

ProcessMaster FEP630, HygienicMaster FEH630

Electromagnetic flowmeter



Safety instructions ATEX / IECEx
Zone 1, 2, 21, 22

Measurement made easy

—
FEP630
FEH630
FET630

Introduction

This document forms an integral part of the following manuals:

- Operating instruction OI/FEP630/FEH630
- Commissioning instruction CI/FEP630/FEH630

Additional Information

Additional documentation on ProcessMaster FEP630, HygienicMaster FEH630 is available for download free of charge at www.abb.com/flow. Alternatively simply scan this code:



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1 Safety

General information and instructions

These instructions are an important part of the product and must be retained for future reference.

Installation, commissioning, and maintenance of the product may only be performed by trained specialist personnel who have been authorized by the plant operator accordingly. The specialist personnel must have read and understood the manual and must comply with its instructions.


For additional information or if specific problems occur that are not discussed in these instructions, contact the manufacturer. The content of these instructions is neither part of nor an amendment to any previous or existing agreement, promise or legal relationship.

Modifications and repairs to the product may only be performed if expressly permitted by these instructions.


Information and symbols on the product must be observed. These may not be removed and must be fully legible at all times. The operating company must strictly observe the applicable national regulations relating to the installation, function testing, repair and maintenance of electrical products.

Warnings

The warnings in these instructions are structured as follows:

 **DANGER**

The signal word '**DANGER**' indicates an imminent danger. Failure to observe this information will result in death or severe injury.

 **WARNING**

The signal word '**WARNING**' indicates an imminent danger. Failure to observe this information may result in death or severe injury.

 **CAUTION**

The signal word '**CAUTION**' indicates an imminent danger. Failure to observe this information may result in minor or moderate injury.

NOTICE

The signal word '**NOTICE**' indicates possible material damage.

Note

'**Note**' indicates useful or important information about the product.

Intended use

The device has been designed for use exclusively within the technical limit values indicated on the identification plate and in the data sheets.

When using measuring media, the following points must be observed:

- Wetted parts such as measuring electrodes, liner, grounding electrodes, grounding plates or protection plates must not be damaged by the chemical and physical properties of the measuring medium during the operating time.
- Measuring media with unknown properties or abrasive measuring media may only be used if the operator is able to perform regular and suitable tests to ensure the safe condition of the device
- The indications on the name plate must be observed
- Before use of corrosive or abrasive measuring media, the operator must clarify the level of resistance of wetted parts.

ABB will gladly support you in the selection, but cannot accept any liability in doing so.

Improper use

The following are considered to be instances of especially improper use of the device:

- Operation as a flexible compensating adapter in piping, for example for compensating pipe offsets, pipe vibrations, pipe expansions, etc.
- For use as a climbing aid, for example for mounting purposes.
- For use as a bracket for external loads, for example as a support for piping, etc.
- Material application, for example by painting over the housing, name plate or welding/soldering on parts.
- Material removal, for example by spot drilling the housing.

Cyber security disclaimer

This product is designed to be connected to and to communicate information and data via a network interface. It is operator's sole responsibility to provide and continuously ensure a secure connection between the product and your network or any other network (as the case may be).

Operator shall establish and maintain any appropriate measures (such as but not limited to the installation of firewalls, application of authentication measures, encryption of data, installation of anti-virus programs, etc.) to protect the product, the network, its system and the interface against any kind of security breaches, unauthorized access, interference, intrusion, leakage and/or theft of data or information.

ABB and its affiliates are not liable for damages and/or losses related to such security breaches, any unauthorized access, interference, intrusion, leakage and/or theft of data or information.

Software downloads

By visiting the web pages indicated below, you will find notifications about newly found software vulnerabilities and options to download the latest software. It is recommended that you visit this web pages regularly:

www.abb.com/cybersecurity

[ABB Library – FEP630 / FEH630](#)



... 1 Safety

Warranty provisions

Using the device in a manner that does not fall within the scope of its intended use, disregarding this manual, using underqualified personnel, or making unauthorized alterations releases the manufacturer from liability for any resulting damage. This renders the manufacturer's warranty null and void.

Service address

To find your local ABB contact visit:
www.abb.com/contacts

For more information visit:
www.abb.com/measurement

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2 Device designs

Two device ranges are available in the 630 series. ProcessMaster 630 and HygienicMaster 630. Two designs (integral mount / remote mount) are available within each device range.

This results in the following variants:

- ProcessMaster FEP631, integral mount device
- ProcessMaster FEP632, flow sensor remote mount design
- HygienicMaster FEH631, integral mount device
- HygienicMaster FEH632, flow sensor remote mount design
- Remote transmitter FET632 for ProcessMaster / HygienicMaster

Devices suitable for use in potentially explosive atmospheres feature the corresponding Ex mark on their name plates. Moreover, each device design has a specific model number.

The parts of the model number relating to explosion protection are listed in the following table. The complete key to model numbers is described in the device data sheet.

ProcessMaster FEP631, integral mount device	FEP631	XX	XX
ProcessMaster FEP632, flow sensor remote mount design	FEP632		
HygienicMaster FEH631, integral mount device	FEH631		
HygienicMaster FEH632, flow sensor remote mount design	FEH632		
Remote transmitter for ProcessMaster / HygienicMaster	FET632		
Explosion protection			
Without		Y0	
ATEX / IECEx (Zone 1 / 21)		A1	
ATEX / IECEx (Zone 2 / 22)		A2	
cFMus Class I, II, III Div. 1 (Zone 1 / 21))		F1	
cFMus Class I, II, III Div. 2 (Zone 2 / 22)		F2	
NEPSI (Zone 1 / 21)		S1	
NEPSI (Zone 2 / 22)		S2	
UKEX Zone 1		U1	
UKEX Zone 2		U2	
Design / terminal box material / cable glands			
Single-compartment / aluminum / M20 x 1.5			S1
Single-compartment / Aluminum / NPT ½ in			S2
Dual-compartment / aluminum / M20 x 1.5			D1
Dual-compartment / aluminum / NPT ½ in.			D2
Remote mount / aluminum / M20 x 1.5			A1
Remote mount / Aluminum / NPT ½ in			A2
Field mount housing / single-compartment / aluminum / M20 x 1.5			F1
Field mount housing / single-compartment / aluminum / NPT ½ in			F2
Wall-mount housing / dual-compartment / aluminum / M20 x 1.5			W1
Wall-mount housing / dual-compartment / Aluminum / NPT ½ in			W2

Table 1: Excerpt from ordering information

... 2 Device designs

Version in integral mount design

The transmitter and the flowmeter sensor form a single mechanical entity.



The transmitter is available in two housing designs:

- Single-compartment housing:
This is suited for use in ATEX/UKEX/IEC Ex Zone 2, 22.
In the single-compartment housing, the electronics chamber and the connection chamber in the transmitter are not separated from each other.
- Dual-compartment housing:
This is suited for use in ATEX/UKEX/IEC Ex Zone 2, 22.
In the dual-compartment housing, the electronics chamber and the connection chamber in the transmitter are separated from each other.

Note

Further information on the Ex Approval of devices can be found in the type examination certificates or the relevant certificates at www.abb.com/flow.





Zone 1 – ATEX, UKEX, IEC

Sensor	
ProcessMaster 630 FEP631-A1, FEP631-U1 Zones 1, 21	HygienicMaster 630 FEH631-A1, FEH631-U1 Zones 1, 21
	
ATEX / UKEX Certificate ATEX: FM17ATEX0016X Certificate UKEX: FM21UKEX0033X DN 3 to 300: II 2 (1) G Ex db eb ib mb [ia Ga] IIC T6...T1 Gb II 2 (1) D Ex tb [ia Da] IIIC T80°C...T _{medium} Db DN 350 to 2000: II 2 (1) G Ex db eb ib [ia Ga] IIC T6...T1 Gb II 2 (1) D Ex tb [ia Da] IIIC T80°C...T _{medium} Db	ATEX / UKEX Certificate: FM17ATEX0016X Certificate UKEX: FM21UKEX0033X DN 3 to 100: II 2 (1) G Ex db eb ib mb [ia Ga] IIC T6...T1 Gb II 2 (1) D Ex tb [ia Da] IIIC T80°C...T _{medium} Db
IEC Certificate: IECEx FME 17.0001X DN 3 to 300: II 2 (1) G Ex db eb ib mb [ia Ga] IIC T6...T1 Gb II 2 (1) D Ex tb [ia Da] IIIC T80°C...T _{medium} Db DN 350 to 2000: II 2 (1) G Ex db eb ib [ia Ga] IIC T6...T1 Gb II 2 (1) D Ex tb [ia Da] IIIC T80°C...T _{medium} Db	IEC Certificate: IECEx FME 17.0001X DN 3 to 100: II 2 (1) G Ex db eb ib mb [ia Ga] IIC T6...T1 Gb II 2 (1) D Ex tb [ia Da] IIIC T80°C...T _{medium} Db





Note

Plug-in Card for Ethernet Communication (ModelCode "DR6") not available with Zone 1.

Zone 2 – ATEX, UKEX, IEC

Sensor	
ProcessMaster 630 FEP631-A2, FEP631-U2 Zones 2, 22	HygienicMaster 630 FEH631-A2, FEH631-U2 Zones 2, 22
1)  2) 	1)  2) 
ATEX / UKEX Certificate ATEX: FM17ATEX0017X Certificate UKEX: FM21UKEX0032X II 3G Ex ec IIC T6...T1 Gc II 3D Ex tc IIIC T80°C...T _{medium} Dc	ATEX / UKEX Certificate ATEX: FM17ATEX0017X Certificate UKEX: FM21UKEX0032X II 3G Ex ec IIC T6...T1 Gc II 3D Ex tc IIIC T80°C...T _{medium} Dc
IEC Certificate: IECEx FME 17.0001X II 3G Ex ec IIC T6...T1 Gc II 3D Ex tc IIIC T80°C...T _{medium} Dc	IEC Certificate: IECEx FME 17.0001X II 3G Ex ec IIC T6...T1 Gc II 3D Ex tc IIIC T80°C...T _{medium} Dc
1) Single-compartment housing 2) Dual-compartment housing	

Zone 2 with Plug-In Card for Ethernet (Modelcode DR6) – ATEX, UKEX, IEC

Sensor	
ProcessMaster 630 FEP631-A2, FEP631-U2 Zones 2, 22	HygienicMaster 630 FEH631-A2, FEH631-U2 Zones 2, 22
1)  2) 	1)  2) 
ATEX / UKEX Certificate ATEX: FM17ATEX0017X Certificate UKEX: FM21UKEX0032X II 3G Ex ec IIC T4...T1 Gc II 3D Ex tc IIIC T80 °C...T _{medium} Dc	ATEX / UKEX Certificate ATEX: FM17ATEX0017X Certificate UKEX: FM21UKEX0032X II 3G Ex ec IIC T4...T1 Gc II 3D Ex tc IIIC T80 °C...T _{medium} Dc
IEC Certificate: IECEx FME 17.0001X II 3G Ex ec IIC T4...T1 Gc II 3D Ex tc IIIC T80 °C...T _{medium} Dc	IEC Certificate: IECEx FME 17.0001X II 3G Ex ec IIC T4...T1 Gc II 3D Ex tc IIIC T80 °C...T _{medium} Dc
1) Single-compartment housing 2) Plug-In Card for Ethernet	

... 2 Device designs

Version with remote mount design

The transmitter is mounted in a separate location from the flowmeter sensor. The electrical connection between the transmitter and flowmeter sensor may only be established using the signal cable supplied.

A maximum signal cable length of 200 m (656 ft) is possible.

Note

Further information on the Ex Approval of devices can be found in the type examination certificates or the relevant certificates at www.abb.com/flow.

ATEX / IEC Zone 1



DANGER

Explosion hazard caused by incorrect transmitter installation





The FET632-Y0 transmitter does not have Ex Approval.

The FET632-Y0 transmitter may not be installed and operated in potentially explosive atmospheres.

The following table presents the combination of the FEP632, FEH632 sensor in explosion-proof design with the FET632 transmitter.

Sensor	
ProcessMaster 630 FEP632-A1, FEP632-U1 In Ex area, Zone 1, 21	HygienicMaster 630 FEH632-A1, FEH632-U1 In Ex area, Zone 1, 21
	
ATEX / UKEX Certificate ATEX: FM17ATEX0016X Certificate UKEX: FM21UKEX0033X DN 3 to 300: II 2 G Ex eb ib mb IIC T6...T1 Gb II 2 D Ex tb IIIC T80°C...T _{medium} Db DN 350 to 2000: II 2 G Ex eb ib IIC T6...T1 Gb II 2 D Ex tb IIIC T80°C...T _{medium} Db	ATEX / UKEX Certificate ATEX: FM17ATEX0016X Certificate UKEX: FM21UKEX0033X DN 3 to 100: II 2 G Ex eb ib mb IIC T6...T1 Gb II 2 D Ex tb IIIC T80°C...T _{medium} Db
IEC Certificate: IECEx FME 17.0001X DN 3 to 300: II 2 G Ex eb ib mb IIC T6...T1 Gb II 2 D Ex tb IIIC T80°C...T _{medium} Db DN 350 to 2000: II 2 G Ex eb ib IIC T6...T1 Gb II 2 D Ex tb IIIC T80°C...T _{medium} Db	IEC Certificate: IECEx FME 17.0001X DN 3 to 100: II 2 G Ex eb ib mb IIC T6...T1 Gb II 2 D Ex tb IIIC T80°C...T _{medium} Db

Transmitter

FET632-A1, FET632-U1 In Ex area, Zone 1, 21	FET632-A2, FET632-U2 In Ex area, Zone 2, 22	FET632-A2, FET632-U2 In Ez area, Zone 2, 22 Transmitter equipped with the plugin card for Ethernet communication (Modelcode "DR6")	FET632-Y0 outside the potentially explosive atmosphere
2) 	1) 	1) 	1) 
ATEX / UKEX Certificate ATEX: FM17ATEX0016X Certificate UKEX: FM21UKEX0033X II 2 (1) G Ex db eb mb [ia Ga] IIC T6 Gb II 2 (1) D Ex tb [ia Da] IIIC T80°C Db	ATEX / UKEX Certificate ATEX: FM17ATEX0017X Certificate UKEX: FM21UKEX0032X II 3G Ex ec IIC T6 Gc II 3D Ex tc IIIC T80°C Dc	ATEX / UKEX Certificate ATEX: FM17ATEX0017X Certificate UKEX: FM21UKEX0032X II 3G Ex ec IIC T4 Gc II 3D Ex tc IIIC T80°C Dc	- No Ex Approval!
IEC Certificate: IECEx FME 17.0001X II 2 (1) G Ex db eb mb [ia Ga] IIC T6 Gb II 2 (1) D Ex tb [ia Da] IIIC T80°C Db	IEC Certificate: IECEx FME 17.0001 X II 3G Ex ec IIC T6 Gc II 3D Ex tc IIIC T80°C Dc	IEC Certificate: IECEx FME 17.0001 X II 3G Ex ec IIC T4 Gc II 3D Ex tc IIIC T80°C Dc	

1) Single-compartment housing

2) Dual-compartment housing

Note

Plug-in Card for Ethernet Communication (ModelCode "DR6") not available with Zone 1.

... 2 Device designs

... Version with remote mount design

ATEX / IEC Zone 2






DANGER

Explosion hazard caused by incorrect transmitter installation

The FET632-Y0 transmitter does not have Ex Approval.

The FET632-Y0 transmitter may not be installed and operated in potentially explosive atmospheres.

The following table presents the combination of the FEP632, FEH632 sensor in explosion-proof design with the FET632 transmitter.

