ProcessMaster FEP630, HygienicMaster FEH630
Electromagnetic flowmeter

Safety instructions FM / cFM Div. 1, Div. 2

Measurement made easy

This document forms an integral part of the following manuals:
- Operating instruction OI/FEP630/FEH630-EN
- Commissioning instruction CI/FEP630/FEH630-EN

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:
Table of contents

1 Safety ................................................................. 3
   General information and instructions .................. 3
   Warnings ............................................................ 3
   Improper use ....................................................... 4
   Notes on data safety .......................................... 4
   Warranty provisions ........................................... 4

2 Device designs .................................................. 5
   Version in integral mount design ....................... 6
      DIV. 1 ................................................................ 6
      DIV. 2 ................................................................ 7
   Version with remote mount design ................. 8
      DIV. 1 ................................................................ 8
      Div. 2 .................................................................. 9
   Overview: The fast track to explosion protection device data .................................................. 11

3 Name plate .......................................................... 11
   Device identification – name plate ..................... 11

4 Housing .............................................................. 12
   Opening and closing the housing .................... 12
      Dual-compartment housing ........................... 12
      Single-compartment housing ...................... 13
   Rotating the transmitter housing and LCD display ... 13
   Installation instructions .................................... 14
      cFMus ............................................................. 14
   Use in areas exposed to combustible dust .......... 14
   Electrical connections ...................................... 15
   Process sealing ................................................ 15
   High temperature design .................................. 16

5 Installing the plug-in cards ..................... 17

6 Operation in Div. 1 ......................................... 18
   Electrical connections ...................................... 18
   Electric data for operation in Div. 1 ................. 19
      Devices with HART protocol ....................... 19
      Special connection conditions .................... 21
      Protection against electrostatic discharges ... 21
   Repair ............................................................... 21
   Temperature data ............................................. 22
      Surface temperature ...................................... 22
      Measuring medium temperature as a function of liner and flange material ..................... 22
   Measuring medium temperature (Ex Data) for ProcessMaster Model FEP631 .................... 23
   Measuring medium temperature (Ex Data) for ProcessMaster Model FEP632 .................... 24
   Measuring medium temperature (Ex Data) for HygienicMaster Model FEH631 .................... 25

7 Operation in Div. 2 ......................................... 27
   Electrical connections ...................................... 27
   Electric data for operation in Div. 2 ................. 29
      Devices with HART protocol ....................... 29
      Special connection conditions .................... 30
      Protection against electrostatic discharges ... 30
   Temperature data ............................................. 30
      Surface temperature ...................................... 30
   Measuring medium temperature as a function of liner and flange material ..................... 31
   Measuring medium temperature (Ex Data) for ProcessMaster Model FEP631 .................... 32
   Measuring medium temperature (Ex Data) for ProcessMaster Model FEP632 .................... 34
   Measuring medium temperature (Ex Data) for HygienicMaster Model FEH631 .................... 35
   Measuring medium temperature (Ex Data) for HygienicMaster Model FEH632 .................... 37

8 Commissioning .............................................. 38
   Checks before commissioning ......................... 38
   Output configuration for NAMUR switching amplifier .................................................. 38
   Configuring the current output ....................... 38
   Configuring the digital outputs ....................... 38

9 Changing the type of protection ................. 40

10 Maintenance .................................................. 41
   Sensor ............................................................. 41
   Cleaning .......................................................... 41

11 Repair .............................................................. 41
   Safety instructions .......................................... 41
   Spare parts ....................................................... 42
   Replacing the fuse .......................................... 42
   Replacing the frontend board ......................... 43
   Integral mount design .................................... 43
   Remote mount design .................................... 45
   Replacing the sensor ....................................... 46
   Returning devices .......................................... 46

12 Recycling and disposal .............................. 47
   Dismounting .................................................... 47
   Disposal .......................................................... 47

13 Additional documents ................................. 47

14 Appendix .......................................................... 48
   Return form ....................................................... 48
   Installation diagram 3KXF000061G0009 ............... 49
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.
1 Safety

Warnings

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 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.

Notes on data safety

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 Automation Products GmbH 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.

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.
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  |  |

<table>
<thead>
<tr>
<th>Explosion protection</th>
</tr>
</thead>
<tbody>
<tr>
<td>Without Y0</td>
</tr>
<tr>
<td>ATEX / IECEx (Zone 1 / 21) A1</td>
</tr>
<tr>
<td>ATEX / IECEx (Zone 2 / 22) A2</td>
</tr>
<tr>
<td>cFMus Class I, II, III Div. 1 (Zone 1 / 21)) F1</td>
</tr>
<tr>
<td>cFMus Class I, II, III Div. 2 (Zone 2 / 22) F2</td>
</tr>
<tr>
<td>NEPSI (Zone 1 / 21) S1</td>
</tr>
<tr>
<td>NEPSI (Zone 2 / 22) S2</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Design / terminal box material / cable glands</th>
</tr>
</thead>
<tbody>
<tr>
<td>Single-compartment / aluminum / M20 x 1.5 S1</td>
</tr>
<tr>
<td>Single-compartment / Aluminum / NPT ½ in S2</td>
</tr>
<tr>
<td>Dual-compartment / aluminum / M20 x 1.5 D1</td>
</tr>
<tr>
<td>Dual-compartment / Aluminum / NPT ½ in D2</td>
</tr>
<tr>
<td>Dual-compartment / stainless steel / M20 x 1.5 D3</td>
</tr>
<tr>
<td>Dual-compartment / stainless steel / NPT ½ in D4</td>
</tr>
<tr>
<td>Dual-compartment / aluminum / M20 x 1.5 (Ex ‘d’ cable gland) D6</td>
</tr>
<tr>
<td>Dual-compartment / stainless steel / M20 x 1.5 (Ex ‘d’ cable gland) D8</td>
</tr>
<tr>
<td>Remote mount / aluminum / M20 x 1.5 A1</td>
</tr>
<tr>
<td>Remote mount / Aluminum / NPT ½ in A2</td>
</tr>
<tr>
<td>Field mount housing / single-compartment / aluminum / M20 x 1.5 F1</td>
</tr>
<tr>
<td>Field mount housing / single-compartment / aluminum / NPT ½ in F2</td>
</tr>
<tr>
<td>Wall-mount housing / dual-compartment / aluminum / M20 x 1.5 W1</td>
</tr>
<tr>
<td>Wall-mount housing / dual-compartment / Aluminum / NPT ½ in W2</td>
</tr>
<tr>
<td>Wall-mount housing / dual-compartment / stainless steel / M20 x 1.5 W3</td>
</tr>
<tr>
<td>Wall-mount housing / dual-compartment / stainless steel / NPT ½ in W4</td>
</tr>
<tr>
<td>Wall-mount housing / dual-compartment / aluminum / M20 x 1.5 (Ex ‘d’ cable gland) W5</td>
</tr>
<tr>
<td>Wall-mount housing / dual-compartment / stainless steel / M20 x 1.5 (Ex ‘d’ cable gland) W7</td>
</tr>
</tbody>
</table>

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 CI I Div. 2
  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 CI I Div. 1
  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.

DIV. 1

<table>
<thead>
<tr>
<th>Sensor</th>
<th>ProcessMaster 630</th>
<th>HygienicMaster 630</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>FEP631-F1</td>
<td>FEH631-F1</td>
</tr>
<tr>
<td>Div. 1</td>
<td></td>
<td>Div. 1</td>
</tr>
</tbody>
</table>

USA, FM approval
Certificate: FM17US0062X
DN3-300:
S-XP-IS: CL I, Div 1, GPS ABCD T6...T1
DIP: CL II,III, Div 1, GPS EFG T6...T3B
>DN300:
CL I, ZN 1, AEx db eb mb [ia Ga] IIC T6...T1 Gb
ZN 21, AEx tb [ia Da] IIIC T80°C...T165°C Db

Canada, FM approval
Certificate: FM17CA0033X
DN3-300:
S-XP-IS: CL I, Div 1, GPS BCD T6...T1
DIP: CL II,III, Div 1, GPS EFG T6...T3B
>DN300:
CL I, ZN 1, Ex db eb mb [ia Ga] IIC T6...T1 Gb
Ex tb [ia Da] IIIC T80°C...T165°C Db

USA, FM approval
Certificate: FM17US0062X
DN3-100:
S-XP-IS: CL I, Div 1, GPS ABCD T6...T1
DIP: CL II,III, Div 1, GPS EFG T6...T3B

Canada, cFM approval
Certificate: FM17CA0033X
DN3-100:
S-XP-IS: CL I, Div 1, GPS BCD T6...T1
DIP: CL II,III, Div 1, GPS EFG T6...T3B
## DIV. 2

### Sensor

<table>
<thead>
<tr>
<th>ProcessMaster 630</th>
<th>HygienicMaster 630</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>FEP631-F2</strong></td>
<td><strong>FEH631-F2</strong></td>
</tr>
<tr>
<td>Div. 2</td>
<td>Div. 2</td>
</tr>
</tbody>
</table>

* Single-compartment housing

** Dual-compartment housing

### USA, FM approval

<table>
<thead>
<tr>
<th>Certificate: FM17US0062X</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ni: CL I, Div 2, GPS ABCD T6...T1</td>
</tr>
<tr>
<td>DIP: CL II,III, Div 2, GPS EFG T6...T3B</td>
</tr>
<tr>
<td>CL I, ZN 2, AEx ec IIC T6...T1</td>
</tr>
<tr>
<td>ZN 21, AEx tb IIIC T80°C...T165°C</td>
</tr>
</tbody>
</table>

