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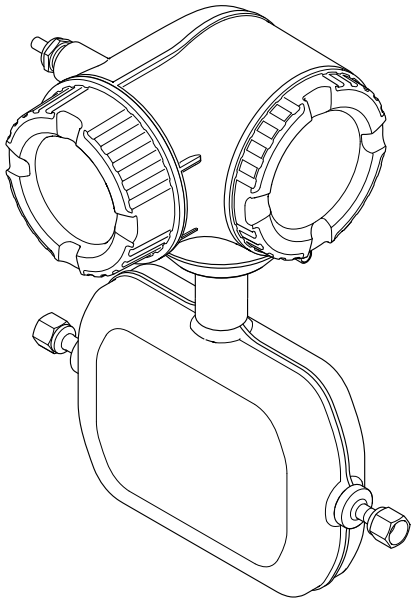
# Operating Instructions
# **Proline Promass A 300 PROFIBUS PA**

Coriolis flowmeter



Endress+Hauser
People for Process Automation

- Make sure the document is stored in a safe place such that it is always available when working on or with the device.
- To avoid danger to individuals or the facility, read the "Basic safety instructions" section carefully, as well as all other safety instructions in the document that are specific to working procedures.
- The manufacturer reserves the right to modify technical data without prior notice. Your Endress+Hauser Sales Center will supply you with current information and updates to these instructions.

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# 1 About this document

## 1.1 Document function

These Operating Instructions contain all the information that is required in various phases of the life cycle of the device: from product identification, incoming acceptance and storage, to mounting, connection, operation and commissioning through to troubleshooting, maintenance and disposal.

## 1.2 Symbols

### 1.2.1 Safety symbols

DANGER
This symbol alerts you to a dangerous situation. Failure to avoid this situation will result in serious or fatal injury.

WARNING
This symbol alerts you to a dangerous situation. Failure to avoid this situation can result in serious or fatal injury.

CAUTION
This symbol alerts you to a dangerous situation. Failure to avoid this situation can result in minor or medium injury.

NOTICE
This symbol contains information on procedures and other facts which do not result in personal injury.

### 1.2.2 Electrical symbols

| Symbol | Meaning |
|---|---|
| | Direct current |
| | Alternating current |
| | Direct current and alternating current |
| | **Ground connection**<br>A grounded terminal which, as far as the operator is concerned, is grounded via a grounding system. |
| | **Protective Earth (PE)**<br>A terminal which must be connected to ground prior to establishing any other connections.<br>The ground terminals are situated inside and outside the device:<br>▪ Inner ground terminal: Connects the protectiv earth to the mains supply.<br>▪ Outer ground terminal: Connects the device to the plant grounding system. |

### 1.2.3 Communication symbols

| Symbol | Meaning |
|---|---|
| | **Wireless Local Area Network (WLAN)**<br>Communication via a wireless, local network. |
| | **LED**<br>Light emitting diode is off. |

| Symbol | Meaning |
|---|---|
| | **LED**<br>Light emitting diode is on. |
| | **LED**<br>Light emitting diode is flashing. |

### 1.2.4 Tool symbols

| Symbol | Meaning |
|---|---|
| | Flat blade screwdriver |
| | Allen key |
| | Open-ended wrench |

### 1.2.5 Symbols for certain types of information

| Symbol | Meaning |
|---|---|
| | **Permitted**<br>Procedures, processes or actions that are permitted. |
| | **Preferred**<br>Procedures, processes or actions that are preferred. |
| | **Forbidden**<br>Procedures, processes or actions that are forbidden. |
| | **Tip**<br>Indicates additional information. |
| | Reference to documentation. |
| | Reference to page. |
| | Reference to graphic. |
| | Notice or individual step to be observed. |
| 1., 2., 3... | Series of steps. |
|  | Result of a step. |
| | Help in the event of a problem. |
| | Visual inspection. |

### 1.2.6 Symbols in graphics

| Symbol | Meaning |
|---|---|
| **1, 2, 3, ...** | Item numbers |
| 1., 2., 3., ... | Series of steps |
| **A, B, C, ...** | Views |
| **A-A, B-B, C-C, ...** | Sections |
| | Hazardous area |

| Symbol | Meaning |
|---|---|
| | Safe area (non-hazardous area) |
|  | Flow direction |

## 1.3 Documentation

For an overview of the scope of the associated Technical Documentation, refer to the following:
- *W@M Device Viewer* (www.endress.com/deviceviewer): Enter the serial number from nameplate
- *Endress+Hauser Operations App*: Enter the serial number from the nameplate or scan the 2D matrix code (QR code) on the nameplate

Detailed list of the individual documents along with the documentation code
→ 250

### 1.3.1 Standard documentation

| Document type | Purpose and content of the document |
|---|---|
| Technical Information | **Planning aid for your device**<br>The document contains all the technical data on the device and provides an overview of the accessories and other products that can be ordered for the device. |
| Sensor Brief Operating Instructions | **Guides you quickly to the 1st measured value - Part 1**<br>The Sensor Brief Operating Instructions are aimed at specialists with responsibility for installing the measuring device.<br>▪ Incoming acceptance and product identification<br>▪ Storage and transport<br>▪ Installation |
| Transmitter Brief Operating Instructions | **Guides you quickly to the 1st measured value - Part 2**<br>The Transmitter Brief Operating Instructions are aimed at specialists with responsibility for commissioning, configuring and parameterizing the measuring device (until the first measured value).<br>▪ Product description<br>▪ Installation<br>▪ Electrical connection<br>▪ Operation options<br>▪ System integration<br>▪ Commissioning<br>▪ Diagnostic information |
| Description of Device Parameters | **Reference for your parameters**<br>The document provides a detailed explanation of each individual parameter in the Expert operating menu. The description is aimed at those who work with the device over the entire life cycle and perform specific configurations. |

### 1.3.2 Supplementary device-dependent documentation

Additional documents are supplied depending on the device version ordered: Always comply strictly with the instructions in the supplementary documentation. The supplementary documentation is an integral part of the device documentation.

## 1.4 Registered trademarks

**PROFIBUS®**
Registered trademark of the PROFIBUS User Organization, Karlsruhe, Germany

**TRI-CLAMP®**
Registered trademark of Ladish & Co., Inc., Kenosha, USA

# 2 Safety instructions

## 2.1 Requirements for the personnel

The personnel for installation, commissioning, diagnostics and maintenance must fulfill the following requirements:
- Trained, qualified specialists must have a relevant qualification for this specific function and task.
- Are authorized by the plant owner/operator.
- Are familiar with federal/national regulations.
- Before starting work, read and understand the instructions in the manual and supplementary documentation as well as the certificates (depending on the application).
- Follow instructions and comply with basic conditions.

The operating personnel must fulfill the following requirements:
- Are instructed and authorized according to the requirements of the task by the facility's owner-operator.
- Follow the instructions in this manual.

## 2.2 Designated use

**Application and media**
The measuring device described in this manual is intended only for the flow measurement of liquids and gases.

Depending on the version ordered, the measuring device can also measure potentially explosive, flammable, poisonous and oxidizing media.

Measuring devices for use in hazardous areas, in hygienic applications or where there is an increased risk due to process pressure, are labeled accordingly on the nameplate.

To ensure that the measuring device remains in proper condition for the operation time:
- Keep within the specified pressure and temperature range.
- Only use the measuring device in full compliance with the data on the nameplate and the general conditions listed in the Operating Instructions and supplementary documentation.
- Based on the nameplate, check whether the ordered device is permitted for the intended use in the hazardous area (e.g. explosion protection, pressure vessel safety).
- Use the measuring device only for media to which the process-wetted materials are sufficiently resistant.
- If the ambient temperature of the measuring device is outside the atmospheric temperature, it is absolutely essential to comply with the relevant basic conditions as specified in the device documentation→ 📄 8.
- Protect the measuring device permanently against corrosion from environmental influences.

**Incorrect use**
Non-designated use can compromise safety. The manufacturer is not liable for damage caused by improper or non-designated use.

**⚠ WARNING**

**Danger of breakage due to corrosive or abrasive fluids and ambient conditions!**
- Verify the compatibility of the process fluid with the sensor material.
- Ensure the resistance of all fluid-wetted materials in the process.
- Keep within the specified pressure and temperature range.

NOTICE

**Verification for borderline cases:**

- For special fluids and fluids for cleaning, Endress+Hauser is glad to provide assistance in verifying the corrosion resistance of fluid-wetted materials, but does not accept any warranty or liability as minute changes in the temperature, concentration or level of contamination in the process can alter the corrosion resistance properties.

**Residual risks**

⚠ WARNING

**The electronics and the medium may cause the surfaces to heat up. This presents a burn hazard!**

- For elevated fluid temperatures, ensure protection against contact to prevent burns.

⚠ WARNING

**Danger of housing breaking due to measuring tube breakage!**

If a measuring tube ruptures, the pressure inside the sensor housing will rise according to the operating process pressure.

- Use a rupture disk.

⚠ WARNING

**Danger from medium escaping!**

For device versions with a rupture disk: medium escaping under pressure can cause injury or material damage.

- Take precautions to prevent injury and material damage if the rupture disk is actuated.

## 2.3 Workplace safety

For work on and with the device:

- Wear the required personal protective equipment according to federal/national regulations.

For welding work on the piping:

- Do not ground the welding unit via the measuring device.

If working on and with the device with wet hands:

- Due to the increased risk of electric shock, gloves must be worn.

## 2.4 Operational safety

Risk of injury.

- Operate the device in proper technical condition and fail-safe condition only.
- The operator is responsible for interference-free operation of the device.

**Conversions to the device**

Unauthorized modifications to the device are not permitted and can lead to unforeseeable dangers.

- If, despite this, modifications are required, consult with Endress+Hauser.

**Repair**

To ensure continued operational safety and reliability,

- Carry out repairs on the device only if they are expressly permitted.
- Observe federal/national regulations pertaining to repair of an electrical device.
- Use original spare parts and accessories from Endress+Hauser only.

## 2.5 Product safety

This measuring device is designed in accordance with good engineering practice to meet state-of-the-art safety requirements, has been tested, and left the factory in a condition in which it is safe to operate.

It meets general safety standards and legal requirements. It also complies with the EU directives listed in the device-specific EU Declaration of Conformity. Endress+Hauser confirms this by affixing the CE mark to the device.

## 2.6 IT security

Our warranty is valid only if the device is installed and used as described in the Operating Instructions. The device is equipped with security mechanisms to protect it against any inadvertent changes to the settings.

IT security measures, which provide additional protection for the device and associated data transfer, must be implemented by the operators themselves in line with their security standards.

## 2.7 Device-specific IT security

The device offers a range of specific functions to support protective measures on the operator's side. These functions can be configured by the user and guarantee greater in-operation safety if used correctly. An overview of the most important functions is provided in the following section.

| Function/interface | Factory setting | Recommendation |
|---|---|---|
| Write protection via hardware write protection switch → 🖹 12 | Not enabled. | On an individual basis following risk assessment. |
| Access code (also applies for Web server login or FieldCare connection) → 🖹 13 | Not enabled (0000). | Assign a customized access code during commissioning. |
| WLAN (order option in display module) | Enabled. | On an individual basis following risk assessment. |
| WLAN security mode | Enabled (WPA2-PSK) | Do not change. |
| WLAN passphrase (password) → 🖹 13 | Serial number | Assign an individual WLAN passphrase during commissioning. |
| WLAN mode | Access Point | On an individual basis following risk assessment. |
| Web server→ 🖹 13 | Enabled. | On an individual basis following risk assessment. |
| CDI-RJ45 service interface → 🖹 14 | – | On an individual basis following risk assessment. |

### 2.7.1 Protecting access via hardware write protection

Write access to the device parameters via the local display, Web browser or operating tool (e.g. FieldCare, DeviceCare) can be disabled via a write protection switch (DIP switch on the motherboard). When hardware write protection is enabled, only read access to the parameters is possible.

Hardware write protection is disabled when the device is delivered → 🖹 131.

### 2.7.2 Protecting access via a password

Different passwords are available to protect write access to the device parameters or access to the device via the WLAN interface.

- User-specific access code
  Protect write access to the device parameters via the local display, Web browser or operating tool (e.g. FieldCare, DeviceCare). Access authorization is clearly regulated through the use of a user-specific access code.
- WLAN passphrase
  The network key protects a connection between an operating unit (e.g. notebook or tablet) and the device via the WLAN interface which can be ordered as an option.
- Infrastructure mode
  When the device is operated in infrastructure mode, the WLAN passphrase corresponds to the WLAN passphrase configured on the operator side.

#### User-specific access code

Write access to the device parameters via the local display, Web browser or operating tool (e.g. FieldCare, DeviceCare) can be protected by the modifiable, user-specific access code (→ 130).

When the device is delivered, the device does not have an access code and is equivalent to *0000* (open).

#### WLAN passphrase: Operation as WLAN access point

A connection between an operating unit (e.g. notebook or tablet) and the device via the WLAN interface (→ 68), which can be ordered as an optional extra, is protected by the network key. The WLAN authentication of the network key complies with the IEEE 802.11 standard.

When the device is delivered, the network key is pre-defined depending on the device. It can be changed via the **WLAN settings** submenu in the **WLAN passphrase** parameter (→ 124).

#### Infrastructure mode

A connection between the device and WLAN access point is protected by means of an SSID and passphrase on the system side. Please contact the relevant system administrator for access.

#### General notes on the use of passwords

- The access code and network key supplied with the device should be changed during commissioning.
- Follow the general rules for generating a secure password when defining and managing the access code or network key.
- The user is responsible for the management and careful handling of the access code and network key.
- For information on configuring the access code or on what to do if you lose the password, see the "Write protection via access code" section → 130

### 2.7.3 Access via Web server

The device can be operated and configured via a Web browser with the integrated Web server (→ 60). The connection is via the service interface (CDI-RJ45) or the WLAN interface.

The Web server is enabled when the device is delivered. The Web server can be disabled if necessary (e.g. after commissioning) via the **Web server functionality** parameter.

The device and status information can be hidden on the login page. This prevents unauthorized access to the information.

For detailed information on device parameters, see:
The "Description of Device Parameters" document → 250.

### 2.7.4 Access via service interface (CDI-RJ45)

The device can be connected to a network via the service interface (CDI-RJ45). Device-specific functions guarantee the secure operation of the device in a network.

The use of relevant industrial standards and guidelines that have been defined by national and international safety committees, such as IEC/ISA62443 or the IEEE, is recommended. This includes organizational security measures such as the assignment of access authorization as well as technical measures such as network segmentation.

Transmitters with an Ex de approval may not be connected via the service interface (CDI-RJ45)!

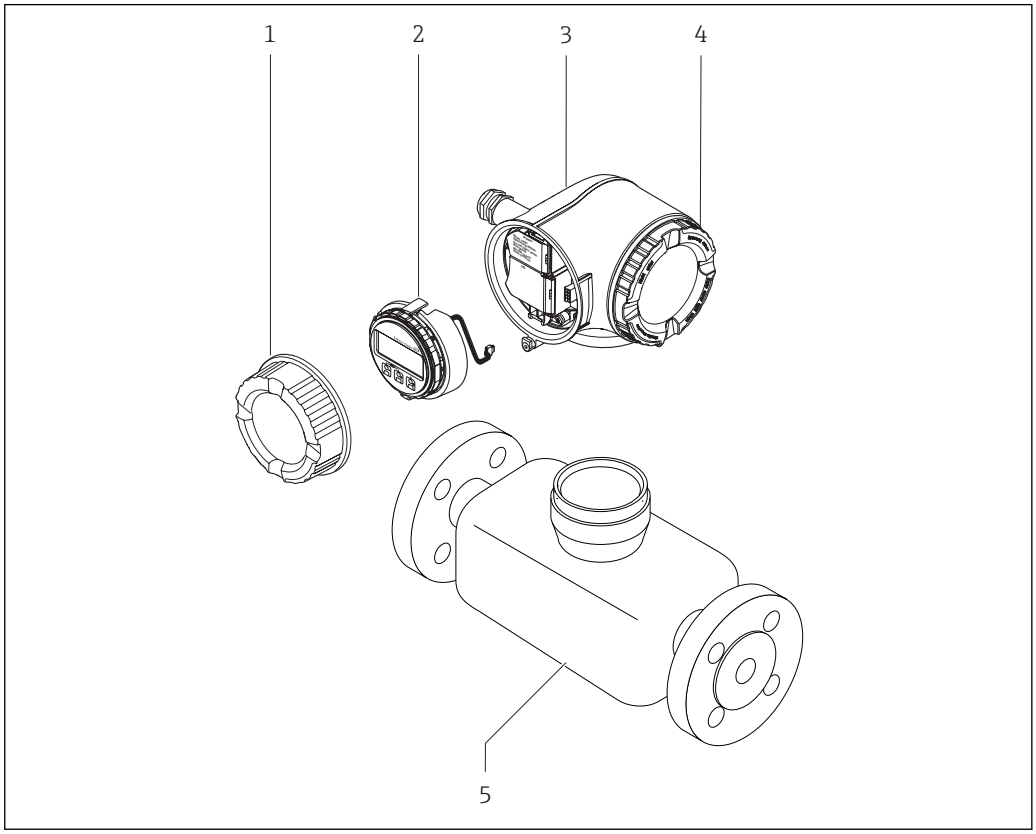
Order code for "Approval transmitter + sensor", options (Ex de): BA, BB, C1, C2, GA, GB, MA, MB, NA, NB

# 3 Product description

The device consists of a transmitter and a sensor.

The device is available as a compact version:
The transmitter and sensor form a mechanical unit.

## 3.1 Product design

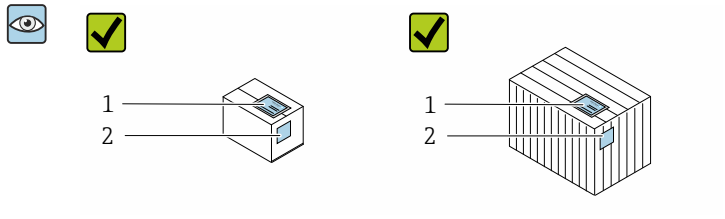



1 *Important components of a measuring device*

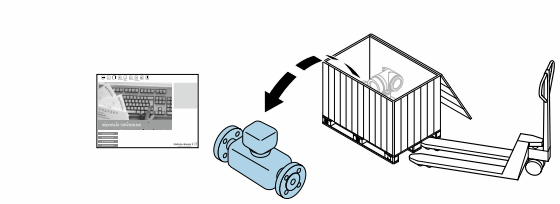
1 *Connection compartment cover*
2 *Display module*
3 *Transmitter housing*
4 *Electronics compartment cover*
5 *Sensor*

# 4 Incoming acceptance and product identification

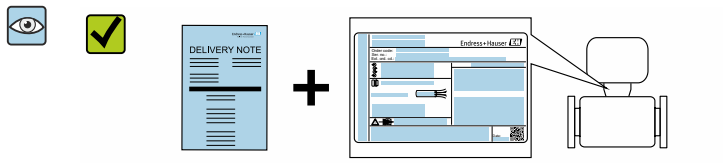
## 4.1 Incoming acceptance




Are the order codes on the delivery note (1) and the product sticker (2) identical?



Are the goods undamaged?




Do the nameplate data match the ordering information on the delivery note?

Is the envelope present with accompanying documents?

- If one of the conditions is not satisfied, contact your Endress+Hauser Sales Center.
- Depending on the device version, the CD-ROM might not be part of the delivery! The Technical Documentation is available via the Internet or via the *Endress+Hauser Operations App*, see the "Product identification" section → 17.

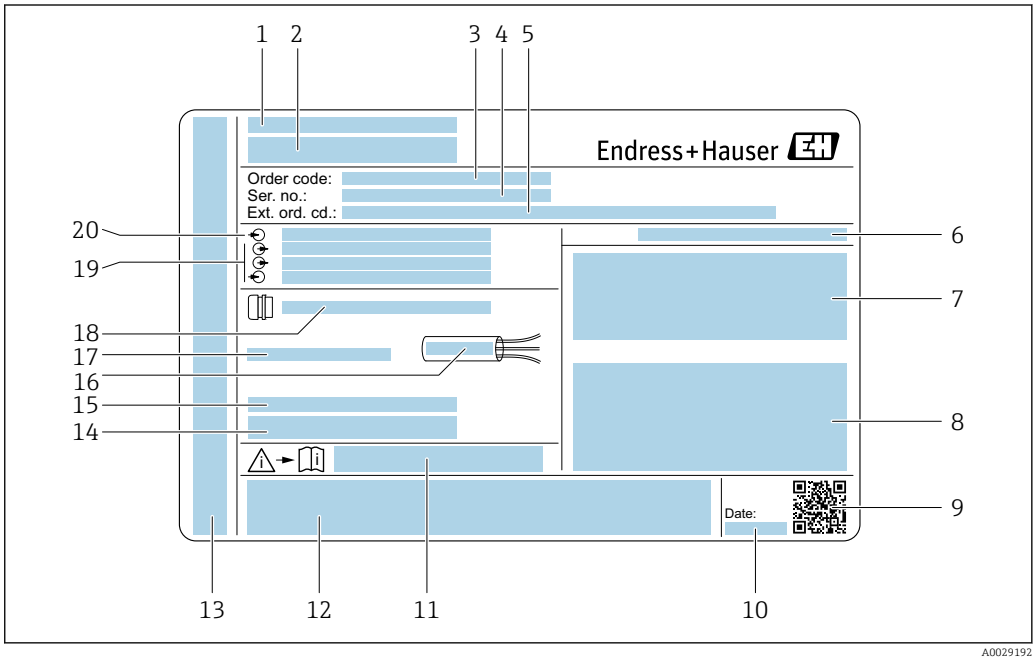
## 4.2 Product identification

The following options are available for identification of the device:
- Nameplate specifications
- Order code with breakdown of the device features on the delivery note
- Enter serial numbers from nameplates in the *W@M Device Viewer* (www.endress.com/deviceviewer): All information about the device is displayed.
- Enter the serial number from nameplates in the *Endress+Hauser Operations App* or scan the 2-D matrix code (QR code) on the nameplate using the *Endress+Hauser Operations App*: All information about the device is displayed.

For an overview of the scope of the associated Technical Documentation, refer to the following:

- The "Additional standard documentation on the device"→ 8 and "Supplementary device-dependent documentation"→ 8 sections
- The *W@M Device Viewer*: enter the serial number from the nameplate (www.endress.com/deviceviewer)
- The *Endress+Hauser Operations App*: Enter the serial number from the nameplate or scan the 2-D matrix code (QR code) on the nameplate.

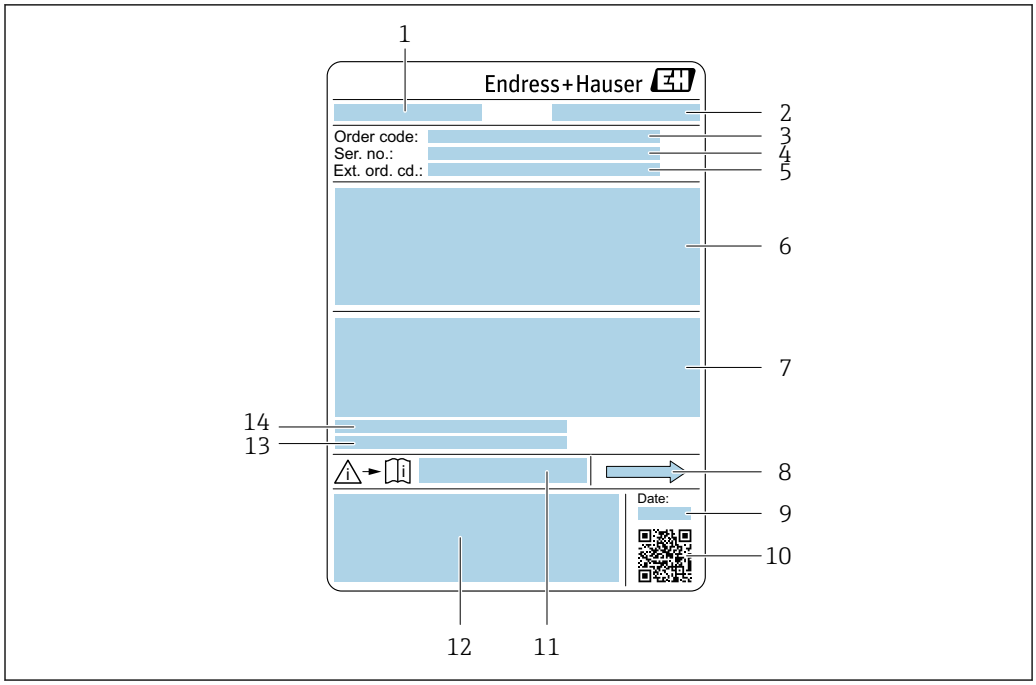
### 4.2.1 Transmitter nameplate




2 *Example of a transmitter nameplate*

1 *Manufacturing location*
2 *Name of the transmitter*
3 *Order code*
4 *Serial number (ser. no.)*
5 *Extended order code (Ext. ord. cd.)*
6 *Degree of protection*
7 *Space for approvals: use in hazardous areas*
8 *Electrical connection data: available inputs and outputs*
9 *2-D matrix code*
10 *Manufacturing date: year-month*
11 *Document number of safety-related supplementary documentation*
12 *Space for approvals and certificates: e.g. CE mark, C-Tick*
13 *Space for degree of protection of connection and electronics compartment when used in hazardous areas*
14 *Firmware version (FW) and device revision (Dev.Rev.) from the factory*
15 *Space for additional information in the case of special products*
16 *Permitted temperature range for cable*
17 *Permitted ambient temperature ($T_a$)*
18 *Information on cable gland*
19 *Available inputs and outputs, supply voltage*
20 *Electrical connection data: supply voltage*

### 4.2.2 Sensor nameplate




3 *Example of a sensor nameplate*

1 *Name of the sensor*
2 *Manufacturing location*
3 *Order code*
4 *Serial number (ser. no.)*
5 *Extended order code (Ext. ord. cd.)*
6 *Nominal diameter of the sensor; flange nominal diameter/nominal pressure; sensor test pressure; medium temperature range; material of measuring tube and manifold; sensor-specific information: e.g. pressure range of sensor housing, wide-range density specification (special density calibration)*
7 *Approval information for explosion protection, Pressure Equipment Directive and degree of protection*
8 *Flow direction*
9 *Manufacturing date: year-month*
10 *2-D matrix code*
11 *Document number of safety-related supplementary documentation*
12 *CE mark, C-Tick*
13 *Surface roughness*
14 *Permitted ambient temperature ($T_a$)*

**Order code**

The measuring device is reordered using the order code.

**Extended order code**

- The device type (product root) and basic specifications (mandatory features) are always listed.
- Of the optional specifications (optional features), only the safety and approval-related specifications are listed (e.g. LA). If other optional specifications are also ordered, these are indicated collectively using the # placeholder symbol (e.g. #LA#).
- If the ordered optional specifications do not include any safety and approval-related specifications, they are indicated by the + placeholder symbol (e.g. XXXXXX-ABCDE +).

### 4.2.3 Symbols on measuring device

| Symbol | Meaning |
|---|---|
| | **WARNING!**<br>This symbol alerts you to a dangerous situation. Failure to avoid this situation can result in serious or fatal injury. |
| | **Reference to documentation**<br>Refers to the corresponding device documentation. |
| | **Protective ground connection**<br>A terminal which must be connected to ground prior to establishing any other connections. |

# 5 Storage and transport

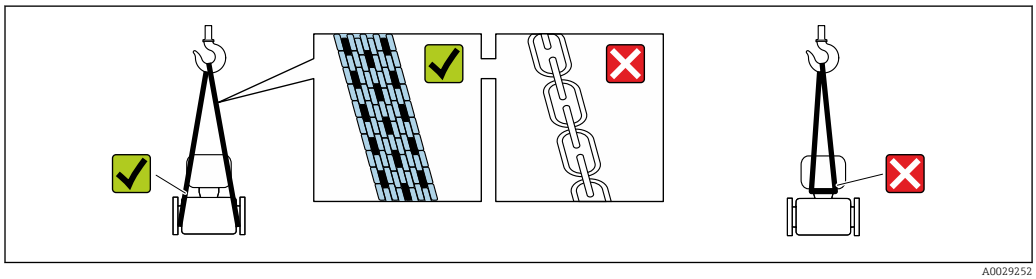
## 5.1 Storage conditions

Observe the following notes for storage:
- Store in the original packaging to ensure protection from shock.
- Do not remove protective covers or protective caps installed on process connections. They prevent mechanical damage to the sealing surfaces and contamination in the measuring tube.
- Protect from direct sunlight to avoid unacceptably high surface temperatures.
- Store in a dry and dust-free place.
- Do not store outdoors.

Storage temperature→ 235

## 5.2 Transporting the product

Transport the measuring device to the measuring point in the original packaging.



A0029252

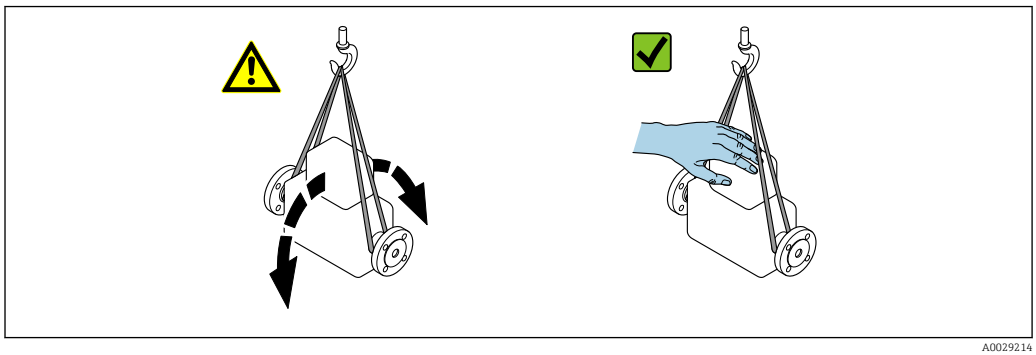
Do not remove protective covers or caps installed on process connections. They prevent mechanical damage to the sealing surfaces and contamination in the measuring tube.

### 5.2.1 Measuring devices without lifting lugs

**WARNING**

**Center of gravity of the measuring device is higher than the suspension points of the webbing slings.**

Risk of injury if the measuring device slips.
- Secure the measuring device against slipping or turning.
- Observe the weight specified on the packaging (stick-on label).



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### 5.2.2 Measuring devices with lifting lugs

**⚠ CAUTION**

**Special transportation instructions for devices with lifting lugs**

- ▶ Only use the lifting lugs fitted on the device or flanges to transport the device.
- ▶ The device must always be secured at two lifting lugs at least.

### 5.2.3 Transporting with a fork lift

If transporting in wood crates, the floor structure enables the crates to be lifted lengthwise or at both sides using a forklift.

## 5.3 Packaging disposal

All packaging materials are environmentally friendly and 100 % recyclable:

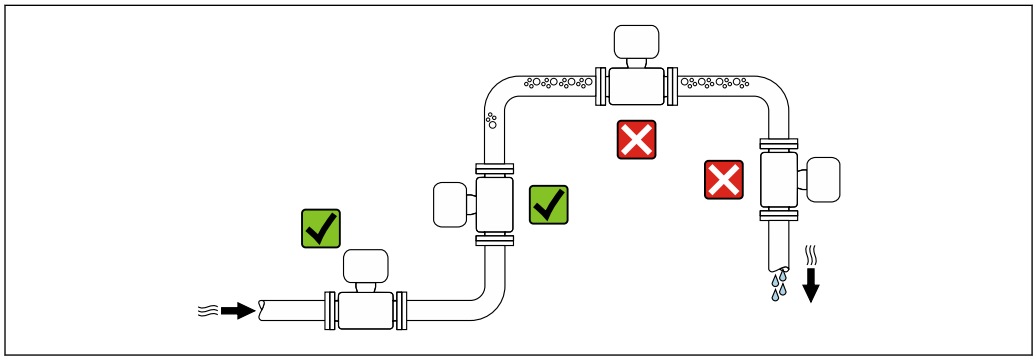
- Outer packaging of device
  Polymer stretch wrap that complies with EU Directive 2002/95/EC (RoHS)
- Packaging
  - Wooden crate treated in accordance with ISPM 15 standard, confirmed by IPPC logo
  - Cardboard box in accordance with European packaging guideline 94/62EC, recyclability confirmed by Resy symbol
- Carrying and securing materials
  - Disposable plastic pallet
  - Plastic straps
  - Plastic adhesive strips
- Filler material
  Paper pads

# 6 Installation

## 6.1 Installation conditions

### 6.1.1 Mounting position

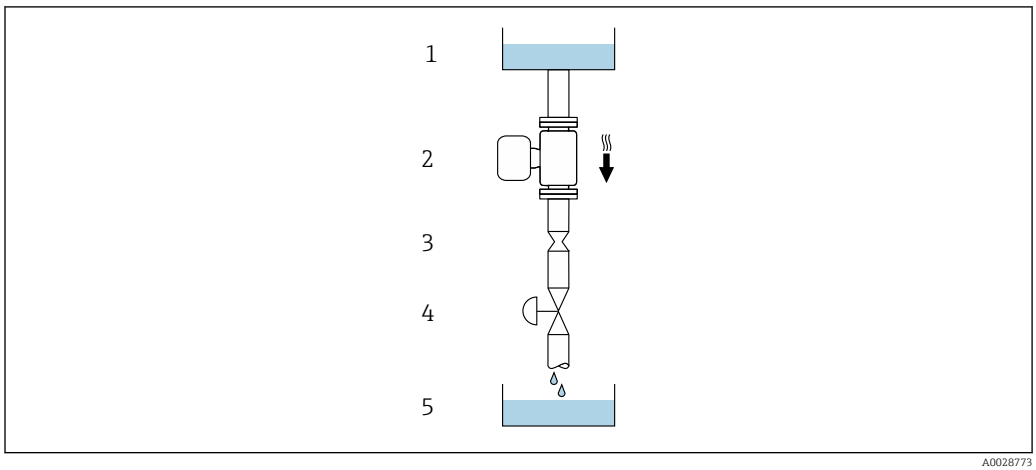
#### Mounting location




To prevent measuring errors arising from accumulation of gas bubbles in the measuring tube, avoid the following mounting locations in the pipe:
- Highest point of a pipeline.
- Directly upstream of a free pipe outlet in a down pipe.

*Installation in down pipes*

However, the following installation suggestion allows for installation in an open vertical pipeline. Pipe restrictions or the use of an orifice with a smaller cross-section than the nominal diameter prevent the sensor running empty while measurement is in progress.



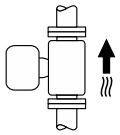
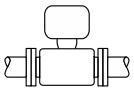
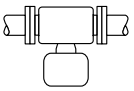
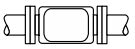

4 *Installation in a down pipe (e.g. for batching applications)*

1 *Supply tank*
2 *Sensor*
3 *Orifice plate, pipe restriction*
4 *Valve*
5 *Batching tank*

| DN | | Ø orifice plate, pipe restriction | |
|---|---|---|---|
| [mm] | [in] | [mm] | [in] |
| 1 | 1/24 | 0.8 | 0.03 |
| 2 | 1/12 | 1.5 | 0.06 |
| 4 | 1/8 | 3.0 | 0.12 |

### Orientation

The direction of the arrow on the sensor nameplate helps you to install the sensor according to the flow direction (direction of medium flow through the piping).

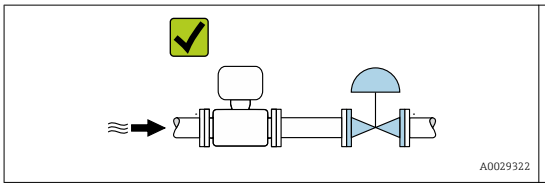
| Orientation | | | Recommendation |
|---|---|---|---|
| **A** | Vertical orientation |  A0015591 | ✓✓ 1) |
| **B** | Horizontal orientation, transmitter at top |  A0015589 | ✓ 2) |
| **C** | Horizontal orientation, transmitter at bottom |  A0015590 | ✓ 3) |
| **D** | Horizontal orientation, transmitter at side |  A0015592 | ✓ |

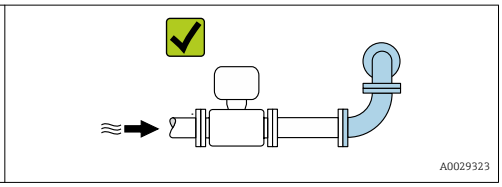
1) This orientation is recommended to ensure self-draining.
2) Applications with low process temperatures may decrease the ambient temperature. To maintain the minimum ambient temperature for the transmitter, this orientation is recommended.
3) Applications with high process temperatures may increase the ambient temperature. To maintain the maximum ambient temperature for the transmitter, this orientation is recommended.

If a sensor is installed horizontally with a curved measuring tube, match the position of the sensor to the fluid properties.

### Inlet and outlet runs

No special precautions need to be taken for fittings which create turbulence, such as valves, elbows or T-pieces, as long as no cavitation occurs → 24.


A0029322


A0029323

*Installation dimensions*

For the dimensions and installation lengths of the device, see the "Technical Information" document, "Mechanical construction" section.

## 6.1.2 Environmental and process requirements

### Ambient temperature range

| | |
|---|---|
| **Measuring device** | ▪ −40 to +60 °C (−40 to +140 °F)<br>▪ Order code for "Test, certificate", option JP:<br>−50 to +60 °C (−58 to +140 °F) |
| **Readability of the local display** | −20 to +60 °C (−4 to +140 °F)<br>The readability of the display may be impaired at temperatures outside the temperature range. |

Dependency of ambient temperature on medium temperature→ 236

▶ If operating outdoors:
Avoid direct sunlight, particularly in warm climatic regions.

You can order a weather protection cover from Endress+Hauser. → 218.

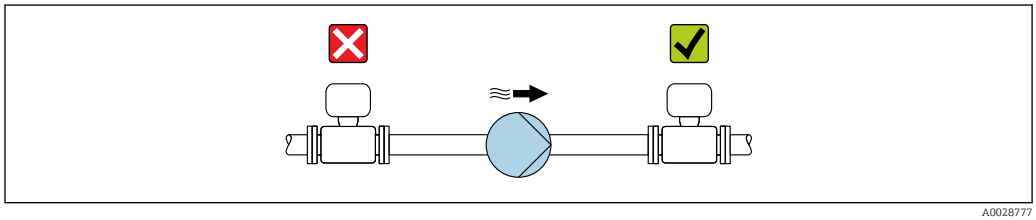
### System pressure

It is important that cavitation does not occur, or that gases entrained in the liquids do not outgas.

Cavitation is caused if the pressure drops below the vapor pressure:
▪ In liquids that have a low boiling point (e.g. hydrocarbons, solvents, liquefied gases)
▪ In suction lines

▶ Ensure the system pressure is sufficiently high to prevent cavitation and outgassing.

For this reason, the following mounting locations are recommended:
▪ At the lowest point in a vertical pipe
▪ Downstream from pumps (no danger of vacuum)



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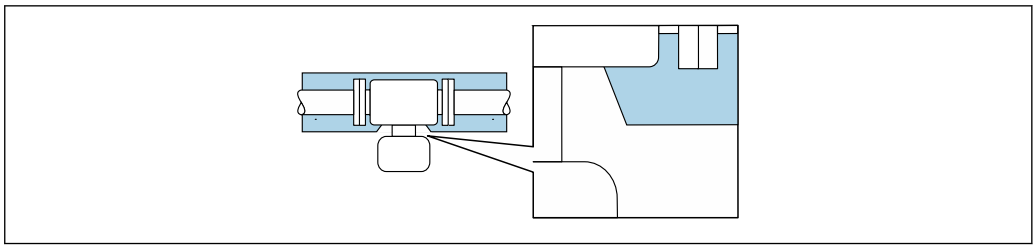
### Thermal insulation

In the case of some fluids, it is important to keep the heat radiated from the sensor to the transmitter to a low level. A wide range of materials can be used for the required insulation.

NOTICE

**Electronics overheating on account of thermal insulation!**

▶ Recommended orientation: horizontal orientation, transmitter housing pointing downwards.
▶ Do not insulate the transmitter housing .
▶ Maximum permissible temperature at the lower end of the transmitter housing: 80 °C (176 °F)
▶ Thermal insulation with extended neck free: We recommend that you do not insulate the extended neck in order to ensure optimum dissipation of heat.




5 *Thermal insulation with extended neck free*

### Heating

NOTICE

**Electronics can overheat due to elevated ambient temperature!**

- ▶ Observe maximum permitted ambient temperature for the transmitter .
- ▶ Depending on the fluid temperature, take the device orientation requirements into account .

NOTICE

**Danger of overheating when heating**

- ▶ Ensure that the temperature at the lower end of the transmitter housing does not exceed 80 °C (176 °F).
- ▶ Ensure that sufficient convection takes place at the transmitter neck.
- ▶ Ensure that a sufficiently large area of the transmitter neck remains exposed. The uncovered part serves as a radiator and protects the electronics from overheating and excessive cooling.
- ▶ When using in potentially explosive atmospheres, observe the information in the device-specific Ex documentation. For detailed information on the temperature tables, see the separate document entitled "Safety Instructions" (XA) for the device.

*Heating options*

If a fluid requires that no heat loss should occur at the sensor, users can avail of the following heating options:

- Electrical heating, e.g. with electric band heaters
- Via pipes carrying hot water or steam
- Via heating jackets

### Vibrations

The high oscillation frequency of the measuring tubes ensures that the correct operation of the measuring system is not influenced by plant vibrations.