Sensor		
ProcessMaster 630 FEP632-A2, FEP632-U2 In Ex area, Zone 2, 22	HygienicMaster 630 FEH632-A2, FEH632-U2 In Ex area, Zone 2, 22	
		
ATEX / UKEX Certificate ATEX: FM17ATEX0017X Certificate UKEX: FM21UKEX0032X II 3G Ex ec IIC T6...T1 Gc II 3D Ex tc IIIC T80°C...T _{medium} Dc	ATEX / UKEX Certificate ATEX: FM17ATEX0017X Certificate UKEX: FM21UKEX0032X II 3G Ex ec IIC T6...T1 Gc II 3D Ex tc IIIC T80°C...T _{medium} Dc	
IEC Certificate: IECEx FME 17.0001X II 3G Ex ec IIC T6...T1 Gc II 3D Ex tc IIIC T80°C...T _{medium} Dc	IEC Certificate: IECEx FME 17.0001X II 3G Ex ec IIC T6...T1 Gc II 3D Ex tc IIIC T80°C...T _{medium} Dc	
Transmitter		
FET632-A2, FET632-U2 In Ex area, Zone 2, 22	FET632-A2, FET632-U2 In Ex area, Zone 2, 22 Transmitter equipped with the plug-in card for Ethernet communication (Modelcode "DR6")	FET632-Y0 outside the potentially explosive atmosphere
¹⁾ 	¹⁾ 	¹⁾ 
ATEX / UKEX Certificate ATEX: FM17ATEX0017X Certificate UKEX: FM21UKEX0032X II 3G Ex ec IIC T6 Gc II 3D Ex tc IIIC T80°C Dc	ATEX / UKEX Certificate ATEX: FM17ATEX0017X Certificate UKEX: FM21UKEX0032X II 3G Ex ec IIC T4 Gc II 3D Ex tc IIIC T80°C Dc	- No Ex Approval!
IEC Certificate: IECEx FME 17.0001 X II 3G Ex ec IIC T6 Gc II 3D Ex tc IIIC T80°C Dc	IEC Certificate: IECEx FME 17.0001 X II 3G Ex ec IIC T4 Gc II 3D Ex tc IIIC T80°C Dc	

1) Single-compartment housing

2) Dual-compartment housing

Overview – The fast track to explosion protection device data

These safety instructions related to explosion protection are valid in conjunction with the following test documentation and certificates:

Scope	Certificate
ATEX Zone 1 / 21	FM17ATEX0016X
ATEX Zone 2 / 22	FM17ATEX 0017X
IEC Ex Zone 1 / 21	IECEX FME 17.0001X
IEC Ex Zone 2 / 22	IECEX FME 17.0001X
FMus Div 1 (USA)	FM17US0062X
FMus Div 2 (USA)	FM17US0062X
cFM Div 1 (Canada)	FM17CA0033X
cFM Div 2 (Canada)	FM17CA0033X
UKEX Zone 1	FM21UKEX0033X
UKEX Zone 2	FM21UKEX0032X

Table 2: Validity range

Model	Operation in zone	Electrical connection and explosion protection data from chapter
ProcessMaster 630	FEP631-A1	Operation in Zone 1, 21 on page 20
	FEP631-A2	Operation in Zone 2, 22 on page 30
	FEP632-A1 and FET632-A1	Operation in Zone 1, 21 on page 20
	FEP632-A1 and FET632-Y0	Operation in Zone 1, 21 on page 20
	FEP632-A2 and FET632-A2	Operation in Zone 2, 22 on page 30
	FEP632-A2 and FET632-Y0	Operation in Zone 2, 22 on page 30
HygienicMaster 630	FEH631-A1	Operation in Zone 1, 21 on page 20
	FEH631-A2	Operation in Zone 2, 22 on page 30
	FEH632-A1 and FET632-A1	Operation in Zone 1, 21 on page 20
	FEH632-A1 and FET632-Y0	Operation in Zone 1, 21 on page 20
	FEH632-A2 and FET632-A2	Operation in Zone 2, 22 on page 30
	FEH632-A2 and FET632-Y0	Operation in Zone 2, 22 on page 30

Table 3: Overview

Note

All documentation, declarations of conformity, and certificates are available in ABB's download area.

www.abb.com/flow

4 Housing

Opening and closing the housing

⚠ DANGER

Danger of explosion if the device is operated with the transmitter housing or terminal box open!

Before opening the transmitter housing or the terminal box, note the following points:

- A valid fire permit must be present.
- Make sure that there is no explosion hazard.
- Switch off the power supply and wait for $t > 20$ minutes before opening.

⚠ WARNING

Risk of injury due to live parts!

When the housing is open, explosion protection and contact protection is not provided and EMC protection is limited.

- Before opening the housing, switch off the power supply.

Dual- compartment housing

NOTICE

Potential adverse effect on the IP rating

- Check the O-ring gasket for damage and replace it if necessary before closing the housing cover.
- Check that the O-ring gasket is properly seated when closing the housing cover.

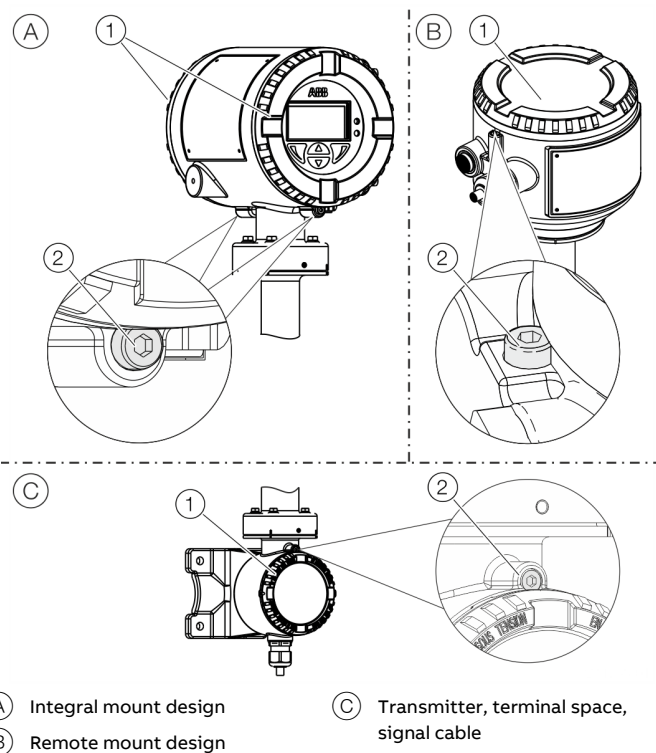


Figure 2: Cover lock (example)

Open the housing:

1. Release the cover lock by screwing in the Allen screw (2).
2. Unscrew cover (1).

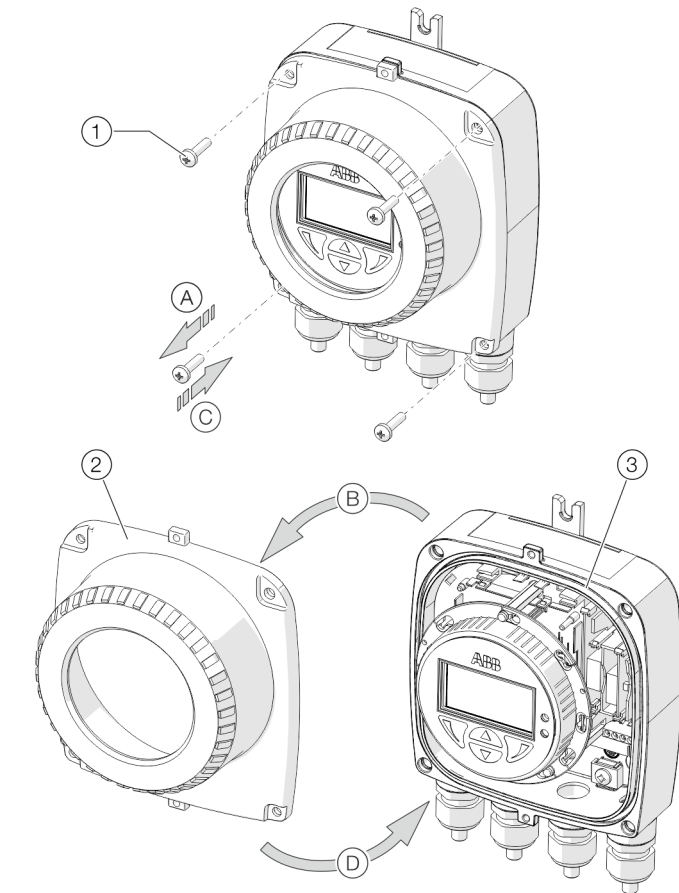
Close the housing:

1. Screw on the cover (1).
2. After closing the housing, lock the cover by unscrewing the Allen screw (2).

... 4 Housing

... Opening and closing the housing

Single-compartment housing



- ① Cover screws
② Transmitter housing cover
③ Gasket

Figure 3: Open / close single-compartment housing

Open the housing:

- Perform steps (A) and (B).

Close the housing:

- Perform steps (C) and (D).

Rotating the transmitter housing and LCD display

Depending on the installation position, the transmitter housing or LCD display can be rotated to enable horizontal readings.

Transmitter housing

⚠ DANGER

Damaging the device carries a risk of explosion!

When the screws for the transmitter housing are loosened, the explosion protection is suspended.

- Tighten all screws prior to commissioning.
- Never disconnect the transmitter housing from the sensor.
- Loosen only the screws indicated when rotating the transmitter housing!

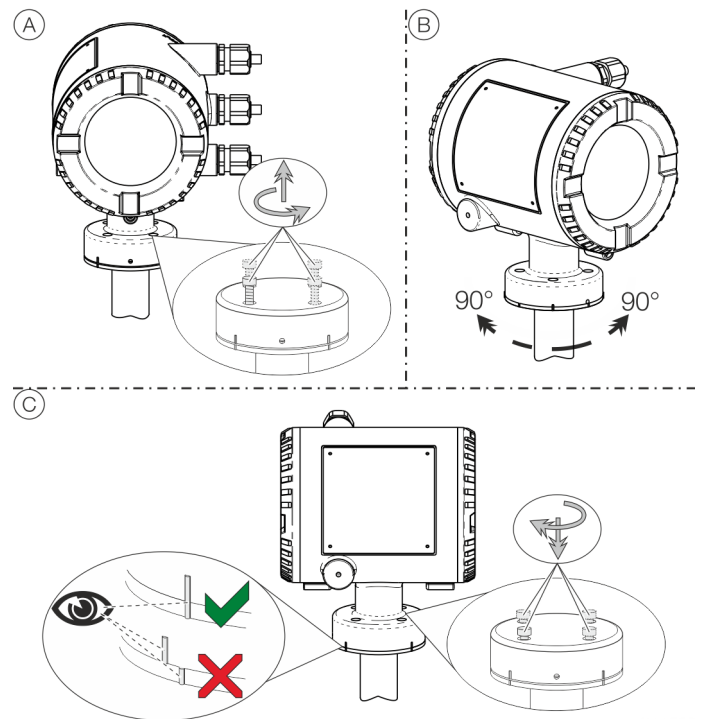


Figure 4: Rotate transmitter housing

Rotate the housing:

- Perform steps (A) to (C).

Installation instructions

ATEX, IECEx and UKEX

The installation, commissioning, maintenance and repair of devices in potentially explosive atmospheres must only be carried out by appropriately trained personnel. Works may be carried out only by persons, whose training has included instructions on different types of protection and installation techniques, concerned rules and regulations as well as general principles of zoning.

The person must possess the appropriate competences for the type of work to be conducted.

The safety instructions for electrical apparatus in potentially explosive areas must be in accordance with Directive 2014/34/EU (ATEX) or British Regulations (UKEX) and IEC 60079-14 (Installation of electrical equipment in potentially explosive areas).

Comply with the applicable regulations for the protection of employees to ensure safe operation.

Use in areas exposed to combustible dust

When using the device in areas exposed to combustible dusts (dust ignition), the following points must be observed:

- The maximum surface temperature of the device may not up-scale the following values.

FEP631, FEH631	80 °C (176 °F)
FEP632, FEH632	80 °C (176 °F)
FET632	80 °C (176 °F)
- The process temperature of the attached piping may up-scale 80 °C (176 °F).
- Approved dust-proof cable glands must be used when operating in Zone 21, 22 or in Class II, Class III.
- In potentially explosive atmospheres, the signal cable must measure at least 5 m (16.40 ft).

Cable entry

The devices are supplied with cable glands installed (certified in accordance with ATEX or IECEx).

- The use of standard cable glands and closures is prohibited.
- The black plugs in the cable glands are intended to provide protection during transport.
- The outside diameter of the connection cable must measure between 6 mm (0.24 in) and 12 mm (0.47 in) to guarantee the required tightness.
- Black cable glands are installed by default when the device is supplied. If signal outputs are connected to intrinsically safe circuits, replace the black cap on the corresponding cable gland with the blue one supplied.
- Any unused cable entries must be sealed before commissioning in accordance with the applicable standards.

Note

Low-temperature version devices (optional, up to -40 °C (-40 °F) ambient temperature) are supplied with metal cable glands due to the required temperature resistance.

... 4 Housing

Electrical connections

Temperature resistance for the connecting cable

The temperature at the cable entries of the device is dependent on the measuring medium temperature T_{medium} and the ambient temperature T_{amb} .

For the electrical connection of the device, use only cables with sufficient temperature resistance in accordance with the following table.

Device in integral mount design	
T_{amb}	Temperature resistance
$\leq 50\text{ °C}$ ($\leq 122\text{ °F}$)	$\geq 60\text{ °C}$ ($\geq 140\text{ °F}$)
$\leq 60\text{ °C}$ ($\leq 140\text{ °F}$)	$\geq 70\text{ °C}$ ($\geq 158\text{ °F}$)
Model in remote mount design	
T_{amb}	Temperature resistance
$\leq 50\text{ °C}$ ($\leq 122\text{ °F}$)	$\geq 70\text{ °C}$ ($\geq 158\text{ °F}$)
$\leq 60\text{ °C}$ ($\leq 140\text{ °F}$)	$\geq 80\text{ °C}$ ($\geq 176\text{ °F}$)

Grounding

The sensor must be grounded in accordance with the applicable international standards.

Perform grounding of the device in accordance with **Electrical connections** on page 20 or **Electrical connections** on page 30.

Ethernet

The output circuits allow for different topologies:

- Daisy Chain
- Star
- Ring

Note

- It is not permitted to combine different network topologies.
- The Plug-in Card for Ethernet is available for installations in Zone 2 / Div 2.
- The rated voltage of the non-intrinsically safe circuits is $U_M = 57\text{ V}$.

High temperature design

The high temperature design allows for complete thermal insulation of the sensor, up to the maximum illustrated device height.

The pipeline and sensor must be insulated after installing the unit according to the following illustration.

The thermal resistance of the insulation may not up-scale $\lambda = 0.036\text{ W/(mK)}$; if it does, the thickness of the insulation must be reduced accordingly.

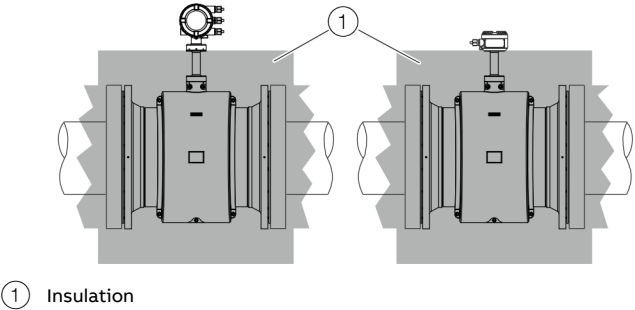


Figure 5: Insulation

5 Installing the plug-in cards

WARNING

Loss of Ex Approval!

Loss of Ex Approval due to retrofitting of plug-in cards on devices for use in potentially explosive atmospheres.

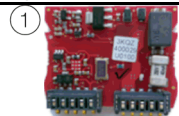
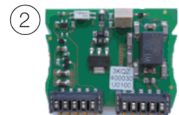
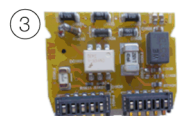


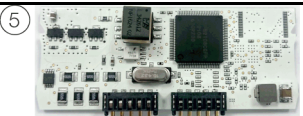
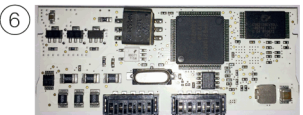




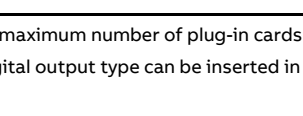



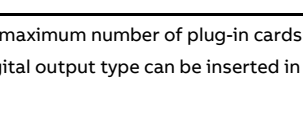

- Devices for use in potentially explosive atmospheres may not be retrofitted with plug-in cards.
- If devices are to be used in potentially explosive atmospheres, the required plug-in cards must be specified when the order is placed.

Note

The AS plug-in card (24 V DC loop power supply) may only be used to power the internal inputs and outputs on the device. It must not be used to power external circuits!

Optional plug-in cards

The transmitter has two slots (OC1, OC2) into which plug-in cards can be inserted to extend inputs and outputs. The slots are located on the transmitter motherboard and can be accessed after removing the front housing cover.

Plug-in cards		Pos.	Description	Quantity*
    	   	①	Current output, 4 to 20 mA passive (red) Order no.: 3KQZ400029U0100	2
		②	Passive digital output (green) Order no.: 3KQZ400030U0100	1**
		③	Passive digital input (yellow) Order no.: 3KQZ400032U0100	1
		④	24 V DC voltage supply (blue) Order no.: 3KQZ400031U0100	1
		⑤	Modbus RTU® RS485 (white) Order no.: 3KQZ400028U0100	1
   	   	⑥	PROFIBUS DP® (white) Order no.: 3KQZ400027U0100	1
		⑦	Ethernet (various protocols) Order no.: 3KQZ400037U0100	1
		⑧	Power over Ethernet (POE) Order no.: 3KQZ400039U0100	1
		⑨	PROFIBUS PA® (blue) Order no.: 3KQZ400061U0100	1**

* The 'Number' column indicates the maximum number of plug-in cards of the same type that can be used.

* Only one plug-in card of passive digital output type can be inserted in Pos. ②.