### Canada, cFM approval

<table>
<thead>
<tr>
<th>Certificate: FM17CA0033X</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ni: CL I, Div 2, GPS ABCD T6...T1</td>
</tr>
<tr>
<td>DIP: CL II,III, Div 2, GPS EFG T6...T3B</td>
</tr>
<tr>
<td>CL I, ZN 2, Ex ec IIC T6...T1 Gc</td>
</tr>
<tr>
<td>Ex tb IIIC T80°C...T165°C Db</td>
</tr>
</tbody>
</table>

### USA, FM approval

<table>
<thead>
<tr>
<th>Certificate: FM17US0062X</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ni: CL I, Div 2, GPS ABCD T6...T1</td>
</tr>
<tr>
<td>DIP: CL II,III, Div 2, GPS EFG T6...T3B</td>
</tr>
<tr>
<td>CL I, ZN 2, AEx ec IIC T6...T1</td>
</tr>
<tr>
<td>ZN 21, AEx tb IIIC T80°C...T165°C</td>
</tr>
</tbody>
</table>

### Canada, cFM approval

<table>
<thead>
<tr>
<th>Certificate: FM17CA0033X</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ni: CL I, Div 2, GPS ABCD T6...T1</td>
</tr>
<tr>
<td>DIP: CL II,III, Div 2, GPS EFG T6...T3B</td>
</tr>
<tr>
<td>CL I, ZN 2, Ex ec IIC T6...T1 Gc</td>
</tr>
<tr>
<td>Ex tb IIIC T80°C...T165°C Db</td>
</tr>
</tbody>
</table>
... 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.

DIV. 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.

<table>
<thead>
<tr>
<th>Sensor</th>
<th>ProcessMaster 630</th>
<th>HygienicMaster 630</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>FEP632-F1</td>
<td>FEH632-F1</td>
</tr>
<tr>
<td>in Ex area, Div. 1</td>
<td></td>
<td>in Ex area, Div. 1</td>
</tr>
</tbody>
</table>

**USA, FM approval**

- DN3-300: S-XP-5: CL I, Div 1, GPS BCD T6...T1
- DIP: CL II,III, Div 1, GPS EFG T6...T3B
- >DN300: CL I, ZN 1, AEx db eb mb [la Ga] IIIB+H2 T6...T1 Gb
- ZN 21, AEx tb [la Da] IIIC T80°C...T165°C Db

**Canada, cFM approval**

- Certificate: FM17CA0033X
- DN3-300: S-XP: CL I, Div 1, GPS BCD T6...T1
- DIP: CL II,III, Div 1, GPS EFG T6...T3B
- >DN300: CL I, ZN 1, Ex db eb mb IIIB+H2 T6...T1 Gb
- Ex tb IIIC T80°C...T165°C Db
ProcessMaster FEP630, HygienicMaster FEH630  ELECTROMAGNETIC FLOWMETER  | SI/FEP630/FEH630/FM/CSA-EN REV. A

<table>
<thead>
<tr>
<th>Sensor</th>
</tr>
</thead>
<tbody>
<tr>
<td>Transmitter</td>
</tr>
<tr>
<td>FET632-F1</td>
</tr>
<tr>
<td>in Ex area, Div. 1</td>
</tr>
</tbody>
</table>

* Single-compartment housing
** Dual-compartment housing

USA, FM approval
Certificate: FM17US0062X
XP-IS: CL I, Div 1, GPS BCD T6
DIP: CL II,III, Div 1, GPS EFG T6
CL I, ZN 1, AEx db [ia Ga] IIB+H2 T6 Gb
ZN 21, AEx tb [ia Da] IIC T80°C Db

USA, FM approval
Certificate: FM17US0062X
XP-IS: CL I, Div 2, GPS ABCD T6
DIP: CL II,III, Div 2, GPS EFG T6
CL I, ZN 2, AEx ec IIC T6
ZN 21, AEx tb IIC T80°C

Canada, cFM approval
Certificate: FM17CA0033X
XP-IS: CL I, Div 1, GPS BCD T6
DIP: CL II,III, Div 1, GPS EFG T6
CL I, ZN 1, Ex db [ia Ga] IIB+H2 T6 Gb
Ex tb [ia Da] IIC T80°C Db

No Ex Approval!

| Certificate: FM17US0062X |
| Certificate: FM17US0062X |
| Certificate: FM17CA0033X |

* Single-compartment housing
** Dual-compartment housing

Div. 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.
... 2  Device designs

... Version with remote mount design

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

<table>
<thead>
<tr>
<th>Sensor</th>
<th>ProcessMaster 630</th>
<th>HygienicMaster 630</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>FEP632-F2</td>
<td>FEH632-F2</td>
</tr>
<tr>
<td></td>
<td>in Ex area, Div. 2</td>
<td>in Ex area, Div. 2</td>
</tr>
</tbody>
</table>

**USA, FM approval**
- NI: CL I, Div 2, GPS ABCD T6...T1
- DIP: CL II,III, Div 2, GPS EFG T6...T6...T3B
- CL I, ZN 2, AEx ec IIC T6...T1
- ZN 21, AEx tb IIIC T80°C...T165°C

**Canada, cFM approval**
- Certificate: FM17CA0033X
- NI: CL I, Div 2, GPS ABCD T6...T1
- DIP: CL II,III, Div 2, GPS EFG T6...T3B
- CL I, ZN 2, Ex ec IIC T6...T1 Gc
- Ex tb IIIC T80°C...T165°C Db

**Transmitter**

**FET632-F2**
- In Ex area, Zone 2, 22

**USA, FM approval**
- NI: CL I, Div 2, GPS ABCD T6
- DIP: CL II,III, Div 2, GPS EFG T6
- CL I, ZN 2, AEx ec IIC T6
- ZN 21, AEx tb IIIC T80°C

**Canada, cFM approval**
- Certificate: FM17CA0033X
- NI: CL I, Div 2, GPS ABCD T6
- DIP: CL II,III, Div 2, GPS EFG T6
- CL I, ZN 2, Ex ec IIC T6 Gc
- Ex tb IIIC T80°C Db

**FET632-Y0**
- Outside the potentially explosive atmosphere

**USA, FM approval**
- NI: CL I, Div 2, GPS ABCD T6
- DIP: CL II,III, Div 2, GPS EFG T6
- CL I, ZN 2, AEx ec IIC T6
- ZN 21, AEx tb IIIC T80°C

**Canada, cFM approval**
- Certificate: FM17CA0033X
- NI: CL I, Div 2, GPS ABCD T6
- DIP: CL II,III, Div 2, GPS EFG T6
- CL I, ZN 2, Ex ec IIC T6 Gc
- Ex tb IIIC T80°C Db

* Single-compartment housing
** Dual-compartment housing

No Ex Approval!
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:

Table 2: Validity range

<table>
<thead>
<tr>
<th>Model</th>
<th>Operation in zone</th>
<th>Electrical connection and explosion protection data</th>
</tr>
</thead>
<tbody>
<tr>
<td>FEP631-F1</td>
<td>Div.1</td>
<td>Operation in Div. 1</td>
</tr>
<tr>
<td>FEP631-F2</td>
<td>Div.2</td>
<td>Operation in Div. 2</td>
</tr>
<tr>
<td>FEP632-F1 and FET632-F1</td>
<td>Div.1</td>
<td>Operation in Div. 1</td>
</tr>
<tr>
<td>FEP632-F1 and FET632-Y0</td>
<td>Div.1</td>
<td>Operation in Div. 1</td>
</tr>
<tr>
<td>FEP632-F2 and FET632-F2</td>
<td>Div.2</td>
<td>Operation in Div. 2</td>
</tr>
<tr>
<td>FEP632-F2 and FET632-Y0</td>
<td>Div.2</td>
<td>Operation in Div. 2</td>
</tr>
<tr>
<td>FEH631-F1</td>
<td>Div.1</td>
<td>Operation in Div. 1</td>
</tr>
<tr>
<td>FEH631-F2</td>
<td>Div.2</td>
<td>Operation in Div. 2</td>
</tr>
<tr>
<td>FEH632-F1 and FET632-F1</td>
<td>Div.1</td>
<td>Operation in Div. 1</td>
</tr>
<tr>
<td>FEH632-F1 and FET632-Y0</td>
<td>Div.1</td>
<td>Operation in Div. 1</td>
</tr>
<tr>
<td>FEH632-F2 and FET632-F2</td>
<td>Div.2</td>
<td>Operation in Div. 2</td>
</tr>
<tr>
<td>FEH632-F2 and FET632-Y0</td>
<td>Div.2</td>
<td>Operation in Div. 2</td>
</tr>
</tbody>
</table>

Table 3: Overview

Note
All documentation, declarations of conformity, and certificates are available in ABB's download area.
www.abb.com/flow

3 Name plate

Device identification – name plate

Note
The name plate shown is an example. The name plate attached to the device can differ from this representation.

Figure 1: Name plate (example)

Note
Devices with 3A approval, EHEDG certificate, SIL are identified with an additional plate.
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.