## 6.1.3 Special mounting instructions

### Drainability

When the device is installed in a vertical position, the measuring tube can be drained completely and protected against deposit buildup if the properties of the measured liquid allow this. Furthermore, as only one measuring tube is used the flow is not impeded and the risk of product being retained in the measuring device is reduced to a minimum. The larger internal diameter of the measuring tube [1)] also reduces the risk of particles getting trapped in the measuring system. Due to the larger cross-section of the individual measuring tube, the tube is also generally less susceptible to clogging.

1) Compared with the double-tube design with a similar flow capacity and measuring tubes with a smaller internal diameter

### Sanitary compatibility

- When installing in hygienic applications, please refer to the information in the "Certificates and approvals/hygienic compatibility" section → 247
- In the case of measuring devices with the order code for "Housing", option B "Stainless, hygienic", to seal the connection compartment cover, screw it closed finger-tight and then tighten it by another 45° (corresponds to 15 Nm).

### Rupture disk

Information that is relevant to the process: → 238.

**WARNING**

**Danger from medium escaping!**

Medium escaping under pressure can cause injury or material damage.

- ▶ Take precautions to prevent danger to persons and damage if the rupture disk is actuated.
- ▶ Observe information on the rupture disk sticker.
- ▶ Make sure that the function and operation of the rupture disk is not impeded through the installation of the device.
- ▶ Do not remove or damage the rupture disk, drain connection and warning signs.

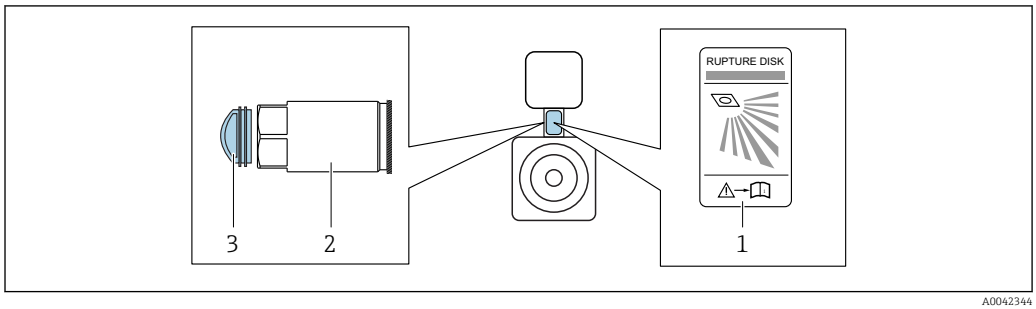
The position of the rupture disk is indicated by an affixed sticker. In versions without a drain connection (order option CU), the sticker is destroyed if the rupture disk is triggered. The disk can therefore be visually monitored.

To allow any escaping medium to drain in a controlled manner, a drain connection is available for the rupture disk integrated in the sensor: order code for "Sensor option", option CU "Drain connection for rupture disk". This connection is intended for a pipe connection with a ¼ " NPT thread and sealed with a grip plug for protection. To guarantee the function of the rupture disk with a drain connection, the drain connection must be connected to the drain system in a hermetically tight manner.

The drain connection is firmly mounted in place by the manufacturer and may not be removed.

It is not possible to use the holder with a measuring device with a drain connection for a rupture disk: order code for "Sensor option", option CU "Drain connection for rupture disk"

It is not possible to use a heating jacket if the drain connection is used: order code for "Sensor option", option CU "Drain connection for rupture disk"

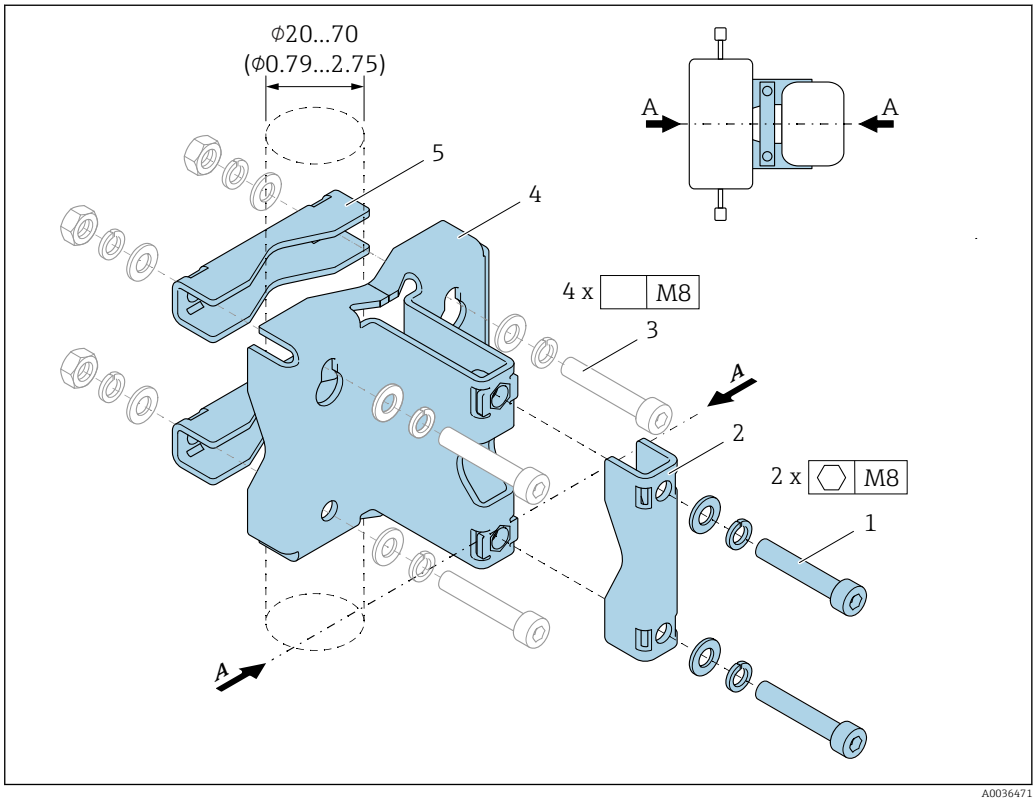



1 *Rupture disk label*
2 *Drain connection for rupture disk with 1/4" NPT female thread and 17mm width across flats (AF): order code for "Sensor option", option CU, drain connection for rupture disk*
3 *Transportation guard*

For information on the dimensions: see the "Mechanical construction" section of the "Technical Information" document

### Sensor holder

The sensor holder is used to secure the device to a wall, tabletop or pipe (order code for "Accessory enclosed", option PR).




1 *2 x Allen screw M8 x 50, washer and spring washer A4*
2 *1 x clamp (measuring device neck)*
3 *4 x securing screw for wall, tabletop or pipe mounting (not supplied)*
4 *1 x base profile*
5 *2 x clamp (pipe mounting)*
A *Measuring device central line*

If the holder is used with a measuring device fitted with a rupture disk, it is important to ensure that the rupture disk in the neck is not covered over and that the cover of the rupture disk is not damaged.

Lubricate all threaded joints prior to mounting. The screws for wall, tabletop or pipe mounting are not supplied with the device and must be chosen to suit the individual installation position.

**⚠ WARNING**

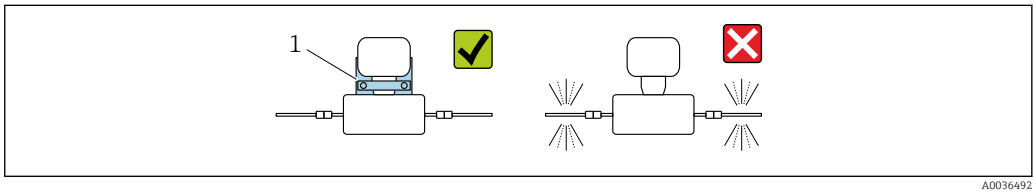
**Strain on pipes!**

Excessive strain on an unsupported pipe can cause the pipe to break.

▶ Install the sensor in a pipe that is adequately supported.

The following mounting versions are recommended for the installation:

Use of the sensor holder.




1 *Sensor holder (order code for "Accessory enclosed", option PR)*

*Mounting on a wall*

Screw the sensor holder to the wall with four screws. Two of the four holes to secure the holder are designed to hook into the screws.

*Mounting on a table*

Screw the sensor holder onto the tabletop with four screws.

*Mounting on a pipe*

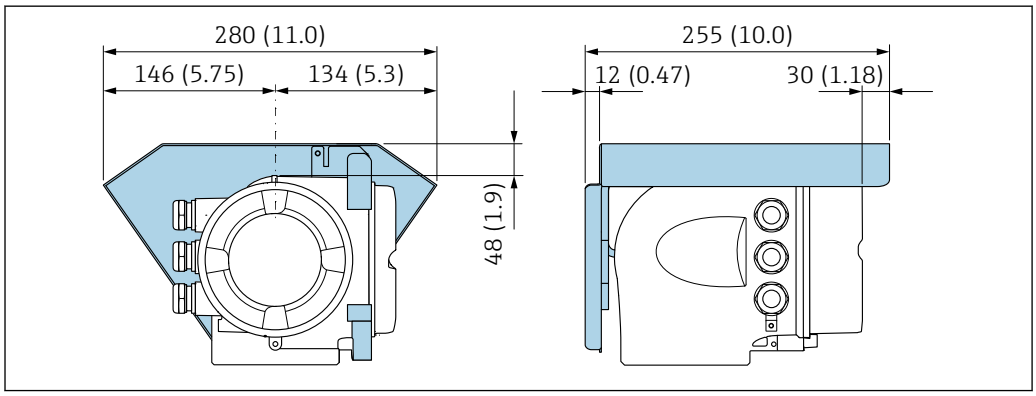
Secure the sensor holder to the pipe with two clamps.

### Zero point adjustment

All measuring devices are calibrated in accordance with state-of-the-art technology. Calibration takes place under reference conditions→ 231. Therefore, a zero point adjustment in the field is generally not required.

Experience shows that zero point adjustment is advisable only in special cases:
- To achieve maximum measuring accuracy even with low flow rates.
- Under extreme process or operating conditions (e.g. very high process temperatures or very high-viscosity fluids).

### Protective cover




*6 Engineering unit mm (in)*

## 6.2 Mounting the measuring device

### 6.2.1 Required tools

#### For sensor

For flanges and other process connections: Corresponding mounting tools

### 6.2.2 Preparing the measuring device

1. Remove all remaining transport packaging.
2. Remove any protective covers or protective caps present from the sensor.
3. Remove stick-on label on the electronics compartment cover.

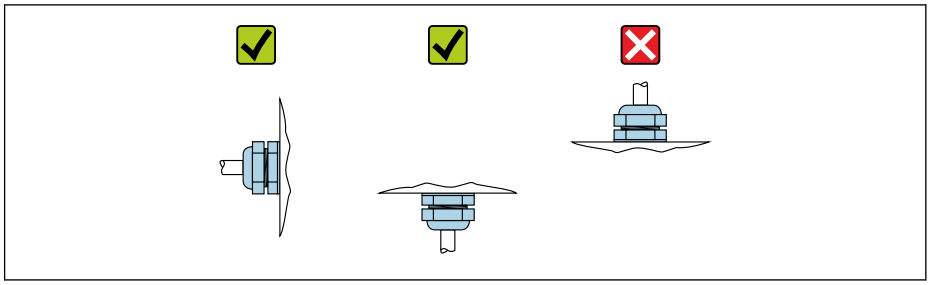
### 6.2.3 Mounting the measuring device

**WARNING**

**Danger due to improper process sealing!**

- Ensure that the inside diameters of the gaskets are greater than or equal to that of the process connections and piping.
- Ensure that the seals are clean and undamaged.
- Secure the seals correctly.

1. Ensure that the direction of the arrow on the nameplate of the sensor matches the flow direction of the fluid.
2. Install the measuring device or turn the transmitter housing so that the cable entries do not point upwards.



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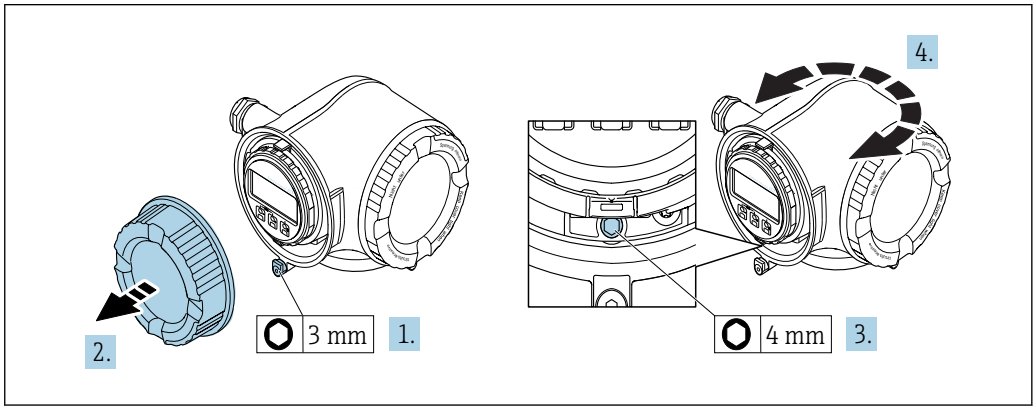
### 6.2.4 Turning the transmitter housing

To provide easier access to the connection compartment or display module, the transmitter housing can be turned.

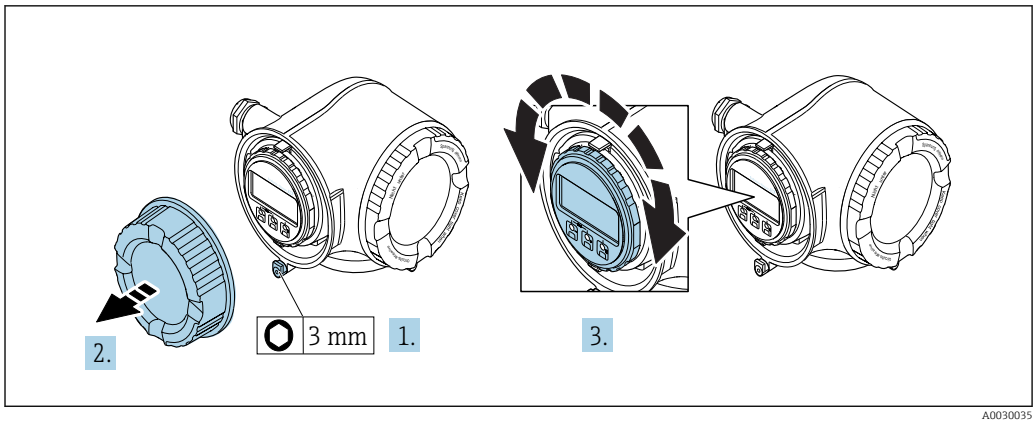



A0029993

1. Depending on the device version: Loosen the securing clamp of the connection compartment cover.
2. Unscrew the connection compartment cover.
3. Release the fixing screw.
4. Turn the housing to the desired position.
5. Firmly tighten the securing screw.
6. Screw on the connection compartment cover.
7. Depending on the device version: Attach the securing clamp of the connection compartment cover.

### 6.2.5 Turning the display module

The display module can be turned to optimize display readability and operability.




A0030035

1. Depending on the device version: Loosen the securing clamp of the connection compartment cover.
2. Unscrew the connection compartment cover.
3. Turn the display module to the desired position: max. 8 × 45° in each direction.
4. Screw on the connection compartment cover.
5. Depending on the device version: Attach the securing clamp of the connection compartment cover.

## 6.3 Post-installation check

| | |
|---|---|
| Is the device undamaged (visual inspection)? | ❑ |
| Does the measuring device conform to the measuring point specifications?<br><br>For example:<br>▪ Process temperature → 🖹 236<br>▪ Process pressure (refer to the section on "Pressure-temperature ratings" in the "Technical Information" document)<br>▪ Ambient temperature<br>▪ Measuring range | ❑ |
| Has the correct orientation for the sensor been selected ?<br><br>▪ According to sensor type<br>▪ According to medium temperature<br>▪ According to medium properties (outgassing, with entrained solids) | ❑ |
| Does the arrow on the sensor nameplate match the direction of flow of the fluid through the piping → 🖹 23? | ❑ |
| Are the measuring point identification and labeling correct (visual inspection)? | ❑ |
| Is the device adequately protected from precipitation and direct sunlight? | ❑ |
| Are the securing screw and securing clamp tightened securely? | ❑ |

# 7 Electrical connection

NOTICE

**The measuring device does not have an internal circuit breaker.**

- ▶ For this reason, assign the measuring device a switch or power-circuit breaker so that the power supply line can be easily disconnected from the mains.
- ▶ Although the measuring device is equipped with a fuse, additional overcurrent protection (maximum 10 A) should be integrated into the system installation.

## 7.1 Connection conditions

### 7.1.1 Required tools

- For cable entries: Use corresponding tools
- For securing clamp: Allen key 3 mm
- Wire stripper
- When using stranded cables: Crimper for wire end ferrule
- For removing cables from terminal: Flat blade screwdriver ≤ 3 mm (0.12 in)

### 7.1.2 Requirements for connecting cable

The connecting cables provided by the customer must fulfill the following requirements.

**Electrical safety**

In accordance with applicable federal/national regulations.

**Protective ground cable**

Cable ≥2.08 $mm^2$ (14 AWG)

The grounding impedance must be less than 1 Ω.

**Permitted temperature range**

- The installation guidelines that apply in the country of installation must be observed.
- The cables must be suitable for the minimum and maximum temperatures to be expected.

**Power supply cable**

Standard installation cable is sufficient.

**Signal cable**

*PROFIBUS PA*

Twisted, shielded two-wire cable. Cable type A is recommended .

For further information on planning and installing PROFIBUS networks see:

- Operating Instructions "PROFIBUS DP/PA: Guidelines for planning and commissioning" (BA00034S)
- PNO Directive 2.092 "PROFIBUS PA User and Installation Guideline"
- IEC 61158-2 (MBP)

*Current output 0/4 to 20 mA*

Standard installation cable is sufficient.

*Pulse/frequency/switch output*

Standard installation cable is sufficient.

*Relay output*

Standard installation cable is sufficient.

*Current input 0/4 to 20 mA*

Standard installation cable is sufficient.

*Status input*

Standard installation cable is sufficient.

### Cable diameter

- Cable glands supplied:
  M20 × 1.5 with cable Ø 6 to 12 mm (0.24 to 0.47 in)
- Spring-loaded terminals: Suitable for strands and strands with ferrules.
  Conductor cross-section 0.2 to 2.5 mm² (24 to 12 AWG).

### Requirements for the connecting cable - Remote display and operating module DKX001

*Optionally available connecting cable*

A cable is supplied depending on the order option
- Order code for measuring device: order code **030** for "Display; operation", option **O**
  or
- Order code for measuring device: order code **030** for "Display; operation", option **M**
  and
- Order code for DKX001: order code **040** for "Cable", option **A, B, D, E**

| | |
|---|---|
| **Standard cable** | 2 × 2 × 0.34 mm² (22 AWG) PVC cable with common shield (2 pairs, pair-stranded) |
| **Flame resistance** | According to DIN EN 60332-1-2 |
| **Oil-resistance** | According to DIN EN 60811-2-1 |
| **Shielding** | Tin-plated copper-braid, optical cover ≥ 85 % |
| **Capacitance: core/shield** | ≤200 pF/m |
| **L/R** | ≤24 µH/Ω |
| **Available cable length** | 5 m (15 ft)/10 m (35 ft)/20 m (65 ft)/30 m (100 ft) |
| **Operating temperature** | When mounted in a fixed position: −50 to +105 °C (−58 to +221 °F); when cable can move freely: −25 to +105 °C (−13 to +221 °F) |

*Standard cable - customer-specific cable*

No cable is supplied, and it must be provided by the customer (up to max. 300 m (1 000 ft)) for the following order option:
Order code for DKX001: Order code **040** for "Cable", option **1** "None, provided by customer, max 300 m"

A standard cable can be used as the connecting cable.

| | |
|---|---|
| **Standard cable** | 4 cores (2 pairs); pair-stranded with common shield |
| **Shielding** | Tin-plated copper-braid, optical cover ≥ 85 % |
| **Capacitance: core/shield** | Maximum 1 000 nF for Zone 1, Class I, Division 1 |

| | |
|---|---|
| **L/R** | Maximum 24 µH/Ω for Zone 1, Class I, Division 1 |
| **Cable length** | Maximum 300 m (1000 ft), see the following table |

| **Cross-section** | **Max. cable length for use in Non-hazardous area, Ex Zone 2, Class I, Division 2 Ex Zone 1, Class I, Division 1** |
|---|---|
| 0.34 $mm^2$ (22 AWG) | 80 m (270 ft) |
| 0.50 $mm^2$ (20 AWG) | 120 m (400 ft) |
| 0.75 $mm^2$ (18 AWG) | 180 m (600 ft) |
| 1.00 $mm^2$ (17 AWG) | 240 m (800 ft) |
| 1.50 $mm^2$ (15 AWG) | 300 m (1000 ft) |

### 7.1.3 Terminal assignment

**Transmitter: supply voltage, input/outputs**

The terminal assignment of the inputs and outputs depends on the individual order version of the device. The device-specific terminal assignment is documented on an adhesive label in the terminal cover.

| Supply voltage | | Input/output 1 | | Input/output 2 | | Input/output 3 | |
|---|---|---|---|---|---|---|---|
| 1 (+) | 2 (–) | 26 (B) | 27 (A) | 24 (+) | 25 (–) | 22 (+) | 23 (–) |
| | | Device-specific terminal assignment: adhesive label in terminal cover. | | | | | |

Terminal assignment of the remote display and operating module → 39.

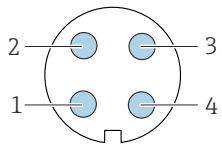
### 7.1.4 Device plugs available

Device plugs may not be used in hazardous areas!

**Order code for "Input; output 1", option GA "PROFIBUS PA"**

| Order code for "Electrical connection" | Cable entry/connection | |
|---|---|---|
| | 2 | 3 |
| L, N, P, U | Connector M12 × 1 | – |

### 7.1.5 Pin assignment of device plug




| Pin | | Assignment | Coding | Plug/socket |
|---|---|---|---|---|
| 1 | + | PROFIBUS PA + | A | Plug |
| 2 | | Grounding | | |
| 3 | - | PROFIBUS PA – | | |
| 4 | | Not assigned | | |

### 7.1.6 Shielding and grounding

Optimal electromagnetic compatibility (EMC) of the fieldbus system can be guaranteed only if the system components and, in particular, the lines are shielded and the shield forms as complete a cover as possible. A shield coverage of 90 %is ideal.

1. To ensure optimal EMC protection, connect the shield to the reference ground as often as possible.
2. For reasons concerning explosion protection, it is recommended that grounding be dispensed with.

To comply with both requirements, there are basically three different types of shielding in the fieldbus system:
- Shielding at both ends
- Shielding at one end on the feed side with capacitance termination at the field device
- Shielding at one end on the feed side

Experience shows that the best results with regard to EMC are achieved in most cases in installations with one-sided shielding on the feed side (without capacitance termination at the field device). Appropriate measures with regard to input wiring must be taken to allow

unrestricted operation when EMC interference is present. These measures have been taken into account for this device. Operation in the event of disturbance variables as per NAMUR NE21 is thus guaranteed.

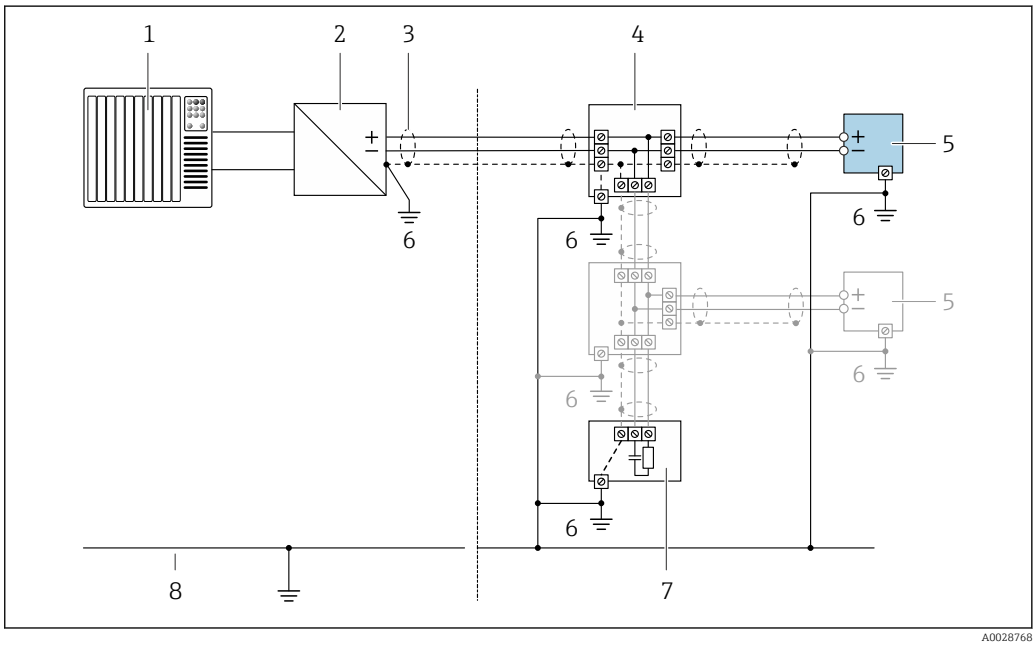
1. Observe national installation requirements and guidelines during installation.
2. Where there are large differences in potential between the individual grounding points,
   connect only one point of the shielding directly to the reference ground.
3. In systems without potential equalization,
   the cable shielding of fieldbus systems should be grounded on one side only, for example at the fieldbus supply unit or at safety barriers.

NOTICE

**In systems without potential matching, the multiple grounding of the cable shield causes mains frequency equalizing currents!**

Damage to the bus cable shield.

- ▶ Only ground the bus cable shield to either the local ground or the protective ground at one end.
- ▶ Insulate the shield that is not connected.




7 *Connection example for PROFIBUS PA*

1 *Control system (e.g. PLC)*
2 *PROFIBUS PA segment coupler*
3 *Cable shield: the cable shield must be grounded at both ends to comply with EMC requirements; observe cable specifications*
4 *T-box*
5 *Measuring device*
6 *Local grounding*
7 *Bus terminator*
8 *Potential equalization conductor*

### 7.1.7 Preparing the measuring device

NOTICE

**Insufficient sealing of the housing!**

Operational reliability of the measuring device could be compromised.

- ▶ Use suitable cable glands corresponding to the degree of protection.

1. Remove dummy plug if present.

2. If the measuring device is supplied without cable glands:
   Provide suitable cable gland for corresponding connecting cable.
3. If the measuring device is supplied with cable glands:
   Observe requirements for connecting cables → 31.

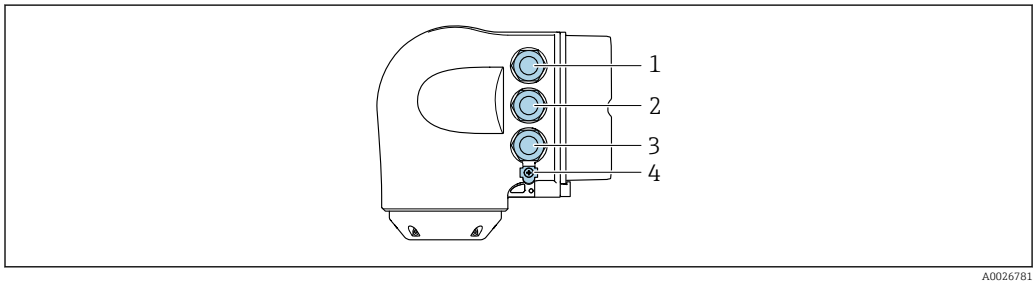
## 7.2 Connecting the measuring device

NOTICE

**Limitation of electrical safety due to incorrect connection!**

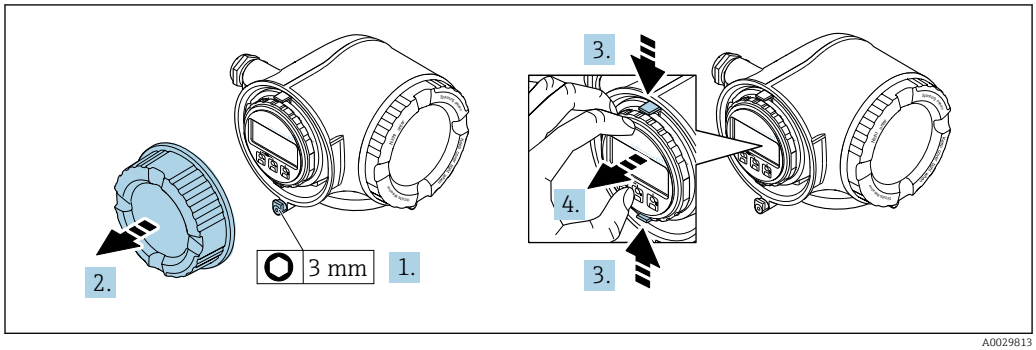
- Have electrical connection work carried out by appropriately trained specialists only.
- Observe applicable federal/national installation codes and regulations.
- Comply with local workplace safety regulations.
- Always connect the protective ground cable ⏚ before connecting additional cables.
- For use in potentially explosive atmospheres, observe the information in the device-specific Ex documentation.

### 7.2.1 Connecting the transmitter




A0026781

*1 Terminal connection for supply voltage*
*2 Terminal connection for signal transmission, input/output*
*3 Terminal connection for signal transmission, input/output or terminal connection for network connection via service interface (CDI-RJ45); optional: connection for external WLAN antenna or remote display and operating module DKX001*
*4 Protective earth (PE)*

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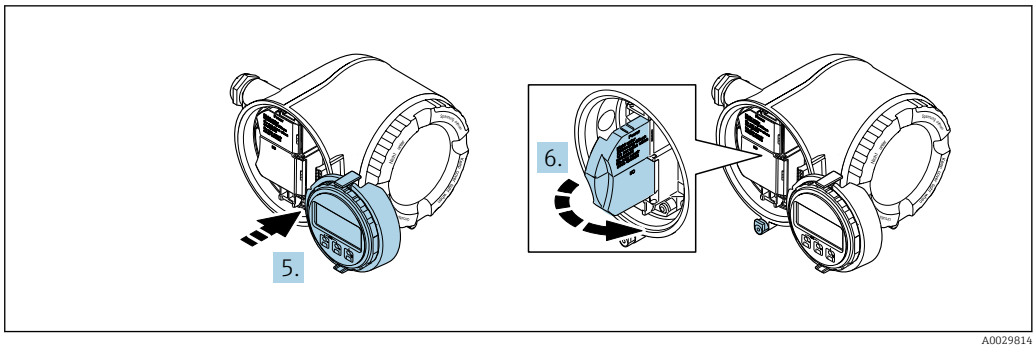
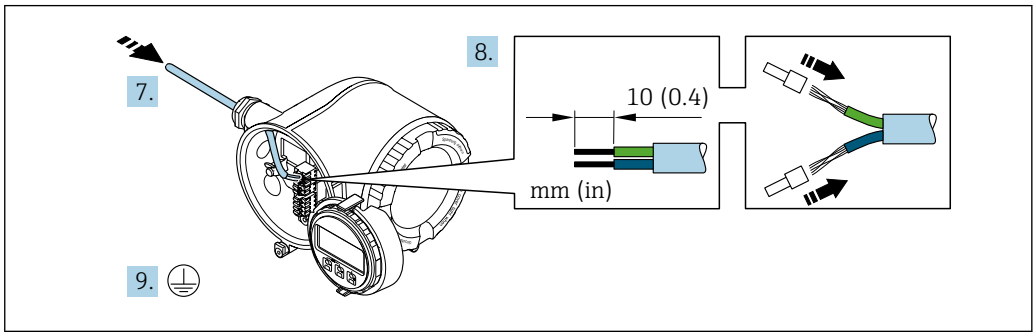
1. Loosen the securing clamp of the connection compartment cover.
2. Unscrew the connection compartment cover.
3. Squeeze the tabs of the display module holder together.
4. Remove the display module holder.




A0029814

5. Attach the holder to the edge of the electronics compartment.
6. Open the terminal cover.

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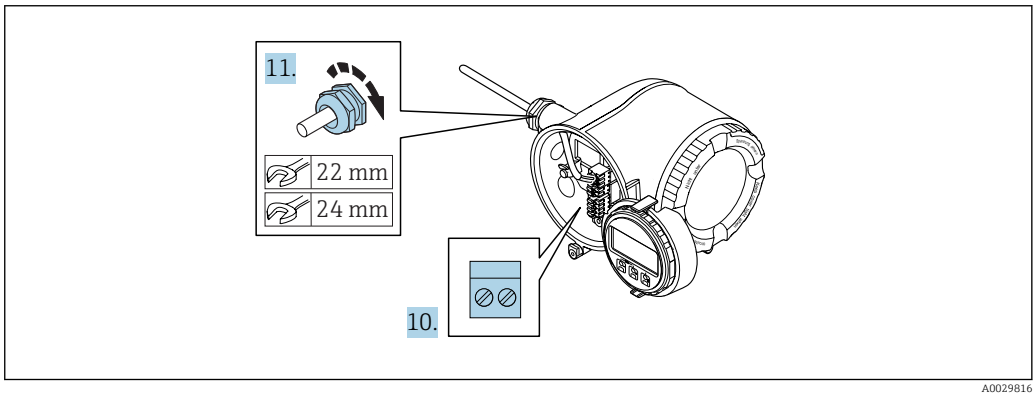
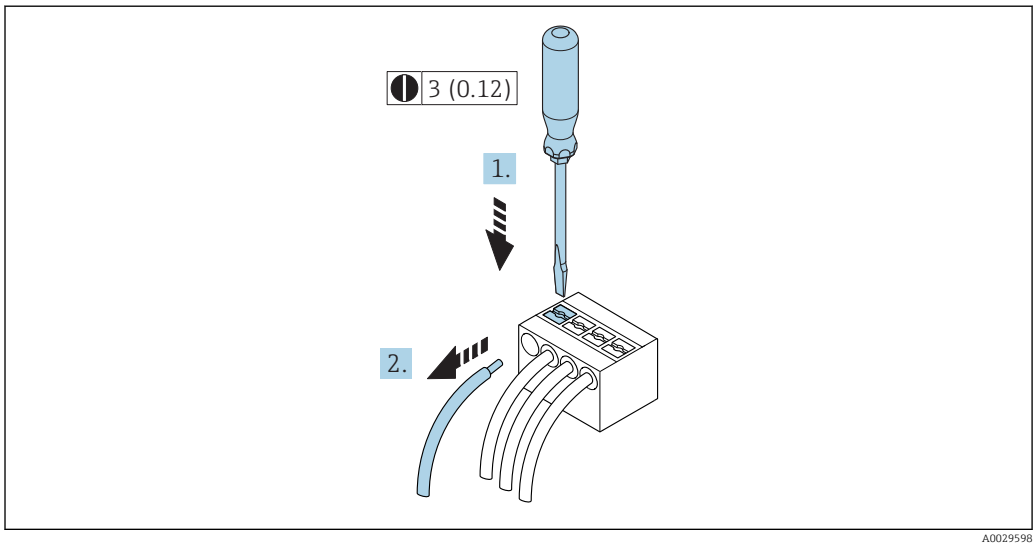
7. Push the cable through the cable entry . To ensure tight sealing, do not remove the sealing ring from the cable entry.
8. Strip the cable and cable ends. In the case of stranded cables, also fit ferrules.
9. Connect the protective ground.




A0029816

10. Connect the cable in accordance with the terminal assignment .
    ↳ **Signal cable terminal assignment:** The device-specific terminal assignment is documented on an adhesive label in the terminal cover.
    **Supply voltage terminal assignment:** Adhesive label in the terminal cover or → 34.
11. Firmly tighten the cable glands.
    ↳ This concludes the cable connection process.
12. Close the terminal cover.
13. Fit the display module holder in the electronics compartment.
14. Screw on the connection compartment cover.
15. Secure the securing clamp of the connection compartment cover.

### Removing a cable



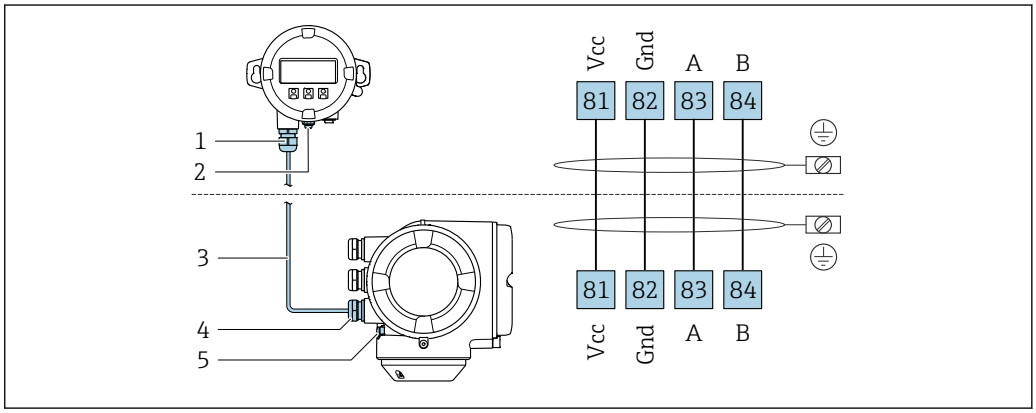

*8 Engineering unit mm (in)*

1. To remove a cable from the terminal, use a flat-blade screwdriver to push the slot between the two terminal holes
2. while simultaneously pulling the cable end out of the terminal.

### 7.2.2 Connecting the remote display and operating module DKX001

The remote display and operating module DKX001 is available as an optional extra → 218.

- The remote display and operating module DKX001 is only available for the following housing version: order code for "Housing": option A "Aluminum, coated"
- The measuring device is always supplied with a dummy cover when the remote display and operating module DKX001 is ordered directly with the measuring device. Display or operation at the transmitter is not possible in this case.
- If ordered subsequently, the remote display and operating module DKX001 may not be connected at the same time as the existing measuring device display module. Only one display or operation unit may be connected to the transmitter at any one time.




1 *Remote display and operating module DKX001*
2 *Protective earth (PE)*
3 *Connecting cable*
4 *Measuring device*
5 *Protective earth (PE)*

## 7.3 Ensuring potential equalization

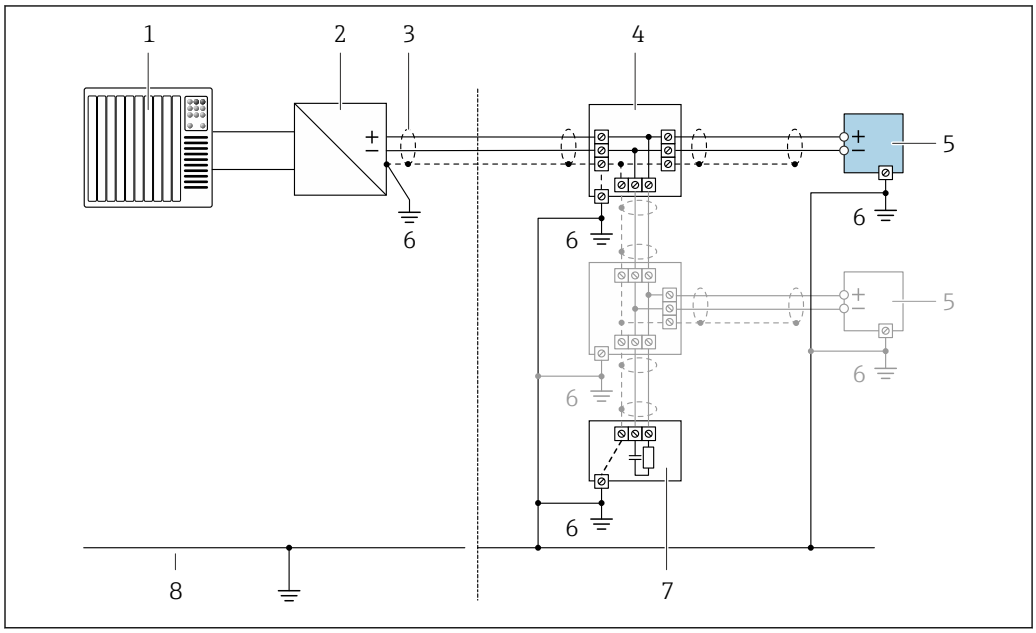
### 7.3.1 Requirements

No special measures for potential equalization are required.