6 Operation in Zone 1, 21

Electrical connections

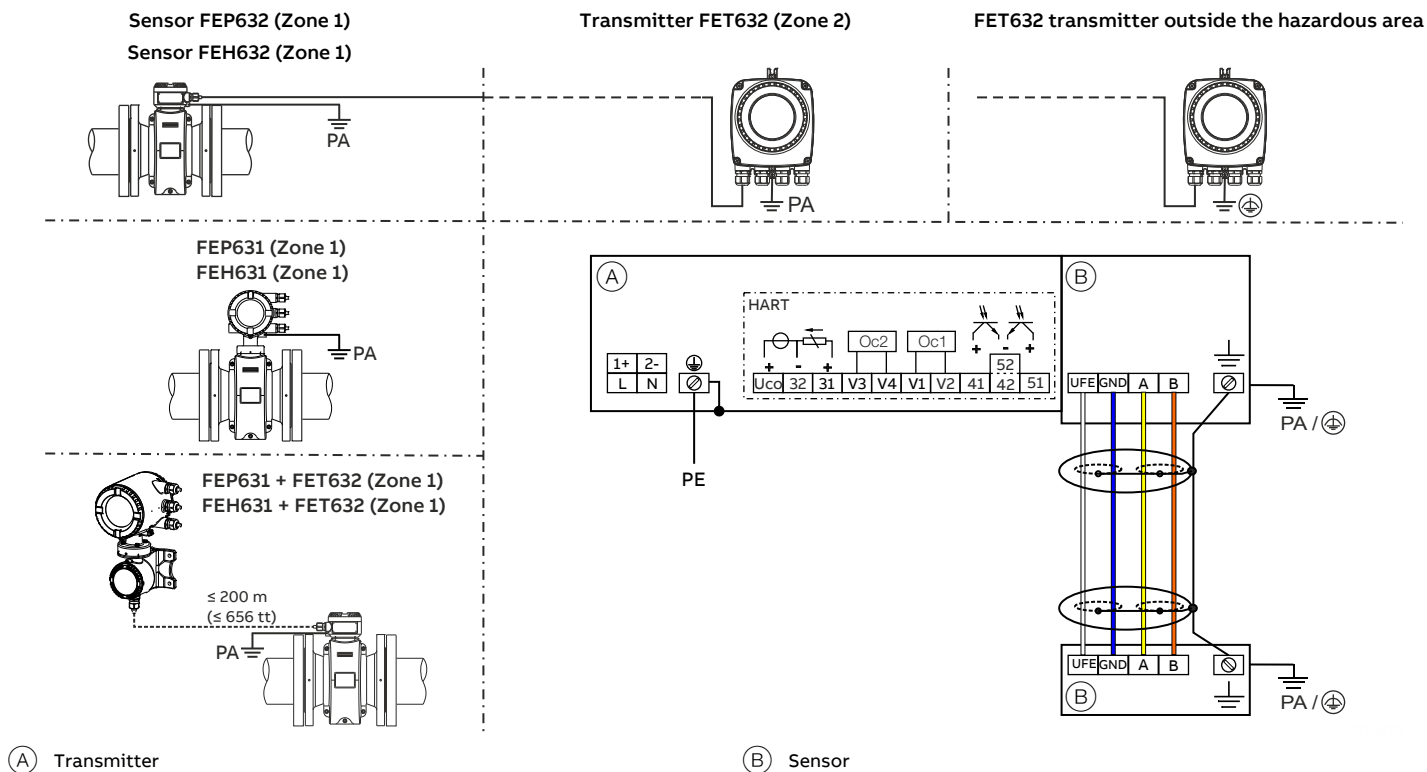


Figure 6: Electrical connections

Note

For detailed information about grounding the transmitter and the flowmeter sensor, please refer to chapter 'Grounding' in the Commissioning instruction or the operating instruction.

Connections for the power supply

AC power supply

Terminal	Function / comments
L	Phase
N	Neutral conductor
PE / ⊕	Protective earth (PE)
▽ / PA	Potential equalization

DC voltage supply

Terminal	Function / comments
1+	+
2-	-
PE / ⊕	Protective earth (PE)
▽ / PA	Potential equalization

Connections for inputs and outputs

Terminal	Function / comments
Uco / 32	Current output 4 to 20 mA- / HART output, active or
31 / 32	Current output 4 to 20 mA- / HART output, passive
41 / 42	Passive digital output DO1
51 / 52	Passive digital output DO2
V1 / V2	Plug-in card, slot OC1
V3 / V4	Plug-in card, slot OC2

Plug-in cards may not be retrofitted in devices with explosion protection on-site – loss of Ex Approval.

Connecting the signal cable

Only for remote mount design.

The sensor housing and transmitter housing must be connected to potential equalization.

Terminal	Function / comments
U _{FE}	Sensor power supply
GND	Ground
A	Data line
B	Data line
⊕	Functional earth / Shielding

Electric data for operation in Zone 1, 21

Model: FEP631, FEH631 or FET632	Type of protection													
Outputs on basic device	'e' / 'XP'		'ia' / 'IS'											
	U _M [V]	I _M [A]	U _O	U _I [V]	I _O [mA]	I _I [mA]	P _O [mW]	P _I [mW]	C _O [nF]	C _I [nF]	C _{OPA} [nF]	C _{IPA} [nF]	L _O [mH]	L _I [mH]
Current / HART output 31 / U_{CO}, active Terminals 31 / U _{CO}	30	0.2	30	30	115	115	815	815	10	10	5	5	0.08	0.08
Current / HART output 31 / 32, passive Terminals 31 / 32	30	0.2	—	30	—	115	—	815	—	27	—	5	0.08	0.08
Digital output 41 / 42, active* Terminals 41 / 42 and V1 / V2*	30	0.1	27.8	30	119	30	826	225	20	20	29	29	0.22	0.22
Digital output 41 / 42, passive Terminals 41 / 42	30	0.1	—	30	—	30	—	225	—	27	—	5	—	0.08
Digital output 51 / 52, active* Terminals 51 / 52 and V1 / V2*	30	0.1	27.8	30	119	30	826	225	20	20	29	29	0.22	0.22
Digital output 51 / 52, passive Terminals 51 / 52	30	0.1	—	30	—	30	—	225	—	27	—	5	—	0.08

All outputs are electrically isolated from each other and from the power supply.

Digital outputs 41 / 42 and 51 / 52 are not electrically isolated from each other. Terminals 42 / 52 have the same potential.

... 6 Operation in Zone 1, 21

... Electric data for operation in Zone 1, 21

Model: FEP631, FEH631 or FET632	Type of protection													
Inputs and outputs with optional plug-in cards	'e' / 'XP'		'ia' / 'IS'											
	U _M [V]	I _M [A]	U _O	U _I [V]	I _O [mA]	I _I [mA]	P _O [mW]	P _I [mW]	C _O [nF]	C _I [nF]	C _{OPA} [nF]	C _{IPA} [nF]	L _O [mH]	L _I [mH]
Current output V3 / V4, active* Terminals V3 / V4 and V1 / V2*	30	0.1	27.8	30	119	30	826	225	29	29	117	117	0.4	0.4
Current output V1 / V2, passive** Current output V3 / V4, passive** Terminals V1 / V2** or V3 / V4**	30	0.1	—	30	—	68	—	510	—	45	—	59	—	0.27
Digital output V3 / V4, active* Terminals V3 / V4 and V1 / V2*	30	0.1	27.8	30	119	68	826	225	17	17	31	31	0.4	0.4
Digital output V1 / V2, passive** Digital output V3 / V4, passive** Terminals V1 / V2** or V3 / V4**	30	0.1	—	30	—	30	—	225	—	13	—	16	—	0.27
Digital input V3 / V4, active* Terminals V3 / V4 and V1 / V2	30	0.1	27.8	30	119	3.45	826	25.8	17	17	31	31	0.4	0.4
Digital input V1 / V2, passive* Digital input V3 / V4, passive* Terminals V1 / V2** or V3 / V4**	30	0.1	—	30	—	3.45	—	25.8	—	13	—	16	—	0.27
Modbus Card (RTU) Terminals V1 / V2	30	0.1	4.2	4.2	150	150	150	150	5300	5300	0.06	0.06	0.09	0.09
PROFIBUS DP Terminals V1 / V2	30	0.1	4.2	4.2	150	150	150	150	5300	5300	0.06	0.06	0.09	0.09
PROFIBUS PA (Non-FISCO) Terminals V1 / V2	30	0.38	—	30	—	100	—	815	—	4	—	—	0	0.008
PROFIBUS PA (FISCO) Terminals V1 / V2	—	—	—	17.5	—	380	—	5320	—	4	—	—	0	0.008

* Only in conjunction with additional '24 V DC loop power supply (blue)' plug-in card in slot OC1.

** The terminal assignment depends on the model number or the slot assignments. For connection examples, refer to **Installation** in the operating instruction.

For devices in Zone 1 / Div. 1 the bus termination must conform to the FISCO model or the explosion protection regulations, respectively.

Special conditions

Zone 1/12 – Certificate No. FM17ATEX0016X and FM21UKEX0033X

1. The painted surface of the FE*6, ProcessMaster and HygenicMaster may store electrostatic charge and become a source of ignition in applications with a low relative humidity <~30 % relative humidity where the painted surface is relatively free of surface contamination such as dirt, dust, or oil.
Guidance on protection against the risk of ignition due to electrostatic discharge can be found in IEC TR60079-32-2
Cleaning of the painted surface should only be done with a damp cloth.
2. For installations in flammable dust, the cable entries shall be fitted with an appropriate cable entry device meeting the requirements of IP 6x fitted with a gasket or seal between the cable entry device and the wall of the enclosure.
3. For Integral and Remote versions FE*63*A1 Category II 2 D having exposed electrodes in the process shall be used in a non-flammable liquid process only.
4. Contact the manufacturer for specific flameproof Ex d apparatus.
5. The ABB Instruction Manual for the ProcessMaster and HygenicMaster details the permitted Temperature Classification and Ambient Temperature ratings as influenced by the Process Medium temperature.

Special connection conditions

Note

The AS plug-in card (24 V DC loop power supply) may only be used to power the internal inputs and outputs on the device. It must not be used to power external circuits!

Note

If the protective earth (PE) is connected in the flowmeter's terminal box, you must ensure that no dangerous potential difference can arise between the protective earth (PE) and the potential equalization (PA) in areas with explosion risk.

Note

For devices with a power supply of 16 to 30 V DC, on-site external overvoltage protection must be provided. It must be ensured that the overvoltage is limited to 140 % (= 42 V DC) of the maximum operating voltage.

The output circuits are designed so that they can be connected to both intrinsically-safe and non-intrinsically-safe circuits.

- Combining intrinsically safe and non-intrinsically safe circuits is not permitted.
- On intrinsically safe circuits, potential equalization should be established along the entire length of the cable used for the signal outputs.
- The rated voltage of the non-intrinsically safe circuits is $U_M = 30 \text{ V}$.
- Intrinsic safety is preserved If the rated voltage $U_M = 30 \text{ V}$ is not up-scaled when connections are established to non-intrinsically safe external circuits.
- The information in **Changing the type of protection** on page 41 must be observed when changing the type of protection.

The concept of intrinsic safety allows several approved intrinsically safe devices to be interconnected without additional intrinsic safety installation checks, if the relevant installation standards are observed.

Devices connected to the relevant equipment must not be operated at over 250 V_{rms} AC or 250 V DC to ground.

Installation in accordance with ATEX or IECEx must comply with the applicable national and international standards and directives.

... 6 Operation in Zone 1, 21

... Special conditions

Protection against electrostatic discharges

DANGER

Explosion hazard due to electrostatic charging!

The painted surface of the device can store electrostatic charges.

As a result, the housing can form an ignition source due to electrostatic discharges in the following conditions:

- The device is operated in environments with a relative humidity of $\leq 30\%$.
- The painted surface of the device is thereby relatively free from impurities such as dirt, dust or oil.
- Instructions on avoiding ignition in potentially explosive environments due to electrostatic discharges in accordance with PD CLC/TR 60079-32-1 and IEC TS 60079-32-1 must be complied with!

Instructions on cleaning

The painted surface of the device must be cleaned only using a moist cloth.

Repair

Devices of type of protection 'd / XP' are equipped with flameproof joints in the housing. Contact ABB before commencing repair work.

Temperature data

Surface temperature

Model name	Surface temperature
FEP632, FEH632	T 80 °C (176 °F)
FEP631 EH631	T 80 °C (176 °F)
FET632	T 80 °C (176 °F)

The surface temperature depends on the fluid temperature.

With increasing measuring medium temperature > 60 °C (140 °F) or > 80 °C (176 °F), the surface temperature also increases to the level of the measuring medium temperature.

Note

The maximum permissible measuring medium temperature depends on the liner and flange material, and is limited by the operating values in the following tables.

Measuring medium temperature as a function of liner and flange material

Model FEP631, FEP632		Measuring medium temperature range (operating data)	
Lining material	Flange material	Minimum	Maximum
Hard rubber	Steel	-10 °C (14 °F) -5 °C (23 °F)*	85 °C (185 °F) 80 °C (176 °F)*
Hard rubber	Stainless steel	-15 °C (5 °F) -5 °C (23 °F)*	85 °C (185 °F) 80 °C (176 °F)*
Soft rubber	Steel	-10 °C (14 °F)	60 °C (140 °F)
Soft rubber	Stainless steel	-15 °C (5 °F)	60 °C (140 °F)
PTFE	Steel	-10 °C (14 °F)	130 °C (266 °F)
PTFE	Stainless steel	-25 °C (-13 °F)	130 °C (266 °F)
PFA	Steel	-10 °C (14 °F)	180 °C (356 °F)
PFA	Stainless steel	-25 °C (-13 °F)	180 °C (356 °F)
Thick PTFE	Steel	-10 °C (14 °F)	180 °C (356 °F)
Thick PTFE	Stainless steel	-25 °C (-13 °F)	180 °C (356 °F)
ETFE	Steel	-10 °C (14 °F)	130 °C (266 °F)
ETFE	Stainless steel	-25 °C (-13 °F)	130 °C (266 °F)

* Only for China production site

Model FEH631, FEH632			Fluid temperature (operating values)	
Liner	Process connection	Material	Minimum	Maximum
PFA	Flange	Stainless steel	-25 °C (-13 °F)	180 °C (356 °F)
PFA	Wafer type	—	-25 °C (-13 °F)	130 °C (266 °F)
PFA	Variable process connection	Stainless steel	-25 °C (-13 °F)	130 °C (266 °F)

... 6 Operation in Zone 1, 21

... Temperature data

Measuring medium temperature (Ex Data) for ProcessMaster Model FEP631



Nominal diameter	Design	Temperature class	Ambient temperature (-40 °C)* -20 °C to +40 °C	Ambient temperature (-40 °C)* -20 °C to +50 °C	Ambient temperature (-40 °C)* -20 °C to +60 °C
			thermally uninsulated, thermally insulated	thermally uninsulated, thermally insulated	thermally uninsulated, thermally insulated
			Gas & dust	Gas & dust	Gas & dust
DN3 to 2000	NT	T1	130°C	130°C	130°C
	HT		180°C	180°C	180°C
	NT	T2	130°C	130°C	130°C
	HT		180°C	180°C	180°C
	NT	T3	130°C	130°C	130°C
	HT		180°C	180°C	180°C
	NT	T4	130°C	130°C	130°C
	HT		130°C	130°C	130°C
	NT	T5	95°C	95°C	95°C
	HT		95°C	95°C	95°C
	NT	T6	80°C	80°C	80°C
	HT		80°C	80°C	80°C

* Low-temperature version (option)

NT standard version, T_{medium} maximum 130 °C (266 °F)

HT high-temperature version, T_{medium} maximum 180 °C (356 °F)

Thermally uninsulated: the sensor is not enclosed with pipe insulation material.

Thermally insulated: the sensor is enclosed with pipe insulation material.

Note

Cables for power supply, signal inputs and outputs must meet the following specifications:

- At an ambient temperature ≤ 50 °C the cable must be suited for at least 60 °C
- At an ambient temperature ≤ 60 °C the cable must be suited for at least 70 °C

Measuring medium temperature (Ex Data) for ProcessMaster Model FEP632



Nominal diameter	Design	Temperature class	Ambient temperature (-40 °C)* -20 °C to +40 °C	Ambient temperature (-40 °C)* -20 °C to +50 °C	Ambient temperature (-40 °C)* -20 °C to +60 °C
			thermally uninsulated, thermally insulated	thermally uninsulated, thermally insulated	thermally uninsulated, thermally insulated
			Gas & dust	Gas & dust	Gas & dust
DN3 to 2000	NT	T1	130°C	130°C	130°C
	HT		180°C	180°C	180°C
	NT	T2	130°C	130°C	130°C
	HT		180°C	180°C	180°C
	NT	T3	130°C	130°C	130°C
	HT		180°C	180°C	180°C
	NT	T4	130°C	130°C	130°C
	HT		130°C	130°C	130°C
	NT	T5	95°C	95°C	95°C
	HT		95°C	95°C	95°C
	NT	T6	80°C	80°C	80°C
	HT		80°C	80°C	80°C

* Low-temperature version (option)

NT standard version, T_{medium} maximum 130 °C (266 °F)

HT high-temperature version, T_{medium} maximum 180 °C (356 °F)

Thermally uninsulated: the sensor is not enclosed with pipe insulation material.

Thermally insulated: the sensor is enclosed with pipe insulation material.