---

**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.
Single-compartment housing

**NOTICE**

Potential adverse effect on the IP rating
- Check the gasket for damage and replace it if necessary before closing the housing cover.
- Check that the gaskets are properly seated when closing the housing cover.

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.
Only loosen the screws shown when rotating the transmitter housing!

Rotate transmitter housing: Perform steps A to C.

---

**Open / close single-compartment housing**

Open transmitter housing: Perform steps A and B.
Close transmitter housing: Perform steps C and D.
4 Housing

Installation instructions

cFMs

The installation, commissioning, maintenance and repair of devices in areas with explosion hazard must only be carried out by appropriately trained personnel.

The operator must strictly observe the applicable national regulations with regard to installation, function tests, repairs, and maintenance of electrical devices. (for example, NEC, CEC).

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

1 Transport protection plugs

Figure 5: Cable entry

The devices are delivered with ½ in NPT or PF ½ in threads with transport protection plugs.

Unused cable entries must be sealed off prior to commissioning using either approved pipe fittings or cable glands in accordance with national regulations (NEC, CEC).

Make sure that the pipe fittings, cable glands and, if applicable, sealing plugs are installed properly and tight.

If the device is to be operated in areas with combustible dusts, a threaded pipe connection or cable gland with suitable approval must be used.

The use of standard cable glands and seals is prohibited.

Any unused cable entries must be sealed before commissioning in accordance with the applicable standards.

Note

Devices which are certified for use in North America are supplied with a ½ in. NPT thread only and without cable glands.
Electrical connections

Temperature resistance for the connecting cable
The temperature at the cable entries of the device is dependent on the measuring medium temperature $T_{\text{medium}}$ and the ambient temperature $T_{\text{amb}}$.

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

<table>
<thead>
<tr>
<th>$T_{\text{amb}}$</th>
<th>Temperature resistance</th>
</tr>
</thead>
<tbody>
<tr>
<td>$\leq 50 , ^\circ\text{C}$ ($\leq 122 , ^\circ\text{F}$)</td>
<td>$\geq 60 , ^\circ\text{C}$ ($\geq 140 , ^\circ\text{F}$)</td>
</tr>
<tr>
<td>$\leq 60 , ^\circ\text{C}$ ($\leq 140 , ^\circ\text{F}$)</td>
<td>$\geq 70 , ^\circ\text{C}$ ($\geq 158 , ^\circ\text{F}$)</td>
</tr>
</tbody>
</table>

Device in integral mount design

Model in remote mount design

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 18.

In accordance with NEC standards, an internal ground connection is present in the device between the sensor and the transmitter.
Perform grounding of the device in accordance with Electrical connections on page 18.

Process sealing

In accordance with the ‘North American Requirements for Process Sealing between Electrical Systems and Flammable or Combustible Process Fluids’.

Note
The device is suitable for use in Canada.
A maximum surface temperature of 165 °C (329 °F) must not be up-scaled when used in Class II, Groups E, F and G.
All cable conduits should be sealed from the device within a distance of 18 in (457 mm).

Among other things, devices with cable conduits are connected to the electrical installation which makes it possible for measuring media to reach the electric system.
To prevent process media from seeping into the electrical installation, the instruments are equipped with process seals which meet the requirements of ANSI / ISA 12.27.01.
The flow measurement devices are designed as ‘single seal devices’ and are suited for the measurement of non-flammable fluids.
In accordance with the requirements of standard ANSI/ISA 12.27.01, the existing operating limits of temperature, pressure and pressure bearing parts must be reduced to the following limit values:
... 4 Housing

... Process sealing

Max. permissible operating temperature in acc. with ISA12.27.01

<table>
<thead>
<tr>
<th>Liner material</th>
<th>Nominal diameter</th>
<th>Max. operating temperature in acc. with ISA12.27.01</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hard rubber</td>
<td>DN15 to 400</td>
<td>0 °C to 90 °C (32 °F to 194 °F)</td>
</tr>
<tr>
<td></td>
<td>DN450 to 2000</td>
<td>Max. 90 °C (194 °F)</td>
</tr>
<tr>
<td>Soft rubber</td>
<td>DN50 to 400</td>
<td>0 °C to 60 °C (32 °F to 140 °F)</td>
</tr>
<tr>
<td></td>
<td>DN450 to 2000</td>
<td>0 °C to 60 °C (140 °F)</td>
</tr>
<tr>
<td>PTFE</td>
<td>DN10 to 400</td>
<td>~40 °C to 170 °C (~40 °F to 338 °F)</td>
</tr>
<tr>
<td></td>
<td>DN450 to 1000</td>
<td>Max. 130 °C (266 °F)</td>
</tr>
<tr>
<td>Thick PTFE</td>
<td>DN10 to 400</td>
<td>~40 °C to 170 °C (~40 °F to 338 °F)</td>
</tr>
<tr>
<td>PFA</td>
<td>DN3 to 200</td>
<td>~40 °C to 170 °C (~40 °F to 338 °F)</td>
</tr>
<tr>
<td>ETFE</td>
<td>DN25 to 400</td>
<td>~40 °C to 150 °C (~40 °F to 302 °F)</td>
</tr>
<tr>
<td></td>
<td>DN450 to 1000</td>
<td>Max. 130 °C (266 °F)</td>
</tr>
<tr>
<td>Ceramic carbide</td>
<td>DN25 to 400</td>
<td>0 °C to 80 °C (32 °F to 176 °F)</td>
</tr>
<tr>
<td></td>
<td>DN450 to 1000</td>
<td>0 °C to 80 °C (32 °F to 176 °F)</td>
</tr>
</tbody>
</table>

Max. permissible nominal pressure rating in acc. with ISA12.27.01

<table>
<thead>
<tr>
<th>Model</th>
<th>Nominal diameter</th>
<th>Max. nominal pressure</th>
<th>Lining material</th>
</tr>
</thead>
<tbody>
<tr>
<td>FEH</td>
<td>DN10 to DN40</td>
<td>Class 150</td>
<td>All</td>
</tr>
<tr>
<td></td>
<td>DN50 to DN100</td>
<td>Class 150</td>
<td>All</td>
</tr>
<tr>
<td>FEP</td>
<td>DN10 to DN50</td>
<td>Class 150</td>
<td>All</td>
</tr>
<tr>
<td></td>
<td>DN65 to DN400</td>
<td>Class 300</td>
<td>All</td>
</tr>
<tr>
<td></td>
<td>DN65 to DN400</td>
<td>Class 600</td>
<td>Hard rubber</td>
</tr>
<tr>
<td></td>
<td>DN450 to DN2600</td>
<td>Class 300</td>
<td>All</td>
</tr>
</tbody>
</table>

The operating temperature of the devices is determined by the fluid temperature and the ambient temperature.

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.

![Insulation Illustration](image_url)
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.

<table>
<thead>
<tr>
<th>Plug-in card</th>
<th>Description</th>
<th>Number*</th>
</tr>
</thead>
</table>
| ![Current output, 4 to 20 mA passive (red)](current_output.png) | Current output, 4 to 20 mA passive (red)  
Order no.: 3KQZ400029U0100 | Maximum of two plug-in cards |
| ![Passive digital output (green)](passive_digital_output.png) | Passive digital output (green)  
Order no.: 3KQZ400030U0100 | Maximum of one plug-in card |
| ![Passive digital input (yellow)](passive_digital_input.png) | Passive digital input (yellow)  
Order no.: 3KQZ400032U0100 | Maximum of one plug-in card |
| ![Loop power supply 24 V DC (blue)](loop_power_supply.png) | Loop power supply 24 V DC (blue)  
Order no.: 3KQZ400031U0100 | Maximum of one plug-in card |

* The 'Number' column indicates the maximum number of plug-in cards of the same type that can be used.
6 Operation in Div. 1

Electrical connections

![Electrical connections diagram](image)

**Figure 7: Electrical connections**

**Note**
For detailed information on grounding the transmitter and the sensor, please refer to the operating or commissioning instruction!

**Connections for the power supply**

<table>
<thead>
<tr>
<th>Terminal</th>
<th>Function / comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>L</td>
<td>Phase</td>
</tr>
<tr>
<td>N</td>
<td>Neutral conductor</td>
</tr>
<tr>
<td>PE / PA</td>
<td>Protective earth (PE)</td>
</tr>
<tr>
<td>/ PA</td>
<td>Potential equalization</td>
</tr>
</tbody>
</table>

**Connections for inputs and outputs**

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

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.

<table>
<thead>
<tr>
<th>Terminal</th>
<th>Function / comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>UFE</td>
<td>Sensor power supply</td>
</tr>
<tr>
<td>GND</td>
<td>Ground</td>
</tr>
<tr>
<td>A</td>
<td>Data line</td>
</tr>
<tr>
<td>B</td>
<td>Data line</td>
</tr>
<tr>
<td></td>
<td>Functional earth / Shielding</td>
</tr>
</tbody>
</table>

Electric data for operation in Div. 1

Devices with HART protocol
When operating in potentially explosive areas, observe the following electrical data for the signal inputs and outputs of the transmitter.
Current output terminals 31 / 32 / Uco can be operated on-site in active or passive mode through appropriate switching.

