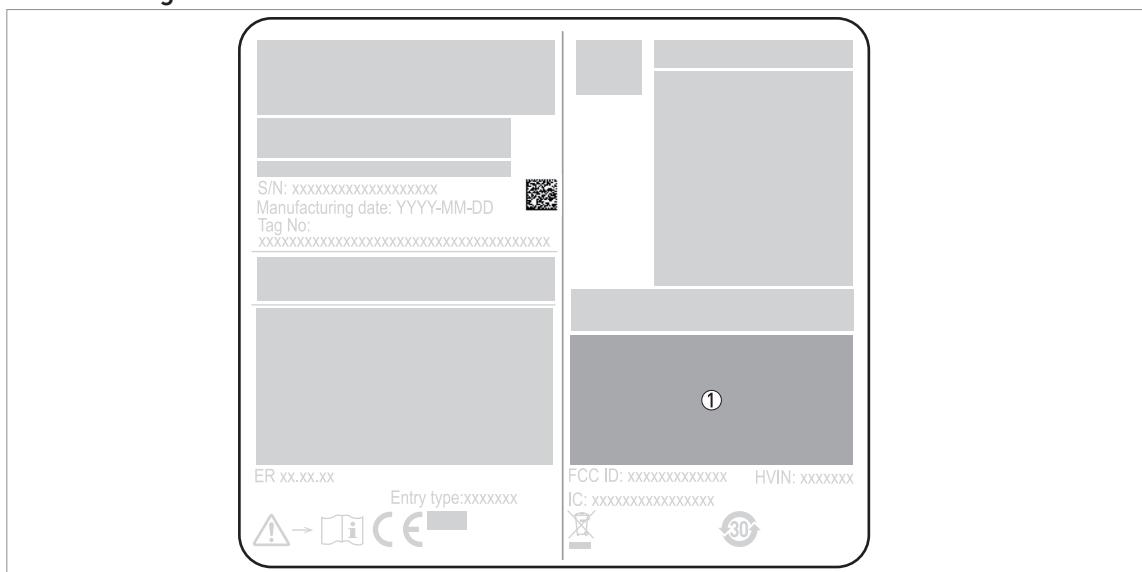


Figure 2-1: ESD warning (on the device nameplate)

① Text: Warning! Potential electrostatic hazard – see instructions

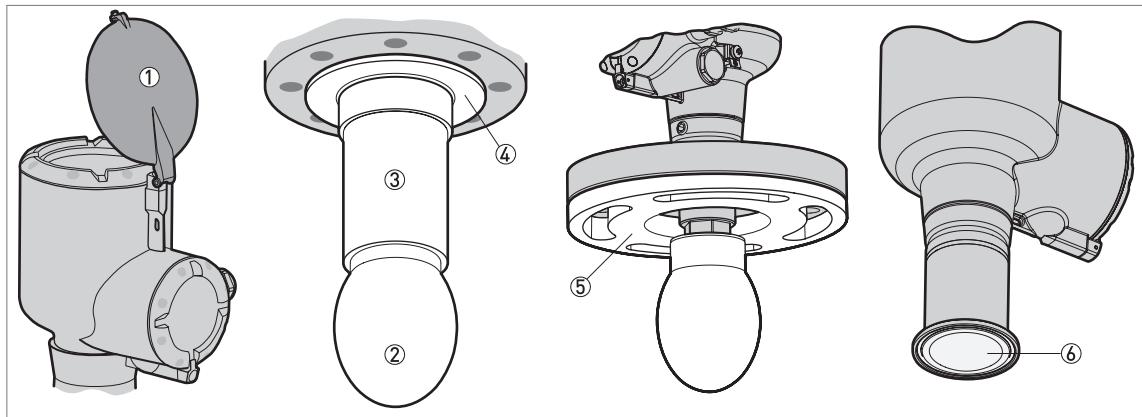


Figure 2-2: Risk of ESD

- ① Sun cover
- ② Drop antenna
- ③ **DR5400 and DR7400:** Extension protection (option for the Drop antenna with one or more antenna extensions)
- ④ **DR5400 and DR7400:** Flange plate protection (option for the Drop antenna)
- ⑤ **DR6400:** Slanted flange (option for the Drop antenna)
- ⑥ **DR7400:** Hygienic antenna

2.2.3 Optional purging system

This option is applicable to:

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

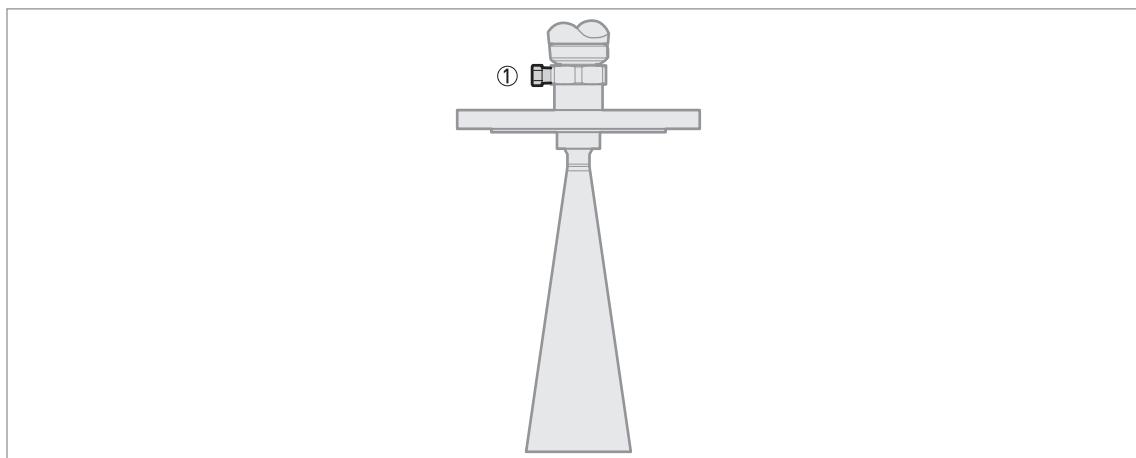


Figure 2-3: Purging system

① NPTF purging connection



INFORMATION!

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

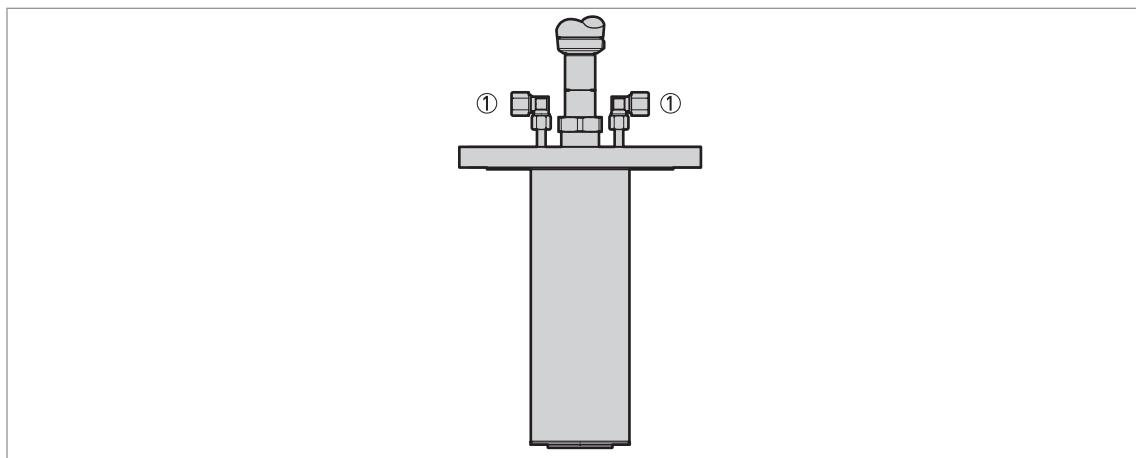


Figure 2-4: Heating/cooling system

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.

DR5400 and DR6400

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.

DR7400

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 Metglas® 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.


INFORMATION!

These tables are applicable if the process connection has a distance piece and you replace a DR7000 signal converter with the DR7400 signal converter. For more data about the replacement of the signal converter, refer to DR7000: Replacement of the signal converter on page 30.

These tables are also applicable if the process connection has a distance piece and you replace a DR6300 signal converter with the DR6400 signal converter. For more data about the replacement of the signal converter, refer to DR6300: Replacement of the signal converter on page 29.