Note

Cables for power supply, signal inputs and outputs must meet the following specifications:

- At an ambient temperature ≤ 50 °C the cable must be suited for at least 70 °C
- At an ambient temperature ≤ 60 °C the cable must be suited for at least 80 °C

... 6 Operation in Zone 1, 21

... Temperature data

Measuring medium temperature (Ex Data) for HygienicMaster Model FEH631

HT + NT design



NT design only



Nominal diameter	Design	Temperature class	Ambient temperature (-40 °C)* -20 °C to +40 °C		Ambient temperature (-40 °C)* -20 °C to +50 °C		Ambient temperature (-40 °C)* -20 °C to +60 °C	
			thermally uninsulated, thermally insulated		thermally uninsulated, thermally insulated		thermally uninsulated, thermally insulated	
			Gas & dust		Gas & dust		Gas & dust	
DN3 to 2000	NT	T1	130 °C		130 °C		130 °C	
	HT		180 °C		180 °C		180 °C	
	NT	T2	130 °C		130 °C		130 °C	
	HT		180 °C		180 °C		180 °C	
	NT	T3	130 °C		130 °C		130 °C	
	HT		180 °C		180 °C		180 °C	
	NT	T4	130 °C		130 °C		130 °C	
	HT		130 °C		130 °C		130 °C	
	NT	T5	95 °C		95 °C		95 °C	
	HT		95 °C		95 °C		95 °C	
	NT	T6	80 °C		80 °C		80 °C	
	HT		80 °C		80 °C		80 °C	

* Low-temperature version (option)

NT standard version, T_{medium} maximum 130 °C (266 °F)

HT high-temperature version, T_{medium} maximum 180 °C (356 °F)

Thermally uninsulated: the sensor is not enclosed with pipe insulation material.

Thermally insulated: the sensor is enclosed with pipe insulation material.

Note

Cables for power supply, signal inputs and outputs must meet the following specifications:

- At an ambient temperature ≤ 50 °C the cable must be suited for at least 60 °C
- At an ambient temperature ≤ 60 °C the cable must be suited for at least 70 °C

Measuring medium temperature (Ex Data) for HygienicMaster Model FEH632

HT + NT design



NT design only



Nominal diameter	Design	Temperature class	Ambient temperature (-40 °C)* -20 °C to +40 °C	Ambient temperature (-40 °C)* -20 °C to +50 °C	Ambient temperature (-40 °C)* -20 °C to +60 °C
			thermally uninsulated, thermally insulated	thermally uninsulated, thermally insulated	thermally uninsulated, thermally insulated
			Gas & dust	Gas & dust	Gas & dust
DN3 to 2000	NT	T1	130°C	130°C	130°C
	HT		180°C	180°C	180°C
	NT	T2	130°C	130°C	130°C
	HT		180°C	180°C	180°C
	NT	T3	130°C	130°C	130°C
	HT		180°C	180°C	180°C
	NT	T4	130°C	130°C	130°C
	HT		130°C	130°C	130°C
	NT	T5	95°C	95°C	95°C
	HT		95°C	95°C	95°C
	NT	T6	80°C	80°C	80°C
	HT		80°C	80°C	80°C

* Low-temperature version (option)

NT standard version, T_{medium} maximum 130 °C (266 °F)

HT high-temperature version, T_{medium} maximum 180 °C (356 °F)

Thermally uninsulated: the sensor is not enclosed with pipe insulation material.

Thermally insulated: the sensor is enclosed with pipe insulation material.

Note

Cables for power supply, signal inputs and outputs must meet the following specifications:

- At an ambient temperature ≤ 50 °C the cable must be suited for at least 70 °C
- At an ambient temperature ≤ 60 °C the cable must be suited for at least 80 °C

7 Operation in Zone 2, 22

Electrical connections

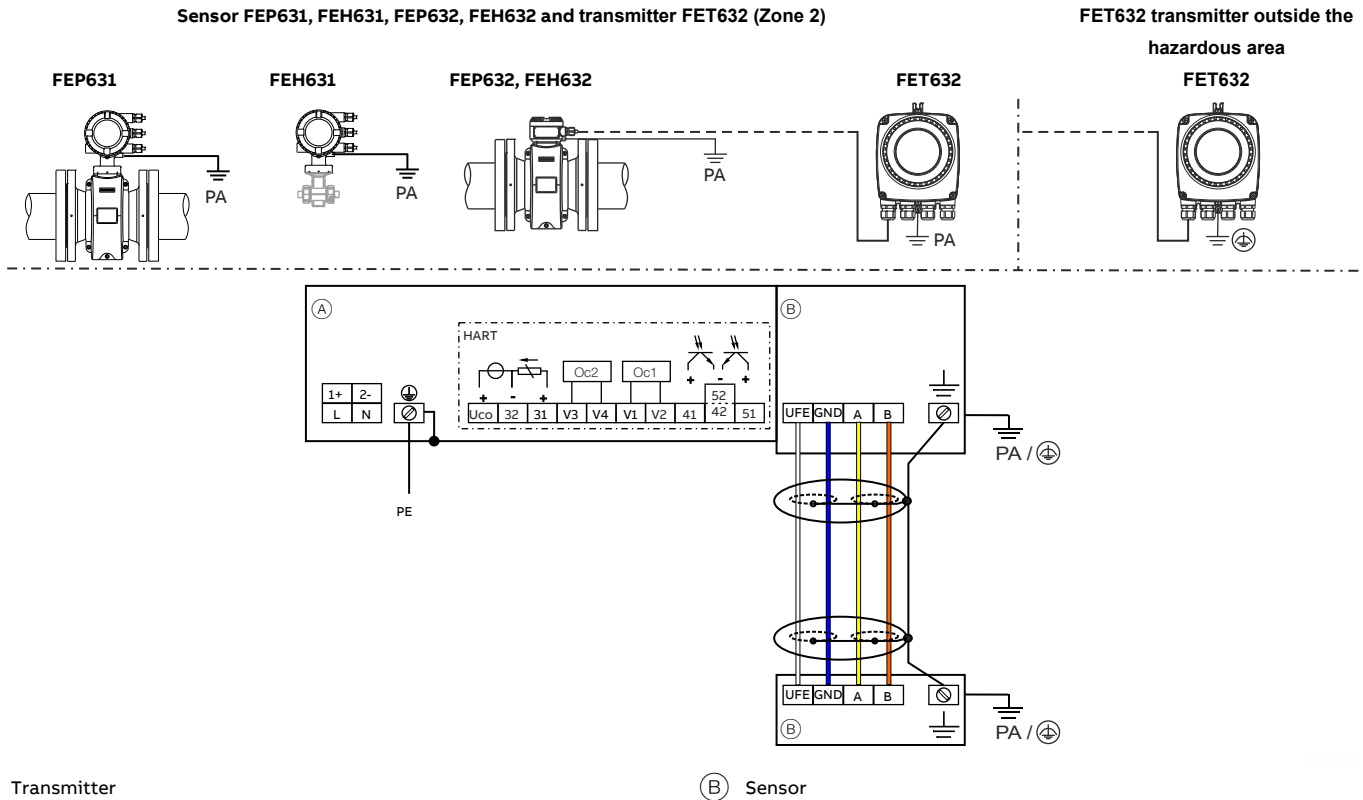


Figure 7: Electrical connections

Note

For detailed information about grounding the transmitter and the flowmeter sensor, please refer to chapter 'Grounding' in the Commissioning instruction or the operating instruction.

Connections for the power supply

AC power supply

Terminal	Function / comments
L	Phase
N	Neutral conductor
PE / ⊕	Protective earth (PE)
▽ / PA	Potential equalization

DC voltage supply

Terminal	Function / comments
1+	+
2-	-
PE / ⊕	Protective earth (PE)
▽ / PA	Potential equalization

Connections for inputs and outputs

Terminal	Function / comments
Uco / 32	Current output 4 to 20 mA- / HART output, active or
31 / 32	Current output 4 to 20 mA- / HART output, passive
41 / 42	Passive digital output DO1
51 / 52	Passive digital output DO2
V1 / V2	Plug-in card, slot OC1
V3 / V4	Plug-in card, slot OC2
Plug-in cards may not be retrofitted in devices with explosion protection on-site – loss of Ex Approval.	

Connecting the signal cable

Only for remote mount design.

The sensor housing and transmitter housing must be connected to potential equalization.

Terminal	Function / comments
U _{FE}	Sensor power supply
GND	Ground
A	Data line
B	Data line
⊕	Functional earth / Shielding

Electrical data for operation in Zone 2, 22

Model: FEP631, FEH631 or FET632

Outputs on basic device	Operating values (general)		Type of protection – 'nA' / 'NI' / 'ec'	
	U _N	I _N	U _N	I _N
Current / HART output 31 / UCO, active Terminals 31 / UCO	30 V	30 mA	30 V	30 mA
Current / HART output 31 / 32, passive Terminals 31 / 32	30 V	30 mA	30 V	30 mA
Digital output 41 / 42, passive Terminals 41 / 42	30 V	25 mA	30 V	25 mA
Digital output 51 / 52, passive Terminals 51 / 52	30 V	30 mA	30 V	30 mA
Digital output 41 / 42, active* Terminals 41 / 42 and V1 / V2*	30 V	30 mA	30 V	30 mA
Digital output 51 / 52, active* Terminals 51 / 52 and V1 / V2*	30 V	30 mA	30 V	30 mA

* Only in conjunction with additional '24 V DC loop power supply (blue)' plug-in card in slot OC1.

All outputs are electrically isolated from each other and from the power supply.

Digital outputs 41 / 42 and 51 / 52 are not electrically isolated from each other. Terminals 42 / 52 have the same potential.

Model: FEP631, FEH631 or FET632

Plug-in cards	Operating values (general)		Type of protection – 'nA' / 'NI' / 'ec'	
	U _N	I _N	U _N	I _N
Current output, active* Terminals V3 / V4 and V1 / V2**	30 V	30 mA	30 V	30 mA
Current output, passive Terminals V1 / V2 or V3 / V4**	30 V	30 mA	30 V	30 mA
Digital output, active* Terminals V3 / V4 and V1 / V2**	30 V	25 mA	30 V	25 mA
Digital output, passive Terminals V1 / V2 or V3 / V4**	30 V	30 mA	30 V	30 mA
Digital input, active* Terminals V3 / V4 and V1 / V2**	30 V	3.45 mA	30 V	3.45 mA
Digital input, passive Terminals V1 / V2 or V3 / V4**	30 V	3.45 mA	30 V	3.45 mA
Modbus Card (RTU) Terminals V1/V2	30 V	30 mA	30 V	30 mA
Profibus DP card Terminals V1/V2	30 V	30 mA	30 V	30 mA
Profibus PA card Terminals V1/V2	32 V	30 mA	32 V	30 mA
Ethernet card Port 1: Pin X1 to X4 Port 2: Pin X5 to X8	57 V	417 mA	57 V	417 mA
Ethernet Card in conjunction with Power over Ethernet (POE Card) Port 1: Pin X1 to X4 Port 2: Pin X5 to X8	57 V	417 mA	57 V	417 mA

* Only in conjunction with additional '24 V DC loop power supply (blue)' plug-in card in slot OC1.

** The terminal assignment relates to the Option Card Slot. Slot 1 = Terminals V1/V2. Slot 2 = Terminal V3/V4. For more details, refer to Installation in the operating instruction.

... 7 Operation in Zone 2, 22

Special conditions

Zone 2/22 – Certificate No. FM17ATEX0017X and FM21UKEX0032X

1. Sensors having exposed electrodes in the process shall be used in a non-flammable liquid process only.
2. The ABB Instruction Manual for the ProcessMaster and HygenicMaster details the permitted Temperature Classification and Ambient Temperature ratings as influenced by the Process Medium temperature.
3. The painted surface of the ProcessMaster and HygenicMaster may store electrostatic charge and become a source of ignition in applications with a low relative humidity <~30 % relative humidity where the painted surface is relatively free of surface contamination such as dirt, dust, or oil.

Guidance on protection against the risk of ignition due to electrostatic discharge can be found in IEC TR60079-32-2
Cleaning of the painted surface should only be done with a damp cloth.

Special connection conditions

Note

The AS plug-in card (24 V DC loop power supply) may only be used to power the internal inputs and outputs on the device. It must not be used to power external circuits!

Note

If the protective earth (PE) is connected in the flowmeter's terminal box, you must ensure that no dangerous potential difference can arise between the protective earth (PE) and the potential equalization (PA) in areas with explosion risk.

Note

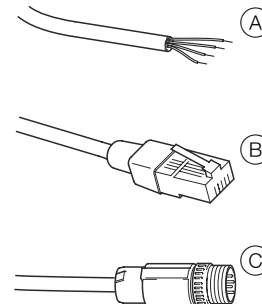
For devices with a power supply of 16 to 30 V DC, on-site external overvoltage protection must be provided. It must be ensured that the overvoltage is limited to 140 % (= 42 V DC) of the maximum operating voltage.

Note

With zone 2 devices and the inner of the adjacent pipe classified as hazardous area, a completely filled pipe must be ensured all the time.

Ethernet connection to remote or integral design transmitter

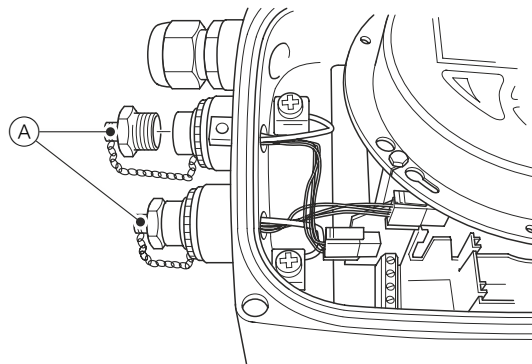
The following possibilities are given to connect the transmitter enclosures.



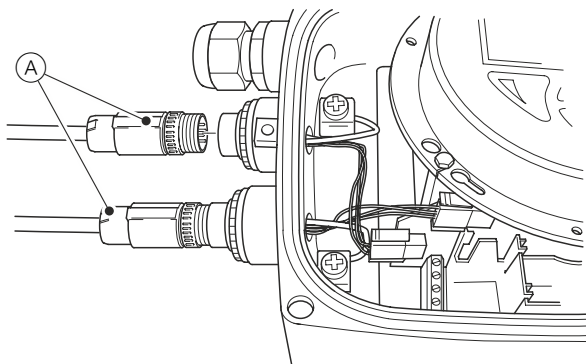
- (A) Connection via a cable gland
- (B) Cable connection via RJ45 connector
- (C) Cable connection via M12 connector

Figure 8: Connection possibilities of the Ethernet cable

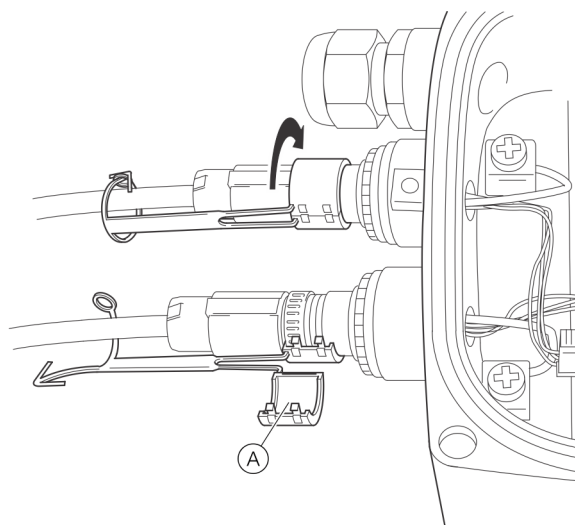
M12 connector connection



1. Remove the metal M12 connector closing cap (A) at the transmitter enclosure from the delivery state.



2. Connect the customer M12 connector (A) cable.



3. Put the enclosed M12 locking clip (A) around the M12 connector and close them until the clip clicks into place. Secure the clip by closing the arrow and needle eye. Do not use or operate the device without the M12 locking clip.

⚠ WARNING

Risk of injury due to live parts.

M12 connectors. Explosive hazard.

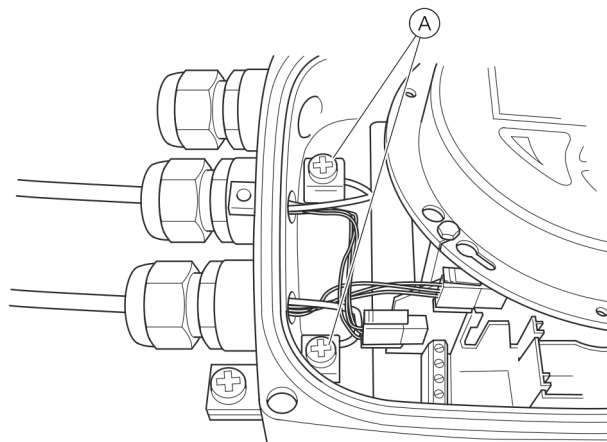
Ethernet options are designed only for use in hazardous applications Zone 2.

Connecting or disconnecting the M12 cable connector when the instrument is energized is not permitted.

- Do not connect or disconnect when energized.

Ground the Ethernet connection cable

Connect the outer shield of the Ethernet cable to the screw terminal.



(A) Screw terminal

Figure 9: Ground the Ethernet connection cable

Protection against electrostatic discharges

⚠ DANGER

Explosion hazard due to electrostatic charging!

The painted surface of the device can store electrostatic charges.

As a result, the housing can form an ignition source due to electrostatic discharges in the following conditions:

- The device is operated in environments with a relative humidity of $\leq 30\%$.
- The painted surface of the device is thereby relatively free from impurities such as dirt, dust or oil.
- Instructions on avoiding ignition in potentially explosive environments due to electrostatic discharges in accordance with PD CLC/TR 60079-32-1 and IEC TS 60079-32-1 must be complied with!

