SensyMaster FMT430, FMT450
Thermal mass flowmeter

Measurement made easy

Additional Information
Additional documentation on SensyMaster FMT430, FMT450 is available free of charge for downloading at www.abb.com/flow. Alternatively simply scan this code:
Short product description
Thermal mass flowmeter on the mass flow measurement of
gases and gas mixtures in closed pipelines.

Device firmware version:
— 01.00.07 (HART)

Additional Information
Additional documentation on SensyMaster FMT430, FMT450 is
available free of charge for downloading at www.abb.com/flow.
Alternatively simply scan this code:

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1 Safety

1.1 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.

1.2 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 useful or important information about the product.

The signal word “NOTICE” is not a signal word indicating a danger to personnel. The signal word “NOTICE” can also refer to material damage.

1.3 Intended use
This device can be used in the following applications:
- As a plug-in sensor flanged into the pipe component in pipelines with nominal diameters DN 25 ... DN 200 (1 ... 8 in.).
- Through a welding adapter directly in pipelines of nominal diameter DN 100 (4 in.) and above, as well as for non-circular cross-sections.

This device is intended for the following uses:
- for direct mass flow measurement of gases and gas mixtures in closed pipelines.
- for indirect measurement of standard volume flows (through standard density and mass current).
- For measuring the temperature of the measuring medium.

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 media for measurement the following points must be observed:
- Measuring media may only be used if, based on the state of the art or the operating experience of the user, it can be assured that the chemical and physical properties necessary for safe operation of the materials of flowmeter sensor components coming into contact with these will not be adversely affected during the operating period.
- Media containing chloride in particular can cause corrosion damage to stainless steels which, although not visible externally, can damage wetted parts beyond repair and lead to the measuring medium escaping. It is the operator’s responsibility to check the suitability of these materials for the respective application.
- Measuring media with unknown properties or abrasive measuring media may only be used if the operator can perform regular and suitable tests to ensure the safe condition of the meter.

1.4 Improper use
The following are considered to be instances of improper use of the device:
- For operating as a flexible adapter in piping, e.g. for compensating pipe offsets, pipe vibrations, pipe expansions, etc.
- For use as a climbing aid, e.g. for mounting purposes
- For use as a support for external loads, e.g. as a support for piping, etc.
- Material application, e.g. by painting over the housing, name plate or welding/soldering on parts.
- Material removal, e.g. by spot drilling the housing.
1.5 Notes on data security
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.

2  Product identification

2.1 Name plate

<table>
<thead>
<tr>
<th>No.</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Serial Number: 245368791002/12345</td>
</tr>
<tr>
<td>2</td>
<td>Model Number: FMT450C12D31M2BM 1R2TC</td>
</tr>
<tr>
<td>3</td>
<td>CE mark</td>
</tr>
<tr>
<td>4</td>
<td>Sensor Element: Ceramic</td>
</tr>
<tr>
<td>5</td>
<td>Mounting Length: 263 mm</td>
</tr>
<tr>
<td>6</td>
<td>Sensor Material: AISI 316TI SST (1.4571)</td>
</tr>
<tr>
<td>7</td>
<td>Protection Class: IP NEMA 65/67, 4X</td>
</tr>
<tr>
<td>8</td>
<td>Sensor Material: Flanges DIN 1185</td>
</tr>
<tr>
<td>9</td>
<td>Ambient temperature / model number range (Tamb. / Tmed.)</td>
</tr>
<tr>
<td>10</td>
<td>Power supply: 24VDC +/- 10%, 20W</td>
</tr>
<tr>
<td>11</td>
<td>“Read operating instruction” symbol</td>
</tr>
<tr>
<td>12</td>
<td>“Hot surface” symbol</td>
</tr>
<tr>
<td>13</td>
<td>Manufacturer address</td>
</tr>
<tr>
<td>14</td>
<td>Manufacture date (month / year)</td>
</tr>
<tr>
<td>15</td>
<td>Update field device firmware</td>
</tr>
<tr>
<td>16</td>
<td>Device firmware revision</td>
</tr>
<tr>
<td>17</td>
<td>Order code</td>
</tr>
<tr>
<td>18</td>
<td>Serial number</td>
</tr>
</tbody>
</table>

Fig. 1: Name plate (example)

| 1   | Type designation |
| 2   | CE mark |
| 3   | Measuring element design |
| 4   | Sensor installation length |
| 5   | Wetted material |
| 6   | IP / NEMA protection type |
| 7   | Sensor process connection |
| 8   | Ambient temperature / model number range (Tamb. / Tmed.) |
| 9   | Power supply |
| 10  | “Read operating instruction” symbol |
| 11  | “Hot surface” symbol |
| 12  | Manufacturer address |
| 13  | Manufacture date (month / year) |
| 14  | Update field device firmware |
| 15  | Device firmware revision |
| 16  | Order code |
| 17  | Serial number |

G12368
3 Transport and storage

3.1 Inspection
Check the devices immediately after unpacking for possible damage that may have occurred from improper transport. Details of any damage that has occurred in transit must be recorded on the transport documents. All claims for damages must be submitted to the shipper without delay and before installation.

3.2 Transport

**DANGER**
Life-threatening danger due to suspended loads.
In the case of suspended loads, a danger of the load falling exists.
Remaining under suspended loads is prohibited.

**WARNING**
Risk of injury due to device slipping.
The device’s center of gravity may be higher than the harness suspension points.
| Make sure that the device does not slip or turn during transport. |
| Support the device laterally during transport. |

3.3 Storing the device
Bear the following points in mind when storing devices:
| Store the device in its original packaging in a dry and dust-free location. |
| Observe the permitted ambient conditions for transport and storage. |
| Avoid storing the device in direct sunlight. |
| In principle, the devices may be stored for an unlimited period. However, the warranty conditions stipulated in the order confirmation of the supplier apply. |

Observe the following instructions:
| Do not expose the device to humidity during transport. |
| Support the device accordingly. |
| Pack the device so that it is protected against vibrations during transport, e.g., by using air-cushioned packaging. |

If the original packaging material is no longer available, wrap the device in bubble wrap or corrugated cardboard and place it in a box of sufficient size lined with a shock-absorbing material (e.g., foam rubber). The thickness of the padding should be appropriate for the device weight and type of shipment. The box must be labeled as “fragile”.

For overseas shipment, always add a desiccant (e.g., silica gel) and hermetically seal the device plus desiccant in a layer of polythene that is 0.2 mm thick. Use an amount of desiccant that is appropriate for the packing volume and the expected transport time (at least for three months). You should also line the box with a layer of union paper.

3.3.1 Ambient conditions

**Storage temperature range**
-25 ... 85 °C (-13 ... 185 °F)

**Relative humidity**
Maximum 85 % RH, annual average ≤ 65 % RH

3.4 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. Include the return form once it has been properly filled out (see appendix in operating instructions) with the device.

According to 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.).

Please contact Customer Center Service acc. to page 2 for nearest service location.
4 Installation

⚠️ DANGER

Danger to life due to piping under pressure!
Sensors which may eject during installation or removal in piping remaining under pressure may pose a danger to life.
— Install or remove a sensor only if the piping is depressurized.
— As an alternative, use a pipe component with an integrated replacement device.

⚠️ WARNING

Risk of injury due to process conditions.
The process conditions, e.g. high pressures and temperatures, toxic and aggressive measuring media, can give rise to hazards when working on the device.
— Before working on the device, ensure that the process conditions do not pose any safety risks.
— If necessary, wear suitable personal protective equipment when working on the device.
— Depressurize and empty the device / piping, allow to cool and purge if necessary.

4.1 Installation conditions
4.1.1 Installation location and assembly

Note the following points when selecting the installation location and when mounting the sensor:
— The ambient conditions (IP rating, ambient temperature range \( T_{\text{amb}} \)) of the device must be adhered to at the installation location.
— Sensors and transmitters must not be exposed to direct sunlight. If necessary, provide a suitable means of sun protection on site. The limit values for the ambient temperature \( T_{\text{amb}} \) must be observed.
— On flange devices, ensure that the counterflanges of the piping are aligned plane parallel. Only install flange devices with suitable gaskets.
— Prevent the sensor from coming into contact with other objects.
— The device is designed for industrial applications. No special EMC protective measures are required if the electromagnetic fields and interference at the installation location of the device comply with "Best Practice" guidelines (in accordance with the standards referred to in the declaration of conformity).
Maintain a suitable distance from electromagnetic fields and interference that extend beyond the usual dimensions.

Gaskets
Users are responsible for selecting and mounting suitable gaskets (material, shape).
Note the following points when selecting and mounting gaskets:
— Only gaskets made from a material that is compatible with the measuring medium and measuring medium temperature may be used
— Gaskets must not extend into the flow area, since possible turbulence may influence the accuracy of the device.
4.1.2 Inlet and outlet sections
The figures below show the recommended inlet and outlet sections for various installations.