# 7.4 Special connection instructions

## 7.4.1 Connection examples

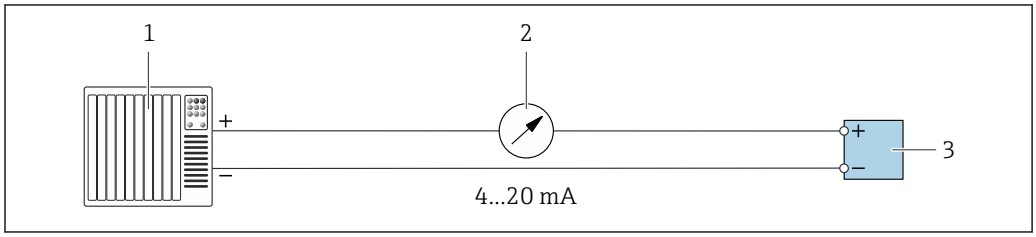
### PROFIBUS PA




9 *Connection example for PROFIBUS PA*

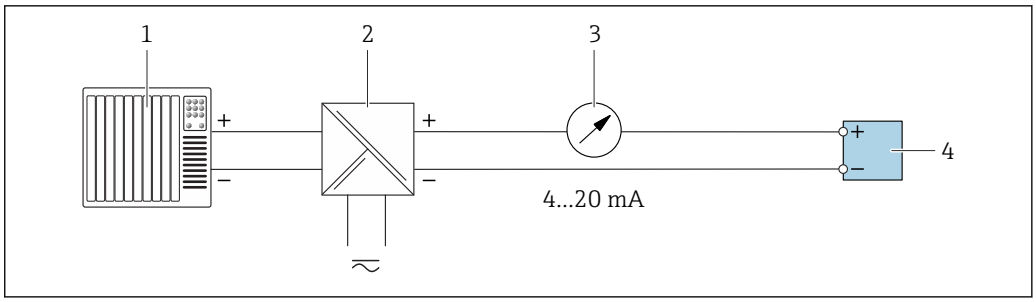
1 *Control system (e.g. PLC)*
2 *PROFIBUS PA segment coupler*
3 *Cable shield: the cable shield must be grounded at both ends to comply with EMC requirements; observe cable specifications*
4 *T-box*
5 *Measuring device*
6 *Local grounding*
7 *Bus terminator*
8 *Potential matching line*

### Current output 4-20 mA




10 *Connection example for 4-20 mA current output (active)*

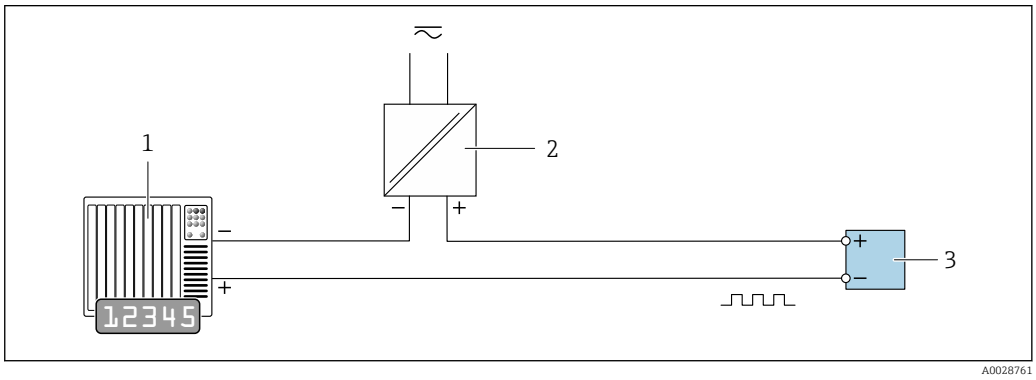
1 *Automation system with current input (e.g. PLC)*
2 *Analog display unit: observe maximum load*
3 *Transmitter*




11 *Connection example for 4-20 mA current output (passive)*

1 *Automation system with current input (e.g. PLC)*
2 *Active barrier for power supply (e.g. RN221N)*
3 *Analog display unit: observe maximum load*
4 *Transmitter*

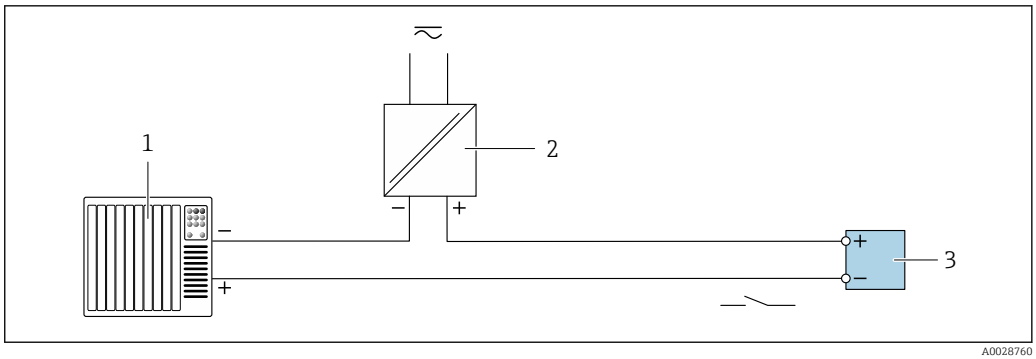
### Pulse/frequency output




12 *Connection example for pulse/frequency output (passive)*

1 *Automation system with pulse/frequency input (e.g. PLC)*
2 *Power supply*
3 *Transmitter: Observe input values → 226*

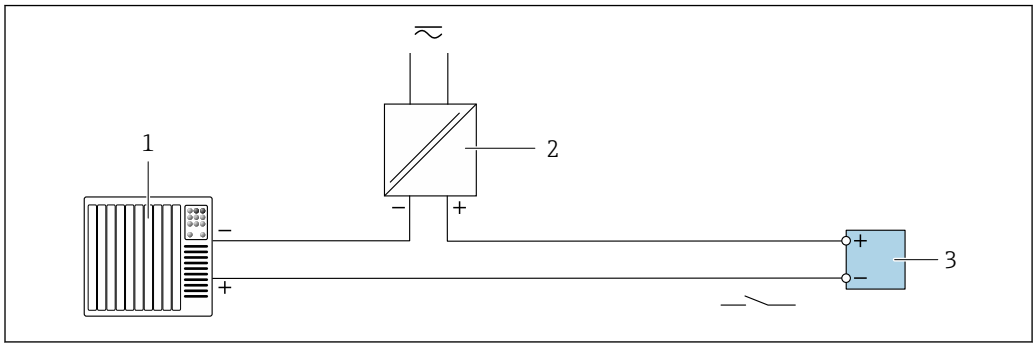
### Switch output




13 *Connection example for switch output (passive)*

1 *Automation system with switch input (e.g. PLC)*
2 *Power supply*
3 *Transmitter: Observe input values → 226*

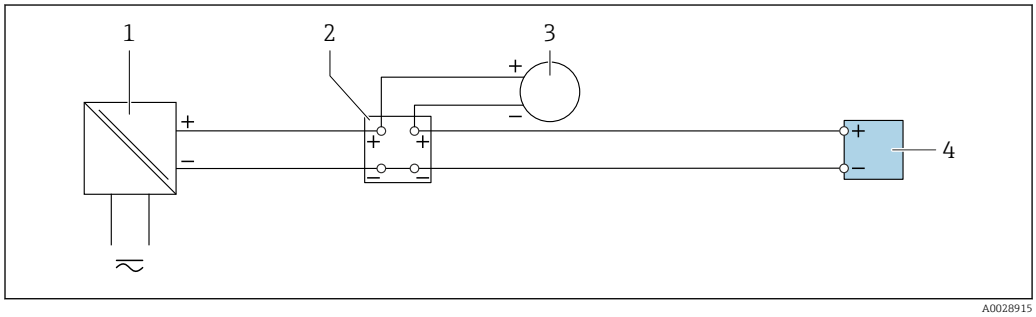
### Relay output




14 *Connection example for relay output (passive)*

1 *Automation system with relay input (e.g. PLC)*
2 *Power supply*
3 *Transmitter: Observe input values → 227*

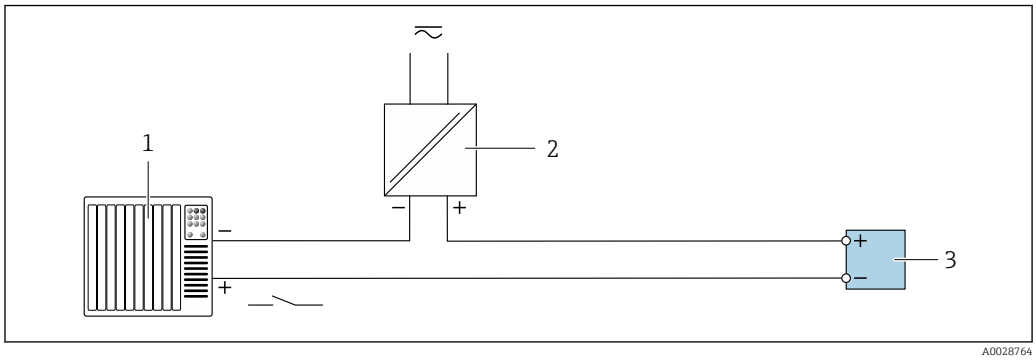
### Current input




15 *Connection example for 4 to 20 mA current input*

1 *Power supply*
2 *Terminal box*
3 *External measuring device (for reading in pressure or temperature, for instance)*
4 *Transmitter*

### Status input




16 *Connection example for status input*

1 *Automation system with status output (e.g. PLC)*
2 *Power supply*
3 *Transmitter*

## 7.5 Hardware settings

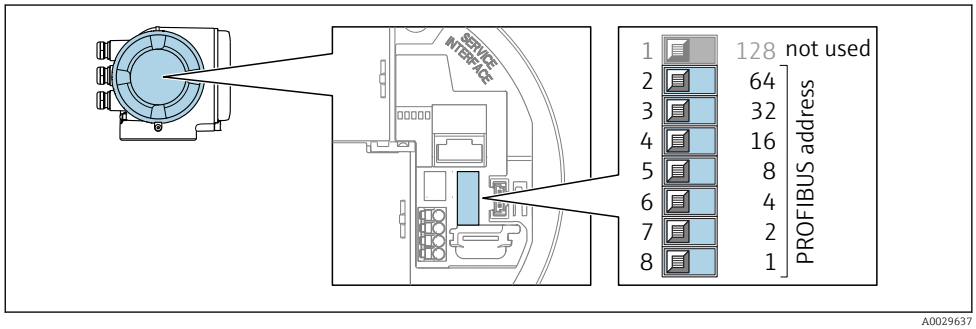
### 7.5.1 Setting the device address

The address must always be configured for a PROFIBUS DP/PA device. The valid address range is between 1 and 126. In a PROFIBUS DP/PA network, each address can only be assigned once. If an address is not configured correctly, the device is not recognized by the master. All measuring devices are delivered from the factory with the device address 126 and with the software addressing method.

Risk of electric shock when opening the transmitter housing.
- ▶ Before opening the transmitter housing:
- ▶ Disconnect the device from the power supply.

#### Hardware addressing

1.

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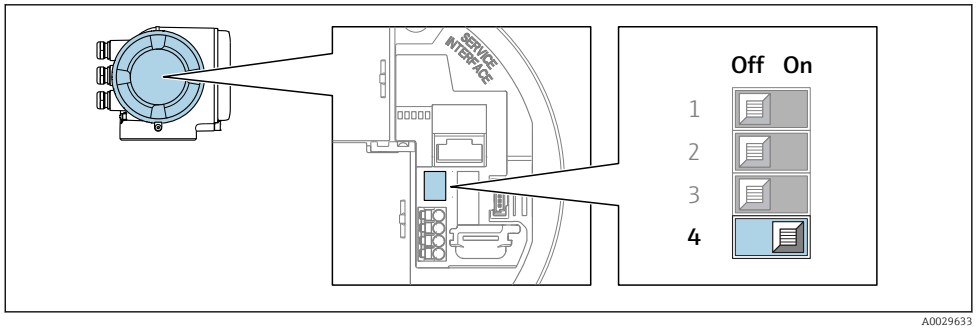
Set the desired device address using the DIP switches in the connection compartment.

2.




A0029633

To switch addressing from software addressing to hardware addressing: set the DIP switch to **On**.

↳ The change of device address takes effect after 10 seconds. The device is restarted.

#### Software addressing

- ▶ To switch addressing from hardware addressing to software addressing: set DIP switch No. 4 to **Off**.

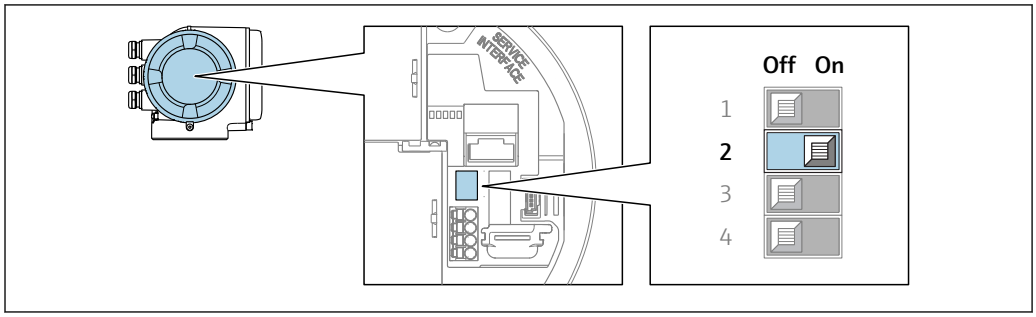
  ↳ The device address configured in the **Device address** parameter (→ 93) takes effect after 10 seconds. The device is restarted.

### 7.5.2 Activating the default IP address

The default IP address 192.168.1.212 can be activated by DIP switch.

### Activating the default IP address via the DIP switch

Risk of electric shock when opening the transmitter housing.
- ▶ Before opening the transmitter housing:
- ▶ Disconnect the device from the power supply.

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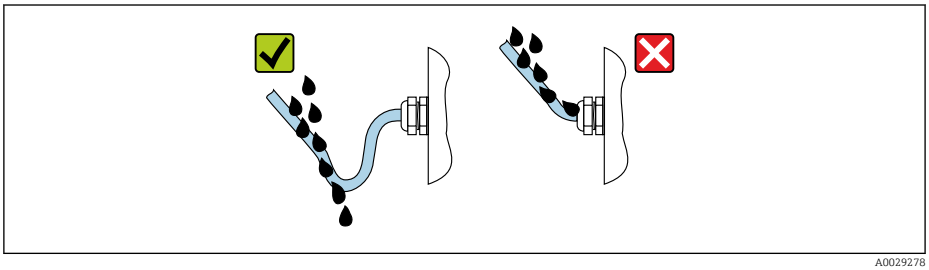
1. Depending on the housing version, loosen the securing clamp or fixing screw of the housing cover.
2. Depending on the housing version, unscrew or open the housing cover and disconnect the local display from the main electronics module where necessary .
3. Set DIP switch No. 2 on the I/O electronics module from **OFF** → **ON**.
4. Reverse the removal procedure to reassemble the transmitter.
5. Reconnect the device to the power supply.
   ↳ The default IP address is used once the device is restarted.

## 7.6 Ensuring the degree of protection

The measuring device fulfills all the requirements for the IP66/67 degree of protection, Type 4X enclosure.

To guarantee IP66/67 degree of protection, Type 4X enclosure, carry out the following steps after the electrical connection:

1. Check that the housing seals are clean and fitted correctly.
2. Dry, clean or replace the seals if necessary.
3. Tighten all housing screws and screw covers.
4. Firmly tighten the cable glands.
5. To ensure that moisture does not enter the cable entry:
   Route the cable so that it loops down before the cable entry ("water trap").
   ↳



A0029278

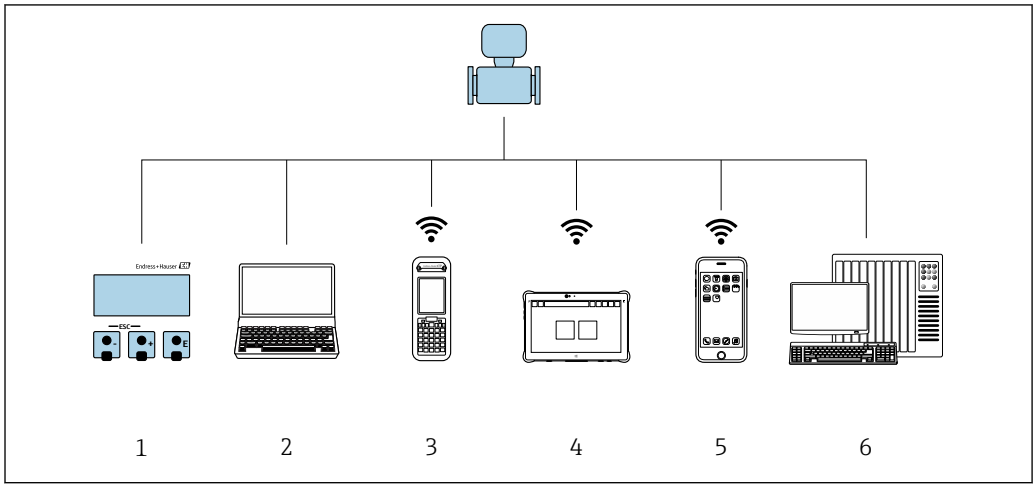
6. Insert dummy plugs into unused cable entries.

## 7.7 Post-connection check

| | |
|---|---|
| Are cables or the device undamaged (visual inspection)? | ❑ |
| Do the cables used meet the requirements? | ❑ |
| Do the cables have adequate strain relief? | ❑ |
| Are all the cable glands installed, firmly tightened and leak-tight? Cable run with "water trap" → 🖹 44? | ❑ |
| If supply voltage is present, do values appear on the display module? | ❑ |

# 8 Operation options

## 8.1 Overview of operation options

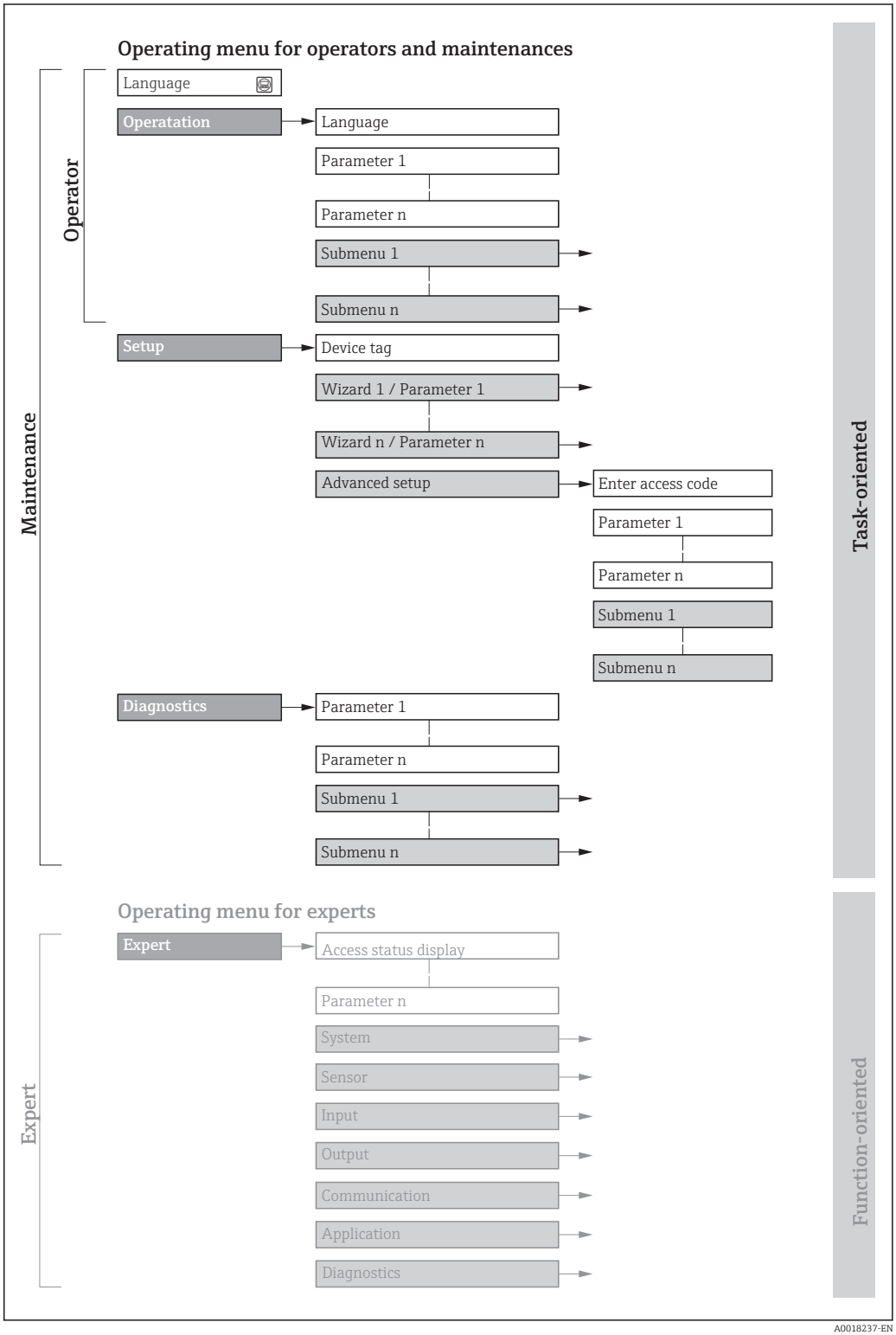



1 *Local operation via display module*
2 *Computer with Web browser (e.g. Internet Explorer) or with operating tool (e.g. FieldCare, DeviceCare, AMS Device Manager, SIMATIC PDM)*
3 *Field Xpert SFX350 or SFX370*
4 *Field Xpert SMT70*
5 *Mobile handheld terminal*
6 *Control system (e.g. PLC)*

## 8.2 Structure and function of the operating menu

### 8.2.1 Structure of the operating menu

For an overview of the operating menu for experts: "Description of Device Parameters" document supplied with the device→ 250




17 *Schematic structure of the operating menu*

### 8.2.2 Operating philosophy

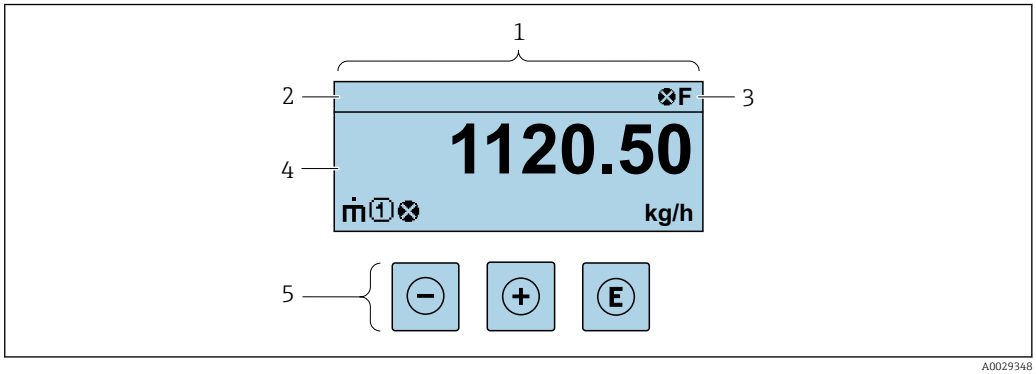
The individual parts of the operating menu are assigned to certain user roles (operator, maintenance etc.). Each user role contains typical tasks within the device lifecycle.

| Menu/parameter | | User role and tasks | Content/meaning |
|---|---|---|---|
| Language | task-oriented | **Role "Operator", "Maintenance"**<br>Tasks during operation:<br>▪ Configuring the operational display<br>▪ Reading measured values | ▪ Defining the operating language<br>▪ Defining the Web server operating language<br>▪ Resetting and controlling totalizers |
| Operation | | | ▪ Configuring the operational display (e.g. display format, display contrast)<br>▪ Resetting and controlling totalizers |
| Setup | | **"Maintenance" role**<br>Commissioning:<br>▪ Configuration of the measurement<br>▪ Configuration of the inputs and outputs<br>▪ Configuration of the communication interface | Wizards for fast commissioning:<br>▪ Set the system units<br>▪ Configuration of the communication interface<br>▪ Define the medium<br>▪ Display I/O/configuration<br>▪ Configure the inputs<br>▪ Configure the outputs<br>▪ Configuring the operational display<br>▪ Define the output conditioning<br>▪ Set the low flow cut off<br>▪ Configure partial and empty pipe detection<br><br>Advanced setup<br>▪ For more customized configuration of the measurement (adaptation to special measuring conditions)<br>▪ Configuration of totalizers<br>▪ Configure the WLAN settings<br>▪ Administration (define access code, reset measuring device) |
| Diagnostics | | **"Maintenance" role**<br>Fault elimination:<br>▪ Diagnostics and elimination of process and device errors<br>▪ Measured value simulation | Contains all parameters for error detection and analyzing process and device errors:<br>▪ Diagnostic list<br>Contains up to 5 currently pending diagnostic messages.<br>▪ Event logbook<br>Contains event messages that have occurred.<br>▪ Device information<br>Contains information for identifying the device.<br>▪ Measured values<br>Contains all current measured values.<br>▪ Analog inputs<br>Is used to display the analog input.<br>▪ **Data logging** submenu with "Extended HistoROM" order option<br>Storage and visualization of measured values<br>▪ Heartbeat<br>The functionality of the device is checked on demand and the verification results are documented.<br>▪ Simulation<br>Is used to simulate measured values or output values. |

| Menu/parameter | | User role and tasks | Content/meaning |
|---|---|---|---|
| Expert | function-oriented | Tasks that require detailed knowledge of the function of the device:<br>▪ Commissioning measurements under difficult conditions<br>▪ Optimal adaptation of the measurement to difficult conditions<br>▪ Detailed configuration of the communication interface<br>▪ Error diagnostics in difficult cases | Contains all the parameters of the device and makes it possible to access these parameters directly using an access code. The structure of this menu is based on the function blocks of the device:<br>▪ System<br>Contains all higher-order device parameters which do not concern the measurement or the communication interface.<br>▪ Sensor<br>Configuration of the measurement.<br>▪ Output<br>Configure the pulse/frequency/switch output.<br>▪ Input<br>Configuring the status input.<br>▪ Output<br>Configuring of the analog current outputs as well as the pulse/frequency and switch output.<br>▪ Communication<br>Configuration of the digital communication interface and the Web server.<br>▪ Submenus for function blocks (e.g. "Analog Inputs")<br>Configuration of function blocks.<br>▪ Application<br>Configure the functions that go beyond the actual measurement (e.g. totalizer).<br>▪ Diagnostics<br>Error detection and analysis of process and device errors and for device simulation and Heartbeat Technology. |

## 8.3 Access to the operating menu via the local display

### 8.3.1 Operational display

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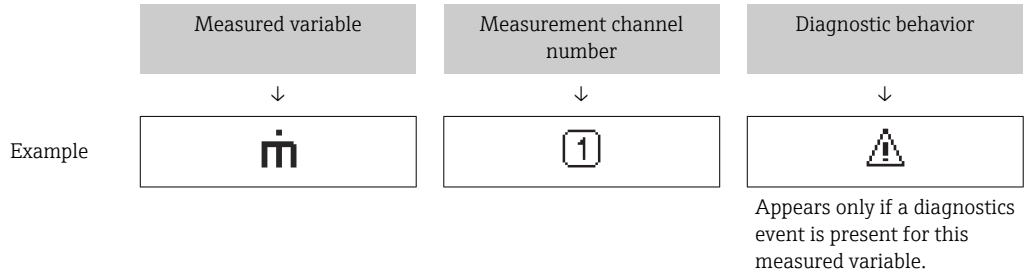
1 *Operational display*
2 *Device tag*
3 *Status area*
4 *Display area for measured values (4-line)*
5 *Operating elements→ 55*

### Status area

The following symbols appear in the status area of the operational display at the top right:
- Status signals→ 🖹 148
  - **F**: Failure
  - **C**: Function check
  - **S**: Out of specification
  - **M**: Maintenance required
- Diagnostic behavior→ 🖹 149
  - ⊗: Alarm
  - ⚠: Warning
- 🔒: Locking (the device is locked via the hardware )
- ⇆: Communication (communication via remote operation is active)

### Display area

In the display area, each measured value is prefaced by certain symbol types for further description:




*Measured values*

| Symbol | Meaning |
|---|---|
| ṁ | Mass flow |
| U̇ | ▪ Volume flow<br>▪ Corrected volume flow |
| ρ | ▪ Density<br>▪ Reference density |
| 🌡 | Temperature |
| Σ | Totalizer<br>ℹ The measurement channel number indicates which of the three totalizers is displayed. |
| → | Status input |

*Measurement channel numbers*

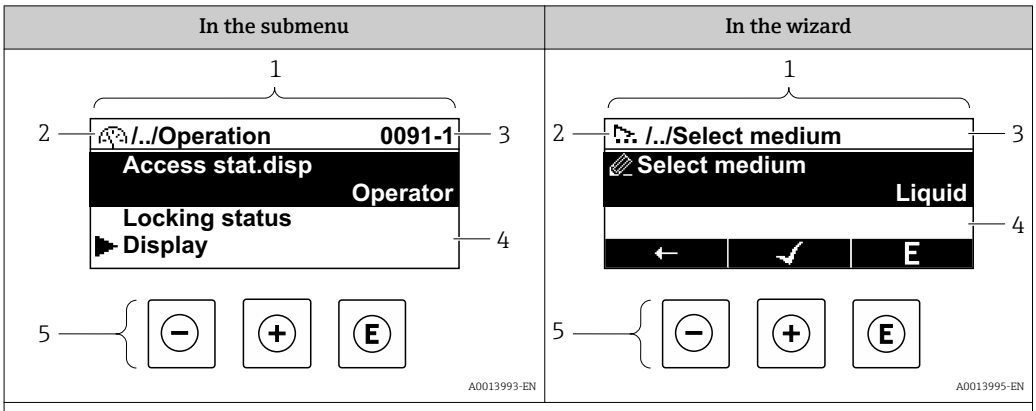
| Symbol | Meaning |
|---|---|
| 1 ... 4 | Measurement channel 1 to 4 |
| The measurement channel number is displayed only if more than one channel is present for the same measured variable type (e.g. Totalizer 1 to 3). | |

*Diagnostic behavior*

| |
|---|
| The diagnostic behavior pertains to a diagnostic event that is relevant to the displayed measured variable.<br>For information on the symbols → 🖹 149 |

ℹ The number and display format of the measured values can be configured via the **Format display** parameter (→ 🖹 111).

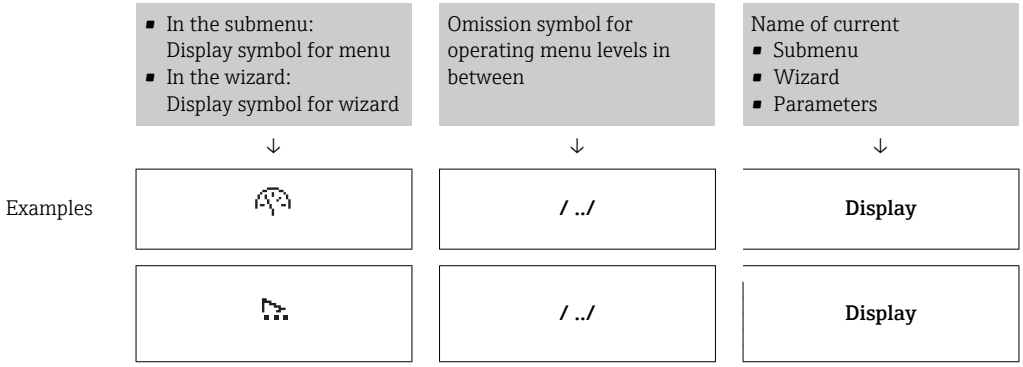
## 8.3.2 Navigation view




1 *Navigation view*
2 *Navigation path to current position*
3 *Status area*
4 *Display area for navigation*
5 *Operating elements* → 🖹 55

### Navigation path

The navigation path - displayed at the top left in the navigation view - consists of the following elements:




For more information about the icons in the menu, refer to the "Display area" section → 🖹 52

### Status area

The following appears in the status area of the navigation view in the top right corner:
- In the submenu
  - The direct access code for the parameter you are navigating to (e.g. 0022-1)
  - If a diagnostic event is present, the diagnostic behavior and status signal
- In the wizard
  If a diagnostic event is present, the diagnostic behavior and status signal

- For information on the diagnostic behavior and status signal → 🖹 148
- For information on the function and entry of the direct access code → 🖹 57

### Display area

*Menus*

| Symbol | Meaning |
|---|---|
| | **Operation**<br>Appears:<br>▪ In the menu next to the "Operation" selection<br>▪ At the left in the navigation path in the **Operation** menu |
| | **Setup**<br>Appears:<br>▪ In the menu next to the "Setup" selection<br>▪ At the left in the navigation path in the **Setup** menu |
| | **Diagnostics**<br>Appears:<br>▪ In the menu next to the "Diagnostics" selection<br>▪ At the left in the navigation path in the **Diagnostics** menu |
| | **Expert**<br>Appears:<br>▪ In the menu next to the "Expert" selection<br>▪ At the left in the navigation path in the **Expert** menu |

*Submenus, wizards, parameters*

| Symbol | Meaning |
|---|---|
| | Submenu |
| | Wizard |
| | Parameters within a wizard<br>No display symbol exists for parameters in submenus. |

*Locking*

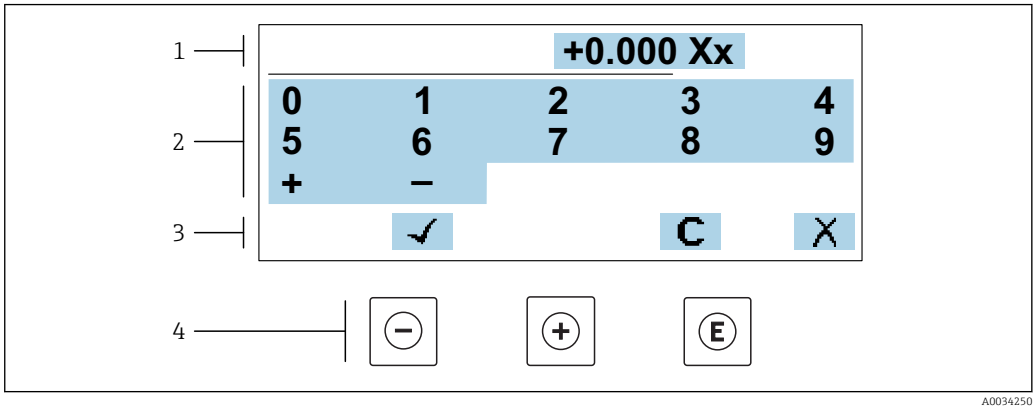
| Symbol | Meaning |
|---|---|
| | **Parameter locked**<br>When displayed in front of a parameter name, indicates that the parameter is locked.<br>▪ By a user-specific access code<br>▪ By the hardware write protection switch |

*Wizard operation*

| Symbol | Meaning |
|---|---|
| | Switches to the previous parameter. |
| | Confirms the parameter value and switches to the next parameter. |
| | Opens the editing view of the parameter. |

### 8.3.3 Editing view

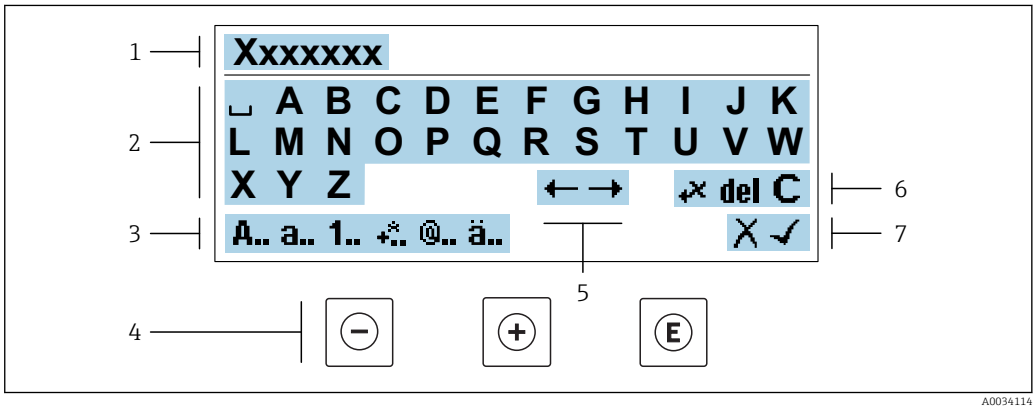
#### Numeric editor




18 *For entering values in parameters (e.g. limit values)*

1 *Entry display area*
2 *Input screen*
3 *Confirm, delete or reject entry*
4 *Operating elements*

#### Text editor




19 *For entering text in parameters (e.g. tag name)*

1 *Entry display area*
2 *Current input screen*
3 *Change input screen*
4 *Operating elements*
5 *Move entry position*
6 *Delete entry*
7 *Reject or confirm entry*

*Using the operating elements in the editing view*

| Operating key(s) | Meaning |
|---|---|
| ⊖ | **Minus key**<br>Move the entry position to the left. |
| ⊕ | **Plus key**<br>Move the entry position to the right. |

| Operating key(s) | Meaning |
|---|---|
| E | **Enter key**<br>▪ Press the key briefly: confirm your selection.<br>▪ Press the key for 2 s: confirm the entry. |
| − + + | **Escape key combination (press keys simultaneously)**<br>Close the editing view without accepting the changes. |

*Input screens*

| Symbol | Meaning |
|---|---|
| A.. | Upper case |
| a.. | Lower case |
| 1.. | Numbers |
| +.. | Punctuation marks and special characters: = + − * / ² ³ ¼ ½ ¾ ( ) [ ] < > { } |
| @.. | Punctuation marks and special characters: ' " ` ^ . , ; : ? ! % µ ° € $ £ ¥ § @ # / \ I ~ & _ |
| ä.. | Umlauts and accents |

*Controlling data entries*

| Symbol | Meaning |
|---|---|
| ← → | Move entry position |
| X | Reject entry |
| ✓ | Confirm entry |
| ← | Delete character immediately to the left of the entry position |
| del | Delete character immediately to the right of the entry position |
| C | Clear all the characters entered |

### 8.3.4 Operating elements

| Operating key(s) | Meaning |
|---|---|
| ⊖ | **Minus key**<br>*In a menu, submenu*<br>Moves the selection bar upwards in a picklist.<br>*With a Wizard*<br>Confirms the parameter value and goes to the previous parameter.<br>*With a text and numeric editor*<br>Move the entry position to the left. |
| ⊕ | **Plus key**<br>*In a menu, submenu*<br>Moves the selection bar downwards in a picklist.<br>*With a Wizard*<br>Confirms the parameter value and goes to the next parameter.<br>*With a text and numeric editor*<br>Move the entry position to the right. |
| Ⓔ | **Enter key**<br>*For operational display*<br>Pressing the key briefly opens the operating menu.<br>*In a menu, submenu*<br>▪ Pressing the key briefly:<br>  ▪ Opens the selected menu, submenu or parameter.<br>  ▪ Starts the wizard.<br>  ▪ If help text is open, closes the help text of the parameter.<br>▪ Pressing the key for 2 s for parameter:<br>  If present, opens the help text for the function of the parameter.<br>*With a Wizard*<br>Opens the editing view of the parameter.<br>*With a text and numeric editor*<br>▪ Press the key briefly: confirm your selection.<br>▪ Press the key for 2 s: confirm the entry. |
| ⊖ + ⊕ | **Escape key combination (press keys simultaneously)**<br>*In a menu, submenu*<br>▪ Pressing the key briefly:<br>  ▪ Exits the current menu level and takes you to the next higher level.<br>  ▪ If help text is open, closes the help text of the parameter.<br>▪ Pressing the key for 2 s returns you to the operational display ("home position").<br>*With a Wizard*<br>Exits the wizard and takes you to the next higher level.<br>*With a text and numeric editor*<br>Close the editing view without accepting the changes. |
| ⊖ + Ⓔ | **Minus/Enter key combination (press the keys simultaneously)**<br>▪ If the keypad lock is active:<br>  Press the key for 3 s: deactivate the keypad lock.<br>▪ If the keypad lock is not active:<br>  Press the key for 3 s: the context menu opens along with the option for activating the keypad lock. |

### 8.3.5 Opening the context menu

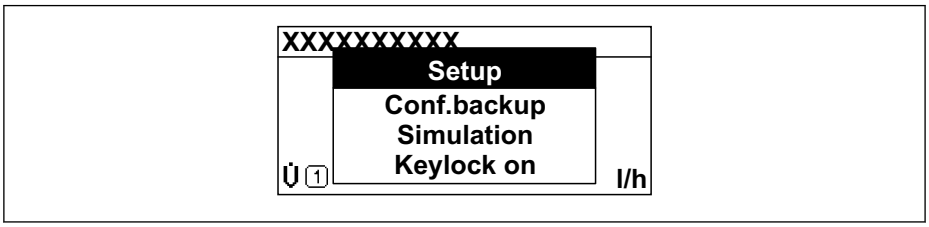
Using the context menu, the user can call up the following menus quickly and directly from the operational display:

- Setup
- Data backup
- Simulation

### Calling up and closing the context menu

The user is in the operational display.