Instructions on cleaning

The painted surface of the device must be cleaned only using a moist cloth.

... 7 Operation in Zone 2, 22

Temperature data

Surface temperature

Model name	Surface temperature
FEP632, FEH632	T 80 °C (176 °F)
FEP631 EH631	T 80 °C (176 °F)
FET632	T 80 °C (176 °F)

The surface temperature depends on the fluid temperature.

With increasing measuring medium temperature > 60 °C (140 °F) or > 80 °C (176 °F), the surface temperature also increases to the level of the measuring medium temperature.

Note

The maximum permissible measuring medium temperature depends on the liner and flange material, and is limited by the operating values in the following tables.

Measuring medium temperature as a function of liner and flange material

Model FEP631, FEP632		Measuring medium temperature range (operating data)	
Lining material	Flange material	Minimum	Maximum
Hard rubber	Steel	-10 °C (14 °F)	85 °C (185 °F)
		-5 °C (23 °F)*	80 °C (176 °F)*
Hard rubber	Stainless steel	-15 °C (5 °F)	85 °C (185 °F)
		-5 °C (23 °F)*	80 °C (176 °F)*
Soft rubber	Steel	-10 °C (14 °F)	60 °C (140 °F)
Soft rubber	Stainless steel	-15 °C (5 °F)	60 °C (140 °F)
PTFE	Steel	-10 °C (14 °F)	130 °C (266 °F)
PTFE	Stainless steel	-25 °C (-13 °F)	130 °C (266 °F)
PFA	Steel	-10 °C (14 °F)	180 °C (356 °F)
PFA	Stainless steel	-25 °C (-13 °F)	180 °C (356 °F)
Thick PTFE	Steel	-10 °C (14 °F)	180 °C (356 °F)
Thick PTFE	Stainless steel	-25 °C (-13 °F)	180 °C (356 °F)
ETFE	Steel	-10 °C (14 °F)	130 °C (266 °F)
ETFE	Stainless steel	-25 °C (-13 °F)	130 °C (266 °F)

* Only for China production site

Model FEH631, FEH632			Fluid temperature (operating values)	
Liner	Process connection	Material	Minimum	Maximum
PFA	Flange	Stainless steel	-25 °C (-13 °F)	180 °C (356 °F)
PFA	Wafer type	—	-25 °C (-13 °F)	130 °C (266 °F)
PFA	Variable process connection	Stainless steel	-25 °C (-13 °F)	130 °C (266 °F)

Measuring medium temperature (Ex Data) for ProcessMaster Model FEP631

Single-compartment housing



Dual-compartment housing



Nominal diameter	Design	Temperature class	Ambient temperature (-40 °C)* -20 °C to +40 °C	Ambient temperature (-40 °C)* -20 °C to +50 °C	Ambient temperature (-40 °C)* -20 °C to +60 °C
			thermally uninsulated, thermally insulated	thermally uninsulated, thermally insulated	thermally uninsulated, thermally insulated
			Gas & dust	Gas & dust	Gas & dust
DN3 to 2000	NT	T1	130°C	130°C	130°C
	HT		180°C	180°C	180°C
	NT	T2	130°C	130°C	130°C
	HT		180°C	180°C	180°C
	NT	T3	130°C	130°C	130°C
	HT		180°C	180°C	180°C
	NT	T4	130°C	130°C	130°C
	HT		130°C	130°C	130°C
	Note: The data below does not apply to Flowmeters equipped with the plug-in card for Ethernet communication (model code DR6)!				
	NT	T5	95°C	95°C	40°C**
	HT		—***	—	—
	NT	T6	95°C	95°C	—
	HT		80°C	—	—
	HT		80°C	—	—

* Low-temperature version (option)

** Single-compartment housing

*** Dual-compartment housing

NT standard version, T_{medium} maximum 130 °C (266 °F)HT high-temperature version, T_{medium} maximum 180 °C (356 °F)

Thermally uninsulated: the sensor is not enclosed with pipe insulation material.

Thermally insulated: the sensor is enclosed with pipe insulation material.

Note

Cables for power supply, signal inputs and outputs must meet the following specifications:

With single-compartment housing

- At an ambient temperature of 50 °C the cable must be suited for at least 80 °C
- At an ambient temperature of 60 °C the cable must be suited for at least 90 °C

With dual-compartment housing

- At an ambient temperature of 50 °C the cable must be suited for at least 70 °C
- At an ambient temperature of 60 °C the cable must be suited for at least 80 °C

... 7 Operation in Zone 2, 22

... Temperature data

Measuring medium temperature (Ex Data) for ProcessMaster Model FEP632



Nominal diameter	Design	Temperature class	Ambient temperature (-40 °C)* -20 °C to +40 °C	Ambient temperature (-40 °C)* -20 °C to +50 °C	Ambient temperature (-40 °C)* -20 °C to +60 °C
			thermally uninsulated, thermally insulated	thermally uninsulated, thermally insulated	thermally uninsulated, thermally insulated
			Gas & dust	Gas & dust	Gas & dust
DN3 to 2000	NT	T1	130°C	130°C	130°C
	HT		180°C	180°C	180°C
	NT	T2	130°C	130°C	130°C
	HT		180°C	180°C	180°C
	NT	T3	130°C	130°C	130°C
	HT		180°C	180°C	180°C
	NT	T4	130°C	130°C	130°C
	HT		130°C	130°C	130°C
	NT	T5	95°C	95°C	95°C
	HT		95°C	95°C	95°C
	NT	T6	80°C	80°C	40°C
	HT		80°C	80°C	20°C

* Low-temperature version (option)

NT standard version, T_{medium} maximum 130 °C (266 °F)

HT high-temperature version, T_{medium} maximum 180 °C (356 °F)

Thermally uninsulated: the sensor is not enclosed with pipe insulation material.

Thermally insulated: the sensor is enclosed with pipe insulation material.

Note

Cables for power supply, signal inputs and outputs must meet the following specifications:

- At an ambient temperature ≤ 50 °C the cable must be suited for at least 70 °C
- At an ambient temperature ≤ 60 °C the cable must be suited for at least 80 °C

Measuring medium temperature (Ex Data) for HygienicMaster Model FEH631**Dual-compartment housing****Single-compartment housing**

Nominal diameter	Design	Temperature class	Ambient temperature (-40 °C)* -20 °C to +40 °C	Ambient temperature (-40 °C)* -20 °C to +50 °C	Ambient temperature (-40 °C)* -20 °C to +60 °C
			thermally uninsulated, thermally insulated	thermally uninsulated, thermally insulated	thermally uninsulated, thermally insulated
			Gas & dust	Gas & dust	Gas & dust
DN3 to 2000	NT	T1	130°C	130°C	130°C
	HT		180°C	180°C	180°C
	NT	T2	130°C	130°C	130°C
	HT		180°C	180°C	180°C
	NT	T3	130°C	130°C	130°C
	HT		180°C	180°C	180°C
	NT	T4	130°C	130°C	130°C
	HT		130°C	130°C	130°C
	Note: The data below does not apply to Flowmeters equipped with the plug-in card for Ethernet communication (model code DR6)!				
	NT	T5	95°C	95°C	40°C** —***
	HT		95°C	95°C	—
	NT	T6	80°C	—	—
	HT		80°C	—	—

* Low-temperature version (option)

** Single-compartment housing

*** Dual-compartment housing

NT standard version, T_{medium} maximum 130 °C (266 °F)HT high-temperature version, T_{medium} maximum 180 °C (356 °F)

Thermally uninsulated: the sensor is not enclosed with pipe insulation material.

Thermally insulated: the sensor is enclosed with pipe insulation material.

Note

Cables for power supply, signal inputs and outputs must meet the following specifications:

With single-compartment housing

- At an ambient temperature of 50 °C the cable must be suited for at least 80 °C
- At an ambient temperature of 60 °C the cable must be suited for at least 90 °C

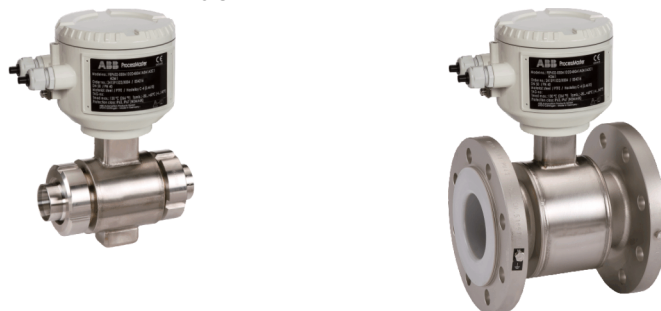
With dual-compartment housing

- At an ambient temperature of 50 °C the cable must be suited for at least 70 °C
- At an ambient temperature of 60 °C the cable must be suited for at least 80 °C

... 7 Operation in Zone 2, 22

... Temperature data

Measuring medium temperature (Ex Data) for HygienicMaster Model FEH632



Nominal diameter	Design	Temperature class	Ambient temperature (-40 °C)* -20 °C to +40 °C	Ambient temperature (-40 °C)* -20 °C to +50 °C	Ambient temperature (-40 °C)* -20 °C to +60 °C
			thermally uninsulated, thermally insulated	thermally uninsulated, thermally insulated	thermally uninsulated, thermally insulated
			Gas & dust	Gas & dust	Gas & dust
DN3 to 2000	NT	T1	130°C	130°C	130°C
	HT		180°C	180°C	180°C
	NT	T2	130°C	130°C	130°C
	HT		180°C	180°C	180°C
	NT	T3	130°C	130°C	130°C
	HT		180°C	180°C	180°C
	NT	T4	130°C	130°C	130°C
	HT		130°C	130°C	130°C
	NT	T5	95°C	95°C	95°C
	HT		95°C	95°C	95°C
	NT	T6	80°C	80°C	40°C
	HT		80°C	80°C	20°C

* Low-temperature version (option)

NT standard version, T_{medium} maximum 130 °C (266 °F)

HT high-temperature version, T_{medium} maximum 180 °C (356 °F)

Thermally uninsulated: the sensor is not enclosed with pipe insulation material.

Thermally insulated: the sensor is enclosed with pipe insulation material.

Note

Cables for power supply, signal inputs and outputs must meet the following specifications:

- At an ambient temperature ≤ 50 °C the cable must be suited for at least 70 °C
- At an ambient temperature ≤ 60 °C the cable must be suited for at least 80 °C

8 Commissioning

Checks before commissioning

The following items must be checked before commissioning:

- The power supply must be switched off.
- The power supply used must match the information on the name plate.
- The connection assignment must be set up in accordance with the electrical connection.
- Sensor and transmitter must be grounded properly.
- The temperature limit values must be observed.
- The transmitter must be installed at a location largely free of vibrations.
- The housing cover and cover lock must be sealed before powering-up the power supply.
- For devices with a remote mount design and a measuring accuracy of 0.2 % of the measured value, make sure that the sensor and the transmitter have been correctly assigned.
- For this purpose, the final characters X1, X2, etc. are printed on the name plates of the sensors. The final characters Y1, Y2, etc. are printed on the transmitters.
- Devices with final characters X1 / Y1 or X2 / Y2 belong together.
- Any unused glands should be sealed in accordance with IEC 60079 prior to commissioning using the plugs supplied. Also refer to Cable glands

Note

Commissioning and operation should be performed in accordance with ATEX 137 or BetrSichV - German Industrial Safety Regulation (EN60079-14). Only properly trained personnel are authorized to carry out commissioning in Ex areas.

Output configuration for NAMUR switching amplifier

Configuring the current output

Current output terminals 31 / 32 / Uco can be operated on-site in active or passive mode through appropriate switching.

Terminal Uco / 32	Current output 4 to 20 mA- / HART output, active
Terminal 31 / 32	Current output 4 to 20 mA- / HART output, passive

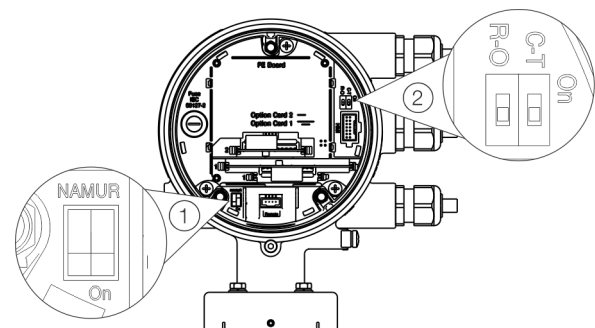
Configuring the digital outputs

In the case of the device version suited for operation in Ex Zone 1 (dual-compartment housing), digital outputs DO1 (41 / 42) and DO2 (51 / 52) can be configured for connection to a NAMUR switching amplifier.

On leaving the factory, the device is configured with the standard wiring (non-NAMUR).

Note

The outputs' type of protection remains unaffected by this. The devices connected to these outputs must conform to the applicable regulations for explosion protection.



① NAMUR DIP switch

② Write protection DIP switch

Figure 10: Position of the DIP switches

Configuration of digital outputs 41 / 42 and 51 / 52

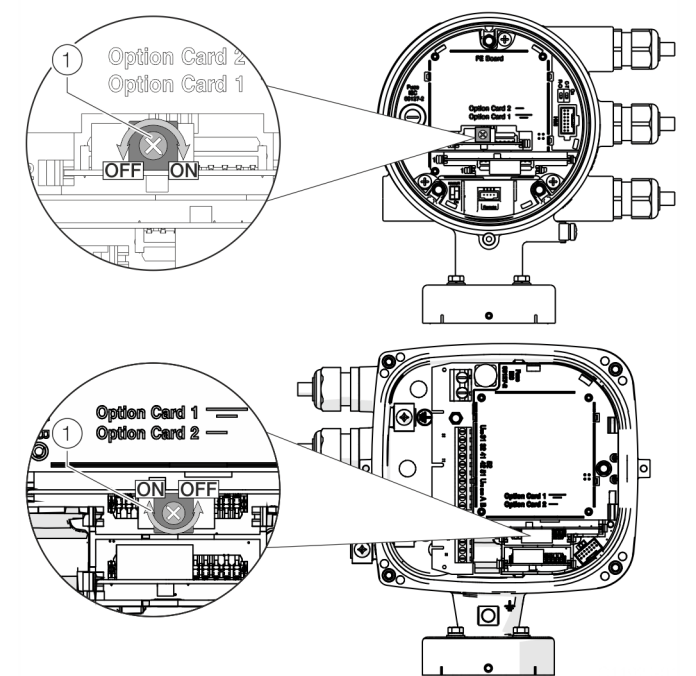
The configuration (NAMUR, optoelectronic coupler) for the digital outputs on the basic device is set via DIP switches in the transmitter.

Position	Function
On	Digital output 41 / 42 and 51 / 52 as NAMUR output.
Off	Digital output 41 / 42 and 51 / 52 as optoelectronic coupler output.

... 8 Commissioning

... Output configuration for NAMUR switching amplifier

Configuration of digital outputs V1 / V2 or V3 / V4



① NAMUR rotary switch

Figure 11: Position of rotary switch on the plug-in card

The configuration (NAMUR, optoelectronic coupler) for the digital output on the plug-in card is set via a rotary switch on the plug-in card.

Position	Function
On	Digital output V1 / V2 or V3 / V4 as NAMUR output.
Off	Digital output V1 / V2 or V3 / V4 as optoelectronic coupler output.

Configure the digital outputs as described:

1. Switch off the supply power and wait at least 20 minutes before the next step.
2. Loosen the cover lock, open the housing cover and move the switch to the desired position.
3. Close the housing cover lock by unscrewing the screw.

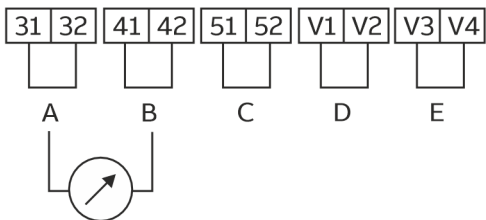
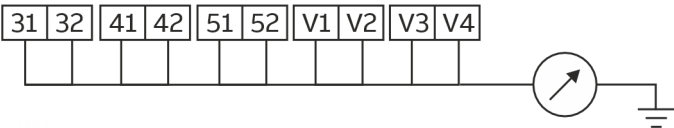
9 Changing the type of protection

If you are installing in Zone 1 / Div. 1, the current outputs and digital outputs can be operated with different types of protection:

- Current output and digital output in intrinsically safe ia / IS design
- Current output and digital output in non-intrinsically safe design

If a device which is already operational is required to provide a different type of protection, the following measures must be implemented/insulation checks must be performed in accordance with IEC 60079-ff.

A subsequent change of the type of protection is the responsibility of the operator.