Refer to the tables that follow if:

- you replace a DR7000 signal converter with the DR7400 signal converter without a distance piece, or
- you replace a DR6300 signal converter with the DR6400 signal converter without a 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
		+50	+43	+85
T5	T100°C	+75	+75	+75
		+65	+58	+100
T4	T135°C	+67	+56	+115
		+59	+43	+135
T3	T150°C	+54	+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
		-36	-33	-50

① Min. process connection temperature is -20°C, if a Kalrez® 6375 gasket is used. Min. process connection temperature is -30°C, if a Metglas® feedthrough is used. 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 (M20x1.5 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.*

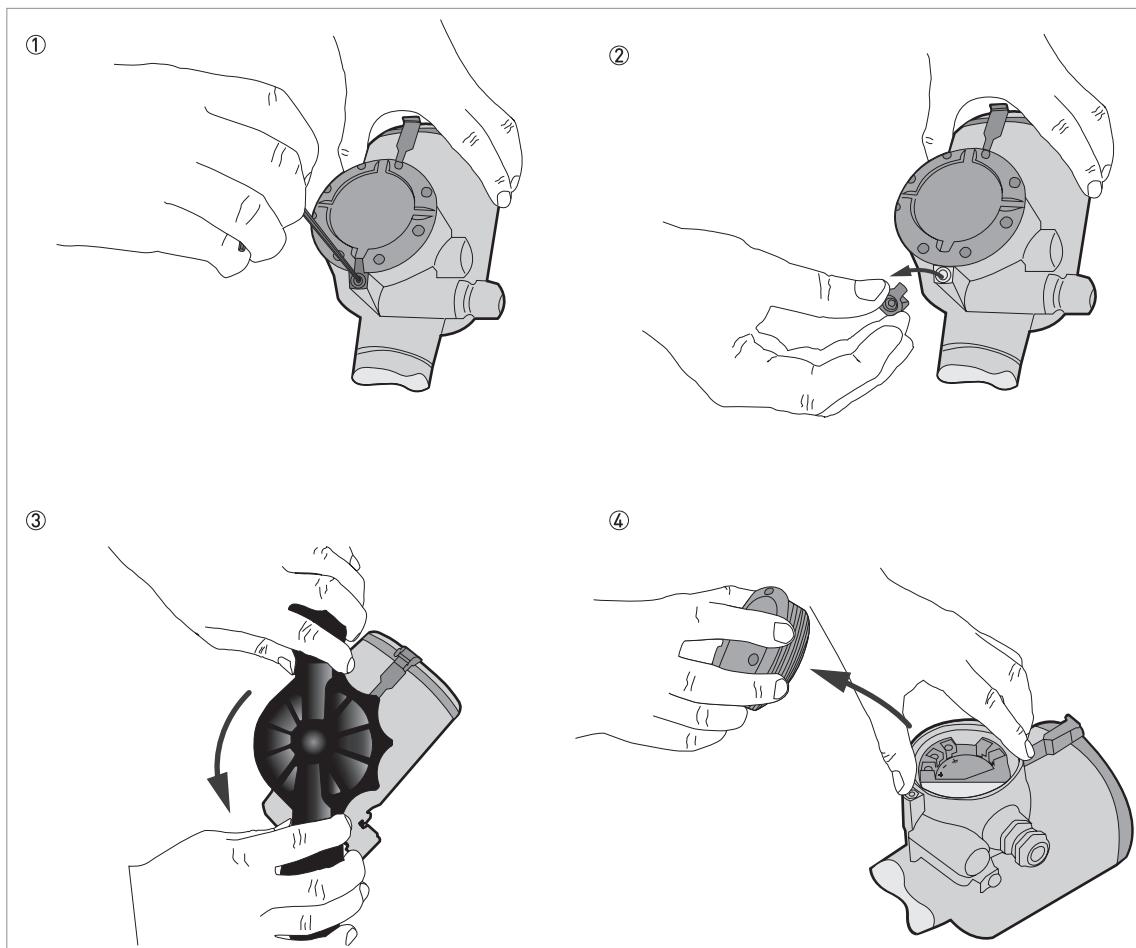


Figure 3-1: How to open the terminal compartment cover

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:

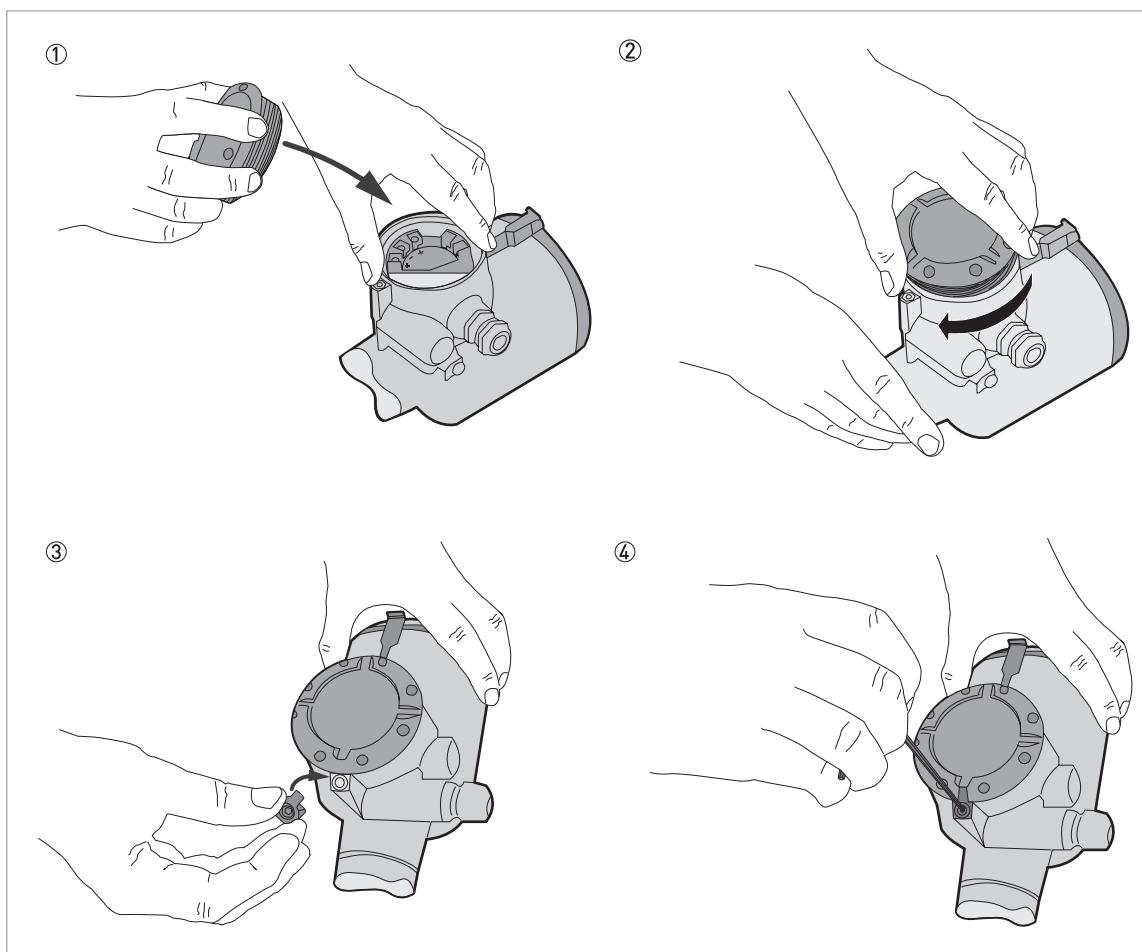


Figure 3-2: How to close the terminal compartment cover

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 ²]	[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.).

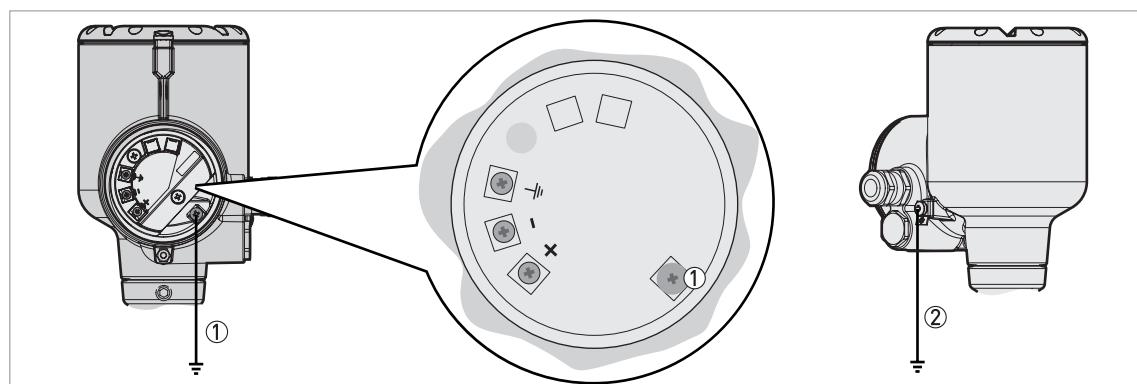


Figure 3-3: Examples of terminals for the equipotential bonding system

- 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 (EN 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. EN 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.
- 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 _i	I _i	P _i	C _i	L _i
	[V]	[mA]	[mW]	[nF]	[μ H]
4...20 mA passive – HART	\leq 30	\leq 130	\leq 1000	=10	\sim 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.