![Inlet and outlet sections](image)

<table>
<thead>
<tr>
<th>Installation</th>
<th>Inlet section</th>
<th>Outlet section</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>≥15 x DN</td>
<td>≥5 x DN</td>
</tr>
<tr>
<td>B</td>
<td>≥15 x DN</td>
<td>≥5 x DN</td>
</tr>
<tr>
<td>C</td>
<td>≥20 x DN</td>
<td>≥5 x DN</td>
</tr>
<tr>
<td>D</td>
<td>≥25 x DN</td>
<td>≥5 x DN</td>
</tr>
<tr>
<td>E</td>
<td>≥40 x DN</td>
<td>≥5 x DN</td>
</tr>
<tr>
<td>F</td>
<td>≥50 x DN</td>
<td>≥5 x DN</td>
</tr>
</tbody>
</table>

To achieve the specified measuring accuracy, the indicated inlet and outlet sections are required.

In case of combinations of several inlet-side errors, e.g. valve and reduction, a longer inlet section must always be taken into account.

In case of confined spaces at the installation place, the outlet section can be reduced to 3 x DN. However, reducing the specified inlet section will reduce the achievable level of accuracy.

A high repeatability of the measured value is maintained.

In case of insufficient inlet and outlet sections, a special calibration may be possible. To do this, a detailed alignment is necessary for individual cases.

The specified inlet and outlet sections must be doubled for gases with a very low density (hydrogen, helium).

4.1.3 Installation at high ambient temperatures

![Mounting position at high ambient temperatures](image)

Under high but permissible ambient temperatures, avoid additional thermal stress from heat convection or radiation, since these sources of heat may exceed the permissible ambient temperature on the equipment surface.

If the device needs to be installed directly on a hot, horizontal piping, we recommend installing it on the side. In such cases, you should avoid installing it in the 12 o’clock position, otherwise the warm air that rises up will cause additional heating of the electronics.

4.1.4 Sensor insulation

![Insulation of the sensor](image)

The sensor may be insulated as shown in Fig. 4.
4.2 Environmental conditions

4.2.1 Ambient temperature
- Standard: -20 … 70 °C (-4 … 158 °F)
- Extended TA9: -40 … 70 °C (-40 … 158 °F)
- Extended TA6: -50 … 70 °C (-58 … 158 °F)

Relative humidity
Maximum 85 % RH, annual average ≤ 65 % RH

IP rating
In accordance with EN 60529: IP 65 / IP 67

4.2.2 NEMA rating
NEMA 4X

4.3 Process conditions

4.3.1 Measuring medium temperature
Devices with ceramic element and flange connection
- Standard: -25 … 150 °C (-13 … 302 °F)
- Extended (optional, only FMTx50): -25 … 300 °C (-13 … 572 °F)

The approved measuring medium temperature $T_{\text{medium}}$ also depends on the selected sensor process connection and the design of the pipe components.

The following temperature specifications apply:

<table>
<thead>
<tr>
<th>Sensor connection</th>
<th>$T_{\text{medium}}$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Threaded connection DIN 11851</td>
<td>-40 ... 140 °C (-40 ... 284 °F)</td>
</tr>
<tr>
<td>Clamp ring fitting</td>
<td>-25 ... 140 °C (-13 ... 284 °F)</td>
</tr>
<tr>
<td>Pipe components with ball valve</td>
<td>Maximum 150 °C (302 °F)</td>
</tr>
<tr>
<td>Integrated hot tap fitting</td>
<td>See the chapter titled 'Material loads for process connections' on page 10</td>
</tr>
</tbody>
</table>

Maximum operating pressure
Standard for devices with flange connection, $P_{\text{medium}}$:
4 MPa, 40 bar (580 psi)

The approved operating pressure $P_{\text{medium}}$ also depends on the selected sensor process connection and the design of the pipe components.

The following temperature specifications apply:

<table>
<thead>
<tr>
<th>Sensor connection</th>
<th>$P_{\text{medium}}$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Threaded connection DIN 11851</td>
<td>1.6 MPa, 16 bar (232 psi)</td>
</tr>
<tr>
<td>Clamp ring fitting</td>
<td>2 MPa, 20 bar (290 psi)</td>
</tr>
<tr>
<td>Integrated hot tap fitting</td>
<td>See the chapter titled 'Material loads for process connections' on page 10</td>
</tr>
</tbody>
</table>

Pressure drop

Fig. 5: Pressure loss in logarithmic representation

A Pressure loss  B Mass flow
4.3.2 Material loads for process connections
DIN and ASME flanges

The maximum approved operating pressure for CL 300 is limited to 40 bar (580 psi).

Integrating hot tap fitting

4.4 Assembly of the pipe component
When installing the pipe components, observe the following points:
— During installation, it is important to ensure that the flow direction corresponds to the attached label.
— When welding the welding adapter, remember to observe the relevant welding instructions. The amount of heat introduced must be kept to an absolute minimum to prevent warping of the mounting flange’s sealing surface.
— In the case of flanged connections, flat gaskets must be installed, which should be in perfect condition and resistant to the measuring media.
— Before installing pipe components or sensors, check all components and gaskets for damage.
— Pipe components must not be installed under tension, otherwise the pipeline may exert impermissible forces on the device.
— When assembling the flanged connections, use screws that offer the required strength and dimensions.
— The screws must be tightened evenly and to the required torque.
— Once the pipe components have been installed, the insertion connection must be sealed by means of a blind flange plus gasket or by closing a shut-off device (if present).
4.4.1 Wafer type design (FMT091) and partial measuring section (FMT092)

Fig. 9: Installing a pipe component (example, wafer type design)

Installation of the FMT091 pipe component (wafer type design) and FMT092 (partial measuring section).
1. Position the pipe component coplanar and centered between the piping. The flow direction must correspond to the arrow indicated on the pipe component. The centering pin on the pipe component must be located on the outflow side (behind the measuring point).
2. Install gaskets between the sealing surfaces.

---

**NOTICE**

For achieve the best measurement results, make sure the gaskets fit concentrically with the pipe component.

- The inside diameter of the pipe and flange must precisely match in the wafer type design. Any differences in levels or edges, or untidy weld seams, will reduce the measuring accuracy.
- To guarantee that the flow profile is not distorted, the gaskets must not protrude into the piping.

3. Use the appropriate screws for the holes.
4. Slightly grease the threaded nuts.
5. Tighten the nuts in a crosswise manner as shown in the figure. First tighten the nuts to approx. 50 % of the maximum torque, then to 80 %, and finally a third time to the maximum torque.

---

**NOTICE**

Torques for screws depend on temperature, pressure, screw and gasket materials. The relevant applicable regulations must be taken into consideration.

---

Fig. 10: Tightening sequence for the flange screws
4.4.2 Weld-on adapter

Consider the following points when installing the welding dater in the piping:

— After welding, the welding adapter must have a length of \( L \) (see chapter ‘Mounting dimensions – welding adapter with flange and with and without ball valve’ on page 13 and ‘Assembly dimension - welding adapter with threaded connection in accordance with DIN 11851’ on page 14).

\[
L = h - \left( \frac{1}{2} \times D \right)
\]

- \( L \) Length of the welding adapter
- \( h \) Installation length of the sensor
- \( D \) Outside diameter of the pipeline

— Shorten the length of the welding adapter as needed before welding it on. After welding, the welding adapter may protrude into the piping no more than 10 mm (0.39 inch).
— Observe thickness of pipeline wall and degree of shrinkage when welding!
— The distance \( h \) from the upper edge of the adapter flange to the pipe central axis must be within a tolerance of \( \pm 2 \) mm (0.08 inch).
— Maintain a right angle to the pipe axis (max. tolerance 2°).
— The adapter centering pin must be aligned with the pipe axis in the flow direction (outflow side, behind the measuring point).
— Once welding is complete, there must be free clearance of at least 28 mm (1.10 inch) to install the sensor; drill to create clearance as needed.

Additional instructions for welding adapter with ball valve

⚠️ **DANGER**

Danger to life due to improper installation!

During welding, the gaskets in the ball valve may overheat. This can lead to the measuring medium escaping in an uncontrolled manner. This can result in severe injuries or death.

Remove the ball valve before welding.

Versions featuring a ball valve enable the flowmeter sensor to be installed and disassembled at low gauge pressures in the pipeline with minimal gas leakage.