1. Press the − and E keys for longer than 3 seconds.
   ↳ The context menu opens.




2. Press − + + simultaneously.
   ↳ The context menu is closed and the operational display appears.

### Calling up the menu via the context menu

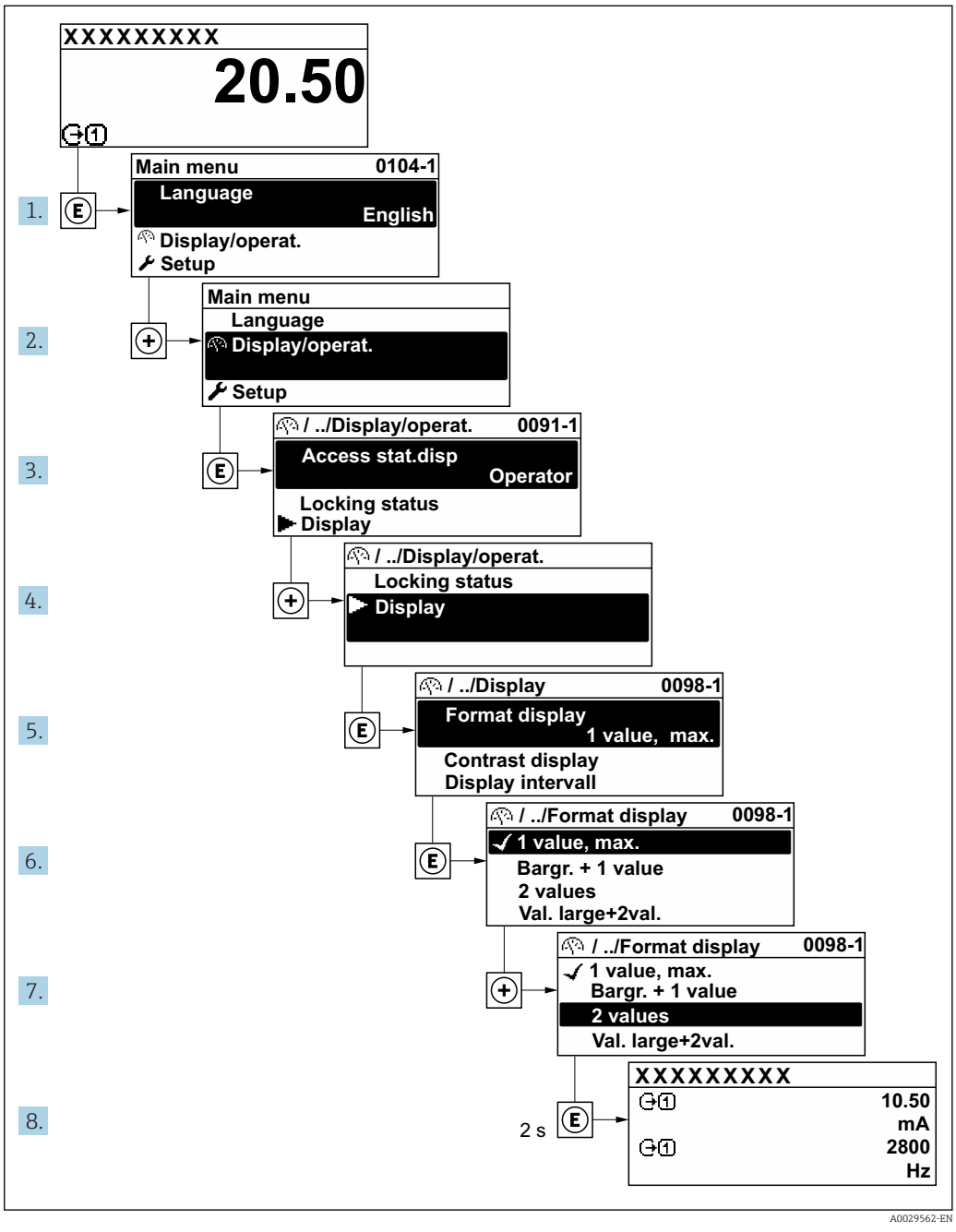
1. Open the context menu.
2. Press + to navigate to the desired menu.
3. Press E to confirm the selection.
   ↳ The selected menu opens.

### 8.3.6 Navigating and selecting from list

Different operating elements are used to navigate through the operating menu. The navigation path is displayed on the left in the header. Icons are displayed in front of the individual menus. These icons are also shown in the header during navigation.

For an explanation of the navigation view with symbols and operating elements
→ 51

**Example: Setting the number of displayed measured values to "2 values"**

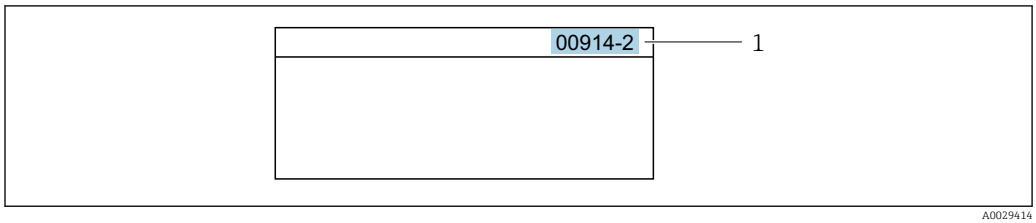



### 8.3.7 Calling the parameter directly

A parameter number is assigned to every parameter to be able to access a parameter directly via the onsite display. Entering this access code in the **Direct access** parameter calls up the desired parameter directly.

**Navigation path**
Expert → Direct access

The direct access code consists of a 5-digit number (at maximum) and the channel number, which identifies the channel of a process variable: e.g. 00914-2. In the navigation view, this appears on the right-hand side in the header of the selected parameter.




*1 Direct access code*

Note the following when entering the direct access code:
- The leading zeros in the direct access code do not have to be entered.
  Example: Enter **"914"** instead of **"00914"**
- If no channel number is entered, channel 1 is accessed automatically.
  Example: Enter **00914** → **Assign process variable** parameter
- If a different channel is accessed: Enter the direct access code with the corresponding channel number.
  Example: Enter **00914-2** → **Assign process variable** parameter

For the direct access codes of the individual parameters, see the "Description of Device Parameters" document for the device

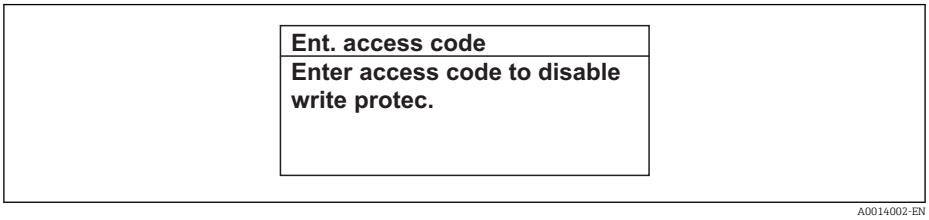
## 8.3.8 Calling up help text

Help text is available for some parameters and can be called up from the navigation view. The help text provides a brief explanation of the parameter function and thereby supports swift and safe commissioning.

### Calling up and closing the help text

The user is in the navigation view and the selection bar is on a parameter.

1. Press E for 2 s.
   ↳ The help text for the selected parameter opens.



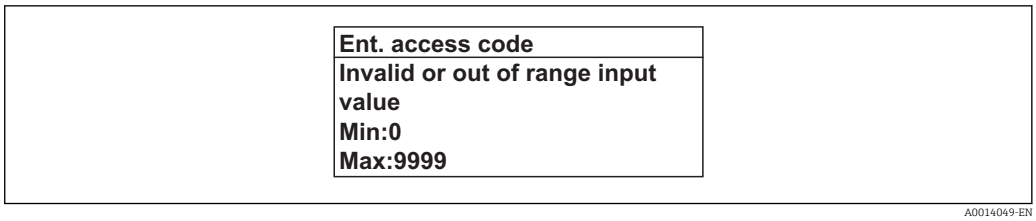

*20 Example: Help text for parameter "Enter access code"*

2. Press − + + simultaneously.
   ↳ The help text is closed.

## 8.3.9 Changing the parameters

Parameters can be changed via the numeric editor or text editor.
- Numeric editor: Change values in a parameter, e.g. specifications for limit values.
- Text editor: Enter text in a parameter, e.g. tag name.

A message is displayed if the value entered is outside the permitted value range.

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For a description of the editing view - consisting of the text editor and numeric editor - with symbols → 53, for a description of the operating elements → 55

## 8.3.10 User roles and related access authorization

The two user roles "Operator" and "Maintenance" have different write access to the parameters if the customer defines a user-specific access code. This protects the device configuration via the local display from unauthorized access → 130.

### Defining access authorization for user roles

An access code is not yet defined when the device is delivered from the factory. Access authorization (read and write access) to the device is not restricted and corresponds to the "Maintenance" user role.

- Define the access code.
  - The "Operator" user role is redefined in addition to the "Maintenance" user role. Access authorization differs for the two user roles.

*Access authorization to parameters: "Maintenance" user role*

| Access code status | Read access | Write access |
|---|---|---|
| An access code has not yet been defined (factory setting). | ✔ | ✔ |
| After an access code has been defined. | ✔ | ✔ 1) |

1) The user only has write access after entering the access code.

*Access authorization to parameters: "Operator" user role*

| Access code status | Read access | Write access |
|---|---|---|
| After an access code has been defined. | ✔ | -- 1) |

1) Despite the defined access code, certain parameters can always be modified and thus are excepted from the write protection, as they do not affect the measurement. Refer to the "Write protection via access code" section

The user role with which the user is currently logged on is indicated by the **Access status** parameter. Navigation path: Operation → Access status

## 8.3.11 Disabling write protection via access code

If the -symbol appears on the local display in front of a parameter, the parameter is write-protected by a user-specific access code and its value cannot be changed at the moment using local operation → 130.

Parameter write protection via local operation can be disabled by entering the user-specific access code in the **Enter access code** parameter via the respective access option.

1. After you press E, the input prompt for the access code appears.

2. Enter the access code.
   ↳ The 🔒-symbol in front of the parameters disappears; all previously write-protected parameters are now re-enabled.

### 8.3.12 Enabling and disabling the keypad lock

The keypad lock makes it possible to block access to the entire operating menu via local operation. As a result, it is no longer possible to navigate through the operating menu or change the values of individual parameters. Users can only read the measured values on the operational display.

The keypad lock is switched on and off via the context menu.

#### Switching on the keypad lock

The keypad lock is switched on automatically:
- If the device has not been operated via the display for > 1 minute.
- Each time the device is restarted.

#### To activate the keylock manually:

1. The device is in the measured value display.
   Press the ⊟ and Ⓔ keys for 3 seconds.
   ↳ A context menu appears.
2. In the context menu select the **Keylock on** option.
   ↳ The keypad lock is switched on.

If the user attempts to access the operating menu while the keypad lock is active, the **Keylock on** message appears.

#### Switching off the keypad lock

▶ The keypad lock is switched on.
Press the ⊟ and Ⓔ keys for 3 seconds.
↳ The keypad lock is switched off.

## 8.4 Access to the operating menu via the Web browser

### 8.4.1 Function range

Thanks to the integrated Web server, the device can be operated and configured via a Web browser and via a service interface (CDI-RJ45) or via a WLAN interface. The structure of the operating menu is the same as for the local display. In addition to the measured values, status information on the device is also displayed and allows the user to monitor the status of the device. Furthermore the device data can be managed and the network parameters can be configured.

A device that has a WLAN interface (can be ordered as an option) is required for the WLAN connection: order code for "Display; operation", option **G** "4-line, illuminated; touch control + WLAN". The device acts as an Access Point and enables communication by computer or a mobile handheld terminal.

For additional information on the Web server, refer to the Special Documentation for the device → 🖹 251

### 8.4.2 Prerequisites

*Computer hardware*

| Hardware | Interface | |
|---|---|---|
| | **CDI-RJ45** | **WLAN** |
| Interface | The computer must have an RJ45 interface. | The operating unit must have a WLAN interface. |
| Connection | Standard Ethernet cable with RJ45 connector. | Connection via Wireless LAN. |
| Screen | Recommended size: ≥12" (depends on the screen resolution) | |

*Computer software*

| Software | Interface | |
|---|---|---|
| | **CDI-RJ45** | **WLAN** |
| Recommended operating systems | ▪ Microsoft Windows 7 or higher.<br>▪ Mobile operating systems:<br>  ▪ iOS<br>  ▪ Android<br>Microsoft Windows XP is supported. | |
| Web browsers supported | ▪ Microsoft Internet Explorer 8 or higher<br>▪ Microsoft Edge<br>▪ Mozilla Firefox<br>▪ Google Chrome<br>▪ Safari | |

*Computer settings*

| Settings | Interface | |
|---|---|---|
| | **CDI-RJ45** | **WLAN** |
| User rights | Appropriate user rights (e.g. administrator rights) for TCP/IP and proxy server settings are necessary (for adjusting the IP address, subnet mask etc.). | |
| Proxy server settings of the Web browser | The Web browser setting *Use a Proxy Server for Your LAN* must be **deselected** . | |
| JavaScript | JavaScript must be enabled.<br>If JavaScript cannot be enabled: enter http://192.168.1.212/basic.html in the address line of the Web browser. A fully functional but simplified version of the operating menu structure starts in the Web browser.<br>When installing a new firmware version: To enable correct data display, clear the temporary memory (cache) of the Web browser under **Internet options**. | |
| Network connections | Only the active network connections to the measuring device should be used. | |
| | Switch off all other network connections such as WLAN. | Switch off all other network connections. |

In the event of connection problems: → 145

*Measuring device: Via CDI-RJ45 service interface*

| Device | CDI-RJ45 service interface |
|---|---|
| Measuring device | The measuring device has an RJ45 interface. |
| Web server | Web server must be enabled; factory setting: ON<br>For information on enabling the Web server → 66 |

*Measuring device: via WLAN interface*

| Device | WLAN interface |
|---|---|
| Measuring device | The measuring device has a WLAN antenna:<br>▪ Transmitter with integrated WLAN antenna<br>▪ Transmitter with external WLAN antenna |
| Web server | Web server and WLAN must be enabled; factory setting: ON<br>For information on enabling the Web server → 66 |

## 8.4.3 Establishing a connection

### Via service interface (CDI-RJ45)

*Preparing the measuring device*

1. Depending on the housing version:
   Release the securing clamp or securing screw of the housing cover.
2. Depending on the housing version:
   Unscrew or open the housing cover.
3. The location of the connection socket depends on the measuring device and the communication protocol:
   Connect the computer to the RJ45 connector via the standard Ethernet connecting cable .

*Configuring the Internet protocol of the computer*

The following information refers to the default Ethernet settings of the device.

IP address of the device: 192.168.1.212 (factory setting)

1. Switch on the measuring device.
2. Connect to the computer using a cable → 67.
3. If a 2nd network card is not used, close all the applications on the notebook.
   ↳ Applications requiring Internet or a network, such as e-mail, SAP applications, Internet or Windows Explorer.
4. Close any open Internet browsers.
5. Configure the properties of the Internet protocol (TCP/IP) as defined in the table:

| | |
|---|---|
| **IP address** | 192.168.1.XXX; for XXX all numerical sequences except: 0, 212 and 255 → e.g. 192.168.1.213 |
| **Subnet mask** | 255.255.255.0 |
| **Default gateway** | 192.168.1.212 or leave cells empty |

### Via WLAN interface

*Configuring the Internet protocol of the mobile terminal*

NOTICE

**If the WLAN connection is lost during the configuration, settings made may be lost.**

- Make sure that the WLAN connection is not disconnected while configuring the device.

NOTICE

**In principle, avoid simultaneous access to the measuring device via the service interface (CDI-RJ45) and the WLAN interface from the same mobile terminal. This could cause a network conflict.**

- Only activate one service interface (CDI-RJ45 service interface or WLAN interface).
- If simultaneous communication is necessary: configure different IP address ranges, e.g. 192.168.0.1 (WLAN interface) and 192.168.1.212 (CDI-RJ45 service interface).

*Preparing the mobile terminal*

- Enable WLAN reception on the mobile terminal.

*Establishing a connection from the mobile terminal to the measuring device*

1. In the WLAN settings of the mobile terminal:
   Select the measuring device using the SSID (e.g. EH_Promass_300_A802000).
2. If necessary, select the WPA2 encryption method.
3. Enter the password: serial number of the measuring device ex-works (e.g. L100A802000).
   ↳ LED on display module flashes: it is now possible to operate the measuring device with the Web browser, FieldCare or DeviceCare.

The serial number can be found on the nameplate.

To ensure the safe and swift assignment of the WLAN network to the measuring point, it is advisable to change the SSID name. It should be possible to clearly assign the new SSID name to the measuring point (e.g. tag name) because it is displayed as the WLAN network.

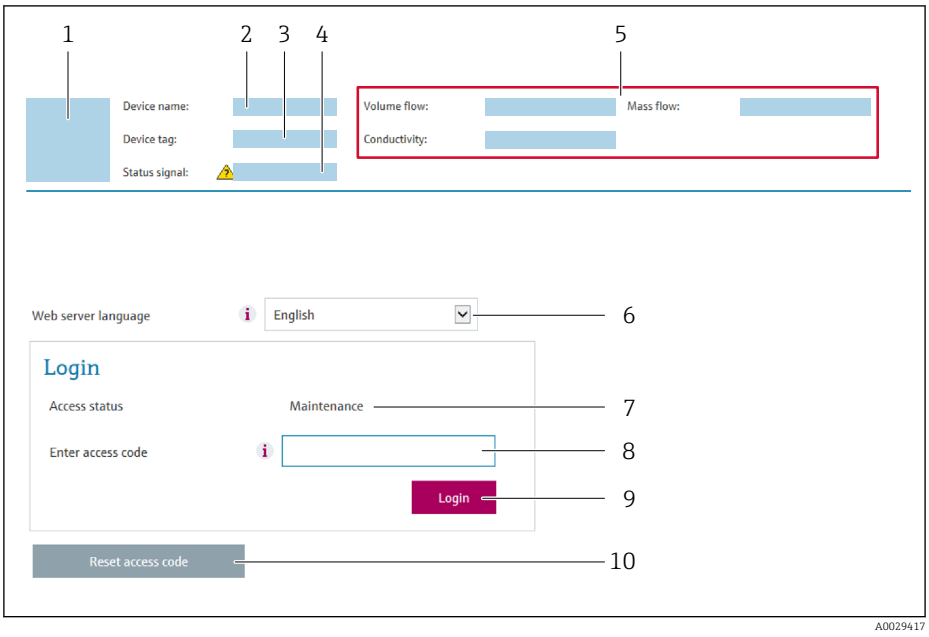
*Disconnecting*

- After configuring the device:
  Terminate the WLAN connection between the operating unit and measuring device.

### Starting the Web browser

1. Start the Web browser on the computer.

2. Enter the IP address of the Web server in the address line of the Web browser: 192.168.1.212
   ↳ The login page appears.




1 *Picture of device*
2 *Device name*
3 *Device tag*
4 *Status signal*
5 *Current measured values*
6 *Operating language*
7 *User role*
8 *Access code*
9 *Login*
10 *Reset access code (→ 127)*

If a login page does not appear, or if the page is incomplete → 145

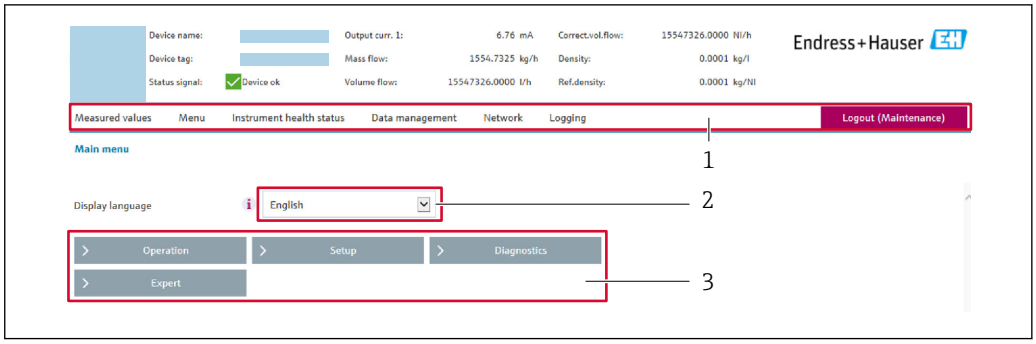
### 8.4.4 Logging on

1. Select the preferred operating language for the Web browser.
2. Enter the user-specific access code.
3. Press **OK** to confirm your entry.

| | |
|---|---|
| **Access code** | 0000 (factory setting); can be changed by customer |

If no action is performed for 10 minutes, the Web browser automatically returns to the login page.

## 8.4.5 User interface




A0029418

1 *Function row*
2 *Local display language*
3 *Navigation area*

### Header

The following information appears in the header:
- Device name
- Device tag
- Device status with status signal → 151
- Current measured values

### Function row

| Functions | Meaning |
|---|---|
| Measured values | Displays the measured values of the measuring device |
| Menu | ▪ Access to the operating menu from the measuring device<br>▪ The structure of the operating menu is the same as for the local display<br>For detailed information on the structure of the operating menu, see the Operating Instructions for the measuring device |
| Device status | Displays the diagnostic messages currently pending, listed in order of priority |
| Data management | Data exchange between PC and measuring device:<br>▪ Device configuration:<br>  ▪ Load settings from the device (XML format, save configuration)<br>  ▪ Save settings to the device (XML format, restore configuration)<br>▪ Logbook - Export Event logbook (.csv file)<br>▪ Documents - Export documents:<br>  ▪ Export backup data record (.csv file, create documentation of the measuring point configuration)<br>  ▪ Verification report (PDF file, only available with the "Heartbeat Verification" application package)<br>▪ File for system integration - If using fieldbuses, upload device drivers for system integration from the measuring device:<br>PROFIBUS PA: GSD file<br>▪ Firmware update - Flashing a firmware version |
| Network configuration | Configuration and checking of all the parameters required for establishing the connection to the measuring device:<br>▪ Network settings (e.g. IP address, MAC address)<br>▪ Device information (e.g. serial number, firmware version) |
| Logout | End the operation and call up the login page |

### Navigation area

If a function is selected in the function bar, the submenus of the function open in the navigation area. The user can now navigate through the menu structure.

### Working area

Depending on the selected function and the related submenus, various actions can be performed in this area:
- Configuring parameters
- Reading measured values
- Calling up help text
- Starting an upload/download

## 8.4.6 Disabling the Web server

The Web server of the measuring device can be switched on and off as required using the **Web server functionality** parameter.

### Navigation

"Expert" menu → Communication → Web server

### Parameter overview with brief description

| Parameter | Description | Selection | Factory setting |
|---|---|---|---|
| Web server functionality | Switch the Web server on and off. | ▪ Off<br>▪ HTML Off<br>▪ On | On |

### Function scope of the "Web server functionality" parameter

| Option | Description |
|---|---|
| Off | ▪ The web server is completely disabled.<br>▪ Port 80 is locked. |
| HTML Off | The HTML version of the web server is not available. |
| On | ▪ The complete functionality of the web server is available.<br>▪ JavaScript is used.<br>▪ The password is transferred in an encrypted state.<br>▪ Any change to the password is also transferred in an encrypted state. |

### Enabling the Web server

If the Web server is disabled it can only be re-enabled with the **Web server functionality** parameter via the following operating options:
- Via local display
- Via Bedientool "FieldCare"
- Via "DeviceCare" operating tool

## 8.4.7 Logging out

Before logging out, perform a data backup via the **Data management** function (upload configuration from device) if necessary.

1. Select the **Logout** entry in the function row.
   ↳ The home page with the Login box appears.
2. Close the Web browser.

3. If no longer needed:
   Reset modified properties of the Internet protocol (TCP/IP) → 62.

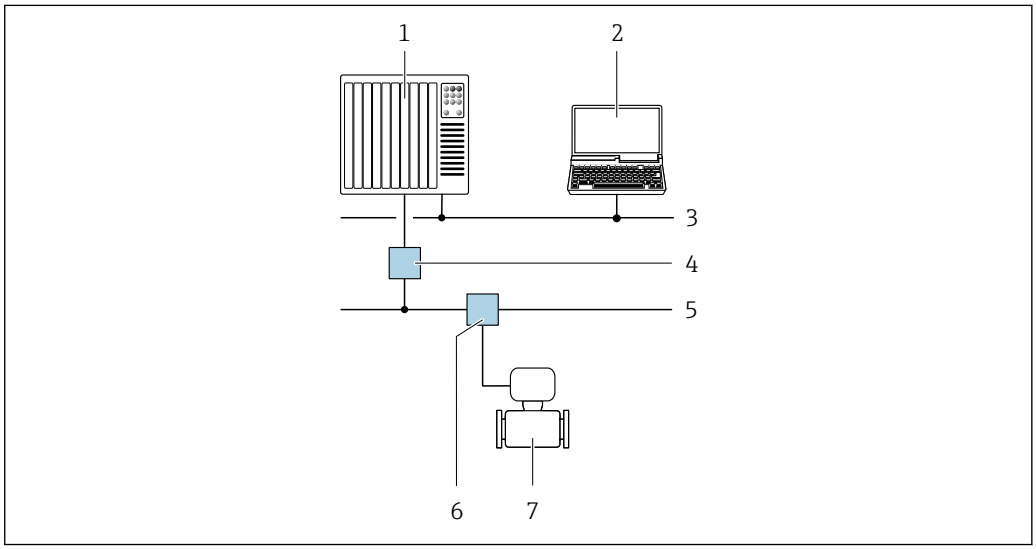
## 8.5 Access to the operating menu via the operating tool

The structure of the operating menu in the operating tools is the same as for operation via the local display.

### 8.5.1 Connecting the operating tool

#### Via PROFIBUS PA network

This communication interface is available in device versions with PROFIBUS PA.




21 *Options for remote operation via PROFIBUS PA network*

1 *Automation system*
2 *Computer with PROFIBUS network card*
3 *PROFIBUS DP network*
4 *Segment coupler PROFIBUS DP/PA*
5 *PROFIBUS PA network*
6 *T-box*
7 *Measuring device*

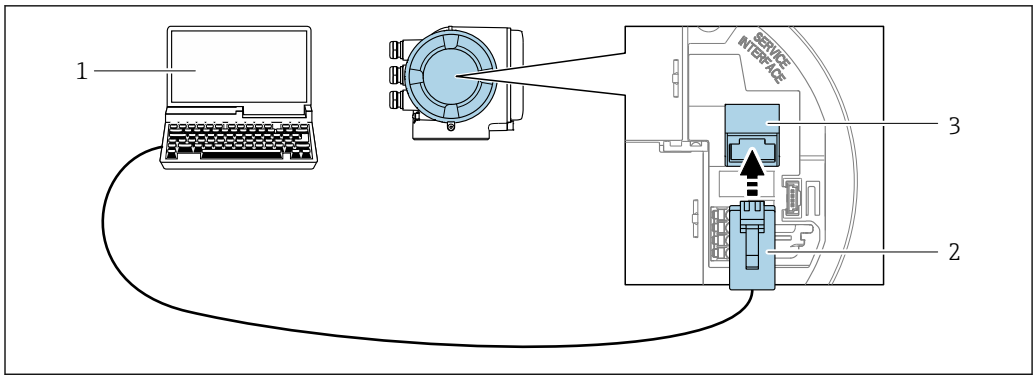
#### Service interface

*Via service interface (CDI-RJ45)*

A point-to-point connection can be established to configure the device onsite. With the housing open, the connection is established directly via the service interface (CDI-RJ45) of the device.

An adapter for RJ45 and the M12 connector is optionally available:
Order code for "Accessories", option **NB**: "Adapter RJ45 M12 (service interface)"

The adapter connects the service interface (CDI-RJ45) to an M12 connector mounted in the cable entry. Therefore the connection to the service interface can be established via an M12 connector without opening the device.

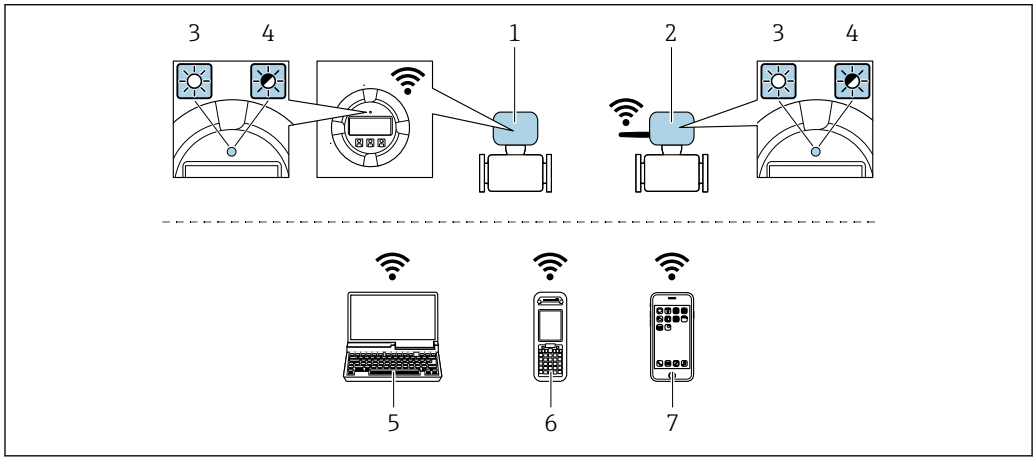



*22 Connection via service interface (CDI-RJ45)*

*1 Computer with Web browser (e.g. Microsoft Internet Explorer, Microsoft Edge) for accessing the integrated device Web server or with "FieldCare", "DeviceCare" operating tool with COM DTM "CDI Communication TCP/IP"*
*2 Standard Ethernet connecting cable with RJ45 connector*
*3 Service interface (CDI-RJ45) of the measuring device with access to the integrated Web server*

### *Via WLAN interface*

The optional WLAN interface is available on the following device version:
Order code for "Display; operation", option G "4-line, illuminated; touch control + WLAN"




*1 Transmitter with integrated WLAN antenna*
*2 Transmitter with external WLAN antenna*
*3 LED lit constantly: WLAN reception is enabled on measuring device*
*4 LED flashing: WLAN connection established between operating unit and measuring device*
*5 Computer with WLAN interface and Web browser (e.g. Microsoft Internet Explorer, Microsoft Edge) for accessing the integrated device Web server or with operating tool (e.g. FieldCare, DeviceCare)*
*6 Mobile handheld terminal with WLAN interface and Web browser (e.g. Microsoft Internet Explorer, Microsoft Edge) for accessing the integrated device Web server or operating tool (e.g. FieldCare, DeviceCare)*
*7 Smart phone or tablet (e.g. Field Xpert SMT70)*

| | |
|---|---|
| Function | WLAN: IEEE 802.11 b/g (2.4 GHz) |
| Encryption | WPA2-PSK AES-128 (in accordance with IEEE 802.11i) |
| Configurable WLAN channels | 1 to 11 |
| Degree of protection | IP67 |
| Available antennas | ▪ Internal antenna<br>▪ External antenna (optional)<br>In the event of poor transmission/reception conditions at the place of installation.<br>Only one antenna active in each case! |

| | |
|---|---|
| Max. range | 50 m (164 ft) |
| Materials:<br>External WLAN antenna | ▪ Antenna: ASA plastic (acrylic ester-styrene-acrylonitrile) and nickel-plated brass<br>▪ Adapter: Stainless steel and nickel-plated brass<br>▪ Cable: Polyethylene<br>▪ Connector: Nickel-plated brass<br>▪ Angle bracket: Stainless steel |

*Configuring the Internet protocol of the mobile terminal*

NOTICE

**If the WLAN connection is lost during the configuration, settings made may be lost.**

▶ Make sure that the WLAN connection is not disconnected while configuring the device.

NOTICE

**In principle, avoid simultaneous access to the measuring device via the service interface (CDI-RJ45) and the WLAN interface from the same mobile terminal. This could cause a network conflict.**

▶ Only activate one service interface (CDI-RJ45 service interface or WLAN interface).
▶ If simultaneous communication is necessary: configure different IP address ranges, e.g. 192.168.0.1 (WLAN interface) and 192.168.1.212 (CDI-RJ45 service interface).

*Preparing the mobile terminal*

▶ Enable WLAN reception on the mobile terminal.

*Establishing a connection from the mobile terminal to the measuring device*

1. In the WLAN settings of the mobile terminal:
   Select the measuring device using the SSID (e.g. EH_Promass_300_A802000).
2. If necessary, select the WPA2 encryption method.
3. Enter the password: serial number of the measuring device ex-works (e.g. L100A802000).
   ↳ LED on display module flashes: it is now possible to operate the measuring device with the Web browser, FieldCare or DeviceCare.

The serial number can be found on the nameplate.

To ensure the safe and swift assignment of the WLAN network to the measuring point, it is advisable to change the SSID name. It should be possible to clearly assign the new SSID name to the measuring point (e.g. tag name) because it is displayed as the WLAN network.

*Disconnecting*

▶ After configuring the device:
   Terminate the WLAN connection between the operating unit and measuring device.

### 8.5.2 FieldCare

**Function scope**

FDT-based plant asset management tool from Endress+Hauser. It can configure all smart field devices in a system and helps you manage them. By using the status information, it is also a simple but effective way of checking their status and condition.

Access is via:
▪ PROFIBUS PA protocol → 67
▪ CDI-RJ45 service interface → 67
▪ WLAN interface→ 68

Typical functions:
- Configuring parameters of transmitters
- Loading and saving device data (upload/download)
- Documentation of the measuring point
- Visualization of the measured value memory (line recorder) and event logbook

For additional information about FieldCare, see Operating Instructions BA00027S and BA00059S

### Source for device description files

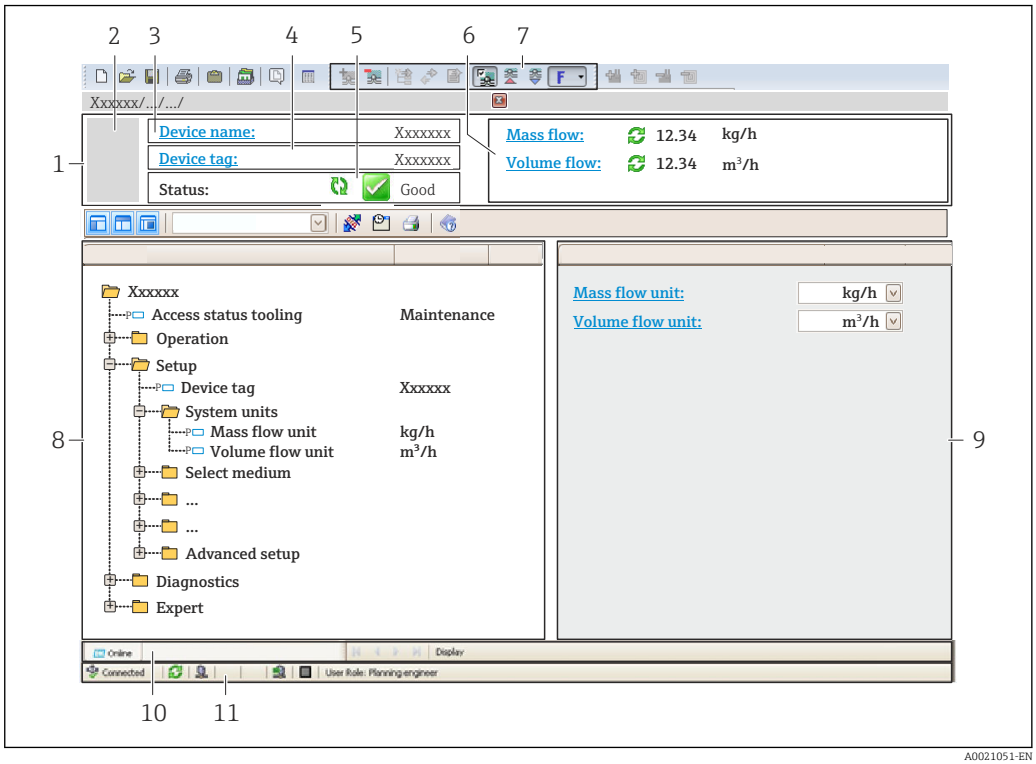
See information → 73

### Establishing a connection

1. Start FieldCare and launch the project.
2. In the network: Add a device.
   ↳ The **Add device** window opens.
3. Select the **CDI Communication TCP/IP** option from the list and press **OK** to confirm.
4. Right-click **CDI Communication TCP/IP** and select the **Add device** option in the context menu that opens.
5. Select the desired device from the list and press **OK** to confirm.
   ↳ The **CDI Communication TCP/IP (Configuration)** window opens.
6. Enter the device address in the **IP address** field: 192.168.1.212 and press **Enter** to confirm.
7. Establish the online connection to the device.

For additional information, see Operating Instructions BA00027S and BA00059S

### User interface




1 *Header*
2 *Picture of device*
3 *Device name*
4 *Device tag*
5 *Status area with status signal→ 151*
6 *Display area for current measured values*
7 *Edit toolbar with additional functions such as save/restore, event list and create documentation*
8 *Navigation area with operating menu structure*
9 *Working area*
10 *Range of action*
11 *Status area*

## 8.5.3 DeviceCare

### Function scope

Tool to connect and configure Endress+Hauser field devices.

The fastest way to configure Endress+Hauser field devices is with the dedicated "DeviceCare" tool. Together with the device type managers (DTMs) it presents a convenient, comprehensive solution.

For details, see Innovation Brochure IN01047S

### Source for device description files

See information → 73

## 8.5.4 SIMATIC PDM

### Function scope

SIMATIC PDM is a standardized, manufacturer-independent program from Siemens for the operation, configuration, maintenance and diagnosis of intelligent field devices via PROFIBUS PA protocol.

**Source for device description files**

See data → 73

# 9 System integration

## 9.1 Overview of device description files

### 9.1.1 Current version data for the device

| | | |
|---|---|---|
| Firmware version | 01.01.zz | ▪ On the title page of the Operating instructions<br>▪ On the transmitter nameplate<br>▪ Firmware version<br>Diagnostics → Device information → Firmware version |
| Release date of firmware version | 11.2018 | --- |
| Manufacturer ID | 0x11 | Manufacturer ID<br>Diagnostics → Device information → Manufacturer ID |
| Device type ID | 0x156D | Device type<br>Diagnostics → Device information → Device type |
| Profile version | 3.02 | --- |

For an overview of the different firmware versions for the device → 214

### 9.1.2 Operating tools

The suitable device description file for the individual operating tools is listed in the table below, along with information on where the file can be acquired.

| Operating tool via PROFIBUS protocol | Sources for obtaining device descriptions |
|---|---|
| FieldCare | ▪ www.endress.com → Download Area<br>▪ CD-ROM (contact Endress+Hauser)<br>▪ DVD (contact Endress+Hauser) |
| DeviceCare | ▪ www.endress.com → Download Area<br>▪ CD-ROM (contact Endress+Hauser)<br>▪ DVD (contact Endress+Hauser) |
| SIMATIC PDM (Siemens) | www.endress.com → Download Area |

## 9.2 Device master file (GSD)

In order to integrate field devices into a bus system, the PROFIBUS system needs a description of the device parameters, such as output data, input data, data format, data volume and supported transmission rate.

These data are available in the device master file (GSD) which is provided to the PROFIBUS Master when the communication system is commissioned. In addition device bit maps, which appear as icons in the network structure, can also be integrated.

With the Profile 3.02 device master file (GSD) it is possible to exchange field devices made by different manufacturers without having to reconfigure.

Generally speaking, it is possible to use two different GSDs with Profile 3.02 and higher: the manufacturer-specific GSD and the Profile GSD.

- Before configuring, the user must decide which GSD should be used to operate the system.
- The setting can be changed via a Class 2 master.

### 9.2.1 Manufacturer-specific GSD

This GSD guarantees the unrestricted functionality of the measuring device. Device-specific process parameters and functions are therefore available.

| Manufacturer-specific GSD | ID number | File name |
|---|---|---|
| PROFIBUS PA | 0x156D | EH3x156D.gsd |

#### Use manufacturer-specific GSD

Assignment is performed in the **Ident number selector** parameter via the **Manufacturer** option.

Sources of supply for the manufacturer-specific GSD:
- Export directly from the device via the integrated web server: Data management→ Documents → Export GSD file
- Download via the Endress+Hauser website: www.endress.com → Download-Area

### 9.2.2 Profile GSD

Differs in terms of the number of Analog Input blocks (AI) and the measured values. If a system is configured with a Profile GSD, it is possible to exchange devices made by different manufacturers. However, it is essential to ensure that the order of the cyclic process values is correct.

| ID number | Supported blocks | Supported channels |
|---|---|---|
| 0x9740 | ▪ 1 Analog Input<br>▪ 1 Totalizer | ▪ Channel Analog Input: volume flow<br>▪ Channel totalizer: volume flow |
| 0x9741 | ▪ 2 Analog Input<br>▪ 1 Totalizer | ▪ Channel Analog Input 1: volume flow<br>▪ Channel Analog Input 2: mass flow<br>▪ Channel totalizer: volume flow |
| 0x9742 | ▪ 3 Analog Input<br>▪ 1 Totalizer | ▪ Channel Analog Input 1: volume flow<br>▪ Channel Analog Input 2: mass flow<br>▪ Channel Analog Input 3: corrected volume flow<br>▪ Channel totalizer: volume flow |

#### Use profile GSD

Assignment is performed in the **Ident number selector** parameter:
- ID number 0x9740: **1 AI, 1 Totalizer (0x9740)** option
- ID number 0x9741: **2 AI, 1 Totalizer (0x9741)** option
- ID number 0x9742: **Profile** option

## 9.3 Compatibility with earlier model

If the device is replaced, the measuring device Promass 300 supports the compatibility of the cyclic data with previous models. It is not necessary to adjust the engineering parameters of the PROFIBUS network with the Promass 300 GSD file.

Earlier models:
- Promass 80PROFIBUS PA
  - ID No.: 1528 (hex)
  - Extended GSD file: EH3x1528.gsd
  - Standard GSD file: EH3_1528.gsd
- Promass 83PROFIBUS PA
  - ID No.: 152A (hex)
  - Extended GSD file: EH3x152A.gsd
  - Standard GSD file: EH3_152A.gsd

### 9.3.1 Automatic identification (factory setting)

The Promass 300 PROFIBUS PA automatically recognizes the measuring device configured in the automation system (Promass 80 PROFIBUS PA or Promass 83 PROFIBUS PA) and makes the same input and output data and measured value status information available for cyclic data exchange.

Automatic identification is set in the **Ident number selector** parameter using the **Automatic mode** option (factory setting).

### 9.3.2 Manual setting

The manual setting is made in the **Ident number selector** parameter via the **Promass 80 (0x1528)** option or **Promass 83 (0x152A)** option.

Afterwards the Promass 300 PROFIBUS PA makes the same input and output data and measured value status information available for cyclic data exchange.