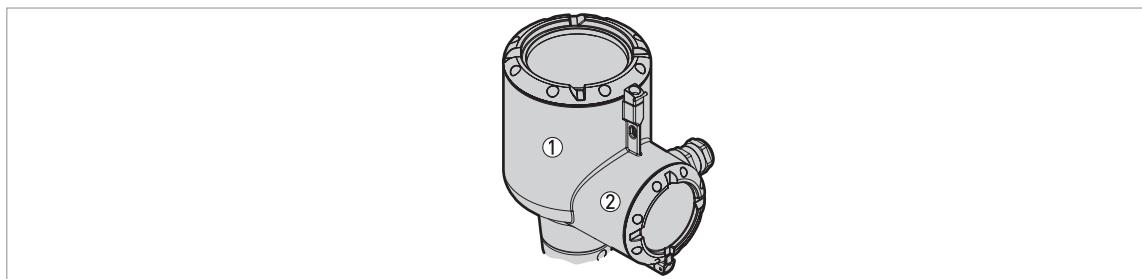


Figure 3-4: Compartments in Ex db ia- and Ex ia tb-approved equipment

- 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 (EN 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 (M20x1.5 or $\frac{1}{2}$ NPT). The cable glands must have a test certificate that agrees with EN 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 EN 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 (M20x1.5 or $\frac{1}{2}$ NPT). The cable glands must have a test certificate that agrees with EN 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. EN 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 ≥ 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 DR6300: Replacement of the signal converter

You can replace the signal converter of a DR6300 level transmitter that has an Ex approval that agrees with EC-Type Examination Certificate KEMA 07ATEX0068 X. But do the checks that follow:



DANGER!

Devices with Ex i approvals: Make sure that you use an intrinsically-safe barrier and electrical wires with the correct parameters. This data is given on the device nameplate of the new converter. Make sure that the signal converter was not installed in Zone 0 or Zone 20.

- If your device was made after June 2009, you can replace the signal converter with a DR6400 signal converter.
- If your device was made before June 2009, you must attach an adaptor when you replace the signal converter with a DR6400 signal converter. Use the spare parts list in the DR6400 handbook to order the adaptor with the new signal converter.

If you replace the signal converter, the data (temperature, voltage etc.) given in these supplementary instructions agrees with the new device configuration.

5.5 DR7000: Replacement of the signal converter

You can replace the signal converter of a DR7000 transmitter that has an Ex approval that agrees with EC-Type Examination Certificate KEMA 07ATEX0068 X. But do the checks that follow:



DANGER!

DR7000 with a hygienic antenna option: You cannot replace the signal converter with a DR7400 signal converter.



DANGER!

Devices with Ex i approvals: Make sure that you use an intrinsically-safe barrier and electrical wires with the correct parameters. This data is given on the device nameplate of the new converter. Make sure that the signal converter was not installed in Zone 0 or Zone 20.

- If your device was made after June 2009, you can replace the signal converter with a DR7400 signal converter.
- If your device was made before June 2009, you must attach an adaptor when you replace the signal converter with a DR7400 signal converter. Use the spare parts list in the DR7400 handbook to order the adaptor with the new signal converter.

If you replace the signal converter, the data (temperature, voltage etc.) given in these supplementary instructions agrees with the new device configuration.

5.6 Manufacturer

AMETEK Drexelbrook
205 Keith Valley Road
Horsham, PA. 19044
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.

5.7 Returning the device to the manufacturer

5.7.1 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.*

5.7.2 Form (for copying) to accompany a returned device

**CAUTION!**

To avoid any risk for our service personnel, this form has to be accessible from outside of the packaging with the returned device.

Company:	Address:
Department:	Name:
Tel. no.:	Fax no. and/or Email address:
Manufacturer's order no. or serial no.:	
The device has been operated with the following medium:	
This medium is:	radioactive
	water-hazardous
	toxic
	caustic
	flammable
	We checked that all cavities in the device are free from such substances.
	We have flushed out and neutralized all cavities in the device.
We hereby confirm that there is no risk to persons or the environment through any residual media contained in the device when it is returned.	
Date:	Signature:
Stamp:	







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Telephone (Worldwide): +1-215-674-1234
Fax: +1 215-674-2731
E-mail: drexelbrook.service@ametek.com
Website: www.drexelbrook.com