The design with ball valve is installed as described above, but the following indications must be observed in addition:

— To install the sensor, the ball valve must be opened completely. Then, the flowmeter sensor can be installed along with the appropriate gasket and screwed into place.
— Before disassembling the sensor, make sure that the pipeline has been depressurized. Then, you can release the screws on the flange, remove the flowmeter sensor and close the ball valve.

⚠️ **NOTICE**

Damage to the sensor.

Closing the ball valve before you remove the sensor can seriously damage the protective cage or the sensor elements. Do not close the ball valve until the flowmeter sensor has been removed.
Mounting dimensions – welding adapter with flange and with and without ball valve

Without ball valve

With ball valve

Fig. 11: Welding adapter with flange - all dimensions given in mm (inch).

1 Centering pin 2 Nut for O-ring 3 connection flange DN 25 (1") 4 flow direction

<table>
<thead>
<tr>
<th>h – sensor length</th>
<th>Ø D – outer pipe diameter (min. / max.)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Without ball valve</td>
</tr>
<tr>
<td>263 (10.35)</td>
<td>100 ... 350 (3.94 ... 13.78)</td>
</tr>
<tr>
<td>425 (16.73)</td>
<td>&gt; 350 ... 700 (&gt; 13.78 ... 27.56)</td>
</tr>
<tr>
<td>775 (30.51)</td>
<td>&gt; 700 ... 1400 (&gt; 27.56 ... 55.12)1)</td>
</tr>
</tbody>
</table>

1) The limitation of the maximum pipe diameter only applies for installations with a measuring element in the middle of the pipe. In case of larger or non-round cross-sections, a non-centered position of the measuring element in the piping is considered in the calibration.
Assembly dimension - welding adapter with threaded connection in accordance with DIN 11851

Fig. 12: Dimensions in mm (inch)

1 Union nut  2 Flow direction  3 Centering pin
4.4.3 Integrated hot tap fitting

Wafer type design
Installation of the wafer type design is performed as explained in chapter ‘Wafer type design (FMT091) and partial measuring section (FMT092)’ on page 11.

Welding design

⚠️ DANGER

Danger to life due to improper installation!
Do not shorten hot tap fitting components or interfere with the design. This can lead to the measuring medium escaping in an uncontrolled manner. This can result in severe injuries or death.

The welding version of the integrated changing device is available in two installation lengths:
— for nominal diameters DN 100 ... DN 125 (4 ... 5”) and
— for nominal diameters DN 150 ... DN 300 (6 ... 12”)

⚠️ NOTICE

— The sensor length $h$ is 425 mm (16.73 inch) respectively.
— The installation depth $Y$ depends on the pipe diameter and must be calculated individually.

Calculation of the outside length $X$ and installation depth $Y$

\[
X = h - \left(\frac{D}{2}\right)
\]

\[
Y = \left(\frac{D}{2}\right) - 28 \text{ mm} \ (1.1 \text{ inch})
\]

$X$ Outside length of the integrated changing device

$Y$ Installation depth of the integrated changing device

$h$ Sensor length

$D$ Outside diameter of the pipeline

Example

— Sensor length $h = 425 \text{ mm (16.73 inch)}$
— Pipe with external diameter of $210 \text{ mm (8.27 inch)}$
— The changing device is in measurement position

$X = 425 \text{ mm} - \left(\frac{210 \text{ mm}}{2}\right) = 320 \text{ mm}$

$Y = \left(\frac{210 \text{ mm}}{2}\right) - 28 \text{ mm} = 77 \text{ mm}$

Consider the following points when installing the welding version in the piping:

— Maintain a right angle to the pipe axis (max. tolerance $2^\circ$).
— The adapter centering pin must be aligned with the pipe axis in the flow direction (outflow side, behind the measuring point).

⚠️ NOTICE

Damage to components
If the welded joints become hot, warping of the sealing surfaces and / or damage to the O-rings can occur. Pause occasionally to allow the fitting to cool.

⚠️ NOTICE

Impact on measuring accuracy
Deviations from the stated dimension and position tolerances have an impact on measuring accuracy.

Fig. 13: Integrated changing device in measurement position, dimensions in mm (inch)

1 Sensor  2 Centering pin  3 Flow direction
4.5 Installing the sensor
When installing the sensor, observe the following points:
— Installation in the pipe component or welding adapter is only possible if the sensor data matches the measuring point specifications.
— The sensor may be sealed only by using the O-ring supplied in the scope of delivery. The O-ring must be placed in the designated groove on the sensor connection flange.
— The measuring elements may not be damaged when inserting the sensor into the pipe component.
— If you are using an integrated changing device, you must check that the changing device is in the disassembly position before releasing the mounting screws.

4.5.1 Wafer type design and welding adapter

Fig. 14: Installing a sensor (example)


Installing the sensor:
1. Place the supplied O-ring in the groove of the sensor connection flange.
2. Carefully slide the sensor into the pipe component. Observe correct alignment to the centering pin in the process
3. Fasten the sensor to the sensor connection flange using screws. Tighten the flange screws simultaneously by applying the required torque (torque for supplied screws, non-lubricated, without use of spring washers: 87 Nm).
4.5.2 Installation / Disassembly in connection with the changing device

**DANGER**

Danger to life due to piping under pressure!
If the changing device is in the measurement position during disassembly of the sensor, this may pose a danger to life due to the possibility of the sensor being ejected.
Disassemble the sensor only if the changing device is in the disassemble position.

**DANGER**

Danger to life due to leaking measuring medium!
If the changing device is in the measurement position during disassembly of the sensor or gaskets in the changing device are damaged, leaking measuring medium may pose a danger to life.
— Make sure that the changing device is in the disassemble position.
— If measuring medium should start to leak in spite of this, immediately stop disassembly of the sensor and tighten the fastening screws.
— Drain and rinse the piping before disassembling the sensor, check and repair the changing device.

**CAUTION**

Risk of injury due to leaking measuring medium!
When you disassemble the transmitter, small quantities of measuring medium may leak due to the nature of the design. Make sure that sufficient ventilation is ensured during disassembly of the sensor.

**NOTICE**

Damage to the changing device
Using tools or other devices to operate the lock nut can damage the hot tap fitting.
Only ever operate the lock nut manually.

---

**Fig. 15:** Sensor process connection
1 O-Ring 2 Connection flange 3 Centering pin 4 Screws to secure the guiding pipe 5 union nut

**Fig. 16:** Sensor installation / Disassembly
A Integrated changing device in disassemble position  B integrated changing device in measurement position
1 Sensor 2 Protection cap 3 Union nut in disassemble position 4 Union nut in measurement position 5 Special screws for protection cap
Installation of the sensor during operation

**NOTICE**

The changing device must be in the disassemble position before disassembling the sensor, the sensor process connection is sealed.

Installing the sensor:
1. Place the supplied O-ring in the groove of the sensor connection flange.
2. Carefully slide the sensor into the changing device. Observe correct alignment to the centering pin in the process.
3. Fasten the sensor to the sensor connection flange using screws. Use the supplied M12 screws, as well as two extended special screws for this.
4. Place the protection caps onto the special screws and tighten using two nuts.
5. Twist the transmitter with the union nut into the measuring position. The lower edge of the union nut indicates the position of the sensor. Only when the measuring position is reached 50 - OPEN - MESSEN (the lower limit stop of the union nut) will the sensor be in the middle of the piping and precise values can be provided.
6. Carry out the electrical connection

Disassembly of the sensor during operation

Disassembly of the sensor:
1. Twist the transmitter with the union nut into the disassemble position. The lower edge of the union nut indicates the position of the sensor. Only when the disassemble position is reached 0 - CLOSE - ZU (the upper limit stop of the union nut) will the sensor be in the disassemble position and the changing device is sealed off from the process.
2. Disconnect electrical connections.
3. Remove protection caps.
4. Remove flange screws.
5. Carefully pull the sensor out of the changing device (do not tip to the side).

4.6 Installing the transmitter in the remote mount design

When selecting a location for the transmitter, consider the following points:

- Observe the information concerning maximum ambient temperature and the protection class on the name plate.
- The location must be mostly free from vibration.
- The location must not be exposed to direct sunlight. If necessary provide a sun screen on site.
- Do not exceed the maximum signal cable length between the transmitter and the sensor.

1. Drill mounting holes at mounting location.
2. Attach transmitter securely to the mounting location using appropriate fasteners for the base material.

[Diagram of mounting dimensions of double-compartment housing]

1 Hole pattern for mounting holes
4.7 Opening and closing the housing

⚠ 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.

⚠ NOTICE
Adverse effect on 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 the transmitter housing cover \(1\).

Close the housing:
1. Remount the transmitter housing cover \(1\).
2. After closing the housing, lock the housing cover by unscrewing the Allen screw \(2\).
**NOTICE**

Adverse effect on IP rating
— Check the gasket for damage and replace it if necessary before closing the housing cover.
— Check that the gasket is properly seated when closing the housing cover.