<table>
<thead>
<tr>
<th>Model: FEP631, FEH631 or FET632</th>
<th>Type of protection</th>
</tr>
</thead>
<tbody>
<tr>
<td>Outputs on basic device</td>
<td>'e' / 'XP'</td>
</tr>
<tr>
<td></td>
<td>'la' / 'IS'</td>
</tr>
<tr>
<td>U_M [V]</td>
<td>U_O [V]</td>
</tr>
<tr>
<td>I_M [A]</td>
<td>I_O [mA]</td>
</tr>
<tr>
<td></td>
<td>P_O [mW]</td>
</tr>
<tr>
<td></td>
<td>P_I [mW]</td>
</tr>
<tr>
<td></td>
<td>C_O [nF]</td>
</tr>
<tr>
<td></td>
<td>C_I [nF]</td>
</tr>
<tr>
<td></td>
<td>C_OPA [nF]</td>
</tr>
<tr>
<td></td>
<td>C_OPL [mH]</td>
</tr>
<tr>
<td></td>
<td>L_I [mH]</td>
</tr>
</tbody>
</table>

Current / HART output 31 / UCO, active
Terminals 31 / UCO

<table>
<thead>
<tr>
<th>Current / HART output 31 / 32, passive</th>
</tr>
</thead>
<tbody>
<tr>
<td>Terminals 31 / 32</td>
</tr>
</tbody>
</table>

Digital output 41 / 42, active*
Terminals 41 / 42 and V1 / V2*

Digital output 41 / 42, passive
Terminals 41 / 42

Digital output 51 / 52, active*
Terminals 51 / 52 and V1 / V2*

Digital output 51 / 52, passive
Terminals 51 / 52

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 Div. 1

### Electric data for operation in Div. 1

<table>
<thead>
<tr>
<th>Inputs and outputs with optional plug-in cards</th>
<th>Type of protection</th>
<th>'e' / 'XP'</th>
<th>'ia' / 'IS'</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>(U_M) [V]</td>
<td>(I_M) [A]</td>
</tr>
<tr>
<td><strong>Current output V3 / V4, active</strong></td>
<td></td>
<td>30</td>
<td>0.1</td>
</tr>
<tr>
<td>Terminals V3 / V4 and V1 / V2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Current output V1 / V2, passive</strong></td>
<td></td>
<td>30</td>
<td>0.1</td>
</tr>
<tr>
<td>Terminals V1 / V2** or V3 / V4**</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Digital output V3 / V4, active</strong></td>
<td></td>
<td>30</td>
<td>0.1</td>
</tr>
<tr>
<td>Terminals V3 / V4 and V1 / V2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Digital output V1 / V2, passive</strong></td>
<td></td>
<td>30</td>
<td>0.1</td>
</tr>
<tr>
<td>Terminals V1 / V2** or V3 / V4**</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Digital input V3 / V4, active</strong></td>
<td></td>
<td>30</td>
<td>0.1</td>
</tr>
<tr>
<td>Terminals V3 / V4 and V1 / V2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Digital input V1 / V2, passive</strong></td>
<td></td>
<td>30</td>
<td>0.1</td>
</tr>
<tr>
<td>Terminals V1 / V2** or V3 / V4**</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* 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.
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 40 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 $250 \text{ V}_{\text{rms}}$ AC or 250 V DC to ground.

Installation in the USA or Canada must comply with ANSI / ISA RP 12.6, ‘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)’.

Protection against electrostatic discharges

**DANGER**
Risk of explosion!
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 EN TR50404 and IEC 60079-32-1 must be observed!

Instructions on cleaning
The painted surface of the device may be cleaned only using a moist cloth.

Repair
Devices of type of protection ‘d’ are equipped with flameproof joints in the housing. Contact ABB before commencing repair work.
6 Operation in Div. 1

Temperature data

Surface temperature

<table>
<thead>
<tr>
<th>Model name</th>
<th>Surface temperature</th>
</tr>
</thead>
<tbody>
<tr>
<td>FEP632, FEH632</td>
<td>T 80 °C (176 °F)</td>
</tr>
<tr>
<td>FEP631 EH631</td>
<td>T 80 °C (176 °F)</td>
</tr>
<tr>
<td>FET632</td>
<td>T 80 °C (176 °F)</td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>Model FEP631, FEP632</th>
<th>Measuring medium temperature range (operating data)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lining material</td>
<td>Flange material</td>
</tr>
<tr>
<td>Hard rubber</td>
<td>Steel</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>Hard rubber</td>
<td>Stainless steel</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>Soft rubber</td>
<td>Steel</td>
</tr>
<tr>
<td>Soft rubber</td>
<td>Stainless steel</td>
</tr>
<tr>
<td>PTFE</td>
<td>Steel</td>
</tr>
<tr>
<td>PTFE</td>
<td>Stainless steel</td>
</tr>
<tr>
<td>PFA</td>
<td>Steel</td>
</tr>
<tr>
<td>PFA</td>
<td>Stainless steel</td>
</tr>
<tr>
<td>Thick PTFE</td>
<td>Steel</td>
</tr>
<tr>
<td>Thick PTFE</td>
<td>Stainless steel</td>
</tr>
<tr>
<td>ETFE</td>
<td>Steel</td>
</tr>
<tr>
<td>ETFE</td>
<td>Stainless steel</td>
</tr>
</tbody>
</table>

* Only for China production site

<table>
<thead>
<tr>
<th>Model FEH631, FEH632</th>
<th>Fluid temperature (operating values)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Liner</td>
<td>Process connection</td>
</tr>
<tr>
<td>PFA</td>
<td>Flange</td>
</tr>
<tr>
<td>PFA</td>
<td>Wafer type</td>
</tr>
<tr>
<td>PFA</td>
<td>Variable process connection</td>
</tr>
</tbody>
</table>
Measuring medium temperature (Ex Data) for ProcessMaster Model FEP631

<table>
<thead>
<tr>
<th>Nominal diameter</th>
<th>Design</th>
<th>Ambient temperature (°C)</th>
<th>Gas &amp; dust</th>
</tr>
</thead>
<tbody>
<tr>
<td>DN3 -2000</td>
<td>NT</td>
<td>(-40 °C)* -20 °C to +40 °C</td>
<td>130°C</td>
</tr>
<tr>
<td></td>
<td>HT</td>
<td>(-40 °C)* -20 °C to +40 °C</td>
<td>180°C</td>
</tr>
<tr>
<td></td>
<td>NT</td>
<td>(-40 °C)* -20 °C to +50 °C</td>
<td>130°C</td>
</tr>
<tr>
<td></td>
<td>HT</td>
<td>(-40 °C)* -20 °C to +50 °C</td>
<td>180°C</td>
</tr>
<tr>
<td></td>
<td>NT</td>
<td>(-40 °C)* -20 °C to +60 °C</td>
<td>130°C</td>
</tr>
<tr>
<td></td>
<td>HT</td>
<td>(-40 °C)* -20 °C to +60 °C</td>
<td>180°C</td>
</tr>
</tbody>
</table>

* 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
... 6 Operation in Div. 1

... Temperature data

Measuring medium temperature (Ex Data) for ProcessMaster Model FEP632

<table>
<thead>
<tr>
<th>Nominal diameter</th>
<th>Design</th>
<th>Temperature class</th>
<th>Ambient temperature</th>
<th>Ambient temperature</th>
<th>Ambient temperature</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>(−40 °C)* −20 °C to +40 °C</td>
<td>(−40 °C)* −20 °C to +50 °C</td>
<td>(−40 °C)* −20 °C to +60 °C</td>
</tr>
<tr>
<td></td>
<td></td>
<td>thermally uninsulated, thermally insulated</td>
<td>thermally uninsulated, thermally insulated</td>
<td>thermally uninsulated, thermally insulated</td>
<td></td>
</tr>
<tr>
<td>DN3-2000</td>
<td>NT</td>
<td>T1</td>
<td>130°C</td>
<td>130°C</td>
<td>130°C</td>
</tr>
<tr>
<td></td>
<td>HT</td>
<td>180°C</td>
<td>180°C</td>
<td>180°C</td>
<td></td>
</tr>
<tr>
<td></td>
<td>NT</td>
<td>T2</td>
<td>180°C</td>
<td>180°C</td>
<td>180°C</td>
</tr>
<tr>
<td></td>
<td>HT</td>
<td>180°C</td>
<td>180°C</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>NT</td>
<td>T3</td>
<td>130°C</td>
<td>130°C</td>
<td>130°C</td>
</tr>
<tr>
<td></td>
<td>HT</td>
<td>180°C</td>
<td>180°C</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>NT</td>
<td>T4</td>
<td>130°C</td>
<td>130°C</td>
<td>130°C</td>
</tr>
<tr>
<td></td>
<td>HT</td>
<td>130°C</td>
<td>130°C</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>NT</td>
<td>T5</td>
<td>95°C</td>
<td>95°C</td>
<td>95°C</td>
</tr>
<tr>
<td></td>
<td>HT</td>
<td>95°C</td>
<td>95°C</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>NT</td>
<td>T6</td>
<td>80°C</td>
<td>80°C</td>
<td>80°C</td>
</tr>
<tr>
<td></td>
<td>HT</td>
<td>80°C</td>
<td>80°C</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* Low-temperature version (option)

NT standard version, Tmedium maximum 130 °C (266 °F)
HT high-temperature version, Tmedium 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