Original installation	New installation	Required step/check
Zone 1 / Div 1: Current outputs and digital outputs in non-intrinsically safe design	Zone 1 / Div 1: Current outputs and digital outputs in intrinsically safe ia / IS design	<ul style="list-style-type: none"> • Switch off power supply. <p>Use 500 VAC or 710 V DC to take the following measurements for one minute:</p> <p>Bridge terminals 31 / 32, 41 / 42, 51 / 52.</p> <p>Then measure all jumpers (A,B,C, D, E) against each other.</p> 
		<ul style="list-style-type: none"> • Switch off power supply <p>Use 500 VAC or 710 V DC to take the following measurements for one minute:</p> <p>Bridge terminals 31 / 32, 41 / 42, 51 / 52/ V1 / V2 / V3 / V4.</p> <p>Then measure against the housing.</p> 
Zone 1 / Div 1: Current outputs and digital outputs in intrinsically safe ia(ib) / IS design	Zone 1 / Div 1: Current outputs and digital outputs in non-intrinsically safe design	<ul style="list-style-type: none"> • Visual inspection. • Visual inspection, no damage visible on the threads (cover, ½ in NPT cable glands).

10 Maintenance

Safety instructions

WARNING

Loss of Ex-approval!

Loss of Ex approval due to replacement of components in devices for use in potentially explosive atmospheres.

- Devices for use in potentially explosive atmospheres may be serviced and repaired by qualified ABB personnel only.
- For measuring devices for potentially explosive atmospheres, observe the relevant operator guidelines.

CAUTION

Risk of burns due to hot measuring media

The device surface temperature may exceed 70 °C (158 °F), depending on the measuring medium temperature!

- Before starting work on the device, make sure that it has cooled sufficiently.

Sensor

The flowmeter essentially requires no maintenance.

The following items should be checked annually:

- Ambient conditions (air circulation, humidity),
- Tightness of the process connections,
- Cable entries and cover screws,
- Operational reliability of the power supply, lightning protection, and station ground.

Cleaning

When cleaning the exterior of meters, make sure that the cleaning agent used does not corrode the housing surface and the seals.

To avoid static charge, a damp cloth must be used for cleaning.

11 Repair

Safety instructions

DANGER

Danger of explosion if the device is operated with the transmitter housing or terminal box open!

While using the device in potentially explosive atmospheres before opening the transmitter housing or the terminal box, note the following points:

- A valid fire permit must be present.
- Make sure that no flammable or hazardous atmospheres are present.

WARNING

Risk of injury due to live parts!

When the housing is open, contact protection is not provided and EMC protection is limited.

- Before opening the housing, switch off the power supply.

WARNING

Loss of Ex-approval!

Loss of Ex approval due to replacement of components in devices for use in potentially explosive atmospheres.

- Devices for use in potentially explosive atmospheres may be serviced and repaired by qualified ABB personnel only.
- For measuring devices for potentially explosive atmospheres, observe the relevant operator guidelines.

CAUTION

Risk of burns due to hot measuring media

The device surface temperature may exceed 70 °C (158 °F), depending on the measuring medium temperature!

- Before starting work on the device, make sure that it has cooled sufficiently.

NOTICE

Damage to components!

The electronic components of the printed circuit board can be damaged by static electricity (observe ESD guidelines).

- Make sure that the static electricity in your body is discharged before touching electronic components.

Spare parts

Repair and maintenance activities may only be performed by authorized customer service personnel.
When replacing or repairing individual components, use original spare parts.

Note

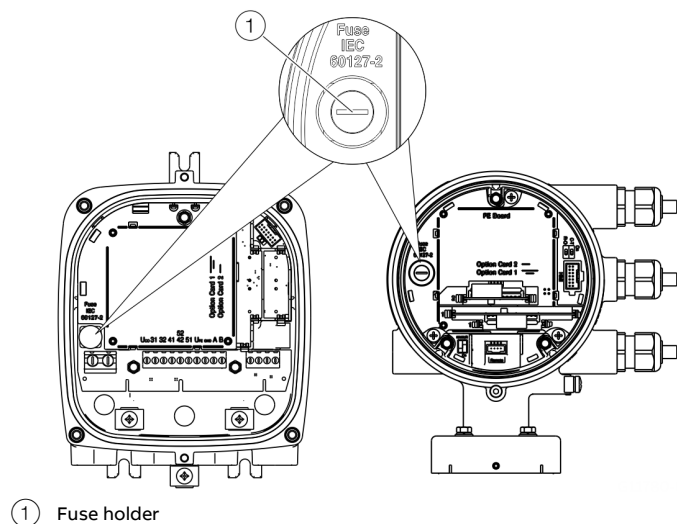
Spare parts can be ordered from ABB Service.

www.abb.com/contacts

Replacing the fuse

NOTICE

If the O-ring gasket is seated incorrectly or damaged, this may have an adverse effect on the housing protection class. Follow the instructions in **Opening and closing the housing** on page 15 to open and close the housing safely.



① Fuse holder

Figure 12: Fuse holder position

There is a fuse in the transmitter housing.

Power supply	16 to 30 V DC	100 to 240 V AC
transmitter		
Rated current of fuse	1.25 A	0.8 A
Nominal voltage of fuse	250 V AC	250 V AC
Design	Device fuse 5 x 20 mm	
Breaking capacity	1500 A at 250 V AC	
Ordering number	3KQR000757U0100	3KQR000757U0200

Perform the following steps to replace the fuse:

1. Switch off the power supply.
2. Open the transmitter housing.
3. Pull out the defective fuse and insert a new fuse.
4. Closing the transmitter housing.
5. Switch on the power supply.
6. Check that the device is working correctly.

If the fuse blows again on activation, the device is defective and must be replaced.

... 11 Repair

Replacing the frontend board

Integral mount design

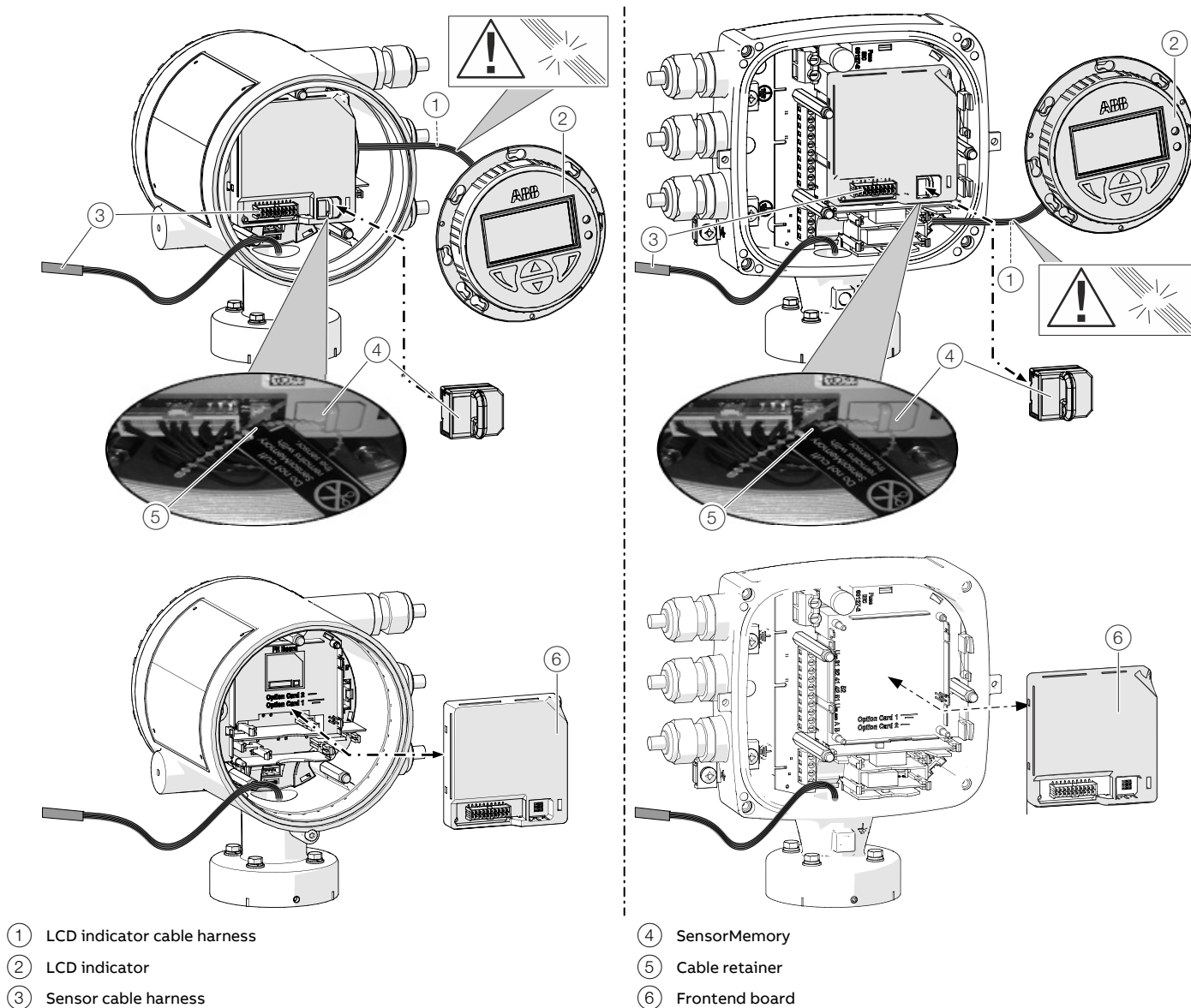


Figure 13: Replacing LCD indicator and frontend board (example)

NOTICE

If the O-ring gasket is seated incorrectly or damaged, this may have an adverse effect on the housing protection class. Follow the instructions in **Opening and closing the housing** on page 15 to open and close the housing safely.

In the event of a fault, the frontend board can be replaced on flowmeters with an integral mount design.

Replace the frontend board as follows:

1. Switch off the power supply.
2. Unscrew / remove the cover.
3. Remove the LCD indicator. Ensure that the cable harness is not damaged.
4. Pull the connector out of the sensor cable harness.
5. Pull out the SensorMemory.

Note

The SensorMemory is assigned to the sensor. The SensorMemory is therefore fastened to the sensor cable harness with a cable retainer.

Ensure that the SensorMemory remains with the sensor and cannot be lost!

6. Pull the faulty frontend board out forwards.
7. Insert new frontend board.
8. Attach connector from the sensor cable harness.
9. Attach the SensorMemory.
10. Insert the LCD indicator and screw on / replace the cover.
11. Once the power supply is switched on, load the system data from the SensorMemory.

... 11 Repair

... Replacing the frontend board

Remote mount design

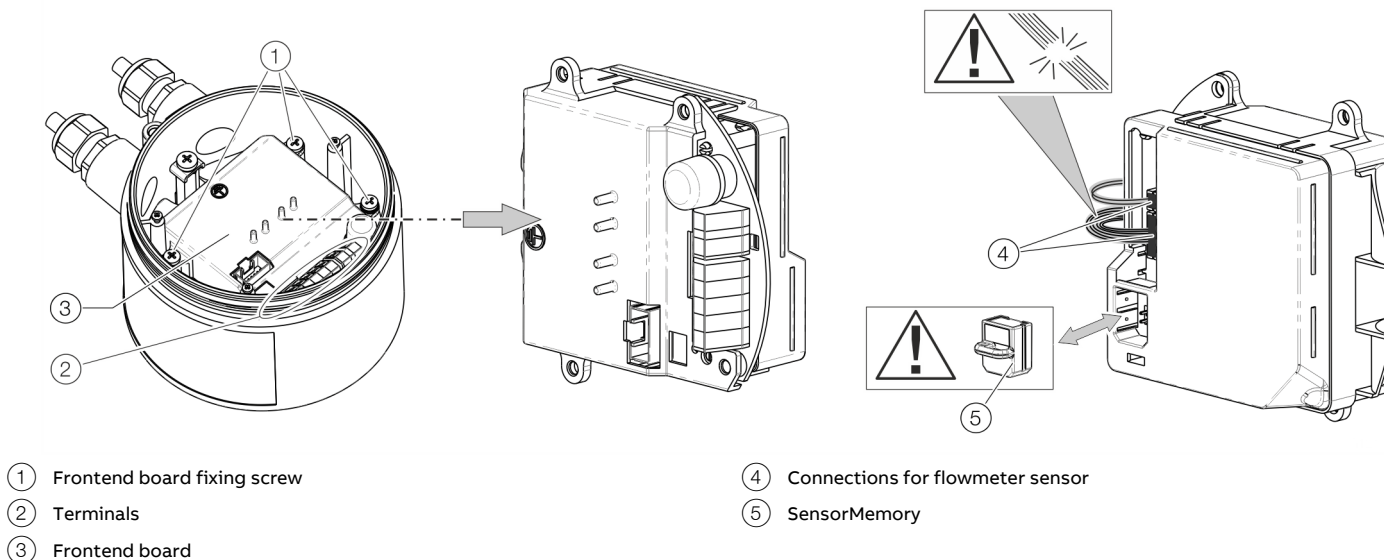


Figure 14: Replacing the frontend board (flowmeter sensor)

NOTICE

If the O-ring gasket is seated incorrectly or damaged, this may have an adverse effect on the housing protection class.
Follow the instructions in **Opening and closing the housing** on page 15 to open and close the housing safely.

The frontend board can be replaced in the event of a malfunction.

Replace the frontend board as follows:

1. Switch off the power supply.
2. Unscrew / remove the cover.
3. Loosen the fixing screws (3x) at the frontend board.
4. Remove the faulty frontend board.
5. Pull the connector out of the sensor cable harness. Ensure that the cable harness is not damaged.
6. Pull out the SensorMemory.

Note

The SensorMemory is assigned to the sensor. Ensure that the SensorMemory remains with the sensor and cannot be lost!

7. Insert the SensorMemory into the new frontend board.
8. Connect the plug of the sensor cable harness.
9. Insert the new frontend board and secure it with the fixing screws (3x).
10. After powering up the power supply, the transmitter automatically replicates the system data from the SensorMemory.

Replacing the sensor

WARNING

Risk of injury due to process conditions.

The process conditions, for example high pressures and temperatures, toxic and aggressive measuring media, can give rise to hazards when working on the device.

- Before working on the device, make sure that the process conditions do not pose any hazards.
- If necessary, wear suited personal protective equipment when working on the device.
- Depressurize and empty the device / piping, allow to cool and purge if necessary.

NOTICE

If the O-ring gasket is seated incorrectly or damaged, this may have an adverse effect on the housing protection class.

Follow the instructions in **Opening and closing the housing** on page 15 to open and close the housing safely.

Note

The frontend board of the replacement sensor has a SensorMemory module.

The calibration and system data of the sensor is stored in the SensorMemory.

After powering-up the power supply, the transmitter automatically replicates the system data from the SensorMemory.

Replace the sensor as described below:

1. Switch off the power supply.
2. Unscrew / remove the cover.
3. Disconnect the signal cable (if necessary, remove the potting compound).
4. Install the new sensor in accordance with **Installation** in der Betriebsanleitung.
5. Complete the electrical connection in accordance with the **Electrical connections** in der Betriebsanleitung.
6. Unscrew / set down the cover once again
7. After powering-up the power supply, the transmitter automatically replicates the system data from the SensorMemory.

Returning devices

Use the original packaging or a secure transport container of an appropriate type if you need to return the device for repair or recalibration purposes.

Fill out the return form (see **Return form** on page 49) and include this with the device.

In accordance with the EU Directive governing hazardous materials, the owner of hazardous waste is responsible for its disposal or must observe the following regulations for shipping purposes:

All devices delivered to ABB must be free from any hazardous materials (acids, alkalis, solvents, etc.).

12 Recycling and disposal

Dismounting

WARNING

Risk of injury due to process conditions.

The process conditions, for example high pressures and temperatures, toxic and aggressive measuring media, can give rise to hazards when dismantling the device.

- If necessary, wear suited personal protective equipment during disassembly.
- Before disassembly, make sure that the process conditions do not pose any safety risks.
- Depressurize and empty the device / piping, allow to cool and purge if necessary.

Bear the following points in mind when dismantling the device:

- Switch off the power supply.
- Disconnect electrical connections.
- Allow the device / piping to cool and depressurize and empty. Collect any escaping medium and dispose of it in accordance with environmental guidelines.
- Use suited tools to disassemble the device, taking the weight of the device into consideration.
- If the device is to be used at another location, the device should preferably be packaged in its original packing so that it cannot be damaged.
- Observe the notices in **Returning devices** on page 47.

Disposal

Note



Products that are marked with the adjacent symbol may **not** be disposed of as unsorted municipal waste (domestic waste).

They should be disposed of through separate collection of electric and electronic devices.

This product and its packaging are manufactured from materials that can be recycled by specialist recycling companies.

Bear the following points in mind when disposing of them:

- As of 8/15/2018, this product will be under the open scope of the WEEE Directive 2012/19/EU and relevant national laws (for example, ElektroG - Electrical Equipment Act - in Germany).
- The product must be supplied to a specialist recycling company. Do not use municipal waste collection points. These may be used for privately used products only in accordance with WEEE Directive 2012/19/EU.
- If there is no possibility to dispose of the old equipment properly, our Service can take care of its pick-up and disposal for a fee.

To find your local ABB service contact visit:

www.abb.com/contacts

or call +49 180 5 222 580

13 Additional documents

Note

All documentation, declarations of conformity, and certificates are available in ABB's download area.

www.abb.com/flow

Trademarks

EtherNet/IP is a trademark of ODVA Inc.

HART is a registered trademark of FieldComm Group, Austin, Texas, USA

Modbus is a registered trademark of Schneider Automation Inc.