---

**4.7.1 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 enclosure**

**DANGER**
Damaging the device carries a risk of explosion!
Never disconnect the transmitter housing from the sensor. Only loosen the screws shown when rotating the transmitter housing!

Rotating the transmitter housing: Perform steps A, B, and C.

---

**Fig. 20: Opening / closing single-compartment housing**
1 Screws for housing cover (4x)  
2 Transmitter housing cover  
3 Gasket

To open the housing: Perform steps A and B.  
To close the housing: Perform steps C and D.

---

**Fig. 21: Rotating the transmitter housing**
LCD indicator - dual-compartment housing
The LCD indicator can be rotated in 3 increments of 90°. Refer to chapter ‘Opening and closing the housing’ on page 19! Rotating the LCD indicator: Perform steps A ... F.

Fig. 22: Rotating the LCD indicator

LCD indicator - single-compartment housing
The LCD indicator can be rotated in 3 increments of 90°. Refer to chapter ‘Opening and closing the housing’ on page 19! Rotating the LCD indicator: Perform steps A ... F.

Fig. 23: Rotating the LCD indicator
4.8 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 must 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.

Optional plug-in cards

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

![Fig. 24: plug-in cards](image)

<table>
<thead>
<tr>
<th>Plug-in card</th>
<th>Number(^1)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Passive current output, 4 ... 20 mA (red) Order no. 3KQZ400029U0100</td>
</tr>
<tr>
<td>2</td>
<td>Passive digital output (green) Order no. 3KQZ400030U0100</td>
</tr>
<tr>
<td>3</td>
<td>Passive digital input (yellow) 3KQZ400032U0100</td>
</tr>
<tr>
<td>4</td>
<td>24 V DC power supply (blue) 3KQZ400031U0100</td>
</tr>
</tbody>
</table>

\(^1\) The “Number” column indicates the maximum number of plug-in cards of the same type that can be used.
Fig. 25: Installation of plug-in cards (example, dual-compartment and single-compartment housing)

1 Cover 2 LCD display 3 Frontend board (FEB, only in integral mount design) 4 Socket OC2 5 Socket OC1 6 Plug-in cards
**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.

**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.

1. Switch off the power supply.
2. Unscrew / remove the cover.
3. Remove the LCD indicator. Ensure that the cable harness is not damaged.
   Insert the LCD display into the bracket (only for single-compartment housings)
4. Remove frontend board (only in integral mount design and dual-compartment housing). Ensure that the cable harness is not damaged.
5. Insert the plug-in card in the corresponding slot and engage. Ensure that the contacts are aligned correctly.
6. Attach the frontend board, insert the LCD display and screw on / replace the cover.
8. After powering up the power supply, configure the plug-in card functions.

### 4.9 Electrical connections

**WARNING**

Risk of injury due to live parts.
Improper work on the electrical connections can result in electric shock.
— Connect the device only with the power supply switched off.
— Observe the applicable standards and regulations for the electrical connection.

The electrical connection may only be established by authorized specialist personnel and in accordance with the connection diagrams.
The electrical connection information in this manual must be observed; otherwise, the IP rating may be adversely affected.
Ground the measurement system according to requirements.

#### 4.9.1 Connecting the power supply

**NOTICE**

— Observe the power supply limit values in accordance with the information on the name plate.
— Observe the voltage drop for large cable lengths and small conductor cross-sections. The voltage at the terminals of the device may not fall below the minimum value required in accordance with the information on the name plate.

The power supply is connected to terminal L (phase), N (neutral), or 1+, 2-, and PE, as stated on the name plate.
A circuit breaker with a maximum rated current of 16 A must be installed in the power supply line of the transmitter.
The wire cross-sectional area of the power supply cable and the circuit breaker used must comply with VDE 0100 and must be dimensioned in accordance with the current consumption of the flowmeter measuring system. The cables must comply with IEC 227 and/or IEC 245.
The circuit breaker should be located near the transmitter and marked as being associated with the device.
Connect the transmitter and sensor to functional earth.
4.9.2 Cable entries
The electrical connection is made via cable entries with a 1/2" NPT or M20 x 1.5 thread. Devices with an M20 x 1.5 or 1/2" NPT thread are supplied with protective plugs. The black protective plugs in the cable glands are intended to provide protection during transport. Any unused cable entries must be sealed before commissioning using sealing plugs in accordance with the applicable local standards.

— Observe the maximum torque of 4.5 Nm (3.3 ft lb) when tightening the M20 cable gland.
— Make sure that the outer dimension of cable used, fits the clamping range of the cable gland.

4.9.3 Installing the connecting cables
Ensure that a drip loop (water trap) is used when installing the connecting cables for the sensor.

4.9.4 Signal cable
The signal cable used for the connection of the transmitter and sensor must fulfill at least the following technical specifications.

<table>
<thead>
<tr>
<th>Specification</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Impedance</td>
<td>100 ... 200 Ω</td>
</tr>
<tr>
<td>Withstand voltage</td>
<td>120 V</td>
</tr>
<tr>
<td>Outer diameter</td>
<td>6 ... 12 mm (0.24 ... 0.47 inch)</td>
</tr>
<tr>
<td>Cable design</td>
<td>Two wire pairs as a star-quad cable</td>
</tr>
<tr>
<td>Conductor cross-section</td>
<td>Length-dependent</td>
</tr>
<tr>
<td>Shield</td>
<td>Copper braid with approximately 85 % coverage</td>
</tr>
<tr>
<td>Temperature range</td>
<td>Depends on application.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Maximum signal cable length</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.25 mm² (AWG 24)</td>
</tr>
<tr>
<td>0.34 mm² (AWG 22)</td>
</tr>
<tr>
<td>0.5 mm² (AWG 20)</td>
</tr>
<tr>
<td>0.75 mm² (AWG 19)</td>
</tr>
</tbody>
</table>

Recommended cables
It is recommended to use an ABB signal cable with the order number 3KQZ407123U0100 for standard applications. The ABB signal cable fulfills the above-mentioned cable specification and can be utilized unrestrictedly up to an ambient temperature of $T_{amb.} = 80 °C (176 °F)$.
## 4.9.5 Electrical connection (HART protocol)

![Diagram of electrical connections](image.png)

### 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 / ⌀</td>
<td>Protective earth (PE)</td>
</tr>
<tr>
<td></td>
<td>Potential equalization</td>
</tr>
</tbody>
</table>

### DC voltage

<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></td>
<td>Potential equalization</td>
</tr>
</tbody>
</table>

### 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>

### Connections for inputs and outputs

<table>
<thead>
<tr>
<th>Terminal</th>
<th>Function / comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Uco / 32</td>
<td>Active 4 ... 20 mA current output / HART or Passive 4 ... 20 mA current output / HART</td>
</tr>
<tr>
<td>31 / 32</td>
<td>Passive digital output DO1</td>
</tr>
<tr>
<td>41 / 42</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>

For details, see chapter 'Optional plug-in cards' on page 22.
4.10 Electrical data for inputs and outputs

**Power supply**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>AC voltage</strong></td>
<td></td>
</tr>
<tr>
<td>Terminals</td>
<td>L / N</td>
</tr>
<tr>
<td>Operating voltage</td>
<td>100 ... 240 V AC, (-15 % / +10 %), 47 ... 64 Hz</td>
</tr>
<tr>
<td>Power consumption</td>
<td>$S_{\text{max}} &lt; 20$ VA</td>
</tr>
<tr>
<td>Power-up current</td>
<td>18.4 A, $t &lt; 3$ ms</td>
</tr>
<tr>
<td><strong>DC voltage</strong></td>
<td></td>
</tr>
<tr>
<td>Terminals</td>
<td>1+ / 2-</td>
</tr>
<tr>
<td>Operating voltage</td>
<td>24 V DC ± 20 %</td>
</tr>
<tr>
<td>Ripple</td>
<td>&lt; 5 %</td>
</tr>
<tr>
<td>Power Consumption</td>
<td>$P_{\text{max}} &lt; 20$ W</td>
</tr>
<tr>
<td>Power-up current</td>
<td>21 A, $t &lt; 10$ ms</td>
</tr>
</tbody>
</table>

**HART communication**

A HART DTM in accordance with FDT1.2 standards is available. HART protocol based integrations in other Tools or systems (e.g., Emerson AMS/Siemens PCS7) are available on request. The DTM, the DD and EDD is available for download from www.abb.com/flow.