- If the Promass 300 PROFIBUS PA is acyclically configured via an operating program (Class 2 master), access is directly via the block structure or the parameters of the measuring device.
- If parameters have been changed in the device to be replaced (Promass 80 PROFIBUS PA or Promass 83 PROFIBUS PA) (parameter setting no longer corresponds to the original factory setting), these parameters must be changed accordingly in the new replacement Promass 300 PROFIBUS PA via an operating program (Class 2 master).

**Example**

The setting for low flow cut off has been changed from mass flow (factory setting) to corrected volume flow in a Promass 80 PROFIBUS PA currently in operation. This device is now replaced by a Promass 300 PROFIBUS PA.

After replacing the device, the assignment for the low flow cut off must also be changed manually in the Promass 300 PROFIBUS PA, i.e. to corrected volume flow, to ensure the measuring device behaves identically.

### 9.3.3 Replacing the measuring devices without changing the GSD file or restarting the controller

In the procedure described below, the device can be replaced without interrupting ongoing operation or restarting the controller. However with this procedure the measuring device is not fully integrated!

1. Replace the measuring device Promass 80 PROFIBUS PA or Promass 83 PROFIBUS PA with a Promass 300 PROFIBUS PA.

2. Set the device address: The same device address that was set for the Promass 80 or Promass 83 PROFIBUS PA must be used.
3. Connect the measuring device Promass 300 PROFIBUS PA.

If the factory setting had been changed on the replaced device (Promass 80 PROFIBUS PA or Promass 83 PROFIBUS PA), the following settings may need to be changed:

1. Configuration of the application-specific parameters.
2. Choice of process variables to be transmitted via the**Channel** parameter in the Analog Input or Totalizer function block.
3. Setting of the units for the process variables.

## 9.4 Using the GSD modules of the previous model

In the compatibility mode, all the modules already configured in the automation system are generally supported during cyclic data transmission. However, Promass 300 does not perform further processing for the following modules, i.e. the function is not executed:
- DISPLAY_VALUE
- BATCHING_QUANTITY
- BATCHING_FIX_COMP_QUANTITY

If the device is replaced, the Promass 300 device supports the compatibility of the cyclic data with previous models. It is not necessary to adjust the engineering parameters of the PROFIBUS network with the Promass 300 GSD file.

The diagnostic messages transmitted to the distributed control system with the GSD of the previous model may differ from the diagnostic messages of the device. The diagnostic messages of the device are critical.

### 9.4.1 Using the CONTROL_BLOCK module in the previous model

If the CONTROL_BLOCK module is used in the previous model, the control variables are processed further if relevant functionalities can be assigned for the Promass 300.

The functions are supported as follows depending on the previous model:

*Previous model: Promass 80 PROFIBUS PA*

| Control variable | Function | Support |
|---|---|---|
| 0 → 2 | Positive zero return: ON | Yes |
| 0 → 3 | Positive zero return: OFF | Yes |
| 0 → 4 | Zero point adjustment: START | Yes |
| 0 → 8 | Measuring mode: UNIDIRECTIONAL | No<br>**Cause:**<br>The Profile Transducer Block Flow is no longer supported.<br>**To continue to use the functionality:**<br>Use the **Totalizer operation mode** parameter in the Totalizer function block. |
| 0 → 9 | Measuring mode: BIDIRECTIONAL | |
| 0 → 24 | UNIT TO BUS | No<br>**Cause:**<br>Functionality is no longer required as the unit is adopted automatically. |

*Previous model: Promass 83 PROFIBUS PA*

| Control variable | Function | Support |
|---|---|---|
| 0 → 2 | Positive zero return: ON | Yes |
| 0 → 3 | Positive zero return: OFF | Yes |
| 0 → 4 | Zero point adjustment: START | Yes |
| 0 → 8 | Measuring mode: UNIDIRECTIONAL | No<br>**Cause:**<br>The Profile Transducer Block Flow is no longer supported.<br>**To continue to use the functionality:**<br>Use the **Totalizer operation mode** parameter in the Totalizer function block. |
| 0 → 9 | Measuring mode: BIDIRECTIONAL | |
| 0 → 24 | UNIT TO BUS | No<br>**Cause:**<br>Functionality is no longer required as the unit is adopted automatically. |
| 0 → 25 | Advanced diagnostics – Warning mode: ON | No<br>**To continue to use the functionality:**<br>The functionalities are offered in the "Heartbeat Technology" application package. |
| 0 → 26 | Advanced diagnostics – Warning mode: OFF | |
| 0 → 70 to 78 | Additional functions: Advanced diagnostics | |

## 9.5 Cyclic data transmission

Cyclic data transmission when using the device master file (GSD).

### 9.5.1 Block model

The block model shows which input and output data the measuring device makes available for cyclic data exchange. Cyclic data exchange takes place with a PROFIBUS master (Class 1), e.g. a control system.

| Measuring device | | | | | Control system |
|---|---|---|---|---|---|
| Flow Block | Analog Input block 1 to 8 | → 79 | Output value AI | → | PROFIBUS PA |
| | Totalizer block 1 to 3 | → 80 | Output value TOTAL | → | |
| | | | Controller SETTOT | ← | |
| | | | Configuration MODETOT | ← | |
| | Analog Output block 1 to 3 | → 82 | Input values AO | ← | |
| | Discrete Input block 1 to 2 | → 82 | Output values DI | → | |
| | Discrete Output block 1 to 4 | → 83 | Input values DO | ← | |

#### Defined order of modules

The measuring device works as a modular PROFIBUS slave. In contrast to a compact slave, a modular slave has a variable design and consists of several individual modules. The device master file (GSD) contains a description of the individual modules (input and output data) along with their individual properties.

The modules are permanently assigned to the slots, i.e. when configuring the modules, the order and the arrangement of the modules must be respected.

| Slot | Module | Function block |
|---|---|---|
| 1 to 8 | AI | Analog Input block 1 to 8 |
| 9 | TOTAL or SETTOT_TOTAL or SETOT_MODETOT_TOTAL | Totalizer block 1 |
| 10 | | Totalizer block 2 |
| 11 | | Totalizer block 3 |
| 12…14 | AO | Analog Output block 1 to 3 |
| 15…16 | DI | Discrete Input block 1 to 2 |
| 17…21 | DO | Discrete Output block 1 to 5 |
| 22…23 | AO | Analog Output block 4 to 5 |

To optimize the data throughput rate of the PROFIBUS network, it is advisable to only configure modules that are processed in the PROFIBUS master system. If this results in gaps between the configured modules, these gaps must be assigned to the EMPTY_MODULE.

### 9.5.2 Description of the modules

The data structure is described from the perspective of the PROFIBUS master:
- Input data: Are sent from the measuring device to the PROFIBUS master.
- Output data: Are sent from the PROFIBUS master to the measuring device.

### AI module (Analog Input)

Transmit an input variable from the measuring device to the PROFIBUS master (Class 1).

The selected input variable, along with the status, is cyclically transmitted to the PROFIBUS Master (Class 1) via the AI module. The input variable is depicted in the first four bytes in the form of a floating point number as per the IEEE 754 standard. The fifth byte contains standardized status information pertaining to the input variable.

Eight Analog Input blocks are available (slot 1 to 8).

*Selection: input variable*

| Input variable |
|---|
| Mass flow |
| Volume flow |
| Corrected volume flow |
| Density |
| Reference density |
| Temperature |
| Electronic temperature |
| Oscillation frequency 0 |
| Frequency fluctuation 0 |
| Oscillation damping 0 |
| Tube damping fluctuation 0 |
| Signal asymmetry |
| Exciter current 0 |
| Concentration [1] |
| Target mass flow [1] |
| Carrier mass flow [1] |
| Target volume flow [1] |
| Carrier volume flow [1] |
| Target corrected volume flow [1] |
| Carrier corrected volume flow [1] |
| Carrier tube temperature [2] |
| Oscillation frequency 1 [2] |
| Oscillation amplitude 0 [2] |
| Oscillation amplitude 1 [2] |
| Frequency fluctuation 1 [2] |
| Oscillation damping 1 [2] |
| Tube damping fluctuation 1 [2] |
| Excitation current 1 [2] |
| HBSI [2] |
| Current input 1 |
| Current input 2 |
| Current input 3 |

1) Only available with the Concentration application package
2) Only available with the Heartbeat Verification application package

*Factory setting*

| Function block | Factory setting |
|---|---|
| AI 1 | Mass flow |
| AI 2 | Volume flow |
| AI 3 | Corrected volume flow |
| AI 4 | Density |
| AI 5 | Mass flow |
| AI 6 | Temperature |
| AI 7 | Mass flow |
| AI 8 | Mass flow |

*Data structure*

*Input data of Analog Input*

| Byte 1 | Byte 2 | Byte 3 | Byte 4 | Byte 5 |
|---|---|---|---|---|
| Measured value: floating point number (IEEE 754) | | | | Status |

### TOTAL module

Transmit a totalizer value from the measuring device to the PROFIBUS master (Class 1).

A selected totalizer value, along with the status, is cyclically transmitted to a PROFIBUS Master (Class 1) via the TOTAL module. The totalizer value is depicted in the first four bytes in the form of a floating point number as per the IEEE 754 standard. The fifth byte contains standardized status information pertaining to the totalizer value.

Three Totalizer blocks are available (slot 9 to 11).

*Selection: totalizer value*

| Input variable |
|---|
| Mass flow |
| Volume flow |
| Corrected volume flow |
| Target fluid mass flow [1] |
| Carrier mass flow [1] |

1) Only available with the "Concentration" application package

*Factory setting*

| Function block | Factory setting: TOTAL |
|---|---|
| Totalizer 1, 2 and 3 | Mass flow |

*Data structure*

*Input data of TOTAL*

| Byte 1 | Byte 2 | Byte 3 | Byte 4 | Byte 5 |
|---|---|---|---|---|
| Measured value: floating point number (IEEE 754) | | | | Status |

### SETTOT_TOTAL module

The module combination consists of the SETTOT and TOTAL functions:
- SETTOT: Control the totalizers via the PROFIBUS master.
- TOTAL: Transmit totalizer value, along with the status, to the PROFIBUS master.

Three Totalizer blocks are available (slot 9 to 11).

*Selection: control totalizer*

| Value SETTOT | Control totalizer |
|---|---|
| 0 | Totalize |
| 1 | Resetting |
| 2 | Adopt totalizer initial setting |

*Factory setting*

| Function block | Factory setting: Value SETTOT (meaning) |
|---|---|
| Totalizer 1, 2 and 3 | 0 (totalizing) |

*Data structure*

*Output data of SETTOT*

| Byte 1 |
|---|
| Control variable 1 |

*Input data of TOTAL*

| Byte 1 | Byte 2 | Byte 3 | Byte 4 | Byte 5 |
|---|---|---|---|---|
| Measured value: floating point number (IEEE 754) | | | | Status |

### SETTOT_MODETOT_TOTAL module

The module combination consists of the SETTOT, MODETOT and TOTAL functions:
- SETTOT: Control the totalizers via the PROFIBUS master.
- MODETOT: Configure the totalizers via the PROFIBUS master.
- TOTAL: Transmit totalizer value, along with the status, to the PROFIBUS master.

Three Totalizer blocks are available (slot 9 to 11).

*Selection: totalizer configuration*

| MODETOT value | Totalizer configuration |
|---|---|
| 0 | Balancing |
| 1 | Balance the positive flow |
| 2 | Balance the negative flow |
| 3 | Stop totalizing |

*Factory setting*

| Function block | Factory setting: Value MODETOT (meaning) |
|---|---|
| Totalizer 1, 2 and 3 | 0 (balancing) |

*Data structure*

*Output data of SETTOT and MODETOT*

| Byte 1 | Byte 2 |
|---|---|
| Control variable 1: SETTOT | Control variable 2: MODETOT |

*Input data of TOTAL*

| Byte 1 | Byte 2 | Byte 3 | Byte 4 | Byte 5 |
|---|---|---|---|---|
| Measured value: floating point number (IEEE 754) | | | | Status |

### AO module (Analog Output)

Transmit a compensation value from the PROFIBUS master (Class 1) to the measuring device.

A compensation value, along with the status, is cyclically transmitted from the PROFIBUS Master (Class 1) to the measuring device via the AO module. The compensation value is depicted in the first four bytes in the form of a floating point number as per the IEEE 754 standard. The fifth byte contains standardized status information pertaining to the compensation value.

Five Analog Output blocks are available (slot 12 to 14, 22 to 23).

*Assigned compensation values*

A compensation value is permanently assigned to the individual Analog Output blocks.

| Function block | Compensation value |
|---|---|
| AO 1 | External pressure [1] |
| AO 2 | External temperature [1] |
| AO 3 | External reference density |
| AO 4 | – |
| AO 5 | – |

1) The compensation values must be transmitted to the device in the SI basic unit

The selection is made via: Expert → Sensor → External compensation

*Data structure*

*Output data of Analog Output*

| Byte 1 | Byte 2 | Byte 3 | Byte 4 | Byte 5 |
|---|---|---|---|---|
| Measured value: floating point number (IEEE 754) | | | | Status |

### DI module (Discrete Input)

Transmit discrete input values from the measuring device to the PROFIBUS master (Class 1). Discrete input values are used by the measuring device to transmit the state of device functions to the PROFIBUS master (Class 1).

The DI module cyclically transmits the discrete input value, along with the status, to the PROFIBUS Master (Class 1). The discrete input value is depicted in the first byte. The second byte contains standardized status information pertaining to the input value.

Two Discrete Input blocks are available (slot 15 to 16).

*Selection: device function*

| Device function | Factory setting: Status (meaning) |
|---|---|
| Empty pipe detection | ▪ 0 (device function not active)<br>▪ 1 (device function active) |
| Low flow cut off | |
| Status verification [1] | ▪ Bit 0: Verification status - Check not done<br>▪ Bit 1: Verification status - Failed<br>▪ Bit 2: Verification status - Busy<br>▪ Bit 3: Verification status - Ready<br>▪ Bit 4: Verification overall result - Failed<br>▪ Bit 5: Verification overall result - Passed<br>▪ Bit 6: Verification overall result - Check not done<br>▪ Bit 7: Not used |

1) Only available with the Heartbeat Verification application package

*Factory setting*

| Function block | Factory setting |
|---|---|
| DI 1 | Empty pipe detection |
| DI 2 | Low flow cut off |

*Data structure*

*Input data of Discrete Input*

| Byte 1 | Byte 2 |
|---|---|
| Discrete | Status |

### DO module (Discrete Output)

Transmit discrete output values from the PROFIBUS master (Class 1) to the measuring device. Discrete output values are used by the PROFIBUS master (Class 1) to enable and disable device functions.

The DO module cyclically transmits the discrete output value, along with the status, to the measuring device. The discrete output value is depicted in the first byte. The second byte contains standardized status information pertaining to the output value.

Five Discrete Output blocks are available (slot 17 to 21).

*Assigned device functions*

A device function is permanently assigned to the individual Discrete Output blocks.

| Function block | Device function | Values: control (meaning) |
|---|---|---|
| DO 1 | Flow override | ▪ 0 (disable device function)<br>▪ 1 (enable device function) |
| DO 2 | Zero point adjustment | |
| DO 3 | Start verification [1] | |
| DO 4 | Relay output | ▪ 0 (non-conductive)<br>▪ 1 (conductive) |
| DO 5 | Concentration [2] | Assignment of medium type<br>(see the following table) |

1) Only available with the Heartbeat Verification application package
2) Only available with the Concentration application package

| Assignment of medium type: function block DO 5 | |
|---|---|
| 101 | Fructose in water |
| 102 | Glucose in water |
| 104 | Hydrogen peroxide in water |
| 105 | Sucrose in water |
| 106 | Invert sugar in water |
| 107 | Nitric acid |
| 108 | Phosphoric acid |
| 109 | Potassium hydroxide |
| 100 | Off |
| 110 | Sodium hydroxide |
| 111 | Ethanol in water |
| 112 | Methanol in water |
| 113 | Ammonium nitrate in water |
| 114 | Iron(III) chloride in water |
| 115 | HFCS42 |
| 116 | HFCS55 |
| 117 | HFCS90 |
| 118 | Original wort |
| 119 | % mass / % volume |
| 121 | Coef Set No. 1 |
| 122 | Coef Set No. 2 |
| 123 | Coef Set No. 3 |
| 124 | Hydrochloric acid |
| 125 | Sulfuric acid |

*Data structure*

*Output data of Discrete Output*

| Byte 1 | Byte 2 |
|---|---|
| Discrete | Status |

### EMPTY_MODULE module

This module is used to assign empty spaces arising from modules not being used in the slots .

The measuring device works as a modular PROFIBUS slave. In contrast to a compact slave, a modular PROFIBUS slave has a variable design and consists of several individual modules. The GSD file contains a description of the individual modules along with their individual properties.

The modules are permanently assigned to the slots. When configuring the modules, it is absolutely essential to observe the sequence/arrangement of the modules. Any gaps between the configured modules must be filled with the EMPTY_MODULE.

# 10 Commissioning

## 10.1 Function check

Before commissioning the measuring device:

▶ Make sure that the post-installation and post-connection checks have been performed.

- "Post-installation check" checklist→ 30
- "Post-connection check" checklist → 45

## 10.2 Switching on the measuring device

▶ After a successful function check, switch on the measuring device.
  ↳ After a successful startup, the local display switches automatically from the startup display to the operational display.

If nothing appears on the local display or a diagnostic message is displayed, refer to the section on "Diagnostics and troubleshooting" → 144.

## 10.3 Connecting via FieldCare

- For FieldCare → 67 connection
- For connecting via FieldCare → 70
- For the FieldCare → 71 user interface

## 10.4 Configuring the device address via software

In the **"Communication" submenu** the device address can be set.

**Navigation**
"Setup" menu → Communication → Device address

### 10.4.1 PROFIBUS network

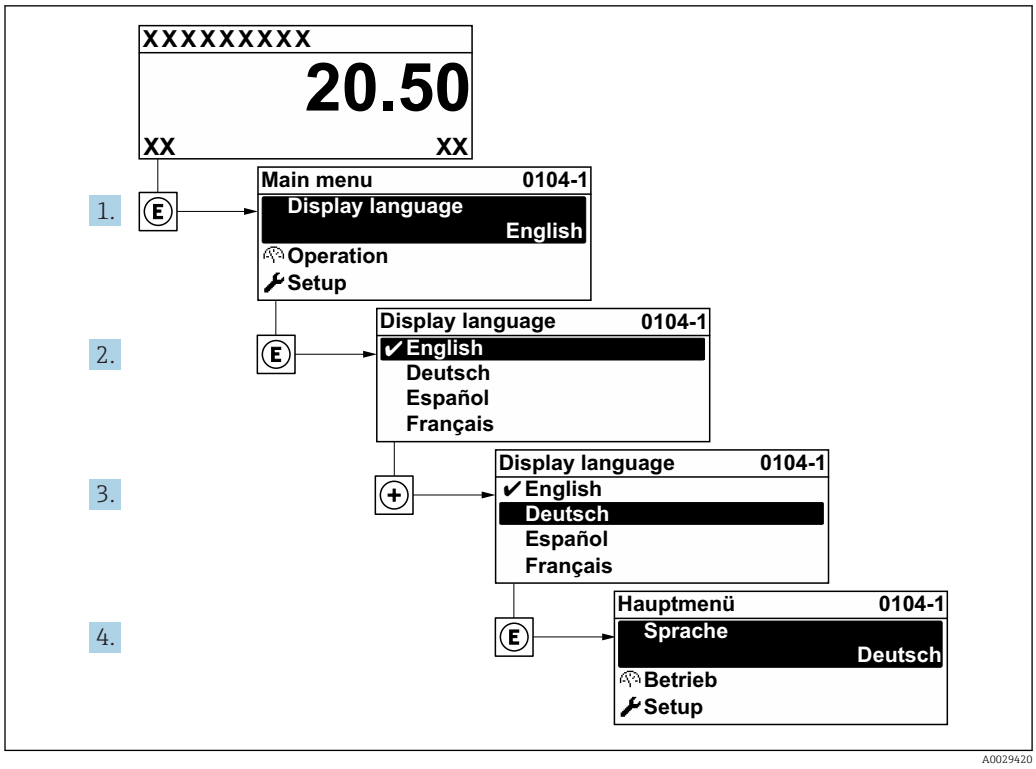
At time of delivery, the measuring device has the following factory setting:

| | |
|---|---|
| **Device address** | 126 |

- To display the current device address: **Device address** parameter → 92
- If hardware addressing is active, software addressing is blocked → 43

## 10.5 Setting the operating language

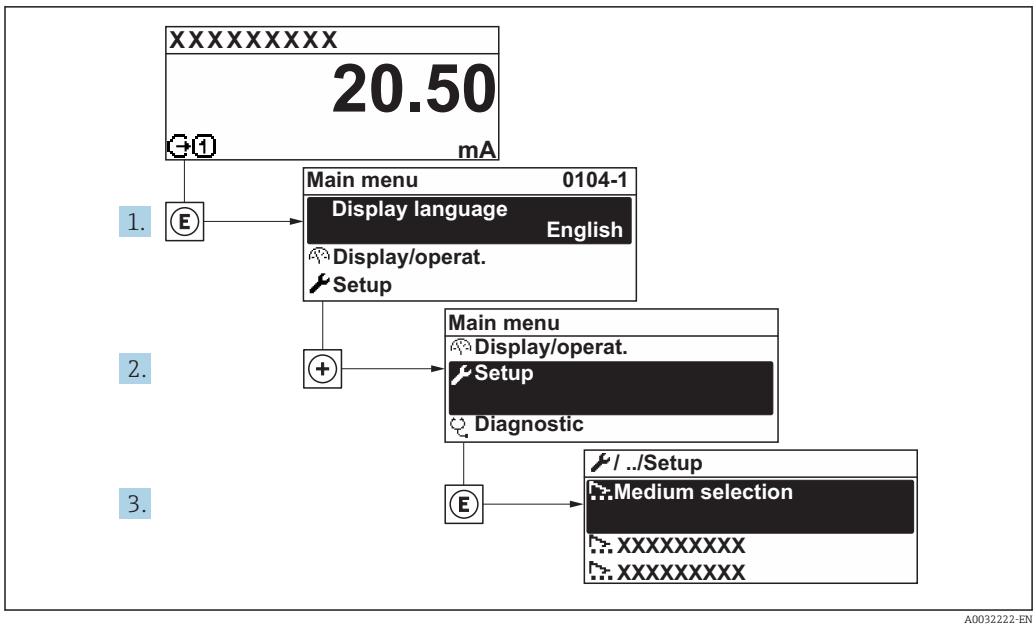
Factory setting: English or ordered local language




23 *Taking the example of the local display*

## 10.6 Configuring the measuring device

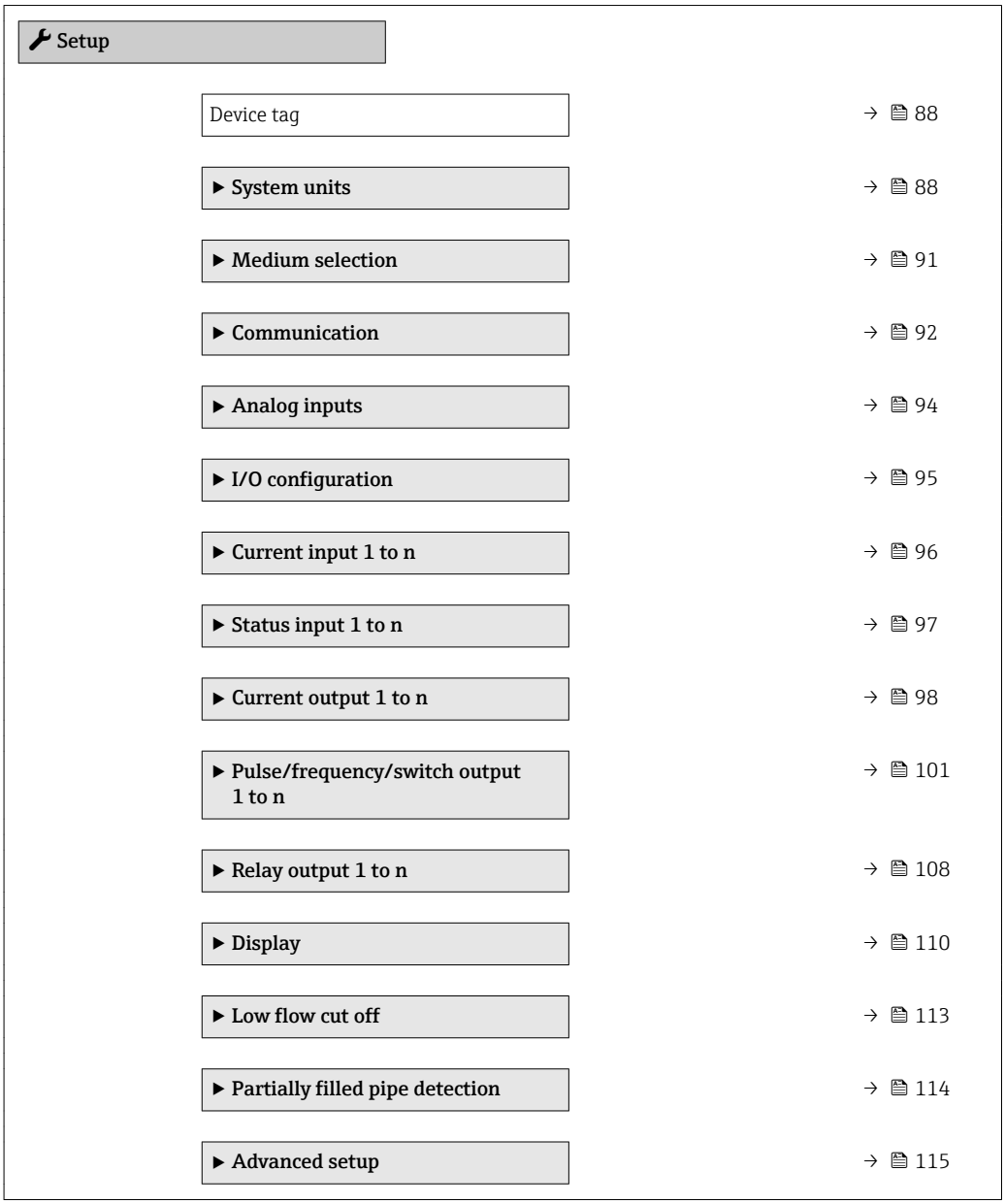
- The **Setup** menu with its guided wizards contains all the parameters needed for standard operation.
- Navigation to the **Setup** menu




24 *Taking the example of the local display*

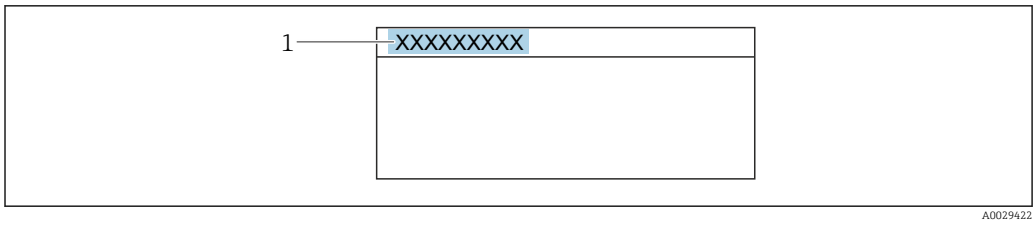
Depending on the device version, not all submenus and parameters are available in every device. The selection can vary depending on the order code.

**Navigation**
"Setup" menu




### 10.6.1 Defining the tag name

To enable fast identification of the measuring point within the system, you can enter a unique designation using the **Device tag** parameter and thus change the factory setting.




*25 Header of the operational display with tag name*

*1 Tag name*

Enter the tag name in the "FieldCare" operating tool → 71

**Navigation**
"Setup" menu → Device tag

**Parameter overview with brief description**

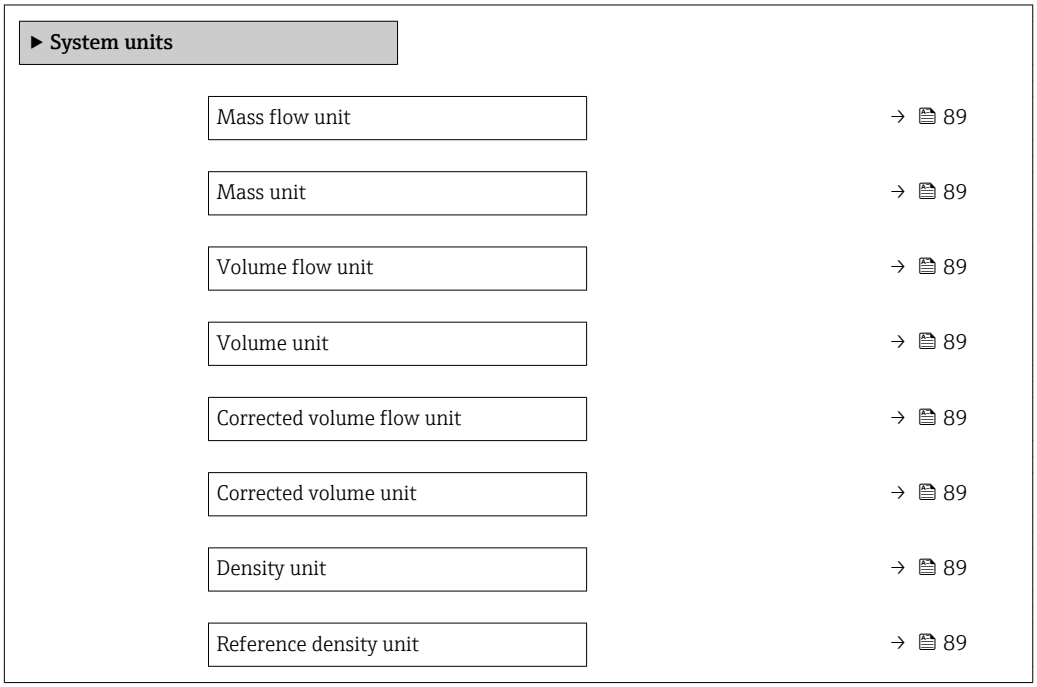
| Parameter | Description | User entry | Factory setting |
|---|---|---|---|
| Device tag | Enter the name for the measuring point. | Max. 32 characters, such as letters, numbers or special characters (e.g. @, %, /). | Promass 300 PA |

## 10.6.2 Setting the system units

In the **System units** submenu the units of all the measured values can be set.

Depending on the device version, not all submenus and parameters are available in every device. The selection can vary depending on the order code.

**Navigation**
"Setup" menu → System units



| | |
|---|---|
| Temperature unit | → 90 |
| Pressure unit | → 90 |

## Parameter overview with brief description

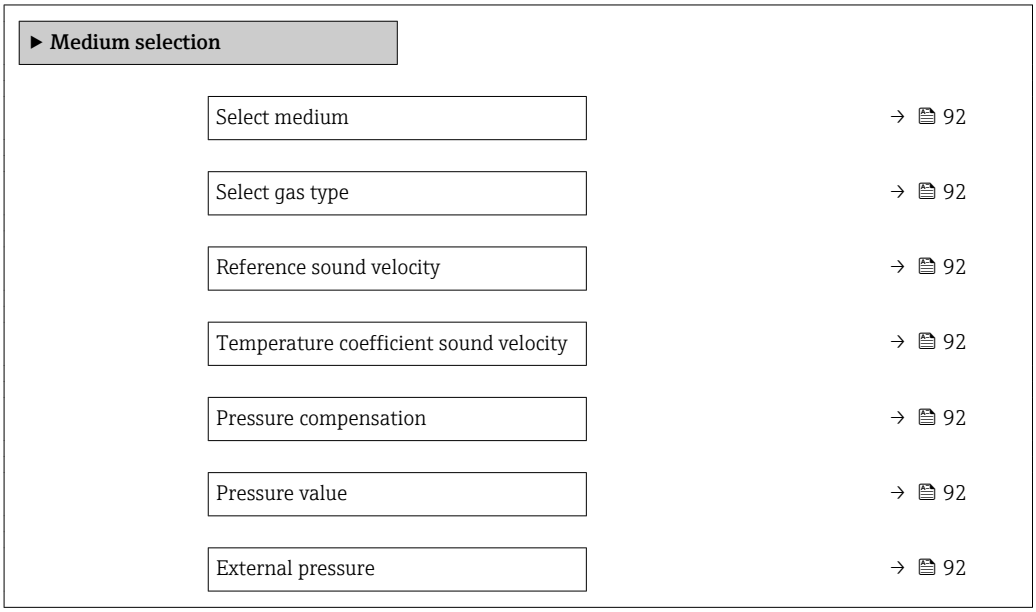
| Parameter | Description | Selection | Factory setting |
|---|---|---|---|
| Mass flow unit | Select mass flow unit.<br>*Result*<br>The selected unit applies for:<br>▪ Output<br>▪ Low flow cut off<br>▪ Simulation process variable | Unit choose list | Country-specific:<br>▪ kg/h<br>▪ lb/min |
| Mass unit | Select mass unit. | Unit choose list | Country-specific:<br>▪ kg<br>▪ lb |
| Volume flow unit | Select volume flow unit.<br>*Result*<br>The selected unit applies for:<br>▪ Output<br>▪ Low flow cut off<br>▪ Simulation process variable | Unit choose list | Country-specific:<br>▪ l/h<br>▪ gal/min (us) |
| Volume unit | Select volume unit. | Unit choose list | Country-specific:<br>▪ l<br>▪ gal (us) |
| Corrected volume flow unit | Select corrected volume flow unit.<br>*Result*<br>The selected unit applies for:<br>**Corrected volume flow** parameter<br>(→ 134) | Unit choose list | Country-specific:<br>▪ Nl/h<br>▪ Sft³/min |
| Corrected volume unit | Select corrected volume unit. | Unit choose list | Country-specific:<br>▪ Nl<br>▪ Sft³ |
| Density unit | Select density unit.<br>*Result*<br>The selected unit applies for:<br>▪ Output<br>▪ Simulation process variable<br>▪ Density adjustment (**Expert** menu) | Unit choose list | Country-specific:<br>▪ kg/l<br>▪ lb/ft³ |
| Reference density unit | Select reference density unit. | Unit choose list | Country-dependent<br>▪ kg/Nl<br>▪ lb/Sft³ |

| Parameter | Description | Selection | Factory setting |
|---|---|---|---|
| Temperature unit | Select temperature unit.<br>*Result*<br>The selected unit applies for:<br>▪ **Electronic temperature** parameter (6053)<br>▪ **Maximum value** parameter (6051)<br>▪ **Minimum value** parameter (6052)<br>▪ **Maximum value** parameter (6108)<br>▪ **Minimum value** parameter (6109)<br>▪ **Maximum value** parameter (6029)<br>▪ **Minimum value** parameter (6030)<br>▪ **Reference temperature** parameter (1816)<br>▪ **Temperature** parameter | Unit choose list | Country-specific:<br>▪ °C<br>▪ °F |
| Pressure unit | Select process pressure unit.<br>*Result*<br>The unit is taken from:<br>▪ **Pressure value** parameter (→ 🖹 92)<br>▪ **External pressure** parameter (→ 🖹 92)<br>▪ Pressure value | Unit choose list | Country-specific:<br>▪ bar a<br>▪ psi a |

### 10.6.3 Selecting and setting the medium

The **Select medium** wizard submenu contains parameters that must be configured in order to select and set the medium.

**Navigation**
"Setup" menu → Select medium



**Parameter overview with brief description**

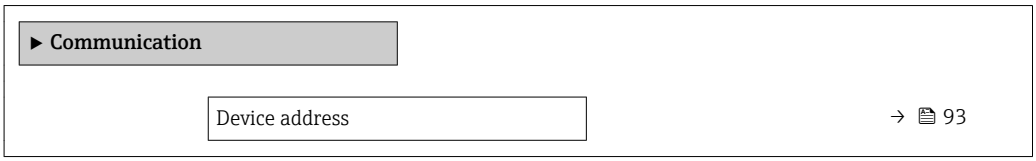
| Parameter | Prerequisite | Description | Selection / User entry / User interface | Factory setting |
|---|---|---|---|---|
| Select medium | – | Select medium type. | ▪ Liquid<br>▪ Gas | Liquid |
| Select gas type | The **Gas** option is selected in the **Select medium** parameter. | Select measured gas type. | ▪ Air<br>▪ Ammonia NH3<br>▪ Argon Ar<br>▪ Sulfur hexafluoride SF6<br>▪ Oxygen O2<br>▪ Ozone O3<br>▪ Nitrogen oxide NOx<br>▪ Nitrogen N2<br>▪ Nitrous oxide N2O<br>▪ Methane CH4<br>▪ Hydrogen H2<br>▪ Helium He<br>▪ Hydrogen chloride HCl<br>▪ Hydrogen sulfide H2S<br>▪ Ethylene C2H4<br>▪ Carbon dioxide CO2<br>▪ Carbon monoxide CO<br>▪ Chlorine Cl2<br>▪ Butane C4H10<br>▪ Propane C3H8<br>▪ Propylene C3H6<br>▪ Ethane C2H6<br>▪ Others | Methane CH4 |
| Reference sound velocity | In the **Select gas type** parameter, the **Others** option is selected. | Enter sound velocity of gas at 0 °C (32 °F). | 1 to 99 999.9999 m/s | 415.0 m/s |
| Temperature coefficient sound velocity | The **Others** option is selected in the **Select gas type** parameter. | Enter temperature coefficient for the gas sound velocity. | Positive floating-point number | 0 (m/s)/K |
| Pressure compensation | – | Select pressure compensation type. | ▪ Off<br>▪ Fixed value<br>▪ External value<br>▪ Current input 1 * | Off |
| Pressure value | The **Fixed value** option or the **Current input 1...n** option is selected in the **Pressure compensation** parameter. | Enter process pressure to be used for pressure correction. | Positive floating-point number | 0 bar |
| External pressure | The **Fixed value** option or the **Current input 1...n** option is selected in the **Pressure compensation** parameter. | Shows the external process pressure value. | Positive floating-point number | 0 bar |

* Visibility depends on order options or device settings

## 10.6.4 Configuring communication interface

The **Communication** submenu guides you systematically through all the parameters that have to be configured for selecting and setting the communication interface.

### Navigation
"Setup" menu → Communication



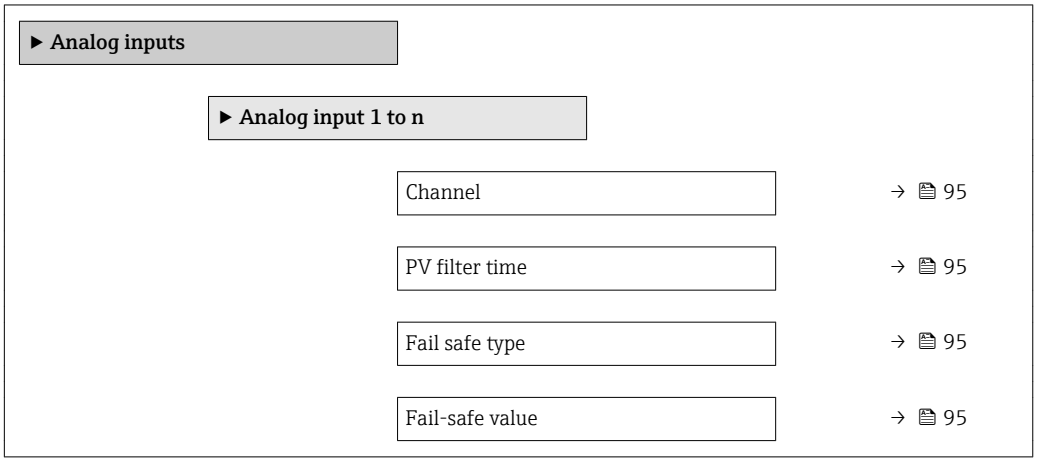

### Parameter overview with brief description

| Parameter | Description | User entry | Factory setting |
|---|---|---|---|
| Device address | Enter device address. | 0 to 126 | 126 |

### 10.6.5 Configuring the analog inputs

The **Analog inputs** submenu guides the user systematically to the individual **Analog input 1 to n** submenu. From here you get to the parameters of the individual analog input.