PROFIBUS, PROFIBUS PA and PROFIBUS DP are registered trademarks of PROFIBUS & PROFINET International (PI)

14 Appendix

Return form

Statement on the contamination of devices and components

Repair and/or maintenance work will only be performed on devices and components if a statement form has been completed and submitted.

Otherwise, the device/component returned may be rejected. This statement form may only be completed and signed by authorized specialist personnel employed by the operator.

Customer details:

Company:

Address:

Contact person:

Telephone:

Fax:

Email:

Device details:

Type:

Serial no.:

Reason for the return/description of the defect:

Was this device used in conjunction with substances which pose a threat or risk to health?

☐ Yes ☐ No

If yes, which type of contamination (please place an X next to the applicable items):

☐ biological

☐ corrosive / irritating

☐ combustible (highly / extremely combustible)

☐ toxic

☐ explosive

☐ other toxic substances

☐ radioactive

Which substances have come into contact with the device?

1.

2.

3.

We hereby state that the devices/components shipped have been cleaned and are free from any dangerous or poisonous substances.

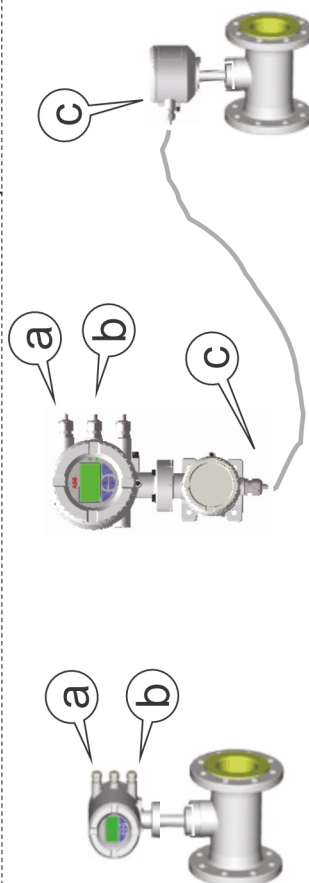
Town/city, date


Signature and company stamp

Installation diagram 3KXF000061G0009

Installation diagram FEP63_ / FEH63_ / FET63_

ORDINARY LOCATION GENERAL PURPOSE	HAZARDOUS LOCATION Zone 2/21	HAZARDOUS LOCATION Zone 1/21
ATEX: - IECEX: -	ATEX: II 3 G & II 2 D IECEX: Gc & Db US: NI / I / 2 / ABCD & DIP / II, III / 1 / EFG I / 2 / AEx nA & I / 21 AEx tb CDN: I / 2 / ABCD & II, III / 1 / EFG I / 2 / Ex nA & I / 21 Ex tb	ATEX: II 2/1 (1) G & II 2 (1) D II 2/1 G & II 2 D II 2 (1) G & II 2 (1) D IECEX: Gb/Ga (Ga) & Db (Da) Gb/Ga & Db Gb (Ga) & Db (Da) US: XP-IS / I / 1 / ABCD & DIP / II, III / 1 / EFG I / 1 / AEx ia mb tb & I / 21 / AEx ia ma tb CDN: XP-IS / I / 1 / ABCD & DIP / II, III / 1 / EFG I / 1 / Ex ia mb tb & I / 21 / Ex ia ma tb



For Model	FE_63_	Projection method 1	General tolerances: Work piece edges:	Tolerancing: Surface:
		ABB Automation Products GmbH 01 26.12.2016 FBU	Installation diagram FE_63	
05	03.12.2021	Summer	3KXFE000061G0009	
Drawn	Checked	Material	REF. BOM	
Number	Drawn	Material		
Drawn	Checked	Material		

POWER SUPPLY
Non IS
Terminals
max 250Vrms

SIGNAL DATA
INPUT/OUTPUT

“IS” or “ia” if
installed in Zone 1
or Division 1.
In Zone 1 or Division 1
intrinsically safe
supply required

31
32
U33
V3
V4
V1
V2
41
42
52
51

SENSOR SIGNALS

Connection
between sensor
and associated
FET63_ transmitter

(A) (B)
(UFE) (GRN)

<div>Notes: ATEX & IECEx application</div> <div><div>1. THE INTRINSIC SAFETY ENTITY CONCEPT ALLOWS THE INTERCONNECTION OF TWO ATEX/IECEx APPROVED INTRINSICALLY SAFE DEVICES WITH ENTITY PARAMETERS NOT SPECIFICALLY EXAMINED IN COMBINATION AS A SYSTEM WHEN: Uo OR Voc OR Vi < V MAX; Io OR loc OR It < I MAX; Ca OR Co > Ci + Ccable; La OR Lo > Li + Lcable; Po < Pi.</div><div>2. DUST-TIGHT CONDUIT SEAL MUST BE USED WHEN INSTALLED IN Zone 21/22 ENVIROMENTS.</div><div>3. CONTROL EQUIPMENT CONNECTED TO THE ASSOCIATED APPARATUS MUST NOT USE OR GENERATE MORE THAN 250 Vrms OR Vdc WITH RESPECT TO EARTH.</div><div>4. INSTALLATION SHOULD BE IN ACCORDANCE WITH THE RELEVANT INTERNATIONAL OR NATIONAL REGULATIONS „INSTALLATION OF INTRINSICALLY SAFE FOR HAZARDOUS LOCATIONS“ REGULATIONS.</div><div>5. THE CONFIGURATION OF ASSOCIATED APPARATUS MUST BE ATEX or IECEx APPROVED UNDER ENTITY CONCEPT.</div><div>6. ASSOCIATED APPARATUS MANUFACTURING INSTALLATION DRAWING MUST BE FOLLOWED WHEN INSTALLING THIS EQUIPMENT.</div><div>7. THE ASSOCIATED APPARATUS MUST BE INSTALLED IN ACCORDANCE WITH BARRIER MANUFACTURE'S INSTALLATION DIAGRAM</div><div>8. SELECTED ASSOCIATED APPARATUS MUST BE THIRD PARTY LISTED AS PROVIDING INTRINSICALLY SAFE CIRCUITS FOR THE APPLICATION. IT MUST MEET THE REQUIREMENTS LISTED IN TABLE OF THIS INSTALLATION DIAGRAM:</div></div>		<div>Notes: US and Canadian application</div> <div><div>1. THE INTRINSIC SAFETY ENTITY CONCEPT ALLOWS THE INTERCONNECTION OF TWO FM AND/OR CSA APPROVED INTRINSICALLY SAFE DEVICES WITH ENTITY PARAMETERS NOT SPECIFICALLY EXAMINED IN COMBINATION AS A SYSTEM WHEN: Uo OR Voc OR Vi < V MAX; Io OR loc OR It < I MAX; Ca OR Co > Ci + Ccable; La OR Lo > Li + Lcable; Po < Pi.</div><div>2. DUST-TIGHT CONDUIT SEAL MUST BE USED WHEN INSTALLED IN CLASS II AND III ENVIROMENTS.</div><div>3. CONTROL EQUIPMENT CONNECTED TO THE ASSOCIATED APPARATUS MUST NOT USE OR GENERATE MORE THAN 250 Vrms OR Vdc WITH RESPECT TO EARTH.</div><div>4. INSTALLATION FOR U.S. AND CANADIAN APPROVED EQUIPMENT SHOULD BE IN ACCORDANCE WITH ANSI/ISA RP12.6 „INSTALLATION OF INTRINSICALLY SAFE SYSTEMS FOR HAZARDOUS (CLASSIFIED) LOCATIONS“, THE NATIONAL ELECTRICAL CODE (ANSI/NFPA 70) SECTIONS 504, 505 AND THE CANADIAN ELECTRICAL CODE (C22.1-02).</div><div>5. THE CONFIGURATION OF ASSOCIATED APPARATUS MUST BE FM AND/OR CSA APPROVED UNDER ENTITY CONCEPT.</div><div>6. ASSOCIATED APPARATUS MANUFACTURING INSTALLATION DRAWING MUST BE FOLLOWED WHEN INSTALLING THIS EQUIPMENT.</div><div>7. THE ASSOCIATED APPARATUS MUST BE INSTALLED IN ACCORDANCE WITH BARRIER MANUFACTURE'S INSTALLATION DIAGRAM</div><div>8. SELECTED ASSOCIATED APPARATUS MUST BE THIRD PARTY LISTED AS PROVIDING INTRINSICALLY SAFE CIRCUITS FOR THE APPLICATION. IT MUST MEET THE REQUIREMENTS LISTED IN TABLE OF THIS INSTALLATION DIAGRAM:</div></div>	
<div>Diezes ist eine zertifizierte Zeichnung Änderungen nur mit Zustimmung der Prüfstelle THIS IS A CERTIFIED DRAWING REVISIONS ONLY WITH APPROVAL OF THE NOTIFIED BODY</div>		<div>For Model FE_63_</div> <div><div>ABB</div><div>ABB Automation Products GmbH</div><div>01 20.12.2016 FBU</div><div>05 03.12.2021 Summer</div><div>Rev. Date Number Name</div><div>Replaces:</div></div> <div>General tolerances: Work piece edges</div> <div>Tolerancing Surface</div> <div>Installation diagram FE_63</div> <div>3KXF000061G0009</div> <div>Material Ref. BOM</div>	
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... 14Appendix

... Installation diagram 3KXF000061G0009

Model code
FEa63dY0
FEa63dA2
FEa63dF2
Communication

HART Modbus Profibus DP PA Ethernet

Zone 2/21 & Division 2

Indication	Abbr.	Status Active or Passive	Option Chosen Option depending on Model Number (MN)	Terminal If "or" occurs Terminal depends on MN	Operating Value			
					U _{nom} [V]	I _{nom} [mA]	U _{nom} [V]	Ex nA /ec / NI I _{nom} [mA]
On board								
Current Output 1	CO1	A	On board Power Supply	31/U _{co}	30	30	30	30
Current Output 1	CO1	P		31/32	30	30	30	30
Digital Output 1	DO1	A	With OC Active Supply	41/42 and V1/V2	30	30	30	30
Digital Output 1	DO1	P		41/42	30	30	30	30
Digital Output 2	DO2	A	With OC Active Supply	51/52 and V1/V2	30	30	30	30
Digital Output 2	DO2	P		51/52	30	30	30	30
Option Cards (OC)								
V1/V2 and V3/V4								
Current Output 2	CO2	A	With OC Active Supply	V1/V2 and V3/V4	30	30	30	30
Current Output 2	CO2	P		V1/V2 or V3/V4	30	30	30	30
Current Output 3	CO3	P		V1/V2 or V3/V4	30	30	30	30
V1/V2 and V3/V4								
Digital Output 3	DO3	A	With OC Active Supply	V1/V2 and V3/V4	30	30	30	30
Digital Output 3	DO3	P		V1/V2 or V3/V4	30	30	30	30
V1/V2 and V3/V4								
Digital Input 1	DI1	A	With OC Active Supply	V1/V2 and V3/V4	30	3,45	30	3,45
Digital Input 1	DI1	P		V1/V2 or V3/V4	30	3,45	30	3,45
Modbus / Profibus DP								
Profibus PA	---	A		V1/V2	32	30	32	30
Ethernet Modul	---	A		X1...X8	57	417	57	417
Power over Ethernet PoE	---	A		---	57	417	57	417

Dieses ist eine zertifizierte Zeichnung
Änderungen nur mit Zustimmung der Prüfstelle
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For Model
FE_63_

Projection method 1
ABB Automation Products GmbH
Date
01 20.12.2016
FBU

General tolerances:
Work piece edges
Tolerancing
Surface

Installation diagram FE_63

Rev. Date Number Name
05 03.12.2021 Summer
Replaces:

3KXF000061G0009

PAGE 3 OF 12

Zone 1/21 & Division 1

Model code

FEa63dA1

FEa63dF1

HART Modbus Profibus DP PA Ethernet Communication

Indication	Abbr.	Status Active or Passive	Option Chosen Option depending on Model Number (MN)	Terminal If "or" occurs Terminal depends on MN	Operating Value														
					Ex e / XP					Ex ia / IS									
					U _M [V]	I _M [A]	U ₀ [V]	U ₁ [V]	I ₀ [mA]	I ₁ [mA]	P ₀ [mW]	P ₁ [mW]	C ₀ [nF]	C ₁ [nF]	C _{0PA} [nF]	C _{1PA} [nF]	L ₀ [mH]	L ₁ [mH]	
On board																			
Current Output 1	CO1	A	On board Power Supply	31/U _{CO}	30	0,2	30	30	115	115	815	815	10	10	5	5	0,08	0,08	
Current Output 1	CO1	P		31/32	30	0,2	-	30	-	115	-	815	-	27	-	5	0,08	0,08	
Digital Output 1	DO1	A	With OC Active Supply	41/42 and V1/V2	30	0,1	27,8	30	119	30	826	225	20	20	29	29	0,22	0,22	
Digital Output 1	DO1	P		41/42	30	0,1	-	30	-	30	-	225	-	27	-	5	-	0,08	
Digital Output 2	DO2	A	With OC Active Supply	51/52 and V1/V2	30	0,1	27,8	30	119	30	826	225	20	20	29	29	0,22	0,22	
Digital Output 2	DO2	P		51/52	30	0,1	-	30	-	30	-	225	-	27	-	5	-	0,08	
Option Cards (OC)																			
Current Output 2	CO2	A	With OC Active Supply	V1/V2 and V3/V4	30	0,1	27,8	30	119	30	826	225	29	29	117	117	0,4	0,4	
Current Output 2	CO2	P		V1/V2 or V3/V4	30	0,1	-	30	-	68	-	510	-	45	-	59	-	0,27	
Current Output 3	CO3	P		V1/V2 or V3/V4	30	0,1	-	30	-	68	-	510	-	45	-	59	-	0,27	
Digital Output 3	DO3	A	With OC Active Supply	V1/V2 and V3/V4	30	0,1	27,8	30	119	68	826	225	17	17	31	31	0,4	0,4	
Digital Output 3	DO3	P		V1/V2 or V3/V4	30	0,1	-	30	-	30	-	225	-	13	-	16	-	0,27	
Digital Input 1	DI1	A	With OC Active Supply	V1/V2 and V3/V4	30	0,1	27,8	30	119	3,45	826	25,8	17	17	31	31	0,4	0,4	
Digital Input 1	DI1	P		V1/V2 or V3/V4	30	0,1	-	30	-	3,45	-	25,8	-	13	-	16	-	0,27	
Modbus / Profibus DP	---	A		V1/V2	30	0,1	4,2	4,2	150	150	150	150	5300	5300	0,06	0,06	0,09	0,09	
Profibus PA	---	A		V1/V2	30	0,38		30V		100		815							
Ethernet Modul	---	---	not available				17,5V	Ä FIS	380(F	ISCO)	5320(FISCO)		4		0	0,008		
Power over Ethernet	---	---	not available																
PoE	---	---	not available																

ABB

ABB Automation Products GmbH

Date
01 20.12.2016 FBU

Drawn by
Checked by

Rev. 05 03.12.2021 Summer

Number

Name

Replaces:

For Model
FE_63_

Projection method 1

General tolerances:
Work piece edges

Tolerancing
Surface

Installation diagram FE_63

3KXF000061 G0009

Rev. 05 03.12.2021 Summer

Number

Name

Replaces:

Revisions only with approval of the notified body

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... 14Appendix

... Installation diagram 3KXF000061G0009

Model number				On Board Input-/ Output			Slot1		Slot2	
Output	Optional Add1	Optional Add2	Current Output CO1 Terminal	Digital Output DO1 Terminal	Digital Output DO2 Terminal	Option Card	Terminal	Option Card	Terminal	
G0	---	---	31/ 32/ Uco	41/ 42	51/ 52	---	---	---	---	
G1	---	---	31/ 32/ Uco	41/ 42	51/ 52	AS *	V1/ V2	---	V3/ V4	
G2	---	---	31/ 32/ Uco	41/ 42	51/ 52	---	---	CO2	V3/ V4	
G3	---	---	31/ 32/ Uco	41/ 42	51/ 52	CO2	V1/ V2	CO3	V3/ V4	
G4	---	---	31/ 32/ Uco	41/ 42	51/ 52	AS	V1/ V2	CO2	V3/ V4	
G5	---	---	31/ 32/ Uco	41/ 42	51/ 52	DI1	V1/ V2	CO2	V3/ V4	
G6	---	---	31/ 32/ Uco	41/ 42	51/ 52	DO3	V1/ V2	---	---	
G7	---	---	31/ 32/ Uco	41/ 42	51/ 52	DI1	V1/ V2	DO3	V3/ V4	
G8	---	---	31/ 32/ Uco	41/ 42	51/ 52	DI1	V1/ V2	---	---	
G9	---	---	31/ 32/ Uco	41/ 42	51/ 52	AS	V1/ V2	DI1	V3/ V4	
M5	---	---	31/ 32/ Uco	41/ 42	51/ 52	MODBUS	V1/ V2	---	---	
D1	---	---	31/ 32/ Uco	41/ 42	51/ 52	PROFIBUS DP	V1/ V2	---	---	
P1	---	---	31/ 32/ Uco	41/ 42	51/ 52	PROFIBUS PA	V1/ V2	---	---	
E1	---	---	31/ 32/ Uco	41/ 42	51/ 52	Ethernet 1x Port	X1...X4	---	---	
E2	---	---	31/ 32/ Uco	41/ 42	51/ 52	Ethernet 2x Port	X1...X4 X5...X8	---	---	
E3	---	---	31/ 32/ Uco	41/ 42	51/ 52	Ethernet 1x Port	X1...X4	PoE	Internal bridge (V34 to 1+2)	

Safety Warning:
The option card AS (Active Supply) is only suitable for use with internal option cards. The use of external circuits is not allowed.
Sicherheitshinweis:
Die Optionskarte AS (Active Supply) ist nur für die Verwendung mit internen Optionskarten geeignet. Der Einsatz mit externen Schaltkreisen ist nicht erlaubt.