**HART output**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Terminals</td>
<td>Active: Uco / 32</td>
</tr>
<tr>
<td></td>
<td>Passive: 31 / 32</td>
</tr>
<tr>
<td>Protocol</td>
<td>HART 7.1</td>
</tr>
<tr>
<td>Transmission</td>
<td>FSK modulation on current output 4 ... 20 mA in accordance with Bell 202 standard</td>
</tr>
<tr>
<td>Baud rate</td>
<td>1200 baud</td>
</tr>
<tr>
<td>Signal amplitude</td>
<td>Maximum 1.2 mAss</td>
</tr>
<tr>
<td>Current output load</td>
<td>Minimum 250 $\Omega$</td>
</tr>
<tr>
<td>Cable</td>
<td>0.25 mm$^2$ (AWG 24), twisted</td>
</tr>
<tr>
<td>Maximum cable length</td>
<td>1200 m (3937 ft)</td>
</tr>
</tbody>
</table>

**Current output Uco / 32, 31 / 32**

Can be configured for the output of mass flow and volume flow.

![Fig. 28:](image1.png)

**NOTICE**

The HART protocol is not secure, as such the intended application should be assessed to ensure that these protocols are suitable before implementation.

![Fig. 29:](image2.png)

Permissible source voltage $U_q$ for passive outputs in relation to load resistance where $I_{\text{max}} = 22$ mA. 

1) Source voltage $U_q$ depends on the load $R_B$ and must be within the permissible range.
Digital output 41 / 42, 51 / 52
These can be configured as pulse outputs, frequency outputs or binary outputs.

**Fig. 30:** (I = internal, E = external, R_B = load)
A Passive digital output 41 / 42, 51 / 52 as pulse or frequency output
B Passive digital output 51 / 52 as binary output

<table>
<thead>
<tr>
<th>Pulse / frequency output (passive)</th>
<th>Terminals</th>
<th>41 / 42, 51 / 52</th>
</tr>
</thead>
<tbody>
<tr>
<td>Output &quot;closed&quot;</td>
<td>0 V ≤ UCEL ≤ 3 V</td>
<td></td>
</tr>
<tr>
<td></td>
<td>For f &lt; 2.5 kHz: 2 mA &lt; ICEL &lt; 10 mA</td>
<td></td>
</tr>
<tr>
<td></td>
<td>For f &gt; 2.5 kHz: 10 mA &lt; ICEL &lt; 30 mA</td>
<td></td>
</tr>
<tr>
<td>Output &quot;open&quot;</td>
<td>16 V ≤ UCEL ≤ 30 V DC</td>
<td></td>
</tr>
<tr>
<td></td>
<td>0 mA ≤ ICEL ≤ 0.2 mA</td>
<td></td>
</tr>
<tr>
<td>f_max</td>
<td>10 kHz</td>
<td></td>
</tr>
<tr>
<td>Pulse width</td>
<td>0.05 ... 2000 ms</td>
<td></td>
</tr>
</tbody>
</table>

**Binary output (passive)**

<table>
<thead>
<tr>
<th>Terminals</th>
<th>41 / 42, 51 / 52</th>
</tr>
</thead>
<tbody>
<tr>
<td>Output &quot;closed&quot;</td>
<td>0 V ≤ UCEL ≤ 3 V</td>
</tr>
<tr>
<td></td>
<td>2 mA ≤ ICEL ≤ 30 mA</td>
</tr>
<tr>
<td>Output &quot;open&quot;</td>
<td>16 V ≤ UCEL ≤ 30 V DC</td>
</tr>
<tr>
<td></td>
<td>0 mA ≤ ICEL ≤ 0.2 mA</td>
</tr>
</tbody>
</table>

Switching function Configurable

**Current output V1 / V2, V3 / V4 (plug-in card)**
Up to two additional current outputs can be implemented via the "Passive current output (red)" plug-in card.
The plug-in card can be used in slot OC1 or in OC2.

**Fig. 31:** (I = internal, E = external, R_B = load)
A Passive current output V1 / V2
B Passive current output V3 / V4

Permissible source voltage U_q for passive outputs in relation to load resistance where I_max = 22 mA.

---

**NOTICE**
- Terminals 42 / 52 have common grounding. Digital outputs 41 / 42 and 51 / 52 are not electrically isolated from each other. An electrically isolated digital output can be made using a plug-in module.
- If you are using a mechanical counter, we recommend setting a pulse width of ≥ 30 ms and a maximum frequency of f_max ≤ 3 kHz.

---

![Diagram of digital output configuration](image-url)

![Diagram of current output configuration](image-url)

---

**Current output configuration**

- Terminals V1 / V2, V3 / V4
- Output signal 4 ... 20 mA
- Load R_B 250 Ω ≤ R_B ≤ 600 Ω
- Source voltage 13 V ≤ U_q ≤ 30 V
- Measuring error < 0.1 % of measured value

1) The source voltage U_q depends on the load R_B and must be within the permissible range.

---

![Diagram of current output configuration](image-url)
Digital output V1 / V2, V3 / V4 (plug-in card)
An additional binary output can be implemented via the “Passive digital output (green)” plug-in card.
The plug-in card can be used in slot OC1 or in OC2.

Binary output (passive)

<table>
<thead>
<tr>
<th>Terminals</th>
<th>V1 / V2, V3 / V4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Output “closed”</td>
<td>0 V ≤ U_{CEL} ≤ 3 V</td>
</tr>
<tr>
<td></td>
<td>2 mA ≤ i_{CEL} ≤ 30 mA</td>
</tr>
<tr>
<td>Output “open”</td>
<td>16 V ≤ U_{CEL} ≤ 30 V DC</td>
</tr>
<tr>
<td></td>
<td>0 mA ≤ i_{CEL} ≤ 0.2 mA</td>
</tr>
</tbody>
</table>

| Switching function | Configurable. |

Digital input V1 / V2, V3 / V4 (plug-in module)
Up to two additional digital inputs can be implemented via the “Passive digital input (yellow)” plug-in card.
The plug-in card can be used in slot OC1 and / or OC2.

<table>
<thead>
<tr>
<th>Terminals</th>
<th>V1 / V2, V3 / V4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Input “On”</td>
<td>16 V ≤ U_{KL} ≤ 30 V</td>
</tr>
<tr>
<td>Input “Off”</td>
<td>0 V ≤ U_{KL} ≤ 3 V</td>
</tr>
<tr>
<td>Internal resistance</td>
<td>R_{I} = 6.5 kΩ</td>
</tr>
<tr>
<td>Function</td>
<td>Configurable.</td>
</tr>
</tbody>
</table>

24 V DC power supply V1 / V2 (plug-in card)
The power supply plug-in card allows a passive output on the transmitter to be used as an active output. See chapter ‘Connection examples’ on page 30.
The plug-in card can only be used in slot OC1.

Fig. 35:  (I = Internal, E = External)

24 V DC power supply

<table>
<thead>
<tr>
<th>Terminals</th>
<th>V1 / V2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Function</td>
<td>For active connection of passive outputs</td>
</tr>
<tr>
<td>Output voltage</td>
<td>24 V DC at 0 mA, 17 V DC at 25 mA</td>
</tr>
<tr>
<td>Load rating i_{max}</td>
<td>25 mA, permanently short circuit-proof</td>
</tr>
</tbody>
</table>

**NOTICE**
When using the device in potentially explosive atmospheres, the power supply plug-in card must only be used to power one passive output. It must not be connected to multiple passive outputs!
4.10.1 Connection examples
Input and output functions are configured via the device software in accordance with the desired application.

Active digital output 41 / 42, 51 / 52, V3 / V4
When the "24 V DC power supply (blue)" plug-in card is used, the digital outputs on the basic device and on the plug-in cards can also be wired as active digital outputs.

**NOTICE**
Each "power supply (blue)" plug-in card must only power one output.
It must not be connected to two outputs (e.g. digital output 41 / 42 and 51 / 52).

---

**Active digital output 41 / 42 (example)**
- **A** Plug-in card "Power supply (blue)" in slot 1
- **B** Digital output 41 / 42

The connection example shows usage for digital output 41 / 42; the same applies to usage for digital output 51 / 52.

---

**Active current output V3 / V4**
When the "24 V DC power supply (blue)" plug-in card is used, the current output on the plug-in card can also be wired as the active current output.

---

**Active digital input V3 / V4**
When the "24 V DC power supply (blue)" plug-in card is used, the digital input on the plug-in card can also be wired as the active digital input.