**HT + NT design**

<table>
<thead>
<tr>
<th>Nominal diameter</th>
<th>Design</th>
<th>Temperature class</th>
<th>Ambient temperature</th>
<th>Ambient temperature</th>
<th>Ambient temperature</th>
</tr>
</thead>
<tbody>
<tr>
<td>DN3-2000</td>
<td>NT</td>
<td>T1</td>
<td>130°C</td>
<td>130°C</td>
<td>130°C</td>
</tr>
<tr>
<td></td>
<td>HT</td>
<td>T1</td>
<td>180°C</td>
<td>180°C</td>
<td>180°C</td>
</tr>
<tr>
<td></td>
<td>NT</td>
<td>T2</td>
<td>130°C</td>
<td>130°C</td>
<td>130°C</td>
</tr>
<tr>
<td></td>
<td>HT</td>
<td>T2</td>
<td>180°C</td>
<td>180°C</td>
<td>180°C</td>
</tr>
<tr>
<td></td>
<td>NT</td>
<td>T3</td>
<td>130°C</td>
<td>130°C</td>
<td>130°C</td>
</tr>
<tr>
<td></td>
<td>HT</td>
<td>T3</td>
<td>180°C</td>
<td>180°C</td>
<td>180°C</td>
</tr>
<tr>
<td></td>
<td>NT</td>
<td>T4</td>
<td>130°C</td>
<td>130°C</td>
<td>130°C</td>
</tr>
<tr>
<td></td>
<td>HT</td>
<td>T4</td>
<td>130°C</td>
<td>130°C</td>
<td>130°C</td>
</tr>
<tr>
<td></td>
<td>NT</td>
<td>T5</td>
<td>95°C</td>
<td>95°C</td>
<td>95°C</td>
</tr>
<tr>
<td></td>
<td>HT</td>
<td>T5</td>
<td>95°C</td>
<td>95°C</td>
<td>95°C</td>
</tr>
<tr>
<td></td>
<td>NT</td>
<td>T6</td>
<td>80°C</td>
<td>80°C</td>
<td>80°C</td>
</tr>
<tr>
<td></td>
<td>HT</td>
<td>T6</td>
<td>80°C</td>
<td>80°C</td>
<td>80°C</td>
</tr>
</tbody>
</table>

* Low-temperature version (option)

NT standard version, $T_{\text{medium}}$ maximum 130 °C (266 °F)
HT high-temperature version, $T_{\text{medium}}$ 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
6 Operation in Div. 1

Temperature data

Measuring medium temperature (Ex Data) for HygienicMaster Model FEH632

<table>
<thead>
<tr>
<th>Nominal diameter</th>
<th>Design</th>
<th>Temperature class</th>
<th>Ambient temperature (-40 °C)* -20 °C to +40 °C</th>
<th>Ambient temperature (-40 °C)* -20 °C to +50 °C</th>
<th>Ambient temperature (-40 °C)* -20 °C to +60 °C</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Gas &amp; dust</td>
<td>Gas &amp; dust</td>
<td>Gas &amp; dust</td>
</tr>
<tr>
<td>NT</td>
<td>T1</td>
<td>Thermally uninsulated, thermally insulated</td>
<td>130°C</td>
<td>130°C</td>
<td>130°C</td>
</tr>
<tr>
<td>NT</td>
<td>T2</td>
<td>Thermally uninsulated, thermally insulated</td>
<td>130°C</td>
<td>130°C</td>
<td>130°C</td>
</tr>
<tr>
<td>NT</td>
<td>T3</td>
<td>Thermally uninsulated, thermally insulated</td>
<td>130°C</td>
<td>130°C</td>
<td>130°C</td>
</tr>
<tr>
<td>NT</td>
<td>T4</td>
<td>Thermally uninsulated, thermally insulated</td>
<td>130°C</td>
<td>130°C</td>
<td>130°C</td>
</tr>
<tr>
<td>NT</td>
<td>T5</td>
<td>Thermally uninsulated, thermally insulated</td>
<td>95°C</td>
<td>95°C</td>
<td>95°C</td>
</tr>
<tr>
<td>NT</td>
<td>T6</td>
<td>Thermally uninsulated, thermally insulated</td>
<td>80°C</td>
<td>80°C</td>
<td>80°C</td>
</tr>
<tr>
<td>HT</td>
<td></td>
<td>Thermally uninsulated, thermally insulated</td>
<td>180°C</td>
<td>180°C</td>
<td>180°C</td>
</tr>
<tr>
<td>HT</td>
<td></td>
<td>Thermally uninsulated, thermally insulated</td>
<td>180°C</td>
<td>180°C</td>
<td>180°C</td>
</tr>
<tr>
<td>HT</td>
<td></td>
<td>Thermally uninsulated, thermally insulated</td>
<td>180°C</td>
<td>180°C</td>
<td>180°C</td>
</tr>
</tbody>
</table>

* Low-temperature version (option)

NT standard version, \( T_{\text{medium}} \) maximum 130 °C (266 °F)
HT high-temperature version, \( T_{\text{medium}} \) 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 Div. 2

Electrical connections

FEP631, FEH631, FEP632, FEH632 sensor and FET632 transmitter (Div. 2)

FET632 transmitter outside the hazardous area

![Electrical connections diagram](image)

**Note**
For detailed information on grounding the transmitter and the sensor, please refer to the operating or commissioning instruction!

Connections for the power supply

**AC power supply**

<table>
<thead>
<tr>
<th>Terminal</th>
<th>Function / comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>L</td>
<td>Phase</td>
</tr>
<tr>
<td>N</td>
<td>Neutral conductor</td>
</tr>
<tr>
<td>PE / ☭</td>
<td>Protective earth (PE)</td>
</tr>
<tr>
<td>☭ / PA</td>
<td>Potential equalization</td>
</tr>
</tbody>
</table>

**DC voltage supply**

<table>
<thead>
<tr>
<th>Terminal</th>
<th>Function / comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>1+</td>
<td>+</td>
</tr>
<tr>
<td>2−</td>
<td>−</td>
</tr>
<tr>
<td>PE / ☭</td>
<td>Protective earth (PE)</td>
</tr>
<tr>
<td>☭ / PA</td>
<td>Potential equalization</td>
</tr>
</tbody>
</table>
... 7 Operation in Div. 2

... Electrical connections

Connections for inputs and outputs

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

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.

<table>
<thead>
<tr>
<th>Terminal</th>
<th>Function / comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>UFE</td>
<td>Sensor power supply</td>
</tr>
<tr>
<td>GND</td>
<td>Ground</td>
</tr>
<tr>
<td>A</td>
<td>Data line</td>
</tr>
<tr>
<td>B</td>
<td>Data line</td>
</tr>
<tr>
<td></td>
<td>Functional earth / Shielding</td>
</tr>
</tbody>
</table>
Electric data for operation in Div. 2

Devices with HART protocol

When operating in potentially explosive areas, observe the following electrical data for the signal inputs and outputs of the transmitter.

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

<table>
<thead>
<tr>
<th>Model: FEP631, FEH631 or FET632</th>
</tr>
</thead>
<tbody>
<tr>
<td>Outputs on basic device</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>Current / HART output 31 / UCO, active</td>
</tr>
<tr>
<td>Terminals 31 / UCO</td>
</tr>
<tr>
<td>Current / HART output 31 / 32, passive</td>
</tr>
<tr>
<td>Terminals 31 / 32</td>
</tr>
<tr>
<td>Digital output 41 / 42, active*</td>
</tr>
<tr>
<td>Terminals 41 / 42 and V1 / V2*</td>
</tr>
<tr>
<td>Digital output 41 / 42, passive</td>
</tr>
<tr>
<td>Terminals 41 / 42</td>
</tr>
<tr>
<td>Digital output 51 / 52, active*</td>
</tr>
<tr>
<td>Terminals 51 / 52 and V1 / V2*</td>
</tr>
<tr>
<td>Digital output 51 / 52, passive</td>
</tr>
<tr>
<td>Terminals 51 / 52</td>
</tr>
</tbody>
</table>

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.

<table>
<thead>
<tr>
<th>Model: FEP631, FEH631 or FET632</th>
</tr>
</thead>
<tbody>
<tr>
<td>Plug-in cards</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>Current output V3 / V4, active1)</td>
</tr>
<tr>
<td>Terminals V3 / V4 and V1 / V21)</td>
</tr>
<tr>
<td>Current output V1 / V2, passive2)</td>
</tr>
<tr>
<td>Current output V3 / V4, passive2)</td>
</tr>
<tr>
<td>Terminals V1 / V22) or V3 / V42)</td>
</tr>
<tr>
<td>Digital output V3 / V4, active1)</td>
</tr>
<tr>
<td>Terminals V3 / V4 and V1 / V21)</td>
</tr>
<tr>
<td>Digital output V1 / V2, passive2)</td>
</tr>
<tr>
<td>Digital output V3 / V4, passive2)</td>
</tr>
<tr>
<td>Terminals V1 / V22) or V3 / V42)</td>
</tr>
<tr>
<td>Digital input V3 / V4, active1)</td>
</tr>
<tr>
<td>Terminals V3 / V4 and V1 / V2</td>
</tr>
<tr>
<td>Digital input V1 / V2, passive2)</td>
</tr>
<tr>
<td>Digital input V3 / V4, passive2)</td>
</tr>
<tr>
<td>Terminals V1 / V22) or V3 / V42)</td>
</tr>
</tbody>
</table>

* 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.
... 7 Operation in Div. 2

... Electric data for operation in Div. 2

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.