**Navigation**
"Setup" menu → Analog inputs



**Parameter overview with brief description**

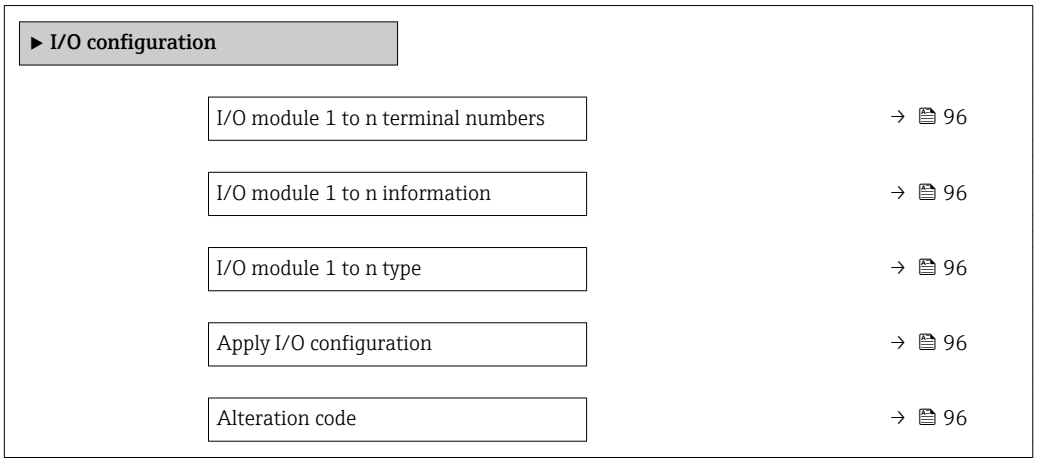
| Parameter | Prerequisite | Description | Selection / User entry | Factory setting |
|---|---|---|---|---|
| Channel | – | Select the process variable. | ▪ Mass flow<br>▪ Volume flow<br>▪ Corrected volume flow *<br>▪ Density<br>▪ Reference density *<br>▪ Target mass flow *<br>▪ Carrier mass flow *<br>▪ Concentration *<br>▪ Target volume flow *<br>▪ Carrier volume flow *<br>▪ Target corrected volume flow *<br>▪ Carrier corrected volume flow *<br>▪ Temperature<br>▪ Carrier pipe temperature *<br>▪ Electronic temperature<br>▪ Oscillation frequency 0<br>▪ Frequency fluctuation 0 *<br>▪ Oscillation damping 0 *<br>▪ Oscillation damping fluctuation 0 *<br>▪ Oscillation damping fluctuation 1 *<br>▪ Signal asymmetry *<br>▪ Exciter current 0 *<br>▪ Current input 1 * | Mass flow |
| PV filter time | – | Specify the time to suppress signal peaks. During the specified time the analog input does not respond to an erratic increase in the process variable. | Positive floating-point number | 0 |
| Fail safe type | – | Select the failure mode. | ▪ Fail-safe value<br>▪ Fallback value<br>▪ Off | Off |
| Fail-safe value | In **Fail safe type** parameter, the **Fail-safe value** option is selected. | Specify the values to be output when an error occurs. | Signed floating-point number | 0 |

* Visibility depends on order options or device settings

### 10.6.6 Displaying the I/O configuration

The **I/O configuration** submenu guides the user systematically through all the parameters in which the configuration of the I/O modules is displayed.

**Navigation**
"Setup" menu → I/O configuration




**Parameter overview with brief description**

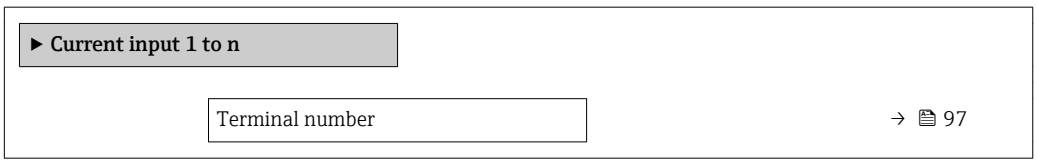
| Parameter | Description | User interface / Selection / User entry | Factory setting |
|---|---|---|---|
| I/O module 1 to n terminal numbers | Shows the terminal numbers used by the I/O module. | ▪ Not used<br>▪ 26-27 (I/O 1)<br>▪ 24-25 (I/O 2) | – |
| I/O module 1 to n information | Shows information of the plugged I/O module. | ▪ Not plugged<br>▪ Invalid<br>▪ Not configurable<br>▪ Configurable<br>▪ Profibus PA | – |
| I/O module 1 to n type | Shows the I/O module type. | ▪ Off<br>▪ Current output *<br>▪ Current input *<br>▪ Status input *<br>▪ Pulse/frequency/switch output * | Off |
| Apply I/O configuration | Apply parameterization of the freely configurable I/O module. | ▪ No<br>▪ Yes | No |
| Alteration code | Enter the code in order to change the I/O configuration. | Positive integer | 0 |

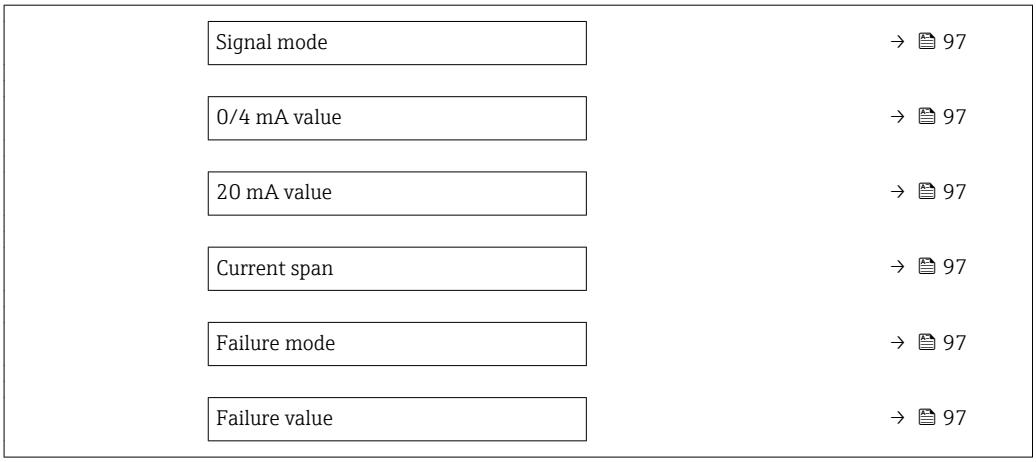
* Visibility depends on order options or device settings

## 10.6.7 Configuring the current input

The **"Current input" wizard** guides the user systematically through all the parameters that have to be set for configuring the current input.

**Navigation**
"Setup" menu → Current input






### Parameter overview with brief description

| Parameter | Prerequisite | Description | User interface / Selection / User entry | Factory setting |
|---|---|---|---|---|
| Terminal number | – | Shows the terminal numbers used by the current input module. | ▪ Not used<br>▪ 24-25 (I/O 2) | – |
| Signal mode | The measuring device is **not** approved for use in the hazardous area with type of protection Ex-i. | Select the signal mode for the current input. | ▪ Passive<br>▪ Active * | Active |
| 0/4 mA value | – | Enter 4 mA value. | Signed floating-point number | 0 |
| 20 mA value | – | Enter 20 mA value. | Signed floating-point number | Depends on country and nominal diameter |
| Current span | – | Select current range for process value output and upper/lower level for alarm signal. | ▪ 4...20 mA<br>▪ 4...20 mA NAMUR<br>▪ 4...20 mA US<br>▪ 0...20 mA | Country-specific:<br>▪ 4...20 mA NAMUR<br>▪ 4...20 mA US |
| Failure mode | – | Define input behavior in alarm condition. | ▪ Alarm<br>▪ Last valid value<br>▪ Defined value | Alarm |
| Failure value | In the **Failure mode** parameter, the **Defined value** option is selected. | Enter value to be used by the device if input value from external device is missing. | Signed floating-point number | 0 |

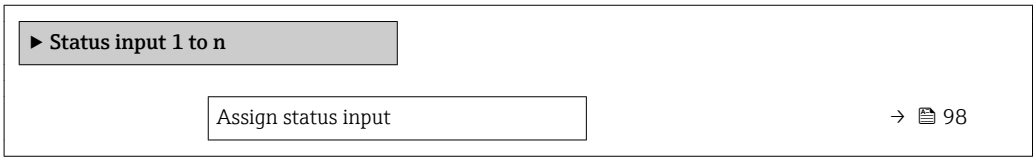
* Visibility depends on order options or device settings

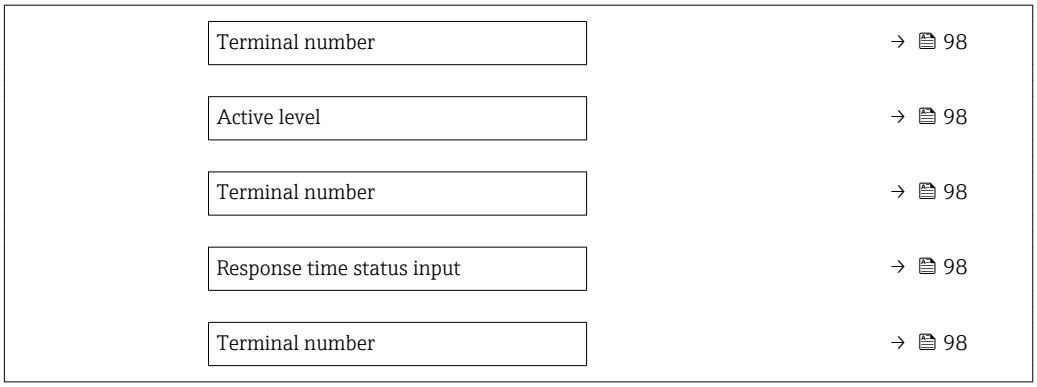
## 10.6.8 Configuring the status input

The **Status input** submenu guides the user systematically through all the parameters that have to be set for configuring the status input.

### Navigation

"Setup" menu → Status input






### Parameter overview with brief description

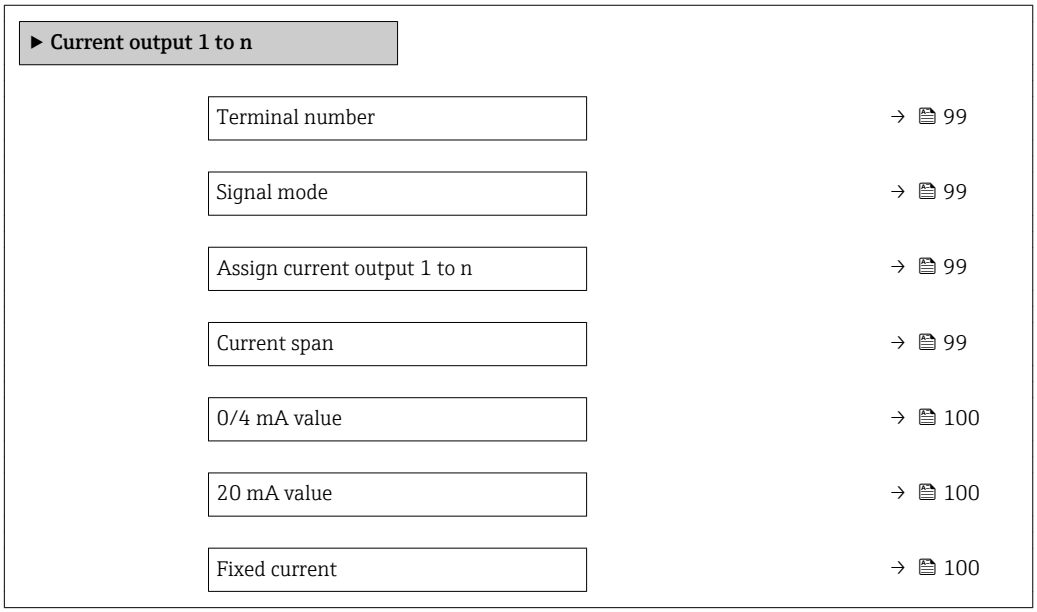
| Parameter | Description | User interface / Selection / User entry | Factory setting |
|---|---|---|---|
| Terminal number | Shows the terminal numbers used by the status input module. | ▪ Not used<br>▪ 24-25 (I/O 2) | – |
| Assign status input | Select function for the status input. | ▪ Off<br>▪ Reset totalizer 1<br>▪ Reset totalizer 2<br>▪ Reset totalizer 3<br>▪ Reset all totalizers<br>▪ Flow override | Off |
| Active level | Define input signal level at which the assigned function is triggered. | ▪ High<br>▪ Low | High |
| Response time status input | Define the minimum amount of time the input signal level must be present before the selected function is triggered. | 5 to 200 ms | 50 ms |

## 10.6.9 Configuring the current output

The **Current output** wizard guides you systematically through all the parameters that have to be set for configuring the current output.

### Navigation

"Setup" menu → Current output



| | |
|---|---|
| Damping output 1 to n | → 100 |
| Failure mode | → 100 |
| Failure current | → 100 |

### Parameter overview with brief description

| Parameter | Prerequisite | Description | User interface / Selection / User entry | Factory setting |
|---|---|---|---|---|
| Terminal number | – | Shows the terminal numbers used by the current output module. | ▪ Not used<br>▪ 24-25 (I/O 2) | – |
| Signal mode | – | Select the signal mode for the current output. | ▪ Passive *<br>▪ Active * | Active |
| Assign current output 1 to n | – | Select process variable for current output. | ▪ Off *<br>▪ Mass flow<br>▪ Volume flow<br>▪ Corrected volume flow *<br>▪ Target mass flow *<br>▪ Carrier mass flow *<br>▪ Target volume flow *<br>▪ Carrier volume flow *<br>▪ Target corrected volume flow *<br>▪ Carrier corrected volume flow *<br>▪ Density<br>▪ Reference density *<br>▪ Concentration *<br>▪ Temperature<br>▪ Carrier pipe temperature *<br>▪ Electronic temperature<br>▪ Oscillation frequency 0<br>▪ Oscillation amplitude 0 *<br>▪ Frequency fluctuation 0 *<br>▪ Oscillation damping 0 *<br>▪ Oscillation damping fluctuation 0 *<br>▪ Signal asymmetry *<br>▪ Exciter current 0 *<br>▪ HBSI *<br>▪ Pressure * | Mass flow |
| Current span | – | Select current range for process value output and upper/lower level for alarm signal. | ▪ 4...20 mA NAMUR<br>▪ 4...20 mA US<br>▪ 4...20 mA<br>▪ 0...20 mA<br>▪ Fixed current | Country-specific:<br>▪ 4...20 mA NAMUR<br>▪ 4...20 mA US |

| Parameter | Prerequisite | Description | User interface / Selection / User entry | Factory setting |
|---|---|---|---|---|
| 0/4 mA value | One of the following options is selected in the **Current span** parameter (→ 🖹 99):<br>▪ 4...20 mA NAMUR<br>▪ 4...20 mA US<br>▪ 4...20 mA<br>▪ 0...20 mA | Enter 4 mA value. | Signed floating-point number | Country-specific:<br>▪ 0 kg/h<br>▪ 0 lb/min |
| 20 mA value | One of the following options is selected in the **Current span** parameter (→ 🖹 99):<br>▪ 4...20 mA NAMUR<br>▪ 4...20 mA US<br>▪ 4...20 mA<br>▪ 0...20 mA | Enter 20 mA value. | Signed floating-point number | Depends on country and nominal diameter |
| Fixed current | The **Fixed current** option is selected in the **Current span** parameter (→ 🖹 99). | Defines the fixed output current. | 0 to 22.5 mA | 22.5 mA |
| Damping output 1 to n | A process variable is selected in the **Assign current output** parameter (→ 🖹 99) and one of the following options is selected in the **Current span** parameter (→ 🖹 99):<br>▪ 4...20 mA NAMUR<br>▪ 4...20 mA US<br>▪ 4...20 mA<br>▪ 0...20 mA | Set reaction time for output signal to fluctuations in the measured value. | 0.0 to 999.9 s | 1.0 s |
| Failure mode | A process variable is selected in the **Assign current output** parameter (→ 🖹 99) and one of the following options is selected in the **Current span** parameter (→ 🖹 99):<br>▪ 4...20 mA NAMUR<br>▪ 4...20 mA US<br>▪ 4...20 mA<br>▪ 0...20 mA | Define output behavior in alarm condition. | ▪ Min.<br>▪ Max.<br>▪ Last valid value<br>▪ Actual value<br>▪ Defined value | Max. |
| Failure current | The **Defined value** option is selected in the **Failure mode** parameter. | Enter current output value in alarm condition. | 0 to 22.5 mA | 22.5 mA |

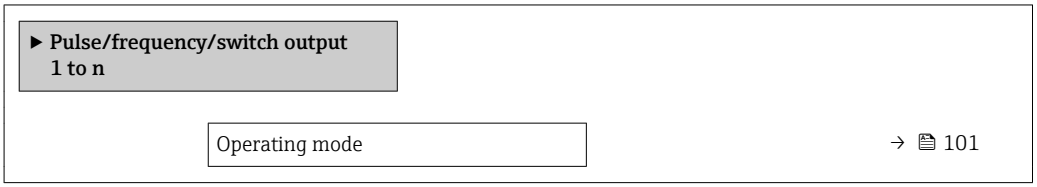
* Visibility depends on order options or device settings

## 10.6.10 Configuring the pulse/frequency/switch output

The **Pulse/frequency/switch output** wizard guides you systematically through all the parameters that can be set for configuring the selected output type.

### Navigation

"Setup" menu → Advanced setup → Pulse/frequency/switch output



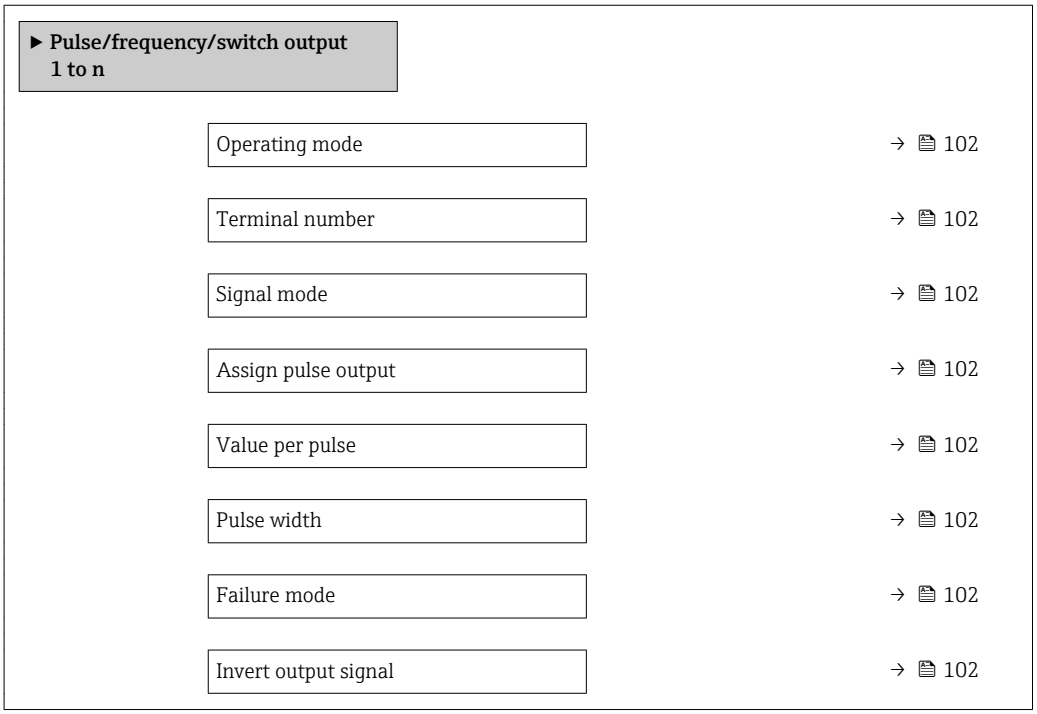

### Parameter overview with brief description

| Parameter | Description | Selection | Factory setting |
|---|---|---|---|
| Operating mode | Define the output as a pulse, frequency or switch output. | ▪ Pulse<br>▪ Frequency<br>▪ Switch | Pulse |

### Configuring the pulse output

### Navigation

"Setup" menu → Pulse/frequency/switch output



### Parameter overview with brief description

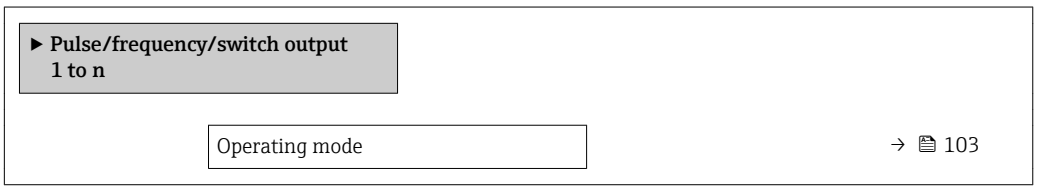
| Parameter | Prerequisite | Description | Selection / User interface / User entry | Factory setting |
|---|---|---|---|---|
| Operating mode | – | Define the output as a pulse, frequency or switch output. | ▪ Pulse<br>▪ Frequency<br>▪ Switch | Pulse |
| Terminal number | – | Shows the terminal numbers used by the PFS output module. | ▪ Not used<br>▪ 24-25 (I/O 2) | – |
| Signal mode | – | Select the signal mode for the PFS output. | ▪ Passive<br>▪ Active | Passive |
| Assign pulse output 1 to n | The **Pulse** option is selected in the **Operating mode** parameter parameter. | Select process variable for pulse output. | ▪ Off<br>▪ Mass flow<br>▪ Volume flow<br>▪ Corrected volume flow *<br>▪ Target mass flow *<br>▪ Carrier mass flow *<br>▪ Target volume flow *<br>▪ Carrier volume flow *<br>▪ Target corrected volume flow *<br>▪ Carrier corrected volume flow * | Off |
| Value per pulse | The **Pulse** option is selected in the **Operating mode** parameter (→ 🖹 101) and a process variable is selected in the **Assign pulse output** parameter (→ 🖹 102). | Enter measured value at which a pulse is output. | Signed floating-point number | Depends on country and nominal diameter |
| Pulse width | The **Pulse** option is selected in the **Operating mode** parameter (→ 🖹 101) and a process variable is selected in the **Assign pulse output** parameter (→ 🖹 102). | Define time width of the output pulse. | 0.05 to 2 000 ms | 100 ms |
| Failure mode | The **Pulse** option is selected in the **Operating mode** parameter (→ 🖹 101) and a process variable is selected in the **Assign pulse output** parameter (→ 🖹 102). | Define output behavior in alarm condition. | ▪ Actual value<br>▪ No pulses | No pulses |
| Invert output signal | – | Invert the output signal. | ▪ No<br>▪ Yes | No |

* Visibility depends on order options or device settings

### Configuring the frequency output

#### Navigation

"Setup" menu → Pulse/frequency/switch output



### Parameter overview with brief description

| Parameter | Prerequisite | Description | Selection / User interface / User entry | Factory setting |
|---|---|---|---|---|
| Operating mode | – | Define the output as a pulse, frequency or switch output. | ▪ Pulse<br>▪ Frequency<br>▪ Switch | Pulse |
| Terminal number | – | Shows the terminal numbers used by the PFS output module. | ▪ Not used<br>▪ 24-25 (I/O 2) | – |
| Signal mode | – | Select the signal mode for the PFS output. | ▪ Passive<br>▪ Active | Passive |

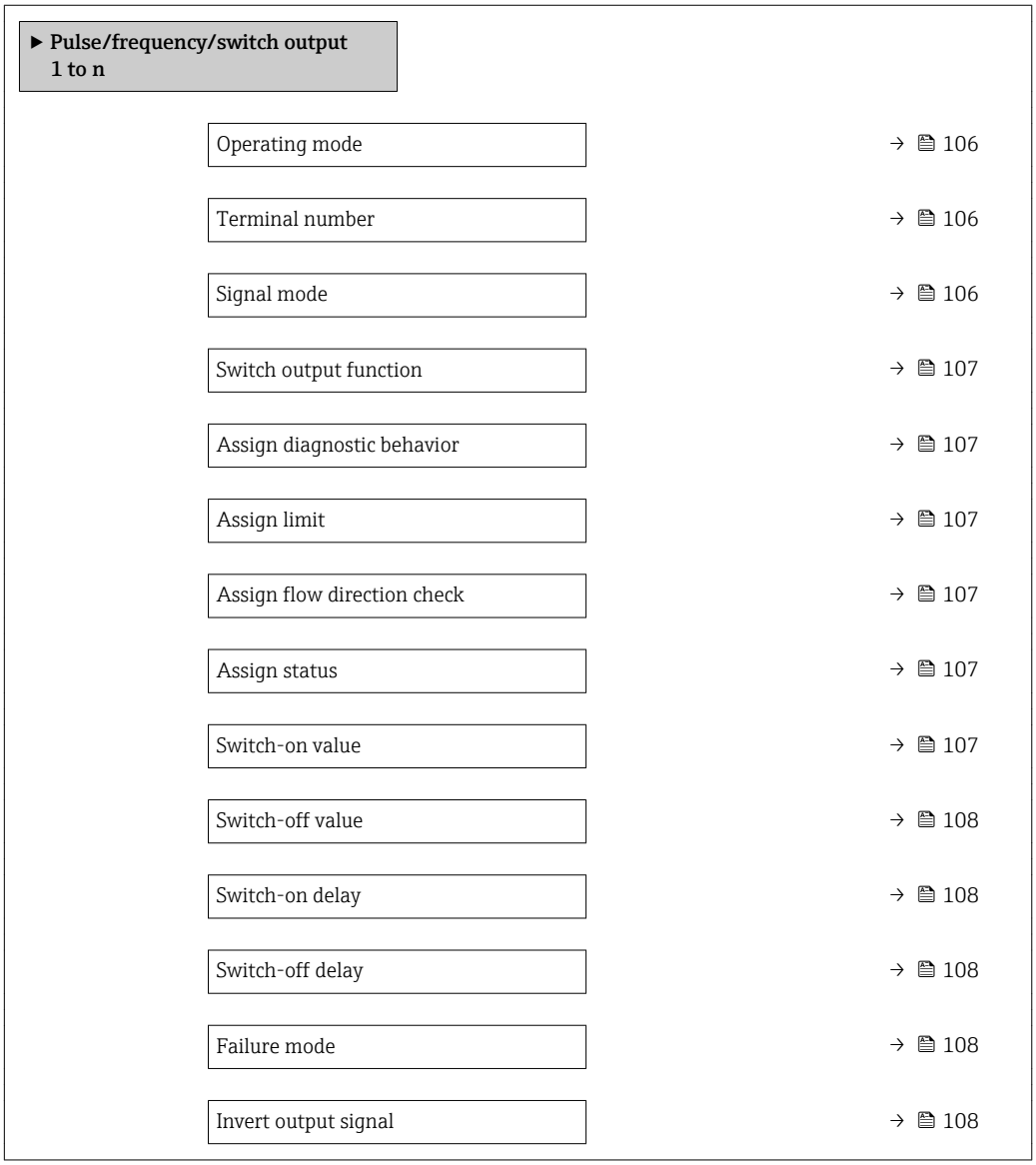
| Parameter | Prerequisite | Description | Selection / User interface / User entry | Factory setting |
|---|---|---|---|---|
| Assign frequency output | The **Frequency** option is selected in the **Operating mode** parameter (→ 101) parameter. | Select process variable for frequency output. | ▪ Off<br>▪ Mass flow<br>▪ Volume flow<br>▪ Corrected volume flow<br>▪ Target mass flow *<br>▪ Carrier mass flow *<br>▪ Target volume flow *<br>▪ Carrier volume flow *<br>▪ Target corrected volume flow *<br>▪ Carrier corrected volume flow *<br>▪ Density<br>▪ Reference density<br>▪ Concentration *<br>▪ Temperature<br>▪ Carrier pipe temperature *<br>▪ Electronic temperature<br>▪ Oscillation frequency 0<br>▪ Oscillation amplitude 0 *<br>▪ Frequency fluctuation 0 *<br>▪ Oscillation damping 0 *<br>▪ Oscillation damping fluctuation 0 *<br>▪ Signal asymmetry *<br>▪ Exciter current 0 *<br>▪ HBSI *<br>▪ Pressure | Off |
| Minimum frequency value | The **Frequency** option is selected in the **Operating mode** parameter (→ 101) and a process variable is selected in the **Assign frequency output** parameter (→ 104). | Enter minimum frequency. | 0.0 to 10 000.0 Hz | 0.0 Hz |
| Maximum frequency value | The **Frequency** option is selected in the **Operating mode** parameter (→ 101) and a process variable is selected in the **Assign frequency output** parameter (→ 104). | Enter maximum frequency. | 0.0 to 10 000.0 Hz | 10 000.0 Hz |
| Measuring value at minimum frequency | The **Frequency** option is selected in the **Operating mode** parameter (→ 101) and a process variable is selected in the **Assign frequency output** parameter (→ 104). | Enter measured value for minmum frequency. | Signed floating-point number | Depends on country and nominal diameter |

| Parameter | Prerequisite | Description | Selection / User interface / User entry | Factory setting |
|---|---|---|---|---|
| Measuring value at maximum frequency | The **Frequency** option is selected in the **Operating mode** parameter (→ 101) and a process variable is selected in the **Assign frequency output** parameter (→ 104). | Enter measured value for maximum frequency. | Signed floating-point number | Depends on country and nominal diameter |
| Failure mode | The **Frequency** option is selected in the **Operating mode** parameter (→ 101) and a process variable is selected in the **Assign frequency output** parameter (→ 104). | Define output behavior in alarm condition. | ▪ Actual value<br>▪ Defined value<br>▪ 0 Hz | 0 Hz |
| Failure frequency | The **Frequency** option is selected in the **Operating mode** parameter (→ 101) and a process variable is selected in the **Assign frequency output** parameter (→ 104). | Enter frequency output value in alarm condition. | 0.0 to 12 500.0 Hz | 0.0 Hz |
| Invert output signal | – | Invert the output signal. | ▪ No<br>▪ Yes | No |

* Visibility depends on order options or device settings

### Configuring the switch output

#### Navigation
"Setup" menu → Pulse/frequency/switch output




### Parameter overview with brief description

| Parameter | Prerequisite | Description | Selection / User interface / User entry | Factory setting |
|---|---|---|---|---|
| Operating mode | – | Define the output as a pulse, frequency or switch output. | ▪ Pulse<br>▪ Frequency<br>▪ Switch | Pulse |
| Terminal number | – | Shows the terminal numbers used by the PFS output module. | ▪ Not used<br>▪ 24-25 (I/O 2) | – |
| Signal mode | – | Select the signal mode for the PFS output. | ▪ Passive<br>▪ Active | Passive |

| Parameter | Prerequisite | Description | Selection / User interface / User entry | Factory setting |
|---|---|---|---|---|
| Switch output function | The **Switch** option is selected in the **Operating mode** parameter. | Select function for switch output. | ▪ Off<br>▪ On<br>▪ Diagnostic behavior<br>▪ Limit<br>▪ Flow direction check<br>▪ Status | Off |
| Assign diagnostic behavior | ▪ In the **Operating mode** parameter, the **Switch** option is selected.<br>▪ In the **Switch output function** parameter, the **Diagnostic behavior** option is selected. | Select diagnostic behavior for switch output. | ▪ Alarm<br>▪ Alarm or warning<br>▪ Warning | Alarm |
| Assign limit | ▪ The **Switch** option is selected in the **Operating mode** parameter parameter.<br>▪ The **Limit** option is selected in the **Switch output function** parameter parameter. | Select process variable for limit function. | ▪ Mass flow<br>▪ Volume flow<br>▪ Corrected volume flow *<br>▪ Target mass flow *<br>▪ Carrier mass flow *<br>▪ Target volume flow *<br>▪ Carrier volume flow *<br>▪ Target corrected volume flow *<br>▪ Carrier corrected volume flow *<br>▪ Density<br>▪ Reference density *<br>▪ Concentration *<br>▪ Temperature<br>▪ Oscillation damping<br>▪ Pressure<br>▪ Totalizer 1<br>▪ Totalizer 2<br>▪ Totalizer 3 | Mass flow |
| Assign flow direction check | ▪ The **Switch** option is selected in the **Operating mode** parameter.<br>▪ The **Flow direction check** option is selected in the **Switch output function** parameter. | Select process variable for flow direction monitoring. | ▪ Off<br>▪ Volume flow<br>▪ Mass flow<br>▪ Corrected volume flow * | Mass flow |
| Assign status | ▪ The **Switch** option is selected in the **Operating mode** parameter.<br>▪ The **Status** option is selected in the **Switch output function** parameter. | Select device status for switch output. | ▪ Partially filled pipe detection<br>▪ Low flow cut off<br>▪ Digital output 4 * | Partially filled pipe detection |
| Switch-on value | ▪ In the **Operating mode** parameter, the **Switch** option is selected.<br>▪ In the **Switch output function** parameter, the **Limit** option is selected. | Enter measured value for the switch-on point. | Signed floating-point number | Country-specific:<br>▪ 0 kg/h<br>▪ 0 lb/min |

| Parameter | Prerequisite | Description | Selection / User interface / User entry | Factory setting |
|---|---|---|---|---|
| Switch-off value | ▪ In the **Operating mode** parameter, the **Switch** option is selected.<br>▪ In the **Switch output function** parameter, the **Limit** option is selected. | Enter measured value for the switch-off point. | Signed floating-point number | Country-specific:<br>▪ 0 kg/h<br>▪ 0 lb/min |
| Switch-on delay | ▪ The **Switch** option is selected in the **Operating mode** parameter.<br>▪ The **Limit** option is selected in the **Switch output function** parameter. | Define delay for the switch-on of status output. | 0.0 to 100.0 s | 0.0 s |
| Switch-off delay | ▪ The **Switch** option is selected in the **Operating mode** parameter.<br>▪ The **Limit** option is selected in the **Switch output function** parameter. | Define delay for the switch-off of status output. | 0.0 to 100.0 s | 0.0 s |
| Failure mode | – | Define output behavior in alarm condition. | ▪ Actual status<br>▪ Open<br>▪ Closed | Open |
| Invert output signal | – | Invert the output signal. | ▪ No<br>▪ Yes | No |

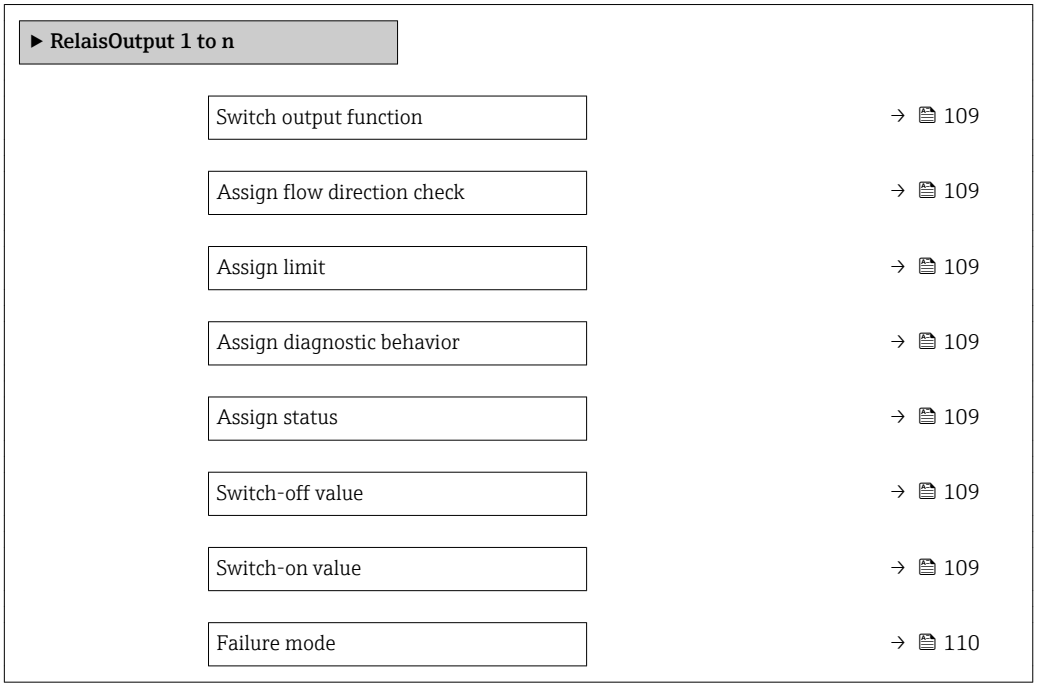
* Visibility depends on order options or device settings

## 10.6.11 Configuring the relay output

The **Relay output** wizard guides the user systematically through all the parameters that have to be set for configuring the relay output.

### Navigation

"Setup" menu → Relay output 1 to n



## Parameter overview with brief description

| Parameter | Prerequisite | Description | Selection / User interface / User entry | Factory setting |
|---|---|---|---|---|
| Relay output function | – | Select the function for the relay output. | ▪ Closed<br>▪ Open<br>▪ Diagnostic behavior<br>▪ Limit<br>▪ Flow direction check<br>▪ Digital Output | Closed |
| Terminal number | – | Shows the terminal numbers used by the relay output module. | ▪ Not used<br>▪ 24-25 (I/O 2) | – |
| Assign flow direction check | In the **Relay output function** parameter, the **Flow direction check** option is selected. | Select process variable for flow direction monitoring. | ▪ Off<br>▪ Volume flow<br>▪ Mass flow<br>▪ Corrected volume flow * | Mass flow |
| Assign limit | The **Limit** option is selected in the **Relay output function** parameter parameter. | Select process variable for limit function. | ▪ Mass flow<br>▪ Volume flow<br>▪ Corrected volume flow *<br>▪ Target mass flow *<br>▪ Carrier mass flow *<br>▪ Target volume flow *<br>▪ Carrier volume flow *<br>▪ Target corrected volume flow *<br>▪ Carrier corrected volume flow *<br>▪ Density<br>▪ Reference density *<br>▪ Concentration *<br>▪ Temperature<br>▪ Oscillation damping<br>▪ Pressure<br>▪ Totalizer 1<br>▪ Totalizer 2<br>▪ Totalizer 3 | Mass flow |
| Assign diagnostic behavior | In the **Relay output function** parameter, the **Diagnostic behavior** option is selected. | Select diagnostic behavior for switch output. | ▪ Alarm<br>▪ Alarm or warning<br>▪ Warning | Alarm |
| Assign status | In the **Relay output function** parameter, the **Digital Output** option is selected. | Select device status for switch output. | ▪ Partially filled pipe detection<br>▪ Low flow cut off<br>▪ Digital output 4 * | Partially filled pipe detection |
| Switch-off value | In the **Relay output function** parameter, the **Limit** option is selected. | Enter measured value for the switch-off point. | Signed floating-point number | Country-specific:<br>▪ 0 kg/h<br>▪ 0 lb/min |
| Switch-off delay | In the **Relay output function** parameter, the **Limit** option is selected. | Define delay for the switch-off of status output. | 0.0 to 100.0 s | 0.0 s |
| Switch-on value | In the **Relay output function** parameter, the **Limit** option is selected. | Enter measured value for the switch-on point. | Signed floating-point number | Country-specific:<br>▪ 0 kg/h<br>▪ 0 lb/min |

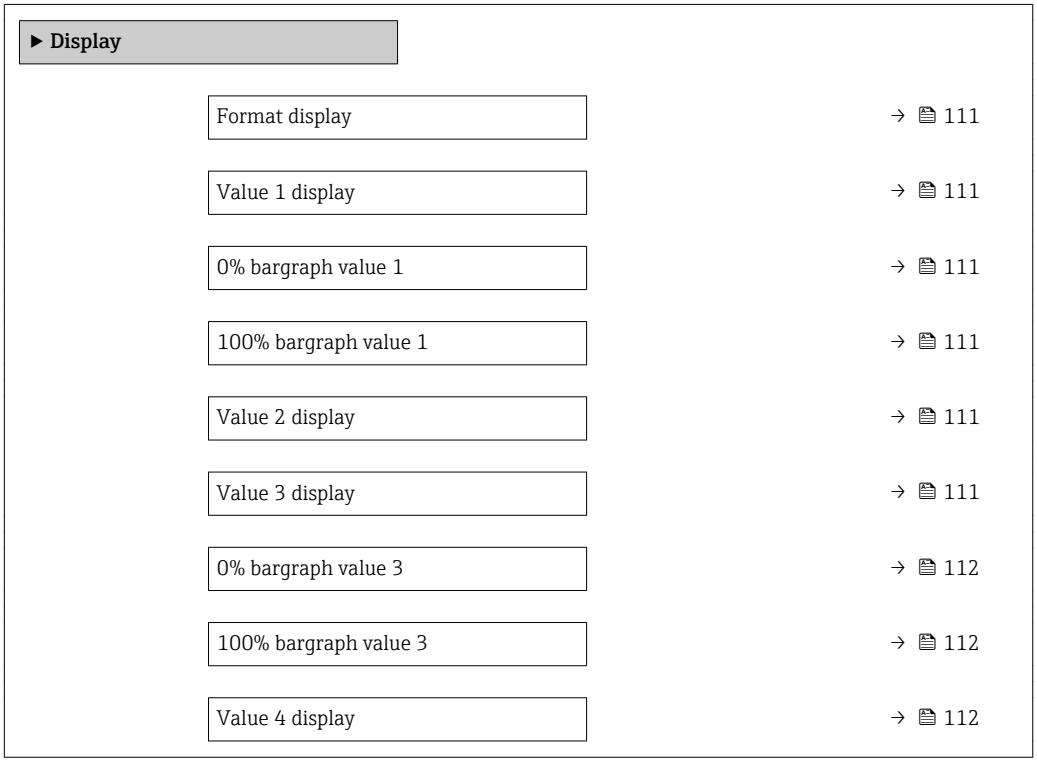
| Parameter | Prerequisite | Description | Selection / User interface / User entry | Factory setting |
|---|---|---|---|---|
| Switch-on delay | In the **Relay output function** parameter, the **Limit** option is selected. | Define delay for the switch-on of status output. | 0.0 to 100.0 s | 0.0 s |
| Failure mode | – | Define output behavior in alarm condition. | ▪ Actual status<br>▪ Open<br>▪ Closed | Open |

* Visibility depends on order options or device settings

## 10.6.12 Configuring the local display

The **Display** wizard guides you systematically through all the parameters that can configured for configuring the local display.