---

**Fig. 36: Active digital output 41 / 42 (example)**
- **A** Plug-in card "Power supply (blue)" in slot 1
- **B** Digital output 41 / 42

---

**Fig. 37: Active digital output V3 / V4 (example)**
- **A** Plug-in card "Power supply (blue)" in slot 1
- **B** Plug-in card "Passive current output (red)" in slot 2

---

**Fig. 38: Active current output V3 / V4 (example)**
- **A** Plug-in card "Power supply (blue)" in slot 1
- **B** Plug-in card "Passive current output (red)" in slot 2

---

**Fig. 39: Active digital input V3 / V4 (example)**
- **A** Plug-in card "Power supply (blue)" in slot 1
- **B** Plug-in card "Passive digital input (yellow)" in slot 2
4.10.2 Connection to integral mount design

**Dual-compartment housing**

Fig. 40: Connection to integral mount design (example)

1. Terminals for power supply
2. Cover for power supply terminals
3. Terminals for inputs and outputs
4. Terminal for potential equalization
5. LCD display
6. Holder for LCD display (parking position)
**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 chapter ‘Opening and closing the housing’ on page 19 to open and close the housing safely.

Observe the following points when connecting to an electrical supply:

— Lead the power supply cable into the housing through the top cable entry.
— Lead the cables for signal inputs and signal outputs into the housing through the middle and, where necessary, bottom cable entries.
— Connect the cables in accordance with the electrical connection diagram. If present, connect the cable shielding to the earthing clamp provided.
— Use wire end ferrules when connecting.
— After connecting the power supply to the dual-compartment housing, terminal cover ② must be installed.
— Close unused cable entries using suitable plugs.
4.10.3 Connection to remote mount design

Transmitter

Dual-compartment housing

Fig. 41: Connection to transmitter in remote mount design (example, dimensions in mm (inch))

- A Upper terminal compartment (backside)
- B Lower terminal compartment
- C Signal cable to flowmeter sensor
- 1 Terminals for power supply
- 2 Cover for power supply terminals
- 3 Terminal for signal cable
- 4 Terminals for inputs and outputs
- 5 Terminal for potential equalization
### 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 chapter ‘Opening and closing the housing’ on page 19 to open and close the housing safely.

Observe the following points when connecting to an electrical supply:

- Lead the cable for the power supply and the signal inputs and outputs into the housing as shown.
- The signal cable to the sensor is connected in the lower connection area of the transmitter.
- Connect the cables in accordance with the electrical connection diagram. If present, connect the cable shielding to the earthing clamp provided.
- Use wire end ferrules when connecting.
- After connecting the power supply, terminal cover must be installed.
- Close unused cable entries using suitable plugs.
Flowmeter sensor

Fig. 43: Connection to sensor in remote mount design (example)

- Signal cable from Transmitter
- Terminal for potential equalization
- Terminals for signal cable

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 chapter ‘Opening and closing the housing’ on page 19 to open and close the housing safely.

Observe the following points when connecting to an electrical supply:
- Lead the signal cable into the housing as shown.
- Connect the cables in accordance with the electrical connection diagram. If present, connect the cable shielding to the earthing clamp provided.
- Use wire end ferrules when connecting.
- At $T_{amb} \geq 60 ^\circ C$ (140 °F) the cable leads within the connection box of the sensor have to be insulated with supplied silicon tubes.
- Close unused cable entries using suitable plugs.

<table>
<thead>
<tr>
<th>Terminal</th>
<th>ABB signal cable 3KQZ407123U0100</th>
<th>HELKAMA signal cable 20522</th>
</tr>
</thead>
<tbody>
<tr>
<td>GND</td>
<td>Blue</td>
<td>Blue (4)</td>
</tr>
<tr>
<td>$U_{FE}$</td>
<td>White</td>
<td>White (3)</td>
</tr>
<tr>
<td>A</td>
<td>Yellow</td>
<td>Blue (2)</td>
</tr>
<tr>
<td>B</td>
<td>Orange</td>
<td>White (1)</td>
</tr>
</tbody>
</table>
5 Commissioning

5.1 Safety instructions

⚠️ 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.

If there is a chance that safe operation is no longer possible,
take the device out of operation and secure it against
unintended startup.

5.2 Hardware settings

5.2.1 Dual-compartment housing

![Fig. 44: Position of DIP switches](G11779)

<table>
<thead>
<tr>
<th>Position</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>On</td>
<td>Write protection active</td>
</tr>
<tr>
<td>Off</td>
<td>Write protection deactivated.</td>
</tr>
</tbody>
</table>

**Write-protect switch**
When write protection is activated, device parameterization
cannot be changed via the LCD indicator. Activating and sealing
the write protection switch protects the device against tampering

⚠️ NOTICE
The product has an ABB service account that can be disabled
with this write protection switch.

**Configuration for 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>Position</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>
5.2.2 Single-compartment housing

The DIP switch is used to configure specific hardware functions. The power supply to the transmitter must be briefly interrupted or an device reset have to be performed in order for the modified setting to take effect.

Write-protect switch
When write protection is activated, device parameterization cannot be changed via the LCD indicator. Activating and sealing the write protection switch protects the device against tampering.

NOTICE
The product has an ABB service account that can be disabled with this write protection switch.

<table>
<thead>
<tr>
<th>Position</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>On</td>
<td>Write protection active</td>
</tr>
<tr>
<td>Off</td>
<td>Write protection deactivated</td>
</tr>
</tbody>
</table>

Configuration for 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>Position</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>
5.3 Checks prior to commissioning
The following points must be checked before commissioning the device:
— The wiring must have been completed as described in the chapter ‘Electrical connections’ on page 24.
— The correct grounding of the sensor.
— The ambient conditions must meet the requirements set out in the technical data.
— The power supply must meet the requirements set out on the identification plate.

5.4 Parameterization of the device
The SensyMaster FMT430, FMT450 can be commissioned and operated via the integrated LCD indicator (option, see chapter ‘Parameterization via the “Easy Setup” menu function’ on page 40).

Alternatively, the SensyMaster FMT430, FMT450 can also be commissioned and operated via ABB Asset Vision Basic (FEx61x DTM).

Flowmeter without display operated through a hot pluggable display

Fig. 47: Optional LCD display
1 Local operating interface 2 Connector plug for LCD display 3 LCD display

The “non display” version of the device can be parameterized using a display which is available as an accessory to the flowmeter.

5.4.1 Parameterization via the local operating interface

DANGER
Risk of explosion during operation of the device with open terminal box!
Only perform parameterization of the device via the local operating interface outside the potentially explosive area!

A PC / notebook and the USB interface cable are required to configure the device via the device's local operating interface. In conjunction with the HART-DTM and the software “ABB AssetVision” available at www.abb.com/flow, all parameters can also be set without a fieldbus connection.

Fig. 48: Connection to the local operating interface
1 Local operating interface 2 USB interface cable 3 PC / notebook

1. Open device terminal box.
2. Connect programming plug to the local operating interface of the device.
3. Insert USB interface cable into a free USB female connector on the PC / notebook.
4. Switch on the device power supply.
5. Start ABB AssetVision and perform the parameterization of the equipment.

Detailed information on operating the software is available in the relevant operating instructions and the DTM online help.
5.4.2 Parameterization via the infrared service port adapter

Configuration via the infrared service port adapter on the device requires a PC / notebook and the FZA100 infrared service port adapter.

All parameters can also be set without a HART connection, using the HART DTM available at www.abb.com / flow and the “ABB AssetVision” software.

![Fig. 49: Infrared service port adapter on transmitter (example)](image1)

1. Place the infrared service port adapter on the front plate of the transmitter as shown.
2. Insert the USB interface cable into a free USB female connector on the PC / notebook.
3. Switch on the device power supply.
4. Start ABB AssetVision and perform the parameterization of the equipment.

Detailed information on operating the software is available in the relevant operating instructions and the DTM online help.

5.4.3 Parameterization via HART

Configuration via the HART interface on the device requires a PC / notebook and a suitable HART modem.

All parameters can also be set via the HART protocol, using the HART DTM available at www.abb.com / flow and the “ABB AssetVision” software.

![Fig. 50: HART modem on transmitter (example)](image2)

1. PC / notebook running ABB AssetVision and HART DTM
2. HART modem
3. Power supply unit

For more detailed information on operating the software and the HART modem, please refer to the relevant operating instructions and the DTM online help.

5.5 Switching on the power supply

— Switch on the power supply.

The LCD display shows the following display during the startup process:

![System Startup Processing](image3)

The process display is displayed after the startup process.
5.6 Parameterization via the "Easy Setup" menu function
Settings for the most common parameters are summarized in the "Easy Setup" menu. This menu provides the fastest way to configure the device.

The following section describes parameterization via the "Easy Setup" menu function.

1. Switch to the configuration level with .

2. Use / to select "Standard".
3. Confirm the selection with .

4. Use to confirm the password. A password is not available as factory default; you can continue without entering a password.

5. Use / to select "Easy Setup".
6. Confirm the selection with .

Selection of the menu language.