Installation in the USA or Canada must comply with ANSI / ISA RP 12.6, '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)'.

Protection against electrostatic discharges

DANGER
Risk of explosion!
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 ≤ 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 EN TR50404 and IEC 60079-32-1 must be observed!

Instructions on cleaning
The painted surface of the device may be cleaned only using a moist cloth.

Temperature data

Surface temperature

<table>
<thead>
<tr>
<th>Model name</th>
<th>Surface temperature</th>
</tr>
</thead>
<tbody>
<tr>
<td>FEP632, FEH632</td>
<td>T 80 °C (176 °F)</td>
</tr>
<tr>
<td>FEP631, EH631</td>
<td>T 80 °C (176 °F)</td>
</tr>
<tr>
<td>FET632</td>
<td>T 80 °C (176 °F)</td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>Model FEP631, FEP632</th>
<th>Measuring medium temperature range (operating data)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Lining material</strong></td>
<td><strong>Flange material</strong></td>
</tr>
<tr>
<td>Hard rubber</td>
<td>Steel</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>Hard rubber</td>
<td>Stainless steel</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>Soft rubber</td>
<td>Steel</td>
</tr>
<tr>
<td>Soft rubber</td>
<td>Stainless steel</td>
</tr>
<tr>
<td>PTFE</td>
<td>Steel</td>
</tr>
<tr>
<td>PTFE</td>
<td>Stainless steel</td>
</tr>
<tr>
<td>PFA</td>
<td>Steel</td>
</tr>
<tr>
<td>PFA</td>
<td>Stainless steel</td>
</tr>
<tr>
<td>Thick PTFE</td>
<td>Steel</td>
</tr>
<tr>
<td>Thick PTFE</td>
<td>Stainless steel</td>
</tr>
<tr>
<td>ETFE</td>
<td>Steel</td>
</tr>
<tr>
<td>ETFE</td>
<td>Stainless steel</td>
</tr>
</tbody>
</table>

* Only for China production site

<table>
<thead>
<tr>
<th>Model FEH631, FEH632</th>
<th>Fluid temperature (operating values)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Liner</strong></td>
<td><strong>Process connection</strong></td>
</tr>
<tr>
<td>PFA</td>
<td>Flange</td>
</tr>
<tr>
<td>PFA</td>
<td>Wafer type</td>
</tr>
<tr>
<td>PFA</td>
<td>Variable process connection</td>
</tr>
</tbody>
</table>
... 7 Operation in Div. 2

... Temperature data

Measuring medium temperature (Ex Data) for ProcessMaster Model FEP631

<table>
<thead>
<tr>
<th>Nominal diameter</th>
<th>Design</th>
<th>Temperature class</th>
<th>Ambient temperature (−40 °C)* −20 °C to +40 °C</th>
<th>Ambient temperature (−40 °C)* −20 °C to +50 °C</th>
<th>Ambient temperature (−40 °C)* −20 °C to +60 °C</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>thermostatically insulated</td>
<td>thermostatically insulated</td>
<td>thermostatically insulated</td>
<td>thermostatically insulated</td>
</tr>
<tr>
<td>DN3-2000</td>
<td>NT</td>
<td>T1</td>
<td>130°C</td>
<td>130°C</td>
<td>130°C</td>
</tr>
<tr>
<td></td>
<td>HT</td>
<td>T1</td>
<td>180°C</td>
<td>180°C</td>
<td>180°C</td>
</tr>
<tr>
<td></td>
<td>NT</td>
<td>T2</td>
<td>130°C</td>
<td>130°C</td>
<td>130°C</td>
</tr>
<tr>
<td></td>
<td>HT</td>
<td>T2</td>
<td>180°C</td>
<td>180°C</td>
<td>180°C</td>
</tr>
<tr>
<td></td>
<td>NT</td>
<td>T3</td>
<td>130°C</td>
<td>130°C</td>
<td>130°C</td>
</tr>
<tr>
<td></td>
<td>HT</td>
<td>T3</td>
<td>180°C</td>
<td>180°C</td>
<td>180°C</td>
</tr>
<tr>
<td></td>
<td>NT</td>
<td>T4</td>
<td>130°C</td>
<td>130°C</td>
<td>130°C</td>
</tr>
<tr>
<td></td>
<td>HT</td>
<td>T4</td>
<td>130°C</td>
<td>130°C</td>
<td>130°C</td>
</tr>
<tr>
<td></td>
<td>NT</td>
<td>T5</td>
<td>95°C</td>
<td>95°C</td>
<td>40°C**</td>
</tr>
<tr>
<td></td>
<td>HT</td>
<td>T5</td>
<td>95°C</td>
<td>95°C</td>
<td>–***</td>
</tr>
<tr>
<td></td>
<td>NT</td>
<td>T6</td>
<td>80°C</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td></td>
<td>HT</td>
<td>T6</td>
<td>80°C</td>
<td>–</td>
<td>–</td>
</tr>
</tbody>
</table>

* Low-temperature version (option)
** Single-compartment housing
*** Dual-compartment housing
NT standard version, $T_{\text{medium}}$ maximum 130 °C (266 °F)
HT high-temperature version, $T_{\text{medium}}$ 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 Div. 2

... Temperature data

Measuring medium temperature (Ex Data) for ProcessMaster Model FEP632

<table>
<thead>
<tr>
<th>Nominal diameter</th>
<th>Design</th>
<th>Temperature class</th>
<th>Ambient temperature (-40 °C to +40 °C)</th>
<th>Ambient temperature (-40 °C to +50 °C)</th>
<th>Ambient temperature (-40 °C to +60 °C)</th>
</tr>
</thead>
<tbody>
<tr>
<td>DN3-2000</td>
<td>NT</td>
<td>T1</td>
<td>130°C</td>
<td>130°C</td>
<td>130°C</td>
</tr>
<tr>
<td></td>
<td>HT</td>
<td></td>
<td>180°C</td>
<td>180°C</td>
<td>180°C</td>
</tr>
<tr>
<td></td>
<td>NT</td>
<td>T2</td>
<td>130°C</td>
<td>130°C</td>
<td>130°C</td>
</tr>
<tr>
<td></td>
<td>HT</td>
<td></td>
<td>180°C</td>
<td>180°C</td>
<td>180°C</td>
</tr>
<tr>
<td></td>
<td>NT</td>
<td>T3</td>
<td>130°C</td>
<td>130°C</td>
<td>130°C</td>
</tr>
<tr>
<td></td>
<td>HT</td>
<td></td>
<td>180°C</td>
<td>180°C</td>
<td>180°C</td>
</tr>
<tr>
<td></td>
<td>NT</td>
<td>T4</td>
<td>130°C</td>
<td>130°C</td>
<td>130°C</td>
</tr>
<tr>
<td></td>
<td>HT</td>
<td></td>
<td>130°C</td>
<td>130°C</td>
<td>130°C</td>
</tr>
<tr>
<td></td>
<td>NT</td>
<td>T5</td>
<td>95°C</td>
<td>95°C</td>
<td>95°C</td>
</tr>
<tr>
<td></td>
<td>HT</td>
<td></td>
<td>95°C</td>
<td>95°C</td>
<td>95°C</td>
</tr>
<tr>
<td></td>
<td>NT</td>
<td>T6</td>
<td>80°C</td>
<td>80°C</td>
<td>40°C</td>
</tr>
<tr>
<td></td>
<td>HT</td>
<td></td>
<td>80°C</td>
<td>80°C</td>
<td>20°C</td>
</tr>
</tbody>
</table>

* Low-temperature version (option)

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

<table>
<thead>
<tr>
<th>Nominal diameter</th>
<th>Design</th>
<th>Temperature class</th>
<th>Ambient temperature (-40 °C)</th>
<th>Ambient temperature (-20 °C to +40 °C)</th>
<th>Ambient temperature (-40 °C)</th>
<th>Ambient temperature (-20 °C to +50 °C)</th>
<th>Ambient temperature (-40 °C)</th>
<th>Ambient temperature (-20 °C to +60 °C)</th>
</tr>
</thead>
<tbody>
<tr>
<td>DN3-2000</td>
<td></td>
<td></td>
<td>Gas &amp; dust</td>
<td>Gas &amp; dust</td>
<td>Gas &amp; dust</td>
<td>Gas &amp; dust</td>
<td>Gas &amp; dust</td>
<td>Gas &amp; dust</td>
</tr>
<tr>
<td>NT</td>
<td>T1</td>
<td></td>
<td>130°C</td>
<td>130°C</td>
<td>130°C</td>
<td>130°C</td>
<td>130°C</td>
<td>130°C</td>
</tr>
<tr>
<td>NT</td>
<td>T2</td>
<td></td>
<td>130°C</td>
<td>130°C</td>
<td>130°C</td>
<td>130°C</td>
<td>130°C</td>
<td>130°C</td>
</tr>
<tr>
<td>NT</td>
<td>T3</td>
<td></td>
<td>130°C</td>
<td>130°C</td>
<td>130°C</td>
<td>130°C</td>
<td>130°C</td>
<td>130°C</td>
</tr>
<tr>
<td>HT</td>
<td>T4</td>
<td></td>
<td>130°C</td>
<td>130°C</td>
<td>130°C</td>
<td>130°C</td>
<td>130°C</td>
<td>130°C</td>
</tr>
<tr>
<td>NT</td>
<td>T5</td>
<td></td>
<td>95°C</td>
<td>95°C</td>
<td>95°C</td>
<td>40°C**</td>
<td>95°C</td>
<td>95°C°F**</td>
</tr>
<tr>
<td>HT</td>
<td>T6</td>
<td></td>
<td>80°C</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