**Navigation**
"Setup" menu → Display



## Parameter overview with brief description

| Parameter | Prerequisite | Description | Selection / User entry | Factory setting |
|---|---|---|---|---|
| Format display | A local display is provided. | Select how measured values are shown on the display. | ▪ 1 value, max. size<br>▪ 1 bargraph + 1 value<br>▪ 2 values<br>▪ 1 value large + 2 values<br>▪ 4 values | 1 value, max. size |
| Value 1 display | A local display is provided. | Select the measured value that is shown on the local display. | ▪ Mass flow<br>▪ Volume flow<br>▪ Corrected volume flow *<br>▪ Target mass flow *<br>▪ Carrier mass flow *<br>▪ Target volume flow *<br>▪ Carrier volume flow *<br>▪ Target corrected volume flow *<br>▪ Carrier corrected volume flow *<br>▪ Density<br>▪ Reference density *<br>▪ Concentration *<br>▪ Temperature<br>▪ Carrier pipe temperature *<br>▪ Electronic temperature<br>▪ Oscillation frequency 0<br>▪ Oscillation amplitude 0 *<br>▪ Frequency fluctuation 0 *<br>▪ Oscillation damping 0 *<br>▪ Oscillation damping fluctuation 0 *<br>▪ Signal asymmetry *<br>▪ Exciter current 0 *<br>▪ Totalizer 1<br>▪ Totalizer 2<br>▪ Totalizer 3<br>▪ Current output 1 *<br>▪ Pressure | Mass flow |
| 0% bargraph value 1 | A local display is provided. | Enter 0% value for bar graph display. | Signed floating-point number | Country-specific:<br>▪ 0 kg/h<br>▪ 0 lb/min |
| 100% bargraph value 1 | A local display is provided. | Enter 100% value for bar graph display. | Signed floating-point number | Depends on country and nominal diameter |
| Value 2 display | A local display is provided. | Select the measured value that is shown on the local display. | For the picklist, see the **Value 1 display** parameter (→ 111) | None |
| Value 3 display | A local display is provided. | Select the measured value that is shown on the local display. | For the picklist, see the **Value 1 display** parameter (→ 111) | None |

| Parameter | Prerequisite | Description | Selection / User entry | Factory setting |
|---|---|---|---|---|
| 0% bargraph value 3 | A selection was made in the **Value 3 display** parameter. | Enter 0% value for bar graph display. | Signed floating-point number | Country-specific:<br>▪ 0 kg/h<br>▪ 0 lb/min |
| 100% bargraph value 3 | A selection was made in the **Value 3 display** parameter. | Enter 100% value for bar graph display. | Signed floating-point number | 0 |
| Value 4 display | A local display is provided. | Select the measured value that is shown on the local display. | For the picklist, see the **Value 1 display** parameter (→ 🖹 111) | None |

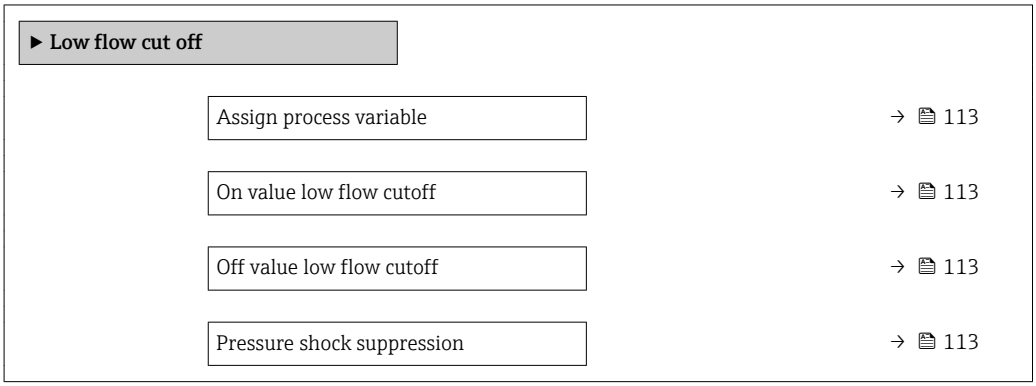
* Visibility depends on order options or device settings

## 10.6.13 Configuring the low flow cut off

The **Low flow cut off** wizard systematically guides the user through all the parameters that must be set to configure low flow cut off.

### Navigation

"Setup" menu → Low flow cut off




### Parameter overview with brief description

| Parameter | Prerequisite | Description | Selection / User entry | Factory setting |
|---|---|---|---|---|
| Assign process variable | – | Select process variable for low flow cut off. | ▪ Off<br>▪ Mass flow<br>▪ Volume flow<br>▪ Corrected volume flow * | Mass flow |
| On value low flow cutoff | A process variable is selected in the **Assign process variable** parameter (→ 113). | Enter on value for low flow cut off. | Positive floating-point number | Depends on country and nominal diameter |
| Off value low flow cutoff | A process variable is selected in the **Assign process variable** parameter (→ 113). | Enter off value for low flow cut off. | 0 to 100.0 % | 50 % |
| Pressure shock suppression | A process variable is selected in the **Assign process variable** parameter (→ 113). | Enter time frame for signal suppression (= active pressure shock suppression). | 0 to 100 s | 0 s |

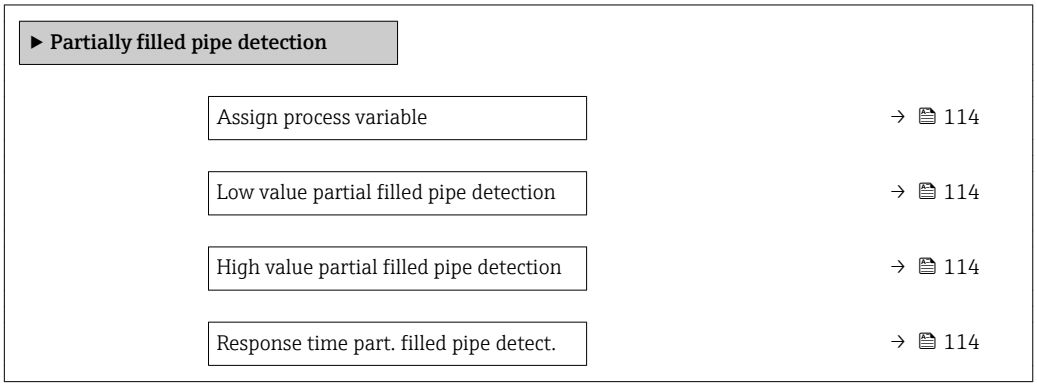
* Visibility depends on order options or device settings

## 10.6.14 Configuring the partial filled pipe detection

The **Partial filled pipe detection** wizard guides you systematically through all parameters that have to be set for configuring the monitoring of the pipe filling.

### Navigation

"Setup" menu → Partially filled pipe detection



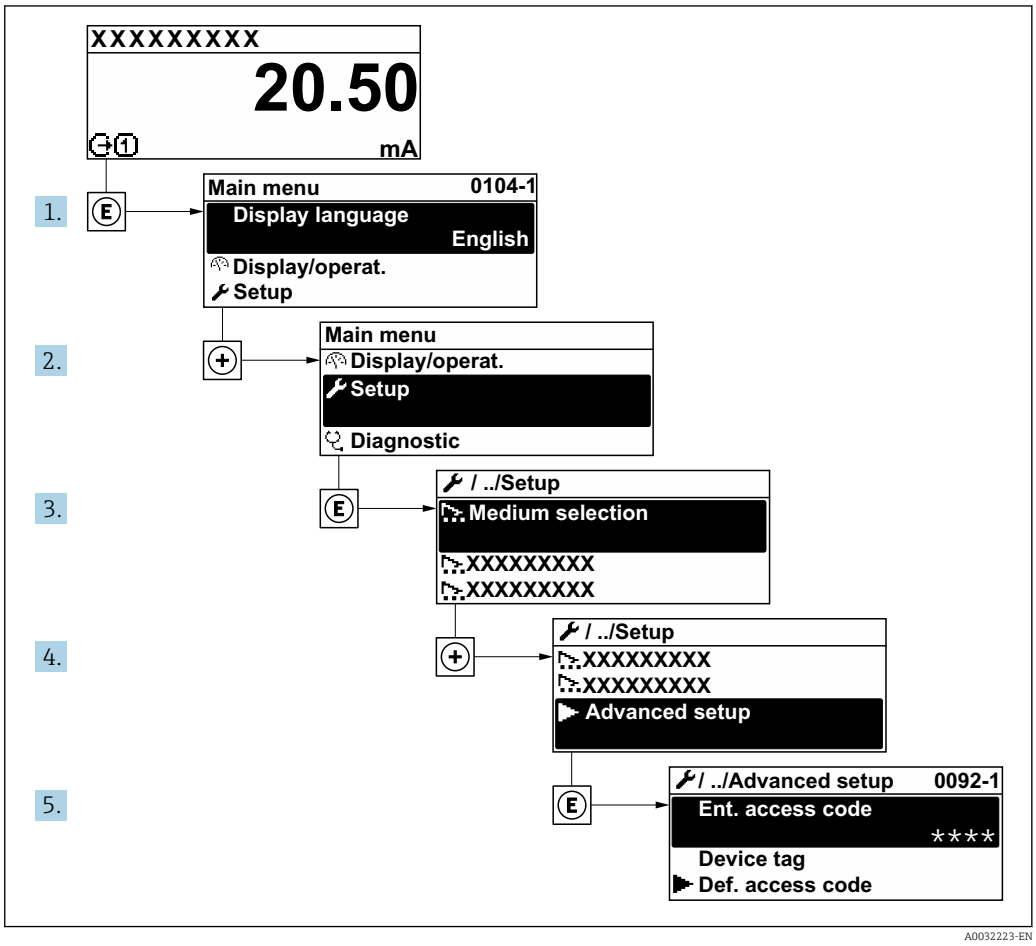

### Parameter overview with brief description

| Parameter | Prerequisite | Description | Selection / User entry | Factory setting |
|---|---|---|---|---|
| Assign process variable | – | Select process variable for partially filled pipe detection. | ▪ Off<br>▪ Density<br>▪ Reference density | Off |
| Low value partial filled pipe detection | A process variable is selected in the **Assign process variable** parameter (→ 114). | Enter lower limit value for deactivating partialy filled pipe detection. | Signed floating-point number | 200 |
| High value partial filled pipe detection | A process variable is selected in the **Assign process variable** parameter (→ 114). | Enter upper limit value for deactivating partialy filled pipe detection. | Signed floating-point number | 6 000 |
| Response time part. filled pipe detect. | A process variable is selected in the **Assign process variable** parameter (→ 114). | Enter time before diagnostic message is displayed for partially filled pipe detection. | 0 to 100 s | 1 s |

## 10.7 Advanced settings

The **Advanced setup** submenu together with its submenus contains parameters for specific settings.

*Navigation to the "Advanced setup" submenu*

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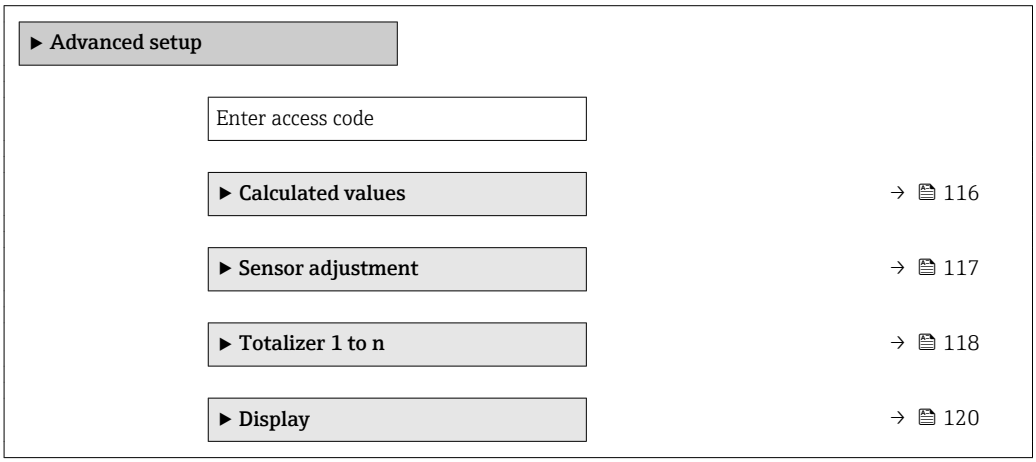
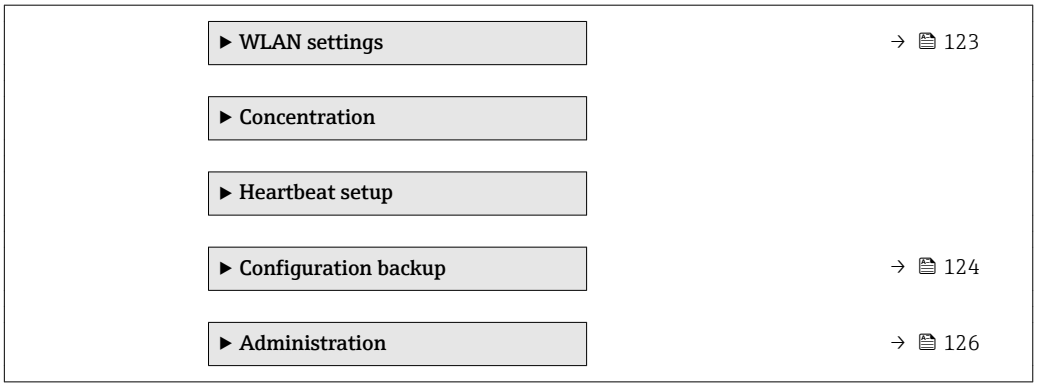
The number of submenus can vary depending on the device version. Some submenus are not dealt with in the Operating Instructions. These submenus and the parameters they contain are explained in the Special Documentation for the device.

### Navigation

"Setup" menu → Advanced setup



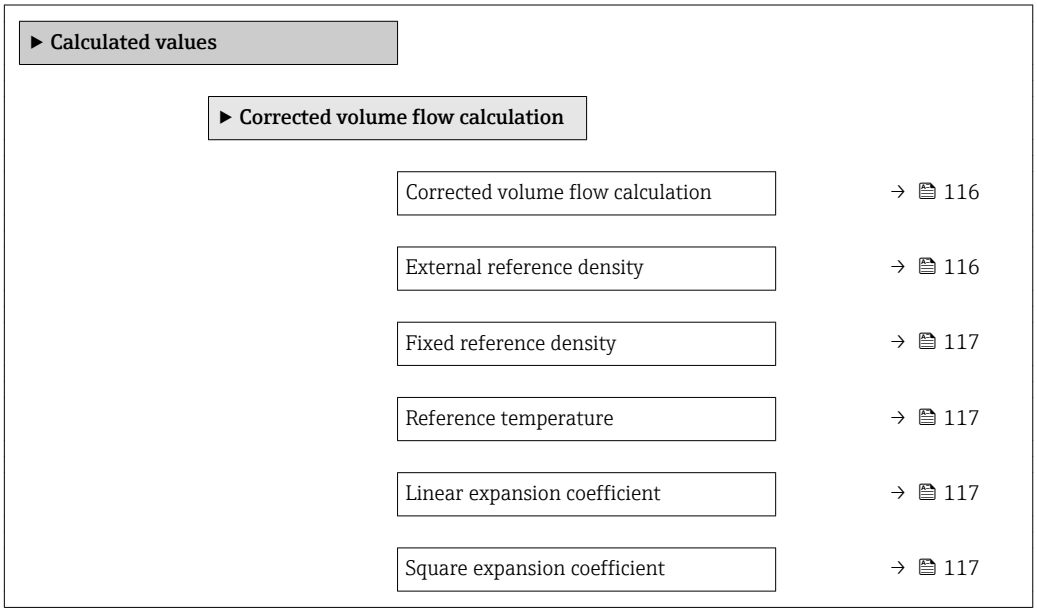



## 10.7.1 Calculated values

The **Calculated values** submenu contains parameters for calculating the corrected volume flow.

### Navigation

"Setup" menu → Advanced setup → Calculated values




### Parameter overview with brief description

| Parameter | Prerequisite | Description | Selection / User interface / User entry | Factory setting |
|---|---|---|---|---|
| Corrected volume flow calculation | – | Select reference density for calculating the corrected volume flow. | ▪ Fixed reference density<br>▪ Calculated reference density<br>▪ External reference density<br>▪ Current input 1 * | Calculated reference density |
| External reference density | – | Shows external reference density. | Floating point number with sign | – |

| Parameter | Prerequisite | Description | Selection / User interface / User entry | Factory setting |
|---|---|---|---|---|
| Fixed reference density | The **Fixed reference density** option is selected in the **Corrected volume flow calculation** parameter parameter. | Enter fixed value for reference density. | Positive floating-point number | 1 kg/Nl |
| Reference temperature | The **Calculated reference density** option is selected in the **Corrected volume flow calculation** parameter parameter. | Enter reference temperature for calculating the reference density. | −273.15 to 99 999 °C | Country-specific:<br>▪ +20 °C<br>▪ +68 °F |
| Linear expansion coefficient | The **Calculated reference density** option is selected in the **Corrected volume flow calculation** parameter parameter. | Enter linear, medium-specific expansion coefficient for calculating the reference density. | Signed floating-point number | 0.0 1/K |
| Square expansion coefficient | The **Calculated reference density** option is selected in the **Corrected volume flow calculation** parameter parameter. | For media with a non-linear expansion pattern: enter the quadratic, medium-specific expansion coefficient for calculating the reference density. | Signed floating-point number | 0.0 $1/K^2$ |

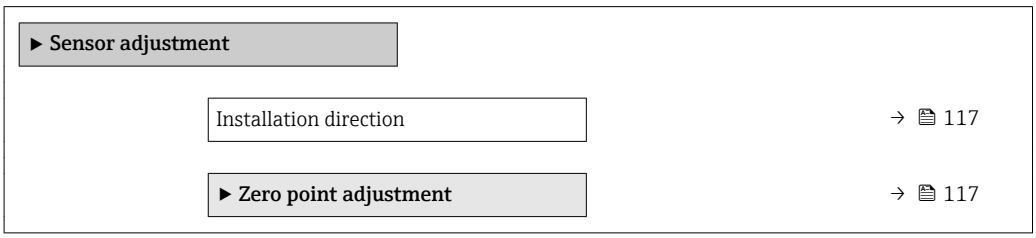
* Visibility depends on order options or device settings

## 10.7.2 Carrying out a sensor adjustment

The **Sensor adjustment** submenu contains parameters that pertain to the functionality of the sensor.

### Navigation

"Setup" menu → Advanced setup → Sensor adjustment




### Parameter overview with brief description

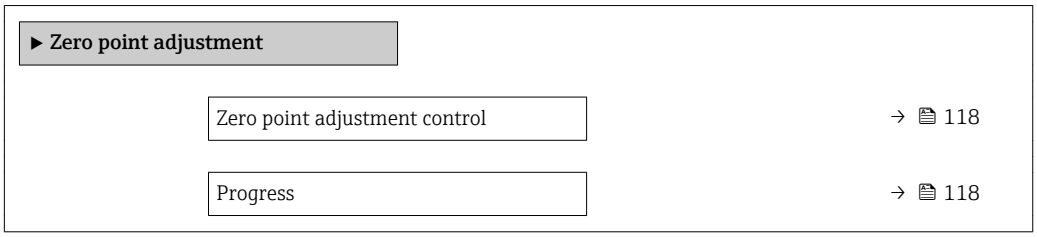
| Parameter | Description | Selection | Factory setting |
|---|---|---|---|
| Installation direction | Set sign of flow direction to match the direction of the arrow on the sensor. | ▪ Flow in arrow direction<br>▪ Flow against arrow direction | Flow in arrow direction |

### Zero point adjustment

All measuring devices are calibrated in accordance with state-of-the-art technology. Calibration takes place under reference conditions→ 231. Therefore, a zero point adjustment in the field is generally not required.

Experience shows that zero point adjustment is advisable only in special cases:
- To achieve maximum measuring accuracy even with low flow rates.
- Under extreme process or operating conditions (e.g. very high process temperatures or very high-viscosity fluids).

**Navigation**
"Setup" menu → Advanced setup → Sensor adjustment → Zero point adjustment




**Parameter overview with brief description**

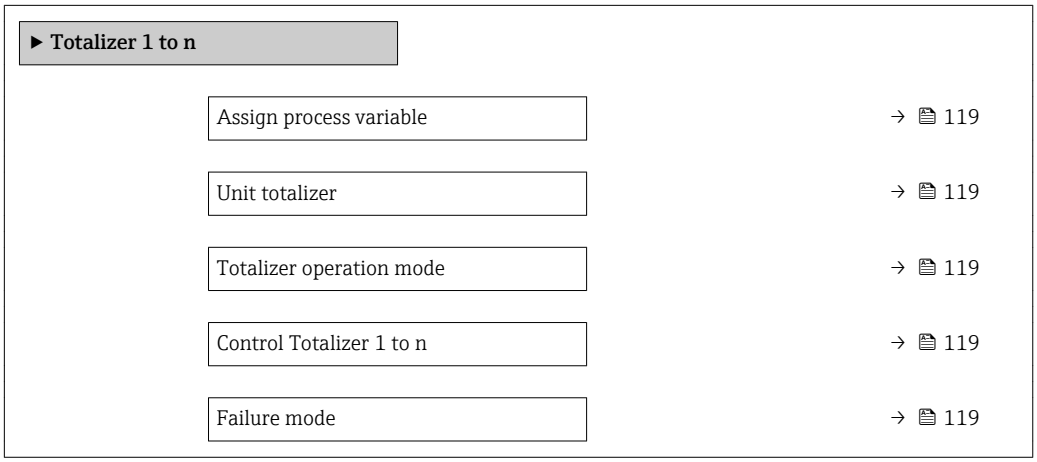
| Parameter | Description | Selection / User interface | Factory setting |
|---|---|---|---|
| Zero point adjustment control | Start zero point adjustment. | ▪ Cancel<br>▪ Busy *<br>▪ Zero point adjust failure *<br>▪ Start * | Cancel |
| Progress | Shows the progress of the process. | 0 to 100 % | – |

* Visibility depends on order options or device settings

## 10.7.3 Configuring the totalizer

In the **"Totalizer 1 to n" submenu** the individual totalizer can be configured.

**Navigation**
"Setup" menu → Advanced setup → Totalizer 1 to n



## Parameter overview with brief description

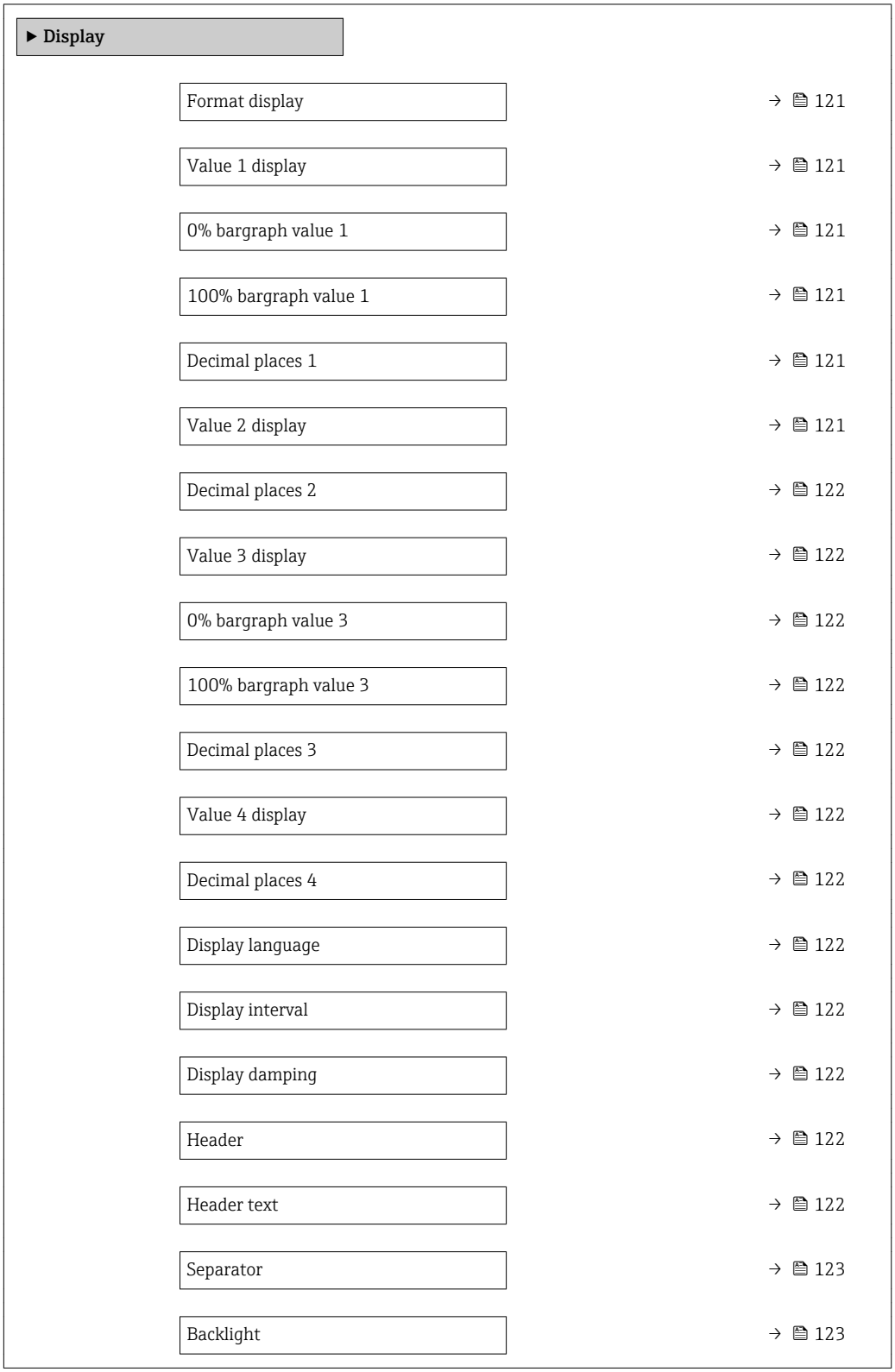
| Parameter | Description | Selection | Factory setting |
|---|---|---|---|
| Assign process variable | Select process variable for totalizer. | ▪ Mass flow<br>▪ Volume flow<br>▪ Corrected volume flow *<br>▪ Target mass flow *<br>▪ Carrier mass flow *<br>▪ Target volume flow *<br>▪ Carrier volume flow *<br>▪ Target corrected volume flow *<br>▪ Carrier corrected volume flow * | Mass flow |
| Unit totalizer | Select the unit for the process variable of the totalizer. | Unit choose list | Country-specific:<br>▪ kg<br>▪ lb |
| Control Totalizer 1 to n | Control totalizer value. | ▪ Totalize<br>▪ Reset + hold<br>▪ Preset + hold | Totalize |
| Totalizer operation mode | Select totalizer calculation mode. | ▪ Net flow total<br>▪ Forward flow total<br>▪ Reverse flow total<br>▪ Last valid value | Net flow total |
| Failure mode | Define the totalizer behavior in the event of a device alarm. | ▪ Stop<br>▪ Actual value<br>▪ Last valid value | Actual value |

* Visibility depends on order options or device settings

### 10.7.4 Carrying out additional display configurations

In the **Display** submenu you can set all the parameters associated with the configuration of the local display.

**Navigation**
"Setup" menu → Advanced setup → Display



## Parameter overview with brief description

| Parameter | Prerequisite | Description | Selection / User entry | Factory setting |
|---|---|---|---|---|
| Format display | A local display is provided. | Select how measured values are shown on the display. | ▪ 1 value, max. size<br>▪ 1 bargraph + 1 value<br>▪ 2 values<br>▪ 1 value large + 2 values<br>▪ 4 values | 1 value, max. size |
| Value 1 display | A local display is provided. | Select the measured value that is shown on the local display. | ▪ Mass flow<br>▪ Volume flow<br>▪ Corrected volume flow *<br>▪ Target mass flow *<br>▪ Carrier mass flow *<br>▪ Target volume flow *<br>▪ Carrier volume flow *<br>▪ Target corrected volume flow *<br>▪ Carrier corrected volume flow *<br>▪ Density<br>▪ Reference density *<br>▪ Concentration *<br>▪ Temperature<br>▪ Carrier pipe temperature *<br>▪ Electronic temperature<br>▪ Oscillation frequency 0<br>▪ Oscillation amplitude 0 *<br>▪ Frequency fluctuation 0 *<br>▪ Oscillation damping 0 *<br>▪ Oscillation damping fluctuation 0 *<br>▪ Signal asymmetry *<br>▪ Exciter current 0 *<br>▪ Totalizer 1<br>▪ Totalizer 2<br>▪ Totalizer 3<br>▪ Current output 1 *<br>▪ Pressure | Mass flow |
| 0% bargraph value 1 | A local display is provided. | Enter 0% value for bar graph display. | Signed floating-point number | Country-specific:<br>▪ 0 kg/h<br>▪ 0 lb/min |
| 100% bargraph value 1 | A local display is provided. | Enter 100% value for bar graph display. | Signed floating-point number | Depends on country and nominal diameter |
| Decimal places 1 | A measured value is specified in the **Value 1 display** parameter. | Select the number of decimal places for the display value. | ▪ x<br>▪ x.x<br>▪ x.xx<br>▪ x.xxx<br>▪ x.xxxx | x.xx |
| Value 2 display | A local display is provided. | Select the measured value that is shown on the local display. | For the picklist, see the **Value 1 display** parameter (→ 🖹 111) | None |

| Parameter | Prerequisite | Description | Selection / User entry | Factory setting |
|---|---|---|---|---|
| Decimal places 2 | A measured value is specified in the **Value 2 display** parameter. | Select the number of decimal places for the display value. | ▪ x<br>▪ x.x<br>▪ x.xx<br>▪ x.xxx<br>▪ x.xxxx | x.xx |
| Value 3 display | A local display is provided. | Select the measured value that is shown on the local display. | For the picklist, see the **Value 1 display** parameter (→ 🖹 111) | None |
| 0% bargraph value 3 | A selection was made in the **Value 3 display** parameter. | Enter 0% value for bar graph display. | Signed floating-point number | Country-specific:<br>▪ 0 kg/h<br>▪ 0 lb/min |
| 100% bargraph value 3 | A selection was made in the **Value 3 display** parameter. | Enter 100% value for bar graph display. | Signed floating-point number | 0 |
| Decimal places 3 | A measured value is specified in the **Value 3 display** parameter. | Select the number of decimal places for the display value. | ▪ x<br>▪ x.x<br>▪ x.xx<br>▪ x.xxx<br>▪ x.xxxx | x.xx |
| Value 4 display | A local display is provided. | Select the measured value that is shown on the local display. | For the picklist, see the **Value 1 display** parameter (→ 🖹 111) | None |
| Decimal places 4 | A measured value is specified in the **Value 4 display** parameter. | Select the number of decimal places for the display value. | ▪ x<br>▪ x.x<br>▪ x.xx<br>▪ x.xxx<br>▪ x.xxxx | x.xx |
| Display language | A local display is provided. | Set display language. | ▪ English<br>▪ Deutsch<br>▪ Français<br>▪ Español<br>▪ Italiano<br>▪ Nederlands<br>▪ Portuguesa<br>▪ Polski<br>▪ русский язык (Russian)<br>▪ Svenska<br>▪ Türkçe<br>▪ 中文 (Chinese)<br>▪ 日本語 (Japanese)<br>▪ 한국어 (Korean)<br>▪ Bahasa Indonesia<br>▪ tiếng Việt (Vietnamese)<br>▪ čeština (Czech) | English (alternatively, the ordered language is preset in the device) |
| Display interval | A local display is provided. | Set time measured values are shown on display if display alternates between values. | 1 to 10 s | 5 s |
| Display damping | A local display is provided. | Set display reaction time to fluctuations in the measured value. | 0.0 to 999.9 s | 0.0 s |
| Header | A local display is provided. | Select header contents on local display. | ▪ Device tag<br>▪ Free text | Device tag |
| Header text | In the **Header** parameter, the **Free text** option is selected. | Enter display header text. | Max. 12 characters such as letters, numbers or special characters (e.g. @, %, /) | ---------- |

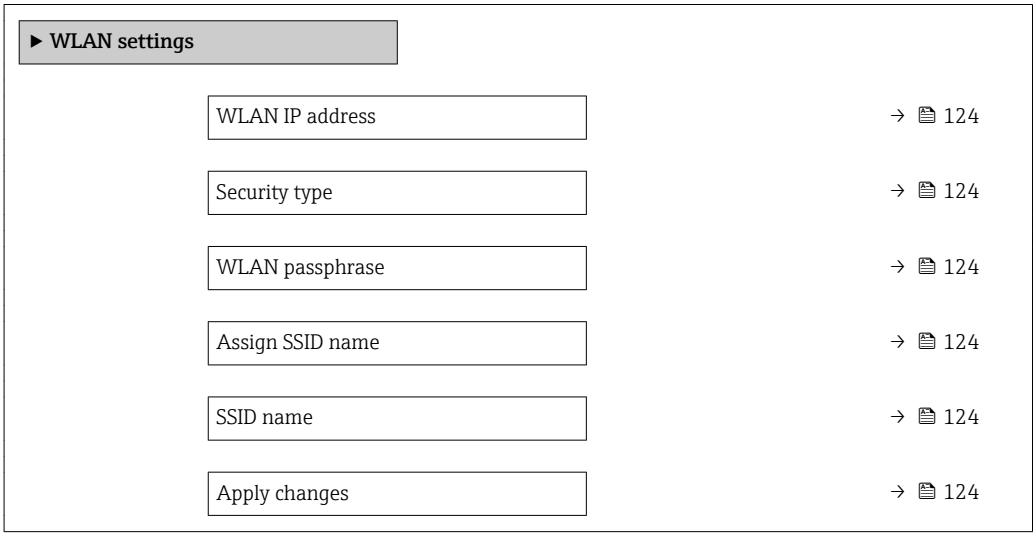
| Parameter | Prerequisite | Description | Selection / User entry | Factory setting |
|---|---|---|---|---|
| Separator | A local display is provided. | Select decimal separator for displaying numerical values. | ▪ . (point)<br>▪ , (comma) | . (point) |
| Backlight | One of the following conditions is met:<br>▪ Order code for "Display; operation", option **F** "4-line, illum.; touch control"<br>▪ Order code for "Display; operation", option **G** "4-line, illum.; touch control +WLAN"<br>▪ Order code for "Display; operation", option **O** "Separate 4-line display, illum.; 10m/30ft cable; touch control" | Switch the local display backlight on and off. | ▪ Disable<br>▪ Enable | Enable |

* Visibility depends on order options or device settings

## 10.7.5 WLAN configuration

The **WLAN Settings** submenu guides the user systematically through all the parameters that have to be set for the WLAN configuration.

**Navigation**
"Setup" menu → Advanced setup → WLAN Settings



**Parameter overview with brief description**

| Parameter | Prerequisite | Description | User entry / Selection | Factory setting |
|---|---|---|---|---|
| WLAN IP address | – | Enter IP address of the device WLAN interface. | 4 octet: 0 to 255 (in the particular octet) | 192.168.1.212 |
| Network security | – | Select the security type of the WLAN network. | ▪ Unsecured<br>▪ WPA2-PSK<br>▪ EAP-PEAP with MSCHAPv2 *<br>▪ EAP-PEAP MSCHAPv2 no server authentic. *<br>▪ EAP-TLS * | WPA2-PSK |
| WLAN passphrase | The **WPA2-PSK** option is selected in the **Security type** parameter. | Enter the network key (8 to 32 characters).<br>The network key supplied with the device should be changed during commissioning for security reasons. | 8 to 32-digit character string comprising numbers, letters and special characters | Serial number of the measuring device (e.g. L100A802000) |
| Assign SSID name | – | Select which name will be used for SSID: device tag or user-defined name. | ▪ Device tag<br>▪ User-defined | User-defined |
| SSID name | ▪ The **User-defined** option is selected in the **Assign SSID name** parameter parameter.<br>▪ The **WLAN access point** option is selected in the **WLAN mode** parameter parameter. | Enter the user-defined SSID name (max. 32 characters).<br>The user-defined SSID name may only be assigned once. If the SSID name is assigned more than once, the devices can interfere with one another. | Max. 32-digit character string comprising numbers, letters and special characters | EH_device designation_last 7 digits of the serial number (e.g. EH_Promass_300_A802000) |
| Apply changes | – | Use changed WLAN settings. | ▪ Cancel<br>▪ Ok | Cancel |

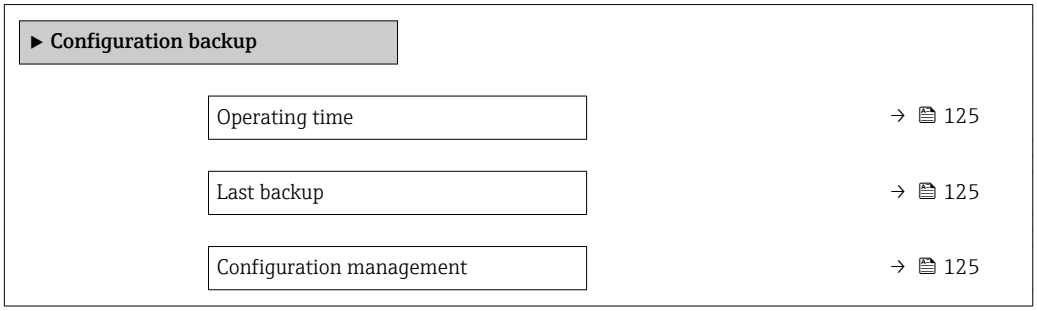
* Visibility depends on order options or device settings

## 10.7.6 Configuration management

After commissioning, you can save the current device configurationor restore the previous device configuration.

You can do so using the **Configuration management** parameter and the related options found in the **Configuration backup** submenu.

**Navigation**
"Setup" menu → Advanced setup → Configuration backup



| | |
|---|---|
| Backup state | → 125 |
| Comparison result | → 125 |

### Parameter overview with brief description

| Parameter | Description | User interface / Selection | Factory setting |
|---|---|---|---|
| Operating time | Indicates how long the device has been in operation. | Days (d), hours (h), minutes (m) and seconds (s) | – |
| Last backup | Shows when the last data backup was saved to HistoROM backup. | Days (d), hours (h), minutes (m) and seconds (s) | – |
| Configuration management | Select action for managing the device data in the HistoROM backup. | ▪ Cancel<br>▪ Execute backup<br>▪ Restore *<br>▪ Compare *<br>▪ Clear backup data | Cancel |
| Backup state | Shows the current status of data saving or restoring. | ▪ None<br>▪ Backup in progress<br>▪ Restoring in progress<br>▪ Delete in progress<br>▪ Compare in progress<br>▪ Restoring failed<br>▪ Backup failed | None |
| Comparison result | Comparison of current device data with HistoROM backup. | ▪ Settings identical<br>▪ Settings not identical<br>▪ No backup available<br>▪ Backup settings corrupt<br>▪ Check not done<br>▪ Dataset incompatible | Check not done |

* Visibility depends on order options or device settings

### Function scope of the "Configuration management" parameter

| Options | Description |
|---|---|
| Cancel | No action is executed and the user exits the parameter. |
| Execute backup | A backup copy of the current device configuration is saved from the HistoROM backup to the memory of the device. The backup copy includes the transmitter data of the device. |
| Restore | The last backup copy of the device configuration is restored from the device memory to the device's HistoROM backup. The backup copy includes the transmitter data of the device. |
| Compare | The device configuration saved in the device memory is compared with the current device configuration of the HistoROM backup. |
| Clear backup data | The backup copy of the device configuration is deleted from the memory of the device. |

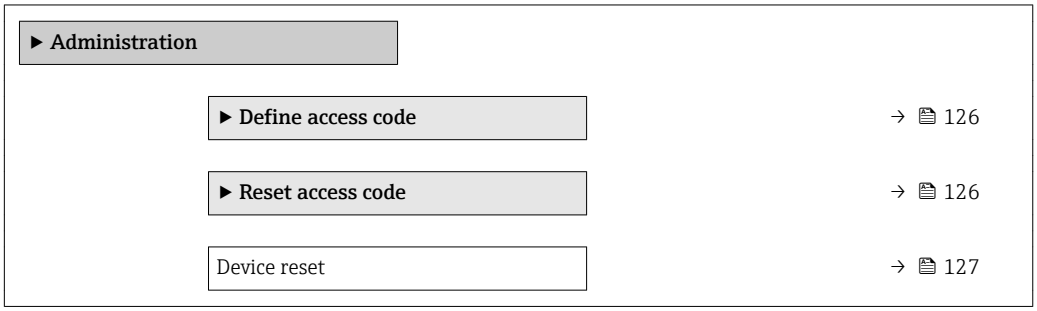
*HistoROM backup*
A HistoROM is a "non-volatile" device memory in the form of an EEPROM.

While this action is in progress, the configuration cannot be edited via the local display and a message on the processing status appears on the display.

### 10.7.7 Using parameters for device administration

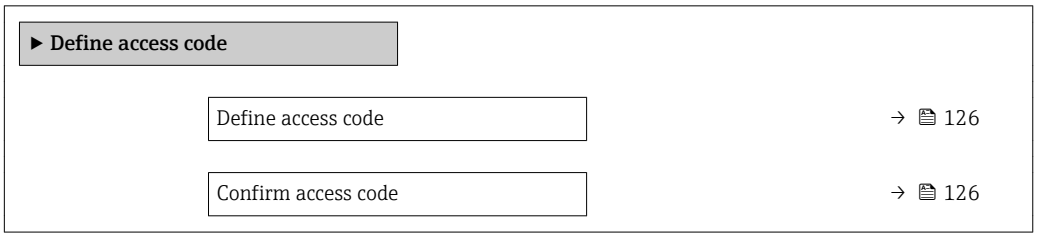
The **Administration** submenu systematically guides the user through all the parameters that can be used for device administration purposes.