7. Use to call up the edit mode.
8. Use / to select the desired language.
9. Confirm the selection with .

Configuration of the current output

10. Use to call up the edit mode.
11. Using / , select the desired process value for current output 31 / 32 / Uco.
12. Confirm the selection with .

Only if an appropriate plug-in card is present!

13. Use to call up the edit mode.
14. Use / to select the desired process value for current output V1 / V2 or V3 / V4.
15. Confirm the selection with .
Configuration of the digital outputs

NOTICE
The devices are supplied standard with deactivated digital outputs. The parameters for configuration of the digital outputs are displayed only if the desired output configuration has been provided upon order or it has been activated in the menu “Input/Output”.

16. Use to call up the edit mode.
17. Using / , select the desired process value for frequency output 41 / 42.
18. Confirm the selection with .

19. Use to call up the edit mode.
20. Using / set the frequency for 100 % of the process variable.
21. Confirm the selection with .

22. Use to call up the edit mode.
23. Using / set the frequency for 0 % of the process variable.
24. Confirm the selection with .

25. Use to call up the edit mode.
26. Using / , select the desired process value for pulse output 41 / 42.
27. Confirm the selection with .

28. Use to call up the edit mode.
29. Use / to select the desired pulse width for the pulse output.
30. Confirm the selection with .

31. Use to call up the edit mode.
32. Using / , select the desired function for binary output 41 / 42.
33. Confirm the selection with .
34. Use \( \text{Next} \) to call up the edit mode.
35. Using \( \text{Easy Setup} \) / \( \text{Edit} \), select the desired process value for frequency output 51 / 52.
36. Confirm the selection with \( \text{Freq.Out 51/52 Mass Flow [%]} \).

37. Use \( \text{Next} \) to call up the edit mode.
38. Using \( \text{Easy Setup} \) / \( \text{Edit} \) set the frequency for 100 % of the process variable.
39. Confirm the selection with \( \text{Freq.Out 51/52 100% 10000 Hz Next Edit} \).

40. Use \( \text{Next} \) to call up the edit mode.
41. Using \( \text{Easy Setup} \) / \( \text{Edit} \) set the frequency for 0 % of the process variable.
42. Confirm the selection with \( \text{Freq.Out 51/52 0% 0 Hz Next Edit} \).

43. Use \( \text{Next} \) to call up the edit mode.
44. Using \( \text{Easy Setup} \) / \( \text{Edit} \), select the desired function for binary output 51 / 52.
45. Confirm the selection with \( \text{Binary Out 51/52 Alarm Next Edit} \).

46. Use \( \text{Next} \) to call up the edit mode.
47. Use \( \text{Easy Setup} \) / \( \text{Edit} \) to select the desired function for binary output V1 / V2 or V3 / V4.
48. Confirm the selection with \( \text{Alarm Dig.Out V1/V2 Dig.Out V3/V4 Next Edit} \).

49. Use \( \text{Next} \) to call up the edit mode.
50. Use \( \text{Easy Setup} \) / \( \text{Edit} \) to select the desired application.
51. Confirm the selection with \( \text{Alarm Easy Setup ...Application Selector Next Edit} \).

*Fixed selection of the application*

Only if the selection is not being made via the digital inputs.

*Fixed selection of the application*

Only if for Dig.Out V1/V2 Mode or Dig.Out V3/V4 Mode Binary has been selected and an appropriate plug-in card is present!
**Select the application using the digital inputs**

Only if the appropriate plug-in cards are present and the application switching function (“Act. App.Selector1|3” or “Act. App.Selector2|3”) has been selected.

### Easy Setup

**Dig.In 0 Application**

- **Application 1**
- **Next**
- **Edit**

The application is selected if both digital inputs are inactive.

**Dig.In 1 Application**

- **Application 2**
- **Next**
- **Edit**

The application is selected if digital input 1 is active.

**Dig.In 2 Application**

- **Application 3**
- **Next**
- **Edit**

The application is selected if digital input 2 is active.

**Dig.In1+2Application**

- **Application 4**
- **Next**
- **Edit**

The application is selected if both digital inputs are active.

52. Use 🔄 to call up the edit mode.
53. Use ↫ / ↥ to assign the applications to the respective digital inputs.
54. Confirm the selection with 🗯.

### Select measuring ranges and units

**Easy Setup**

**Unit Massflow Qm**

- **Next**
- **Edit**

Only if Mass Flow [unit] or Mass Flow [%] have been selected as process value for a current, frequency or pulse output.

55. Use 🔄 to call up the edit mode.
56. Use ↫ / ↥ to select the unit for mass flow measurement.
57. Confirm the selection with 🗯.

**Qm Max**

- **Next**
- **Edit**

Only if Mass Flow [unit] or Mass Flow [%] have been selected as process value for a current, frequency or pulse output.

58. Use 🔄 to call up the edit mode.
59. Use ↫ / ↥ to set the desired measuring range for mass flow measurement.
60. Confirm the selection with 🗯.

**Unit Volumeflow Qv@**

- **m³/h**
- **Next**
- **Edit**

Only if Qv@ [unit] or Qv@ [%] have been selected as process value for a current, frequency or pulse output.

61. Use 🔄 to call up the edit mode.
62. Use ↫ / ↥ to select the desired unit for volume flow measurement.
63. Confirm the selection with 🗯.

**Std. Conditions Vol@**

- **20°C 1 ATM**
- **Next**
- **Edit**

Only if Qv@ [unit] or Qv@ [%] have been selected as process value for a current, frequency or pulse output.
64. Use \( \uparrow \) to call up the edit mode.
65. Use / to select the desired standard state for volume flow measurement.
66. Confirm the selection with \( \Rightarrow \).

67. Use \( \uparrow \) to call up the edit mode.
68. Use / to set the desired measuring range for volume flow measurement.
69. Confirm the selection with \( \Rightarrow \).

70. Use \( \uparrow \) to call up the edit mode.
71. Use / to select the desired temperature unit.
72. Confirm the selection with \( \Rightarrow \).

73. Use \( \uparrow \) to call up the edit mode.
74. Use / to set the desired measuring range for temperature measurement.
75. Confirm the selection with \( \Rightarrow \).

76. Use \( \uparrow \) to call up the edit mode.
77. Use / to set the desired low flow (% of \( Q_{m\text{Max}} \) / \( Q_{V\text{Max}} \)).
78. Confirm the selection with \( \Rightarrow \).

Once all parameter have been set, the main menu appears again. The most important parameters are now set.

79. Use \( \Rightarrow \) to switch to the process display.
6 Operation

**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.

When operating the device, please note the following:
— Aggressive or corrosive media may lead to the damage of wetted parts of the sensor. As a result, measuring medium under pressure can leak out.
— Measuring medium under pressure can leak out due to fatigue on the gasket of the sensor connection or the process connection (e.g. flange or pipe fitting).

If there is a chance that safe operation is no longer possible, take the device out of operation and secure it against unintended startup.

6.1 Menu navigation

**NOTICE**
For detailed information on the operation and parameterization of the device, consult the associated operating instructions (OI)!

The LCD indicator has capacitive operating buttons. These enable you to control the device through the closed housing cover.

**NOTICE**
The transmitter automatically calibrates the capacitive buttons on a regular basis. If the cover is opened during operation, the sensitivity of the buttons is firstly increased to enable operating errors to occur. The button sensitivity will return to normal during the next automatic calibration.

You can use the or operating buttons to browse through the menu or select a number or character within a parameter value.
Different functions can be assigned to the and operating buttons. The function that is currently assigned to them is shown on the LCD display.

**Control button functions**

<table>
<thead>
<tr>
<th>Button</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>Exit</td>
<td>Exit menu</td>
</tr>
<tr>
<td>Back</td>
<td>Go back one submenu</td>
</tr>
<tr>
<td>Cancel</td>
<td>Cancel a parameter entry</td>
</tr>
<tr>
<td>Next</td>
<td>Select the next position for entering numerical and alphanumeric values</td>
</tr>
<tr>
<td>Select</td>
<td>Select submenu / parameter</td>
</tr>
<tr>
<td>Edit</td>
<td>Edit parameter</td>
</tr>
<tr>
<td>OK</td>
<td>Save parameter entered</td>
</tr>
</tbody>
</table>

Fig. 51: LCD display
1 Operating buttons for menu navigation
2 Menu name display
3 Menu number display
4 Marker for indicating relative position within the menu
5 Display showing the current functions of the and operating buttons
6.2 Menu levels

Process display
The process display shows the current process values.
There are two menu levels under the process display.

Information level (Operator Menu)
The information level contains the parameters and information that are relevant for the operator.
The device configuration cannot be changed on this level.