* Low-temperature version (option)
** Single-compartment housing
*** Dual-compartment housing
... 7 Operation in Div. 2

... Temperature data

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
Measuring medium temperature (Ex Data) for HygienicMaster Model FEH632

<table>
<thead>
<tr>
<th>Nominal diameter</th>
<th>Design</th>
<th>Temperature class</th>
<th>Ambient temperature</th>
<th>Ambient temperature</th>
<th>Ambient temperature</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>(∞ - 40 °C)</td>
<td>(∞ - 20 °C to +40 °C)</td>
<td>(∞ - 40 °C)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>thermally uninsulated</td>
<td>Gas &amp; dust</td>
<td>thermally uninsulated</td>
<td>Gas &amp; dust</td>
</tr>
<tr>
<td></td>
<td></td>
<td>thermally insulated</td>
<td></td>
<td>thermally insulated</td>
<td></td>
</tr>
<tr>
<td>DNG 2000</td>
<td>NT</td>
<td>T1</td>
<td>130°C</td>
<td>130°C</td>
<td>130°C</td>
</tr>
<tr>
<td></td>
<td>HT</td>
<td>T1</td>
<td>180°C</td>
<td>180°C</td>
<td>180°C</td>
</tr>
<tr>
<td></td>
<td>NT</td>
<td>T2</td>
<td>130°C</td>
<td>130°C</td>
<td>130°C</td>
</tr>
<tr>
<td></td>
<td>HT</td>
<td>T2</td>
<td>180°C</td>
<td>180°C</td>
<td>180°C</td>
</tr>
<tr>
<td></td>
<td>NT</td>
<td>T3</td>
<td>130°C</td>
<td>130°C</td>
<td>130°C</td>
</tr>
<tr>
<td></td>
<td>HT</td>
<td>T3</td>
<td>180°C</td>
<td>180°C</td>
<td>180°C</td>
</tr>
<tr>
<td></td>
<td>NT</td>
<td>T4</td>
<td>130°C</td>
<td>130°C</td>
<td>130°C</td>
</tr>
<tr>
<td></td>
<td>HT</td>
<td>T4</td>
<td>130°C</td>
<td>130°C</td>
<td>130°C</td>
</tr>
<tr>
<td></td>
<td>NT</td>
<td>T5</td>
<td>95°C</td>
<td>95°C</td>
<td>95°C</td>
</tr>
<tr>
<td></td>
<td>HT</td>
<td>T5</td>
<td>95°C</td>
<td>95°C</td>
<td>95°C</td>
</tr>
<tr>
<td></td>
<td>NT</td>
<td>T6</td>
<td>80°C</td>
<td>80°C</td>
<td>40°C</td>
</tr>
<tr>
<td></td>
<td>HT</td>
<td>T6</td>
<td>80°C</td>
<td>80°C</td>
<td>20°C</td>
</tr>
</tbody>
</table>

* Low-temperature version (option)

NT standard version, $T_{\text{medium}}$ maximum 130 °C (266 °F)
HT high-temperature version, $T_{\text{medium}}$ 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 Div. 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.

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.

<table>
<thead>
<tr>
<th>Number</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>On</td>
<td>Digital output 41 / 42 and 51 / 52 as NAMUR output.</td>
</tr>
<tr>
<td>Off</td>
<td>Digital output 41 / 42 and 51 / 52 as optoelectronic coupler output.</td>
</tr>
</tbody>
</table>

Figure 9: Position of the DIP switches
Configuration of digital outputs V1 / V2 or V3 / V4

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.

<table>
<thead>
<tr>
<th>Number</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>On</td>
<td>Digital output V1 / V2 or V3 / V4 as NAMUR output.</td>
</tr>
<tr>
<td>Off</td>
<td>Digital output V1 / V2 or V3 / V4 as optoelectronic coupler output.</td>
</tr>
</tbody>
</table>

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.

<table>
<thead>
<tr>
<th>Original installation</th>
<th>New installation</th>
<th>Required step/check</th>
</tr>
</thead>
<tbody>
<tr>
<td>Zone 1 / Div 1:</td>
<td>Zone 1 / Div 1:</td>
<td></td>
</tr>
<tr>
<td>Current outputs and digital outputs in non-intrinsically safe design</td>
<td>Current outputs and digital outputs in intrinsically safe ia / IS design</td>
<td>Switch off power supply. Use 500 VAC or 710 V DC to take the following measurements for one minute: Bridge terminals 31 / 32, 41 / 42, 51 / 52. Then measure against the housing.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

![Diagram showing the measurement points](image)

- Switch off power supply
  Use 500 VAC or 710 V DC to take the following measurements for one minute: Bridge terminals 31 / 32, 41 / 42, 51 / 52 / V1 / V2 / V3 / V4. Then measure against the housing.

- Visual inspection.

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

- Visual inspection, no damage visible on the threads (cover, 1/4 in NPT cable glands).
10 Maintenance

**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.
... 11 Repair

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 12 to open and close the housing safely.

![Fuse holder position](image)

Figure 11: Fuse holder position

There is a fuse in the transmitter housing.

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

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.
Replacing the frontend board

Integral mount design

Figure 12: 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 12 to open and close the housing safely.
... 11 Repair

... Replacing the frontend board

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.
Remote mount design

Figure 13: Replacing the frontend board (flowmeter sensor)

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.
... 11 Repair

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 12 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 48) 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 46.

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
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
Notes: ATEX & IECEx application

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 Vdc OR Vt < V MAX,
   * I0 OR Ioc OR Ic < I MAX,
   * Ca OR Co > Ci + Ccable; La OR Lo > Li + Lcable; Po < Pi.

2. DUST-TIGHT CONDUIT SEAL MUST BE USED WHEN INSTALLED IN ZONE 21/22 ENVIRONMENTS.

3. CONTROL EQUIPMENT CONNECTED TO THE ASSOCIATED APPARATUS MUST NOT USE OR GENERATE MORE THAN 250 Vrms OR Vdc WITH RESPECT TO EARTH.

4. INSTALLATION SHOULD BE IN ACCORDANCE WITH THE RELEVANT INTERNATIONAL OR NATIONAL REGULATIONS 'INSTALLATION OF INTRINSICALLY SAFE FOR HAZARDOUS LOCATIONS' REGULATIONS.

5. THE CONFIGURATION OF ASSOCIATED APPARATUS MUST BE ATEX or IECEx APPROVED UNDER ENTITY CONCEPT.

6. ASSOCIATED APPARATUS MANUFACTURER'S INSTALLATION DRAWING MUST BE FOLLOWED WHEN INSTALLING THIS EQUIPMENT.

7. THE ASSOCIATED APPARATUS MUST BE INSTALLED IN ACCORDANCE WITH BARRIER MANUFACTURER'S INSTALLATION DIAGRAM.

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.

Notes: US and Canadian application

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 Vdc OR Vt < V MAX,
   * I0 OR Ioc OR Ic < I MAX,
   * Ca OR Co > Ci + Ccable; La OR Lo > Li + Lcable; Po < Pi.

2. DUST-TIGHT CONDUIT SEAL MUST BE USED WHEN INSTALLED IN CLASS II AND III ENVIRONMENTS.

3. CONTROL EQUIPMENT CONNECTED TO THE ASSOCIATED APPARATUS MUST NOT USE OR GENERATE MORE THAN 250 Vrms OR Vdc WITH RESPECT TO EARTH.


5. THE CONFIGURATION OF ASSOCIATED APPARATUS MUST BE FM AND/OR CSA APPROVED UNDER ENTITY CONCEPT.

6. ASSOCIATED APPARATUS MANUFACTURER'S INSTALLATION DRAWING MUST BE FOLLOWED WHEN INSTALLING THIS EQUIPMENT.

7. THE ASSOCIATED APPARATUS MUST BE INSTALLED IN ACCORDANCE WITH BARRIER MANUFACTURER'S INSTALLATION DIAGRAM.

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.

For Model: FE_63
Projection method 1: 0.0 - 0.05 General tolerances: 0.05
From Drawn: 01.12.2016

ABB Automation Products Gmbh

Installation diagram FE_63

3KXF000061G0009

01 20.12.2016

Rev. Date Number Name
Page 2 OF 10
Allowed I/O connections and OPTION CARD handling:

- CO1 passive
  - Current OUT 1 (on Board)

- CO1 active
  - Current OUT 1 (on Board)

- DO1 passive
  - Digital OUT 1 (on Board)

- DO2 passive
  - Digital OUT 2 (on Board)

ABB (passive)

- UCO +
- S2 -
- S1 +

ABB (active)

- UCO +
- S2 -
- S1 +

CUSTOMER (active)

- LOAD

WARNING:

- Terminals should only be used for "On-Board" Current Out!