Summary of model numbers, option cards and the corresponding customer connections / terminals

ABB

ABB Automation Products GmbH

05.03.2021 Summer

01.2012.2016 FBu

3KXF000061G0009

Rev. Date Number Name

Replaces:

For Model FE_63_

Projection method 1

General tolerances:
Work piece edges

Tolerancing:
Surface

Installation diagram FE_63

3KXF000061G0009

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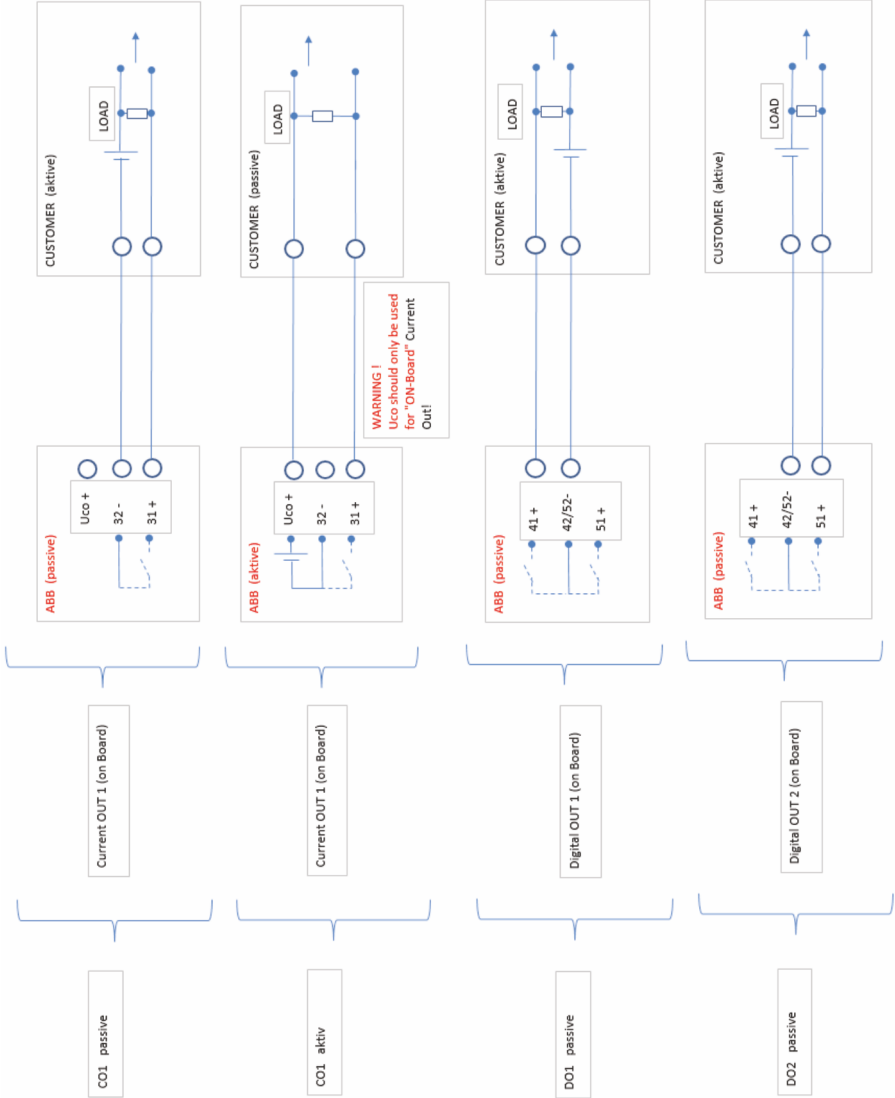
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Allowed I/O connections and OPTION CARD handling:



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For Model	FE_63_	Projection method: 1	General tolerances: Work piece edges.	Tolerancing: Surface:
ABB		ABB Automation Products GmbH	Installation diagram FE_63	
Rev.	Date	Number	Name	Material
05	03.12.2021	Summer	01 20.12.2016 FBu	3KXF0000061G0009
Checked per Sisd.	Checked	Drawn by	Date	Ref. BOM
Replaces:				

... 14Appendix

... Installation diagram 3KXF000061G0009

DO1 aktive

Digital OUT 1 (on Board)

Active Supply (Option Card) (SLOT 1)

ABB (passive)

41 +
42/52-
51 +

ABB (aktive)

V1 +
V2 -

max. 30mA

WARNING !
V1/V2 should only be used even for 41/42 or 51/52, but never for both together!

CUSTOMER (passive)

LOAD

DO2 aktive

Digital OUT 2 (on Board)

Active Supply (Option Card) (SLOT 1)

ABB (passive)

41 +
42/52-
51 +

ABB (aktive)

V1 +
V2 -

max. 30mA

WARNING !
V1/V2 should only be used even for 41/42 or 51/52, but never for both together!

CUSTOMER (passive)

LOAD

For Model

FE_63_

Projection method 1

ABB

ABB Automation Products GmbH

Date

01 20.12.2016

Name

FBU

General tolerances:

Work piece edges

Tolerancing:

Surface:

Installation diagram FE_63

3KXF000061G0009

Material

Ref. BOM

Rev.

Date

Number

Name

Replaces:

05

03.12.2021

Summer

Checked per Sld

01

20.12.2016

FBU

Rev.

Date

Number

Name

Replaces:

05

03.12.2021

Summer

Checked per Sld

01

20.12.2016

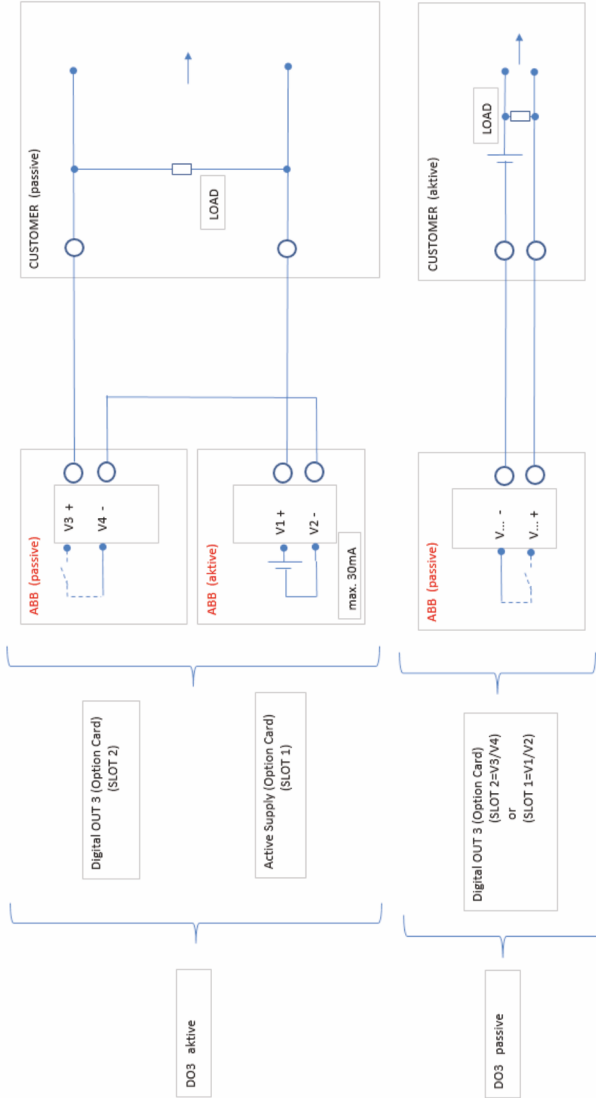
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PAGE 7 OF 12

Allowed I/O connections and OPTION CARD handling:



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ABB		ABB Automation Products GmbH	Installation diagram FE_63	
Rev.	Date	Number	Name	Material
05	03.12.2021	Summer	01 20.12.2016 FBu	3KXF0000061G0009
Checked per Std.		Ref. BOM		
Replaces:				

... 14Appendix

... Installation diagram 3KXF000061G0009

CO2 aktive

Current OUT 2 (Option Card)
(SLOT 2)

ABB (passive)
V3 +
V4 -

CUSTOMER (passive)

Active Supply (Option Card)
(SLOT 1)

ABB (aktive)
V1 +
V2 -
max. 30mA

CUSTOMER (active)

CO2 passive

Current OUT 2 (Option Card)
(SLOT 2=V3/V4)
or
(SLOT 1=V1/V2)

ABB (passive)
V... -
V... +

CUSTOMER (active)

For Model
FE_63_

ABB
ABB Automation Products GmbH
Date
01 20.12.2016
FBU

Checked per Sld
05 03.12.2021
Summer

Rev. Date Number Name

Projection method 1

General tolerances:
Work piece edges

Tolerancing:
Surface

Installation diagram FE_63

3KXF000061G0009

Material
Ref. BOM

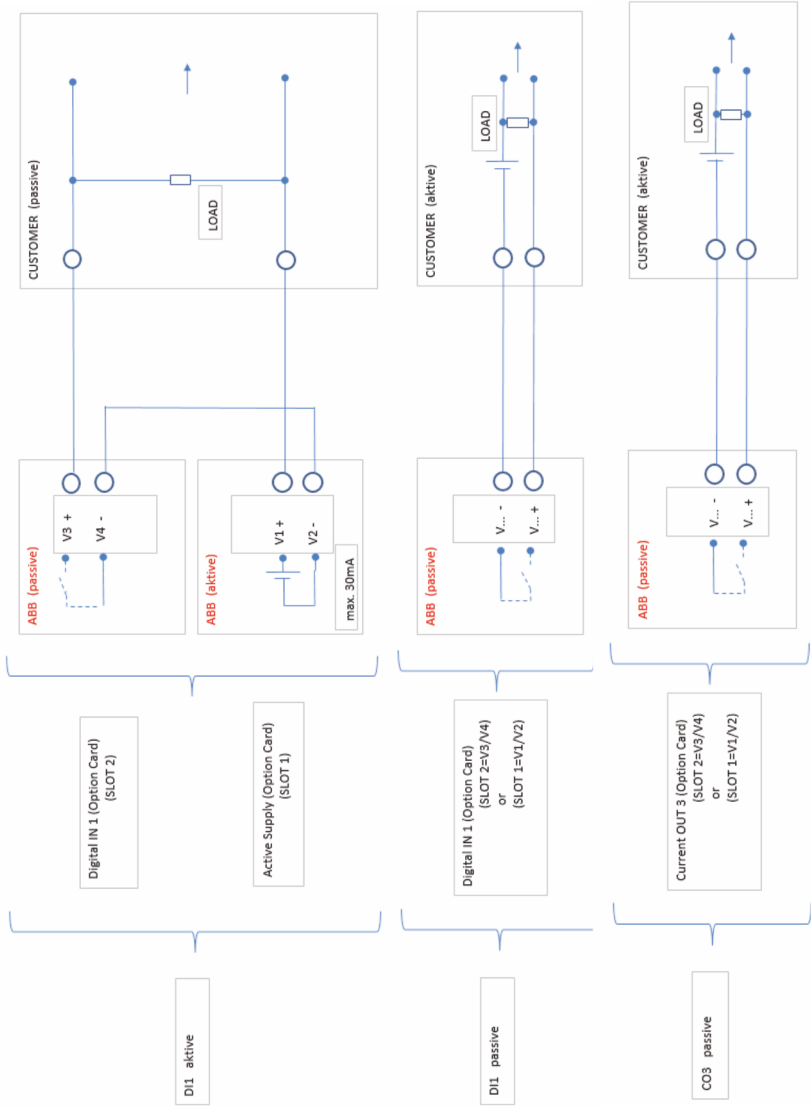
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ABB		ABB Automation Products GmbH	Installation diagram FE_63	
Rev.	Date	Number	Name	Material
05	03.12.2021	Summer		3KXF0000061G0009
Checked per Sld		Rev. B/W		
Replaces:				

... 14Appendix

... Installation diagram 3KXF000061G0009

Allowed I/O connections and OPTION CARD handling:

ABB (active)

Uco +
32 -
31 +

Current OUT 1 (on Board)

ABB (passive)

41 +
42/52 -
51 +

Digital OUT 1 (on Board)

DO1 active

WARNING !
Uco should only be used
for „On-board“ Digital Out!

ABB (active)

V1 +
V2 -

Modbus / Profibus DP /
Profibus PA

CUSTOMER (passive)

LOAD

ABB (active)

V1 +
V2 -

Modbus / Profibus DP /
Profibus PA

CUSTOMER (passive)

LOAD

For Model: FE_63_

Projection method: 1

General tolerances:
Work piece edges

Tolerancing:
Surface

ABB

ABB Automation Products GmbH

Date: 01.20.12.2016

Name: FBu

Checked per Std:

05.03.12.2021

Summer

Rev.: 05

Number:

Name:

Replaces:

Installation diagram FE_63

3KXF000061G0009

Material:

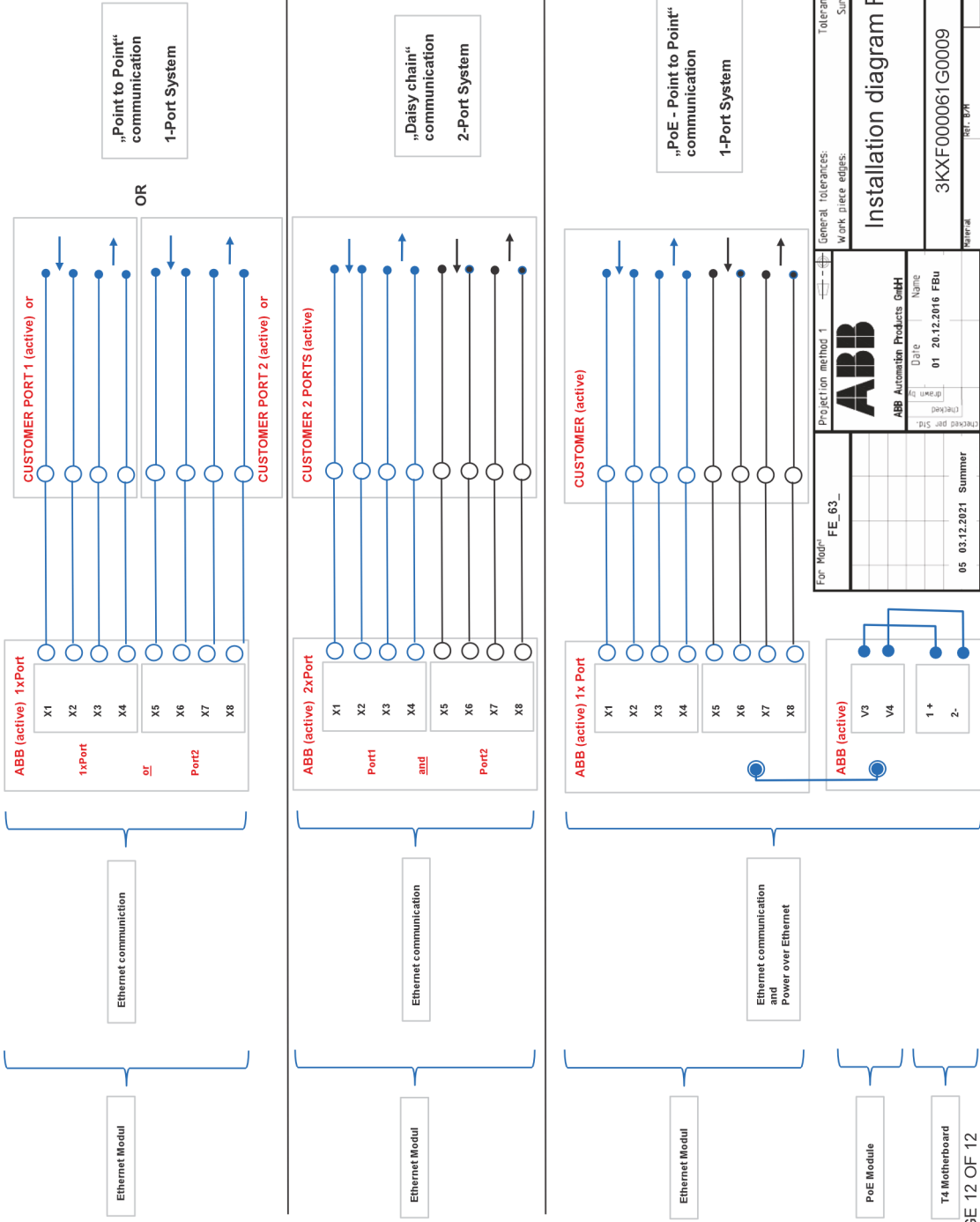
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Allowed I/O connections and OPTION CARD handling:



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		01	20.12.2016	
Replaces:				

Notes

Notes

ABB Measurement & Analytics

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