Configuration level (Configuration)
The configuration level contains all the parameters required for device commissioning and configuration. The device configuration can be changed on this level. For detailed information on the parameters, see chapter “Parameter descriptions” in the operating instruction.
6.2.1 Process display

The process display appears on the LCD display when the device is powered on. It shows information about the device and current process values.

The way in which the current process values are shown can be adjusted on the configuration level.

The symbols at the bottom of the process display are used to indicate the functions of the operating buttons and , in addition to other information.

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="G12382" alt="Symbol" /></td>
<td>Call up information level. When Autoscroll mode is activated, the icon appears here and the operator pages are automatically displayed one after the other.</td>
</tr>
<tr>
<td><img src="G12382" alt="Symbol" /></td>
<td>Call up configuration level.</td>
</tr>
<tr>
<td><img src="G12382" alt="Symbol" /></td>
<td>The device is protected against changes in the parametrization.</td>
</tr>
</tbody>
</table>

6.2.2 Switching to the information level (operator menu)

On the information level, the operator menu can be used to display diagnostic information and choose which operator pages to display.

1. Open the Operator Menu using .

![Operator Menu](G12382)

2. Select the desired submenu using / .

3. Confirm the selection with .

<table>
<thead>
<tr>
<th>Menu</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>... / Operator Menu</td>
<td></td>
</tr>
<tr>
<td><strong>Diagnostics</strong></td>
<td>Selection of sub-menu “Diagnostics”; see also chapter ‘Error messages on the LCD display’ on page 48.</td>
</tr>
<tr>
<td>Operator Page 1 ... n</td>
<td>Selection of operator page to be displayed.</td>
</tr>
<tr>
<td>Autoscroll</td>
<td>When Autoscroll is activated, automatic switching of the operator pages is initiated on the process screen.</td>
</tr>
<tr>
<td><strong>Signals View</strong></td>
<td>Selection of submenu “Signals View” (only for service purposes).</td>
</tr>
</tbody>
</table>
6.2.3 Error messages on the LCD display
In the event of an error, a message consisting of a symbol and text (e.g. Electronics) appears at the bottom of the process screen. The text displayed provides information about the area in which the error has occurred.

![Process display]

The error messages are divided into four groups in accordance with the NAMUR classification scheme. The group assignment can only be changed using a DTM or EDD:

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>✗</td>
<td>Error / failure</td>
</tr>
<tr>
<td>▼</td>
<td>Function check</td>
</tr>
<tr>
<td>?</td>
<td>Outside of the specification</td>
</tr>
<tr>
<td>⚠</td>
<td>Maintenance required</td>
</tr>
</tbody>
</table>

The error messages are also divided into the following areas:

<table>
<thead>
<tr>
<th>Range</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operation</td>
<td>Error / alarm due to the current operating conditions.</td>
</tr>
<tr>
<td>Sensor</td>
<td>Error / alarm of the flowmeter sensor.</td>
</tr>
<tr>
<td>Electronics</td>
<td>Error / alarm of the electronics.</td>
</tr>
<tr>
<td>Configuration</td>
<td>Error / alarm due to device configuration.</td>
</tr>
</tbody>
</table>

1. Use 👆 to switch to the configuration level.
2. Select the desired level of access using ↩ / ↩.
3. Confirm the selection with ↩.

**NOTICE**
There are three levels of access. A password can be defined for level “Standard”. There is no factory default password. For security reasons it is recommended to set a password.

<table>
<thead>
<tr>
<th>Access Level</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Read Only</td>
<td>All parameters are locked. Parameters are read only and cannot be modified.</td>
</tr>
<tr>
<td>Standard</td>
<td>All the parameters can be altered. The Customer could configure a password to lock the access to whole device parameters.</td>
</tr>
<tr>
<td>Service</td>
<td>The Customer Service has access to the Service menu. In case a Standard password is set than Service level is not accessible with Standard login.</td>
</tr>
</tbody>
</table>

**NOTICE**
For a detailed description of errors and information regarding troubleshooting, refer to the chapter titled “Diagnosis / Error messages” in the operating instruction.
Once you have logged on to the corresponding access level, you can edit or reset the password. Reset (status "no password defined") by selecting [ ] as a password.

4. Enter the corresponding password. No password is preset in the factory settings. Users can switch to the configuration level without entering a password. The selected access level remains active for 3 minutes. Within this time period you can toggle between the process display and the configuration level without re-entering the password.

5. Use [ ] to confirm the password.

The LCD display now indicates the first menu item on the configuration level.

6. Select a menu using [ ] / [ ].
7. Confirm the selection with [ ].

### 6.2.5 Selecting and changing parameters

#### Entry from table

When an entry is made from a table, a value is selected from a list of parameter values.

1. Select the parameters you want to set in the menu.
2. Use [ ] to call up the list of available parameter values. The parameter value that is currently set is highlighted.
3. Select the desired value using [ ] / [ ].
4. Confirm the selection with [ ].

This concludes the procedure for selecting a parameter value.

#### Numerical entry

When a numerical entry is made, a value is set by entering the individual decimal positions.

1. Select the parameters you want to set in the menu.
2. Use [ ] to call up the parameter for editing. The decimal place that is currently selected is highlighted.
3. Use [ ] to select the decimal place to change.
4. Use [ ] / [ ] to set the desired value.
5. Use [ ] to select the next decimal place.
6. If necessary select and set additional decimal places in accordance with steps 3 to 4.
7. Use [ ] to confirm your setting.

This concludes the procedure for changing a parameter value.

#### Alphanumeric entry

When an alphanumeric entry is made, a value is set by entering the individual decimal positions.

1. Select the parameters you want to set in the menu.
2. Use [ ] to call up the parameter for editing. The decimal place that is currently selected is highlighted.
3. Use [ ] to select the desired value.
4. Confirm the selection with [ ].

This concludes the procedure for selecting a parameter value.
3. Use \textit{\textgreater} to select the decimal place to change.
4. Use \textit{\textless} / \textit{\textless} to set the desired value.
5. Use \textit{\textless} to select the next decimal place.
6. If necessary select and set additional decimal places in accordance with steps 3 to 4.
7. Use \textit{\textgreater} to confirm your setting.
This concludes the procedure for changing a parameter value.

\textbf{Exiting the setup}
For some menu items, values must be entered. If you don't want to change the parameter, you can exit the menu as described below.
1. Pressing \textit{\textgreater} (Next) repeatedly moves the cursor to the right. Once the cursor reaches the end position, "Cancel" is displayed in the lower right of the screen.
2. \textit{\textleft} terminates editing and exits the menu item. Use \textit{\textleft} to return to the start.

\textbf{NOTICE}
The LCD display automatically returns to the process display three minutes after the last button has been actuated.

\section*{7 Maintenance}

\subsection*{7.1 Safety instructions}

\textbf{DANGER}
\textbf{Danger to life due to piping under pressure!}
Sensors which may eject during installation or removal in piping remaining under pressure may pose a danger to life.
\begin{itemize}
  \item Install or remove a sensor only if the piping is depressurized.
  \item As an alternative, use a pipe component with an integrated replacement device.
\end{itemize}

\textbf{WARNING}
\textbf{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.

\textbf{CAUTION}
\textbf{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.

\textbf{NOTICE}
\textbf{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.

\textbf{NOTICE}
For detailed information on the maintenance of the device, consult the associated operating instructions (OI)!

\section*{8 Specification}

\textbf{NOTICE}
The detailed device data sheet is available in the download area at www.abb.com/flow.

\section*{9 Additional documents}

\textbf{NOTICE}
All documentation, declarations of conformity, and certificates are available in ABB's download area.
www.abb.com/flow

\textbf{Trademarks}

\begin{itemize}
  \item HART is a registered trademark of FieldComm Group, Austin, Texas, USA
  \item Kalrez and Kalrez Spectrum\textsuperscript{TM} are registered trademarks of DuPont Performance Elastomers.
  \item Viton is a DuPont de Nemours trademark
\end{itemize}
10 Appendix

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:**

<table>
<thead>
<tr>
<th>Company:</th>
<th>Telephone:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Address:</td>
<td></td>
</tr>
<tr>
<td>Contact person:</td>
<td>Telephone:</td>
</tr>
<tr>
<td>Fax:</td>
<td>E-Mail:</td>
</tr>
</tbody>
</table>

**Device details:**

<table>
<thead>
<tr>
<th>Typ:</th>
<th>Serial no.:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reason for the return/description of the defect:</td>
<td></td>
</tr>
</tbody>
</table>

**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)?

<table>
<thead>
<tr>
<th>Biological</th>
<th>Corrosive / irritating</th>
<th>Combustible (highly / extremely combustible)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Toxic</td>
<td>Explosiv</td>
<td>Other toxic substances</td>
</tr>
<tr>
<td>Radioactive</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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