<table>
<thead>
<tr>
<th>For Model</th>
<th>FE_63</th>
<th>Installation Method</th>
<th>General Tolerances</th>
<th>Tolerancing</th>
</tr>
</thead>
<tbody>
<tr>
<td>ABB</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Installation diagram FE_63

3KXF000061G0009

Rev. Date Number Name
Allowed I/O connections and OPTION CARD handling:

- **DC1 active**
  - Digital OUT 1 (on Board)
  - Active Supply (Option Card) (SLOT 1)

- **DC2 active**
  - Digital OUT 2 (on Board)
  - Active Supply (Option Card) (SLOT 1)

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

**ABB (passive)**
- 41 +
- 42/S2-
- 51 +

**ABB (active)**
- V1 +
- V2 -
- max. 30mA

**CUSTOMER (passive)**

**LOAD**

**Installation diagram FE_63**

ABB Automation Products GmbH

3KXF00061G0009

PAGE 4 OF 10
Allowed I/O connections and OPTION CARD handling:

![Diagram showing allowed I/O connections and OPTION CARD handling.]

For Model: FE_63
Projection method 1

General tolerances: Tolerancing:
work piece edges:
Surface:

Installation diagram FE_63

ABB Automatic Products GmbH

3KXF000061G0009
Allowed I/O connections and OPTION CARD handling:

- CO2 active
- CO2 passive
- Current OUT 2 (Option Card) (SLOT 2)
- Active Supply (Option Card) (SLOT 1)
- Current OUT 2 (Option Card) (SLOT 2+V3/V4) or (SLOT 1+V1/V2)
- ABB (passive)
- ABB (active)
- CUSTOMER (passive)
- LOAD
- MAX 30mA

Installation diagram 3KXF00061G0009
Allowed I/O connections and OPTION CARD handling:

Digital IN 1 (Option Card) (SLOT 2)

- DIS active
- DIS passive

Active Supply (Option Card) (SLOT 1)

Current OUT 3 (Option Card) (SLOT 1-V3/V2)

- CDS active

ABB (passive)

V3 +
V4 -

ABB (active)

V3 +
V3 -

max. 30mA

ABB (passive)

V3 -

CUSTOMER (passive)

LOAD

ABB (active)

V3 -

CUSTOMER (active)

LOAD

Installation diagram FE_63

ABB

For Model FE_63

ABB Automation Products GmbH

Installation diagram FE_63

01 20.12.2016 FBu

01 20.12.2016 FBu

3KXF000061G0009

Rev. Date Number Name

PAGE 7 OF 10
### Zone 2/21 & Division 2

Model code: FEa63dY0, FEa63dA2, FEa63dF2

**HART Communication**

<table>
<thead>
<tr>
<th>Indication</th>
<th>Abbr.</th>
<th>Status</th>
<th>Option</th>
<th>Terminal</th>
<th>Operating Value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Active or Passive</td>
<td>Chosen Option depending on Model Number (MN)</td>
<td>If “or” occurs, Terminal depends on MN</td>
<td>GP</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>U_{in} [V]</td>
</tr>
</tbody>
</table>

**On board**

- **Current Output 1**
  - CO1: A, On board Power Supply, 31/U_{CO}, 30 30 30 30
  - 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
  - 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
  - DO2: P, 51/52, 30 30 30 30

**Option Cards (OC)**

- **Current Output 2**
  - CO2: A, With OC Active Supply, V1/V2 and V3/V4, 30 30 30 30

- **Current Output 3**
  - CO3: P, V1/V2 or V3/V4, 30 30 30 30

- **Digital Output 3**
  - DO3: A, With OC Active Supply, V3/V4, 30 30 30 30
  - DO3: P, V1/V2 and V3/V4, 30 30 30 30

- **Digital Input 1**
  - DI1: A, With OC Active Supply, V3/V4, 30 3.45 30 3.45
  - DI1: P, V1/V2 or V3/V4, 30 3.45 30 3.45

---

**Installation diagram 3KXF00061G0009**

---
### Zone 1/21 & Division 1

**Model code**
- FEa03dA1
- FEa03df1

**HART Communication**

<table>
<thead>
<tr>
<th>Indication</th>
<th>Abbr.</th>
<th>Status</th>
<th>Active or Passive</th>
<th>Option</th>
<th>Terminal</th>
<th>Operating Value</th>
<th>Ex e / XP</th>
<th>Ex ia / IS</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>V</td>
<td>A</td>
<td>V</td>
</tr>
<tr>
<td>On board</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>30</td>
<td>0.2</td>
<td>30</td>
</tr>
<tr>
<td>Current Output 1</td>
<td>CO1</td>
<td>A</td>
<td>On board Power Supply</td>
<td>31/U_{CO}</td>
<td></td>
<td>30</td>
<td>0.2</td>
<td>30</td>
</tr>
<tr>
<td>Current Output 1</td>
<td>CO1</td>
<td>P</td>
<td></td>
<td>31/32</td>
<td></td>
<td>30</td>
<td>0.2</td>
<td>30</td>
</tr>
<tr>
<td>Digital Output 1</td>
<td>DO1</td>
<td>A</td>
<td>With OC Active Supply</td>
<td>41/42 and V1/V2</td>
<td></td>
<td>30</td>
<td>0.1</td>
<td>30</td>
</tr>
<tr>
<td>Digital Output 1</td>
<td>DO1</td>
<td>P</td>
<td></td>
<td>41/42</td>
<td></td>
<td>30</td>
<td>0.1</td>
<td>30</td>
</tr>
<tr>
<td>Digital Output 2</td>
<td>DO2</td>
<td>A</td>
<td>With OC Active Supply</td>
<td>51/S2 and V1/V2</td>
<td></td>
<td>30</td>
<td>0.1</td>
<td>30</td>
</tr>
<tr>
<td>Digital Output 2</td>
<td>DO2</td>
<td>P</td>
<td></td>
<td>51/S2</td>
<td></td>
<td>30</td>
<td>0.1</td>
<td>30</td>
</tr>
</tbody>
</table>

**Option Cards (OC)**

| Current Output 2    | CO2   | A      | With OC Active Supply | V1/V2 and V3/V4        |                          | 30 | 0.1      | 30 | 119| 826| 225| 29 | 29 | 117| 117| 0.4 | 0.4 |
| Current Output 2    | CO2   | P      |                   | V1/V2 or V3/V4         |                          | 30 | 0.1      | 30 | 119| 826| 225| 29 | 29 | 117| 117| 0.4 | 0.4 |
| Current Output 3    | CO3   | A      |                   | V1/V2 or V3/V4         |                          | 30 | 0.1      | 30 | 119| 826| 225| 17 | 17 | 31 | 31 | 0.4 | 0.4 |
| Digital Output 3    | DO3   | A      | With OC Active Supply | V1/V2 and V3/V4        |                          | 30 | 0.1      | 30 | 119| 826| 225| 17 | 17 | 31 | 31 | 0.4 | 0.4 |
| Digital Input 1     | D11   | A      | With OC Active Supply | V1/V2 and V3/V4        |                          | 30 | 0.1      | 30 | 119| 3,45| 25,8| 17 | 17 | 31 | 31 | 0.4 | 0.4 |

---

**Installation diagram FE_63**

---

**ABB Automation Products GmbH**

---

**Page 9 of 10**
<table>
<thead>
<tr>
<th>Model number</th>
<th>On Board Input/Output</th>
<th>Slot1</th>
<th>Slot2</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Current Output</td>
<td>Digital Output</td>
<td>Option Card</td>
</tr>
<tr>
<td></td>
<td>CO1 Terminal</td>
<td>DO1 Terminal</td>
<td>CO2</td>
</tr>
<tr>
<td></td>
<td></td>
<td>DO2 Terminal</td>
<td></td>
</tr>
<tr>
<td>G0</td>
<td>...</td>
<td>31/32 Vuo</td>
<td>AS</td>
</tr>
<tr>
<td>G1</td>
<td>...</td>
<td>31/32 Vuo</td>
<td>...</td>
</tr>
<tr>
<td>G2</td>
<td>...</td>
<td>31/32 Vuo</td>
<td>...</td>
</tr>
<tr>
<td>G3</td>
<td>DRT</td>
<td>31/32 Vuo</td>
<td>AS</td>
</tr>
<tr>
<td>G6</td>
<td>DRT</td>
<td>31/32 Vuo</td>
<td>AS</td>
</tr>
<tr>
<td>G8</td>
<td>DRT</td>
<td>31/32 Vuo</td>
<td>AS</td>
</tr>
<tr>
<td>G0</td>
<td>DRT</td>
<td>31/32 Vuo</td>
<td>AS</td>
</tr>
<tr>
<td>G6</td>
<td>DRT</td>
<td>31/32 Vuo</td>
<td>AS</td>
</tr>
<tr>
<td>G8</td>
<td>DRT</td>
<td>31/32 Vuo</td>
<td>AS</td>
</tr>
<tr>
<td>G6</td>
<td>DRT</td>
<td>31/32 Vuo</td>
<td>AS</td>
</tr>
<tr>
<td>G8</td>
<td>DRT</td>
<td>31/32 Vuo</td>
<td>AS</td>
</tr>
</tbody>
</table>

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

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.

Installation diagram FE_63

ABB Automatic Products GmbH

Installation diagram 3KXF00061G0009
Trademarks

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