**Navigation**
"Setup" menu → Advanced setup → Administration




#### Using the parameter to define the access code

**Navigation**
"Setup" menu → Advanced setup → Administration → Define access code

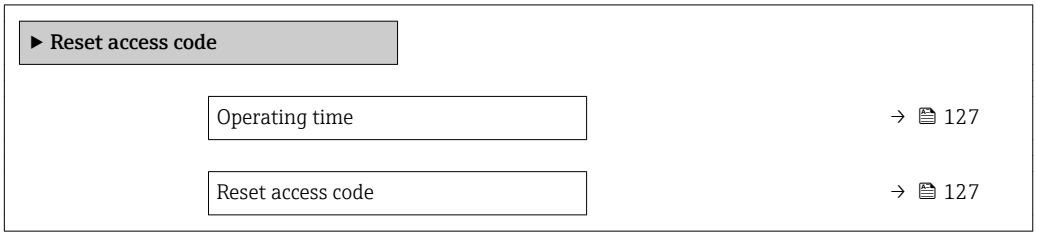



#### Parameter overview with brief description

| Parameter | Description | User entry |
|---|---|---|
| Define access code | Restrict write-access to parameters to protect the configuration of the device against unintentional changes. | Max. 16-digit character string comprising numbers, letters and special characters |
| Confirm access code | Confirm the entered access code. | Max. 16-digit character string comprising numbers, letters and special characters |

#### Using the parameter to reset the access code

**Navigation**
"Setup" menu → Advanced setup → Administration → Reset access code



### Parameter overview with brief description

| Parameter | Description | User interface / User entry | Factory setting |
|---|---|---|---|
| Operating time | Indicates how long the device has been in operation. | Days (d), hours (h), minutes (m) and seconds (s) | – |
| Reset access code | Reset access code to factory settings.<br>For a reset code, contact your Endress+Hauser service organization.<br>The reset code can only be entered via:<br>▪ Web browser<br>▪ DeviceCare, FieldCare (via service interface CDI-RJ45)<br>▪ Fieldbus | Character string comprising numbers, letters and special characters | 0x00 |

### Using the parameter to reset the device

**Navigation**
"Setup" menu → Advanced setup → Administration

### Parameter overview with brief description

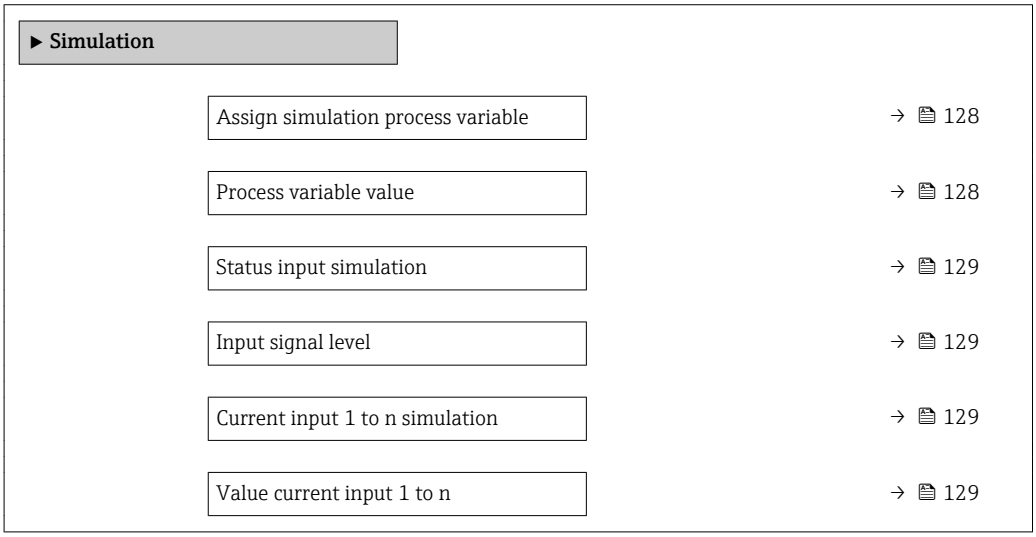
| Parameter | Description | Selection | Factory setting |
|---|---|---|---|
| Device reset | Reset the device configuration - either entirely or in part - to a defined state. | ▪ Cancel<br>▪ To delivery settings<br>▪ Restart device<br>▪ Restore S-DAT backup * | Cancel |

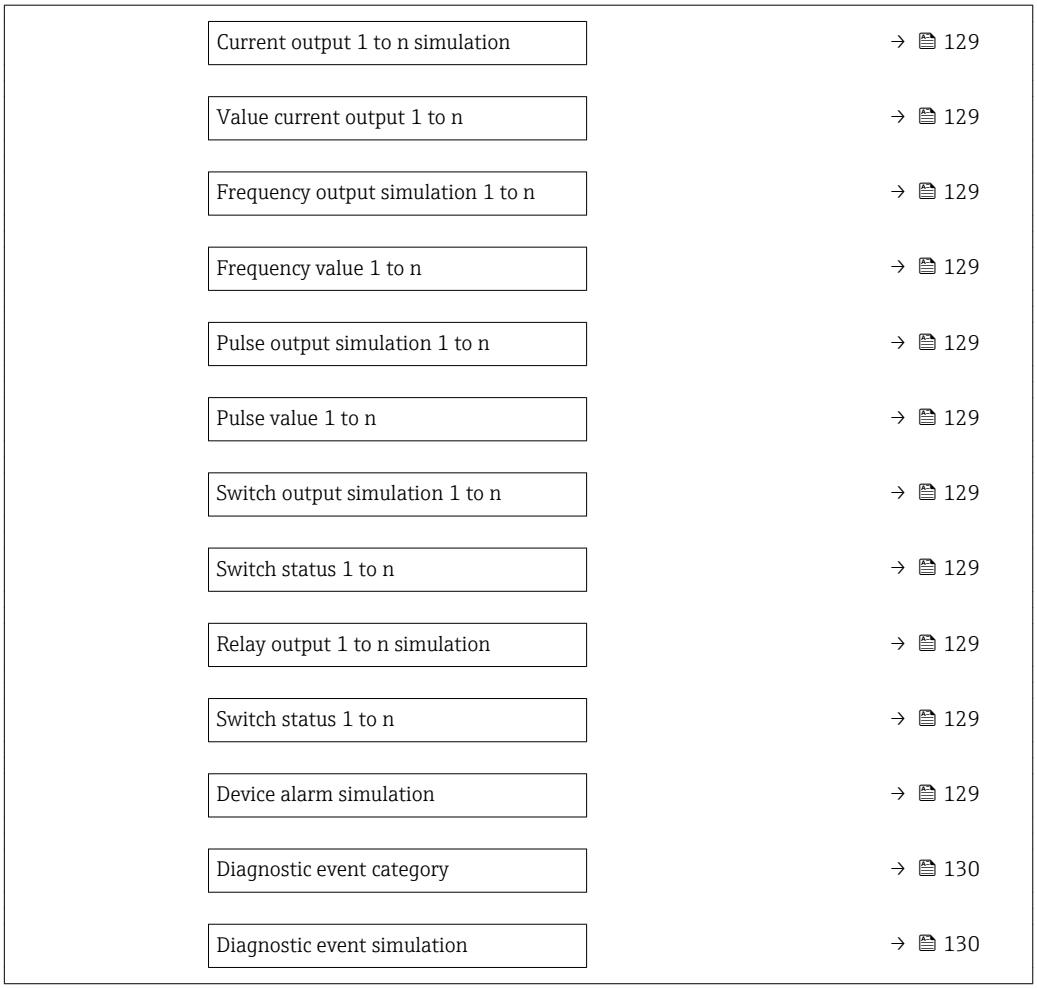
* Visibility depends on order options or device settings

## 10.8 Simulation

The **Simulation** submenu enables you to simulate, without a real flow situation, various process variables in the process and the device alarm mode and to verify downstream signal chains (switching valves or closed-control loops).

**Navigation**
"Diagnostics" menu → Simulation






### Parameter overview with brief description

| Parameter | Prerequisite | Description | Selection / User entry / User interface | Factory setting |
|---|---|---|---|---|
| Assign simulation process variable | – | Select a process variable for the simulation process that is activated. | ▪ Off<br>▪ Mass flow<br>▪ Volume flow<br>▪ Corrected volume flow *<br>▪ Target mass flow *<br>▪ Carrier mass flow *<br>▪ Target volume flow *<br>▪ Carrier volume flow *<br>▪ Target corrected volume flow *<br>▪ Carrier corrected volume flow *<br>▪ Density<br>▪ Reference density *<br>▪ Temperature<br>▪ Concentration * | Off |
| Process variable value | A process variable is selected in the **Assign simulation process variable** parameter (→ 128). | Enter the simulation value for the selected process variable. | Depends on the process variable selected | 0 |

| Parameter | Prerequisite | Description | Selection / User entry / User interface | Factory setting |
|---|---|---|---|---|
| Status input simulation | – | Switch simulation of the status input on and off. | ▪ Off<br>▪ On | Off |
| Input signal level | In the **Status input simulation** parameter, the **On** option is selected. | Select the signal level for the simulation of the status input. | ▪ High<br>▪ Low | High |
| Current input 1 to n simulation | – | Switch simulation of the current input on and off. | ▪ Off<br>▪ On | Off |
| Value current input 1 to n | In the **Current input 1 to n simulation** parameter, the **On** option is selected. | Enter the current value for simulation. | 0 to 22.5 mA | 0 mA |
| Current output 1 to n simulation | – | Switch the simulation of the current output on and off. | ▪ Off<br>▪ On | Off |
| Value current output 1 to n | In the **Current output 1 to n simulation** parameter, the **On** option is selected. | Enter the current value for simulation. | 3.59 to 22.5 mA | 3.59 mA |
| Frequency output simulation 1 to n | In the **Operating mode** parameter, the **Frequency** option is selected. | Switch the simulation of the frequency output on and off. | ▪ Off<br>▪ On | Off |
| Frequency value 1 to n | In the **Frequency output simulation 1 to n** parameter, the **On** option is selected. | Enter the frequency value for the simulation. | 0.0 to 12 500.0 Hz | 0.0 Hz |
| Pulse output simulation 1 to n | In the **Operating mode** parameter, the **Pulse** option is selected. | Set and switch off the pulse output simulation.<br>For **Fixed value** option: **Pulse width** parameter (→ 102) defines the pulse width of the pulses output. | ▪ Off<br>▪ Fixed value<br>▪ Down-counting value | Off |
| Pulse value 1 to n | In the **Pulse output simulation 1 to n** parameter, the **Down-counting value** option is selected. | Enter the number of pulses for simulation. | 0 to 65 535 | 0 |
| Switch output simulation 1 to n | In the **Operating mode** parameter, the **Switch** option is selected. | Switch the simulation of the switch output on and off. | ▪ Off<br>▪ On | Off |
| Switch status 1 to n | – | Select the status of the status output for the simulation. | ▪ Open<br>▪ Closed | Open |
| Relay output 1 to n simulation | – | Switch simulation of the relay output on and off. | ▪ Off<br>▪ On | Off |
| Switch status 1 to n | The **On** option is selected in the **Switch output simulation 1 to n** parameter parameter. | Select status of the relay output for the simulation. | ▪ Open<br>▪ Closed | Open |
| Pulse output simulation | – | Set and switch off the pulse output simulation.<br>For **Fixed value** option: **Pulse width** parameter defines the pulse width of the pulses output. | ▪ Off<br>▪ Fixed value<br>▪ Down-counting value | Off |
| Pulse value | In the **Pulse output simulation** parameter, the **Down-counting value** option is selected. | Set and switch off the pulse output simulation. | 0 to 65 535 | 0 |
| Device alarm simulation | – | Switch the device alarm on and off. | ▪ Off<br>▪ On | Off |

| Parameter | Prerequisite | Description | Selection / User entry / User interface | Factory setting |
|---|---|---|---|---|
| Diagnostic event category | – | Select a diagnostic event category. | ▪ Sensor<br>▪ Electronics<br>▪ Configuration<br>▪ Process | Process |
| Diagnostic event simulation | – | Select a diagnostic event to simulate this event. | ▪ Off<br>▪ Diagnostic event picklist (depends on the category selected) | Off |
| Logging interval | – | Define the logging interval tlog for data logging. This value defines the time interval between the individual data points in the memory. | 1.0 to 3 600.0 s | – |

* Visibility depends on order options or device settings

## 10.9 Protecting settings from unauthorized access

The following write protection options exist in order to protect the configuration of the measuring device from unintentional modification:
- Protect access to parameters via access code → 130
- Protect access to local operation via key locking → 60
- Protect access to measuring device via write protection switch → 131

### 10.9.1 Write protection via access code

The effects of the user-specific access code are as follows:
- Via local operation, the parameters for the measuring device configuration are write-protected and their values can no longer be changed.
- Device access is protected via the Web browser, as are the parameters for the measuring device configuration.
- Device access is protected via FieldCare or DeviceCare (via CDI-RJ45 service interface), as are the parameters for the measuring device configuration.

#### Defining the access code via local display

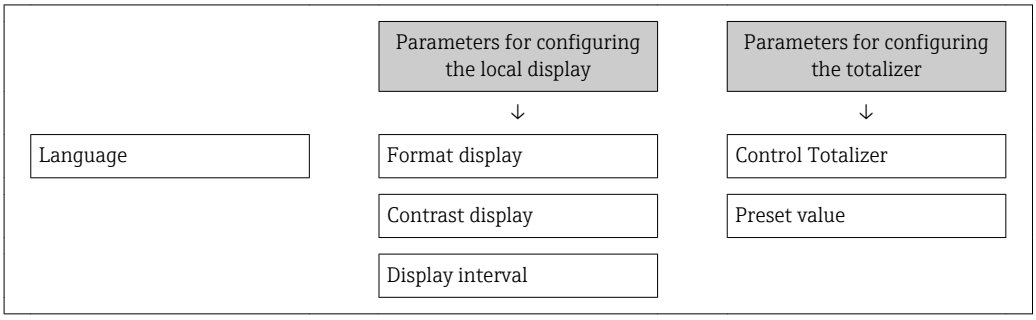
1. Navigate to the **Define access code** parameter (→ 126).
2. Define a max. 16-digit character string comprising numbers, letters and special characters as the access code.
3. Enter the access code again in the **Confirm access code** parameter (→ 126) to confirm the code.
   ↳ The -symbol appears in front of all write-protected parameters.

The device automatically locks the write-protected parameters again if a key is not pressed for 10 minutes in the navigation and editing view. The device locks the write-protected parameters automatically after 60 s if the user skips back to the operational display mode from the navigation and editing view.

- If parameter write protection is activated via an access code, it can also only be deactivated via this access code → 59.
- The user role with which the user is currently logged on via the local display is indicated by the → 59 **Access status** parameter. Navigation path: Operation → Access status

### Parameters which can always be modified via the local display

Certain parameters that do not affect the measurement are excepted from parameter write protection via the local display. Despite the user-specific access code, they can always be modified, even if the other parameters are locked.




### Defining the access code via the Web browser

1. Navigate to the **Define access code** parameter (→ 126).
2. Define a max. 16-digit numeric code as an access code.
3. Enter the access code again in the **Confirm access code** parameter (→ 126) to confirm the code.
   ↳ The Web browser switches to the login page.

If no action is performed for 10 minutes, the Web browser automatically returns to the login page.

- If parameter write protection is activated via an access code, it can also only be deactivated via this access code → 59.
- The user role with which the user is currently logged on via Web browser is indicated by the **Access status** parameter. Navigation path: Operation → Access status

### Resetting the access code

If you misplace the user-specific access code, it is possible to reset the code to the factory setting. A reset code must be entered for this purpose. The user-specific access code can then be defined again afterwards.

### Via Web browser, FieldCare, DeviceCare (via CDI-RJ45 service interface), fieldbus

For a reset code, contact your Endress+Hauser service organization.

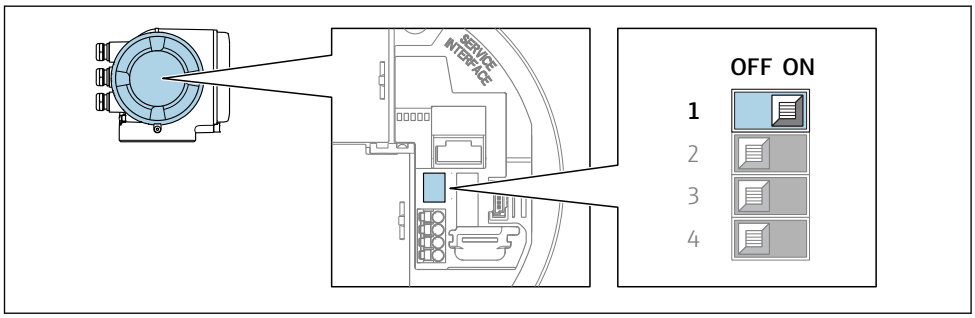
1. Navigate to the **Reset access code** parameter (→ 127).
2. Enter the reset code.
   ↳ The access code has been reset to the factory setting **0000**. It can be redefined → 130.

## 10.9.2 Write protection via write protection switch

Unlike parameter write protection via a user-specific access code, this allows write access to the entire operating menu - except for the **"Contrast display" parameter** - to be locked.

The parameter values are now read only and cannot be edited any more (exception **"Contrast display" parameter**):
- Via local display
- Via PROFIBUS PA protocol

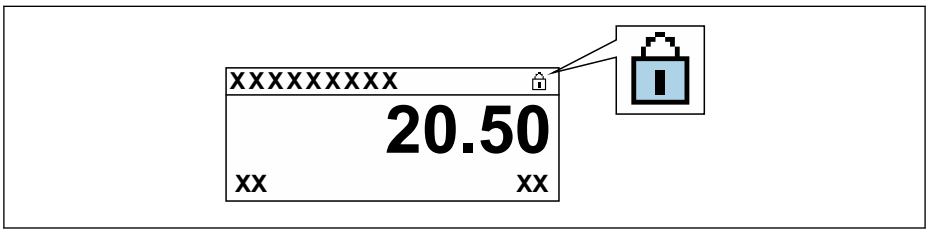
1.




A0029630

Setting the write protection (WP) switch on the main electronics module to the **ON** position enables hardware write protection.

↳ In the **Locking status** parameter the **Hardware locked** option is displayed → 133. In addition, on the local display the -symbol appears in front of the parameters in the header of the operational display and in the navigation view.




A0029425

2. Setting the write protection (WP) switch on the main electronics module to the **OFF** position (factory setting) disables hardware write protection.

↳ No option is displayed in the **Locking status** parameter → 133. On the local display, the -symbol disappears from in front of the parameters in the header of the operational display and in the navigation view.

# 11 Operation

## 11.1 Reading the device locking status

Device active write protection: **Locking status** parameter

Operation → Locking status

*Function scope of the "Locking status" parameter*

| Options | Description |
|---|---|
| None | The access status displayed in the **Access status** parameter applies → 59. Only appears on local display. |
| Hardware locked | The DIP switch for hardware locking is activated on the PCB board. This locks write access to the parameters (e.g. via local display or operating tool) . |
| Temporarily locked | Write access to the parameters is temporarily locked on account of internal processes running in the device (e.g. data upload/download, reset etc.). Once the internal processing has been completed, the parameters can be changed once again. |

## 11.2 Adjusting the operating language

Detailed information:
- To configure the operating language → 85
- For information on the operating languages supported by the measuring device → 242

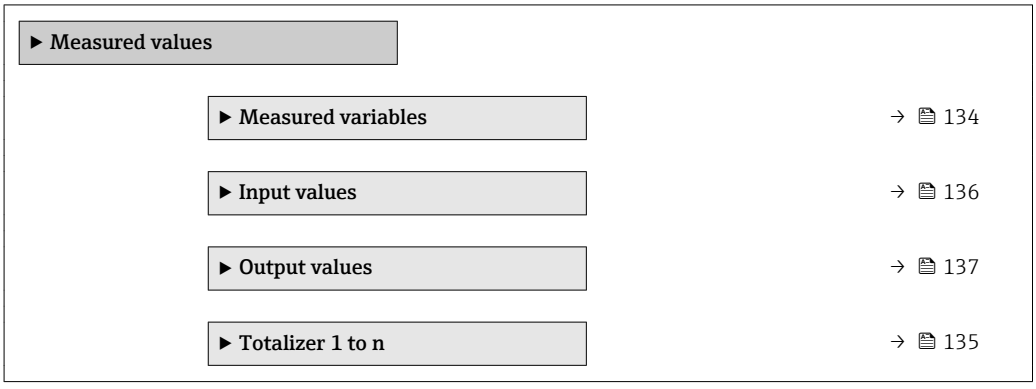
## 11.3 Configuring the display

Detailed information:
- On the basic settings for the local display → 110
- On the advanced settings for the local display → 120

## 11.4 Reading measured values

With the **Measured values** submenu, it is possible to read all the measured values.

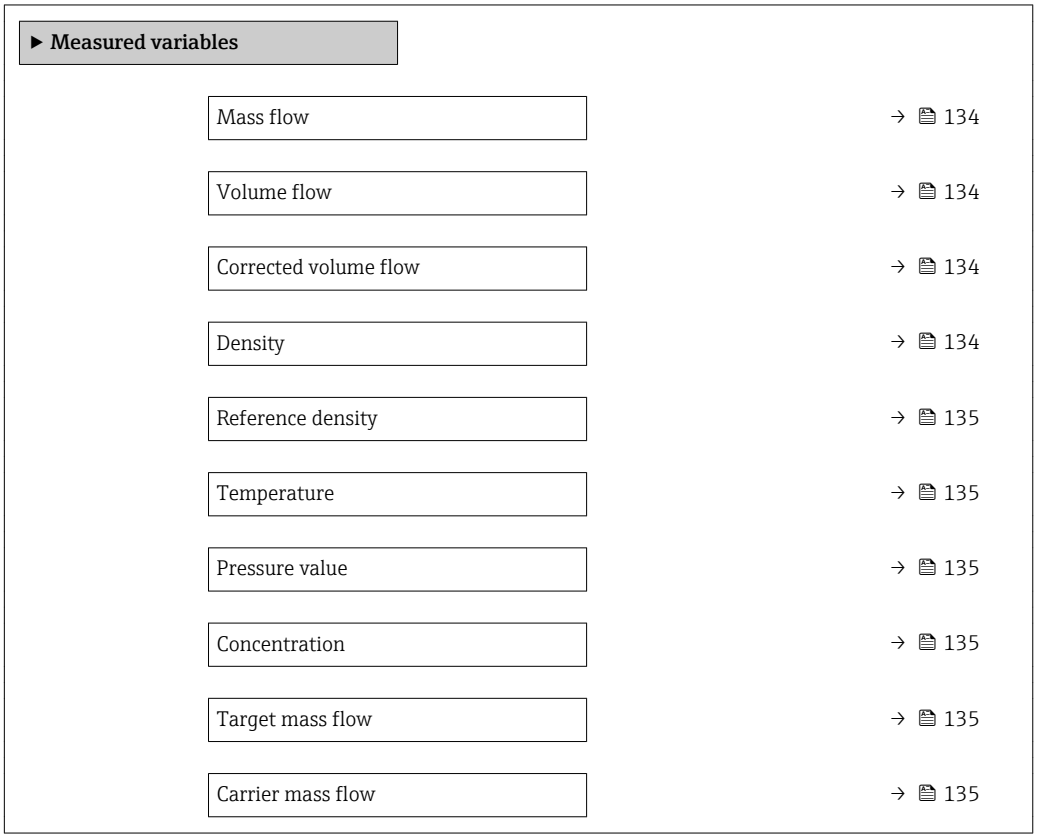
**Navigation**
"Diagnostics" menu → Measured values



### 11.4.1 "Measured variables" submenu

The **Measured variables** submenu contains all the parameters needed to display the current measured values for each process variable.

**Navigation**
"Diagnostics" menu → Measured values → Measured variables




**Parameter overview with brief description**

| Parameter | Prerequisite | Description | User interface |
|---|---|---|---|
| Mass flow | – | Displays the mass flow currently measured.<br>*Dependency*<br>The unit is taken from the **Mass flow unit** parameter (→ 89). | Signed floating-point number |
| Volume flow | – | Displays the volume flow currently calculated.<br>*Dependency*<br>The unit is taken from the **Volume flow unit** parameter (→ 89). | Signed floating-point number |
| Corrected volume flow | – | Displays the corrected volume flow currently calculated.<br>*Dependency*<br>The unit is taken from the **Corrected volume flow unit** parameter (→ 89). | Signed floating-point number |
| Density | – | Shows the density currently measured.<br>*Dependency*<br>The unit is taken from the **Density unit** parameter (→ 89). | Signed floating-point number |

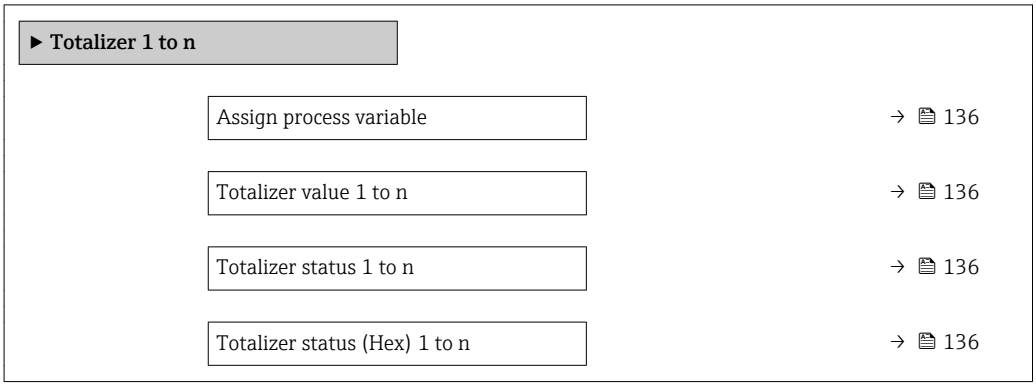
| Parameter | Prerequisite | Description | User interface |
|---|---|---|---|
| Reference density | – | Displays the reference density currently calculated.<br>*Dependency*<br>The unit is taken from the **Reference density unit** parameter (→ 🖹 89). | Signed floating-point number |
| Temperature | – | Shows the medium temperature currently measured.<br>*Dependency*<br>The unit is taken from the **Temperature unit** parameter (→ 🖹 90). | Signed floating-point number |
| Pressure value | – | Displays either a fixed or external pressure value.<br>*Dependency*<br>The unit is taken from the **Pressure unit** parameter (→ 🖹 90). | Signed floating-point number |
| Concentration | For the following order code:<br>Order code for "Application package", option **ED** "Concentration"<br>The software options currently enabled are displayed in the **Software option overview** parameter. | Displays the concentration currently calculated.<br>*Dependency*<br>The unit is taken from the **Concentration unit** parameter. | Signed floating-point number |
| Target mass flow | With the following conditions:<br>Order code for "Application package", option **ED** "Concentration"<br>The software options currently enabled are displayed in the **Software option overview** parameter. | Displays the mass flow currently measured for the target medium.<br>*Dependency*<br>The unit is taken from the **Mass flow unit** parameter (→ 🖹 89). | Signed floating-point number |
| Carrier mass flow | With the following conditions:<br>Order code for "Application package", option **ED** "Concentration"<br>The software options currently enabled are displayed in the **Software option overview** parameter. | Displays the mass flow currently measured for the carrier medium.<br>*Dependency*<br>The unit is taken from the **Mass flow unit** parameter (→ 🖹 89). | Signed floating-point number |

## 11.4.2 Totalizer

The **Totalizer** submenu contains all the parameters needed to display the current measured values for every totalizer.

### Navigation

"Diagnostics" menu → Measured values → Totalizer 1 to n



**Parameter overview with brief description**

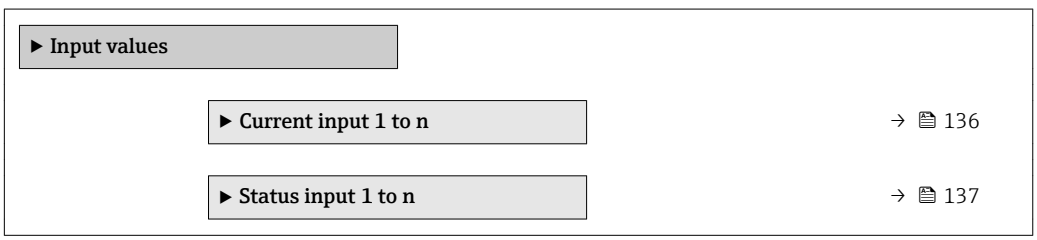
| Parameter | Prerequisite | Description | Selection / User entry / User interface | Factory setting |
|---|---|---|---|---|
| Assign process variable | – | Select process variable for totalizer. | ▪ Mass flow<br>▪ Volume flow<br>▪ Corrected volume flow *<br>▪ Target mass flow *<br>▪ Carrier mass flow *<br>▪ Target volume flow *<br>▪ Carrier volume flow *<br>▪ Target corrected volume flow *<br>▪ Carrier corrected volume flow * | Mass flow |
| Totalizer value 1 to n | In the **Assign process variable** parameter one of the following options is selected:<br>▪ Volume flow<br>▪ Mass flow<br>▪ Corrected volume flow<br>▪ Total mass flow<br>▪ Condensate mass flow<br>▪ Energy flow<br>▪ Heat flow difference | Displays the current totalizer counter value. | Signed floating-point number | 0 kg |
| Totalizer status 1 to n | – | Displays the current totalizer status. | ▪ Good<br>▪ Uncertain<br>▪ Bad | – |
| Totalizer status (Hex) 1 to n | In **Target mode** parameter, the **Auto** option is selected. | Displays the current status value (hex) of the totalizer. | 0 to 0xFF | – |

* Visibility depends on order options or device settings

## 11.4.3 "Input values" submenu

The **Input values** submenu guides you systematically to the individual input values.

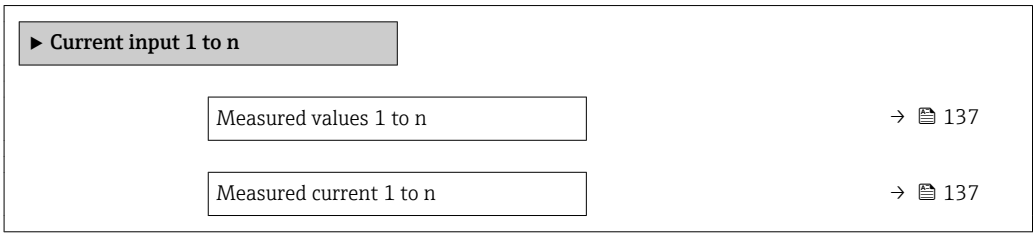
**Navigation**
"Diagnostics" menu → Measured values → Input values




**Input values of current input**

The **Current input 1 to n** submenu contains all the parameters needed to display the current measured values for every current input.

**Navigation**
"Diagnostics" menu → Measured values → Input values → Current input 1 to n



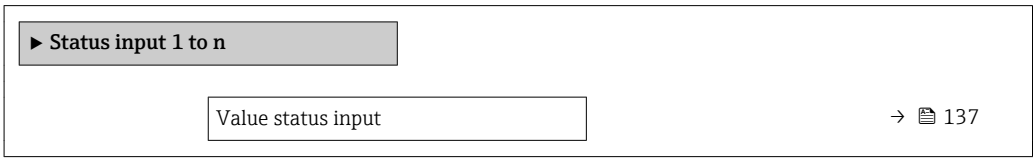

**Parameter overview with brief description**

| Parameter | Description | User interface |
|---|---|---|
| Measured values 1 to n | Displays the current input value. | Signed floating-point number |
| Measured current 1 to n | Displays the current value of the current input. | 0 to 22.5 mA |

**Input values of status input**

The **Status input 1 to n** submenu contains all the parameters needed to display the current measured values for every status input.

**Navigation**
"Diagnostics" menu → Measured values → Input values → Status input 1 to n



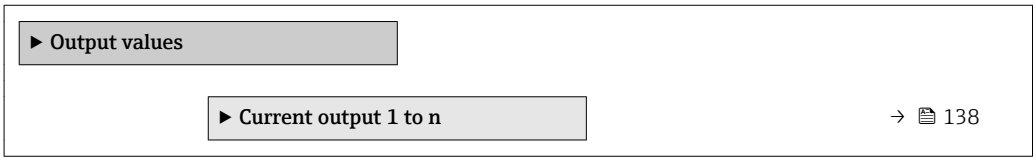

**Parameter overview with brief description**

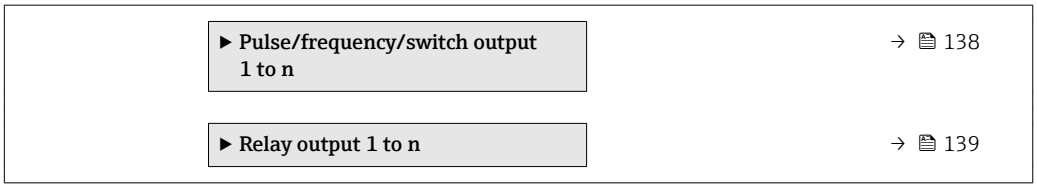
| Parameter | Description | User interface |
|---|---|---|
| Value status input | Shows the current input signal level. | ▪ High<br>▪ Low |

## 11.4.4 Output values

The **Output values** submenu contains all the parameters needed to display the current measured values for every output.

**Navigation**
"Diagnostics" menu → Measured values → Output values



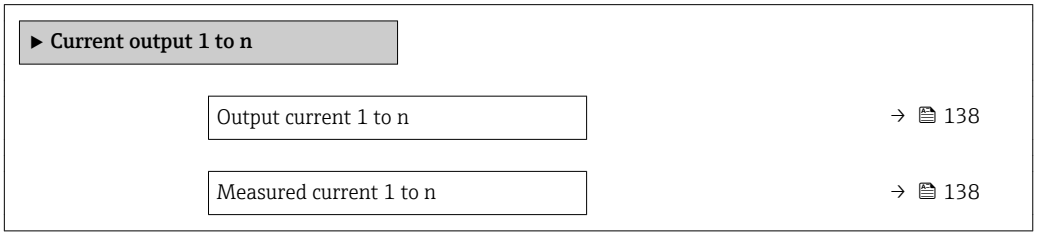



### Output values of current output

The **Value current output** submenu contains all the parameters needed to display the current measured values for every current output.

#### Navigation

"Diagnostics" menu → Measured values → Output values → Value current output 1 to n




### Parameter overview with brief description

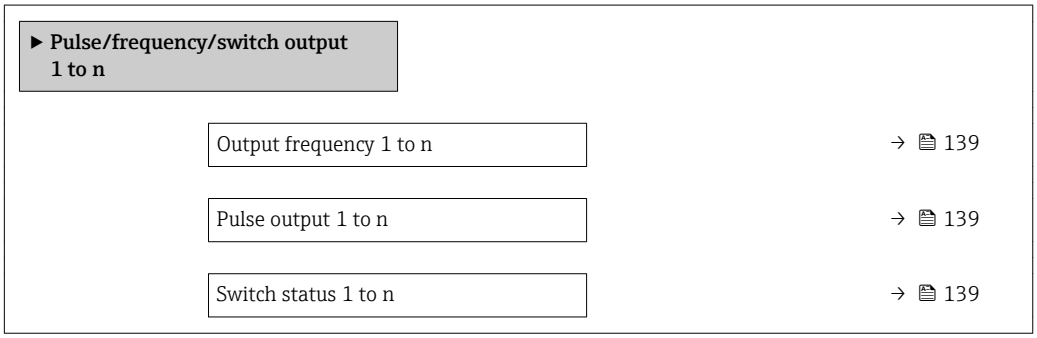
| Parameter | Description | User interface |
|---|---|---|
| Output current 1 | Displays the current value currently calculated for the current output. | 3.59 to 22.5 mA |
| Measured current | Displays the current value currently measured for the current output. | 0 to 30 mA |

### Output values for pulse/frequency/switch output

The **Pulse/frequency/switch output 1 to n** submenu contains all the parameters needed to display the current measured values for every pulse/frequency/switch output.

#### Navigation

"Diagnostics" menu → Measured values → Output values → Pulse/frequency/switch output 1 to n



### Parameter overview with brief description

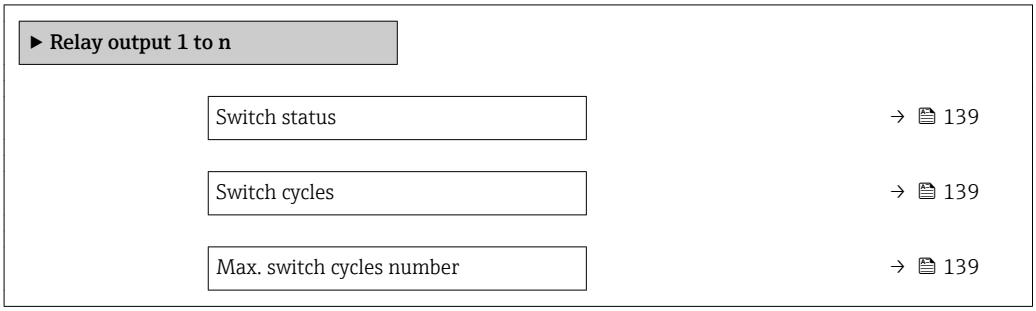
| Parameter | Prerequisite | Description | User interface |
|---|---|---|---|
| Output frequency 1 to n | In the **Operating mode** parameter, the **Frequency** option is selected. | Displays the value currently measured for the frequency output. | 0.0 to 12 500.0 Hz |
| Pulse output 1 to n | The **Pulse** option is selected in the **Operating mode** parameter parameter. | Displays the pulse frequency currently output. | Positive floating-point number |
| Switch status 1 to n | The **Switch** option is selected in the **Operating mode** parameter. | Displays the current switch output status. | ▪ Open<br>▪ Closed |

### Output values for relay output

The **Relay output 1 to n** submenu contains all the parameters needed to display the current measured values for every relay output.

### Navigation

"Diagnostics" menu → Measured values → Output values → Relay output 1 to n




### Parameter overview with brief description

| Parameter | Description | User interface |
|---|---|---|
| Switch status | Shows the current relay switch status. | ▪ Open<br>▪ Closed |
| Switch cycles | Shows number of all performed switch cycles. | Positive integer |
| Max. switch cycles number | Shows the maximal number of guaranteed switch cycles. | Positive integer |

## 11.5 Adapting the measuring device to the process conditions

The following are available for this purpose:
- Basic settings using the**Setup** menu (→ 86)
- Advanced settings using the**Advanced setup** submenu (→ 115)

## 11.6 Performing a totalizer reset

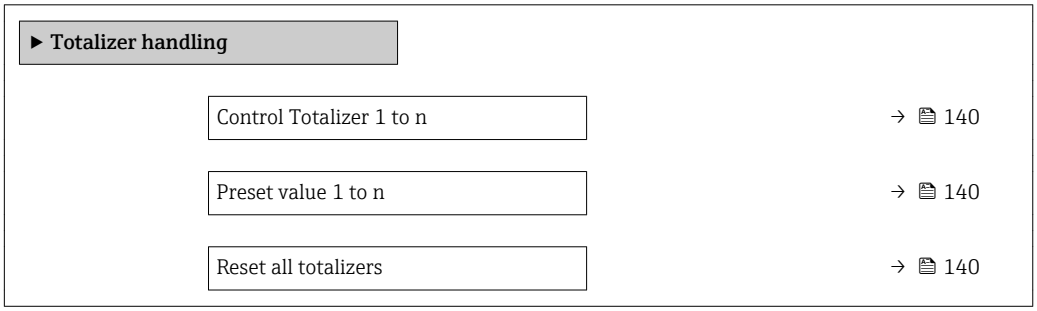
The totalizers are reset in the **Operation** submenu:
Control Totalizer

*Function scope of the "Control Totalizer " parameter*

| Options | Description |
|---|---|
| Totalize | The totalizer is started. |
| Reset + hold | The totaling process is stopped and the totalizer is reset to 0. |
| Preset + hold | The totaling process is stopped and the totalizer is set to its defined start value from the **Preset value 1 to n** parameter. |

### Navigation

"Operation" menu → Totalizer handling




### Parameter overview with brief description

| Parameter | Prerequisite | Description | Selection / User entry | Factory setting |
|---|---|---|---|---|
| Control Totalizer 1 to n | – | Control totalizer value. | ▪ Totalize<br>▪ Reset + hold<br>▪ Preset + hold | Totalize |
| Preset value 1 to n | In the **Assign process variable** parameter one of the following options is selected:<br>▪ Volume flow<br>▪ Mass flow<br>▪ Corrected volume flow<br>▪ Total mass flow<br>▪ Condensate mass flow<br>▪ Energy flow<br>▪ Heat flow difference | Specify start value for totalizer. | Signed floating-point number | 0 kg |
| Reset all totalizers | – | Reset all totalizers to 0 and start. | ▪ Cancel<br>▪ Reset + totalize | Cancel |

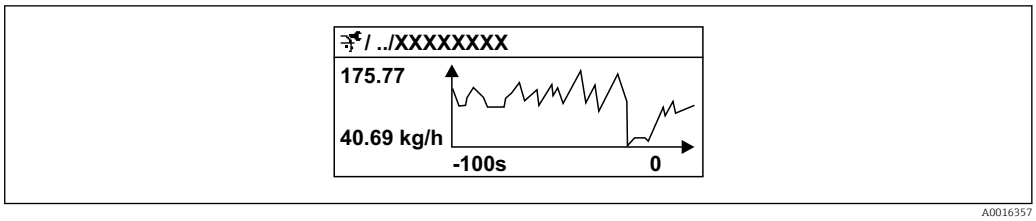
## 11.7 Showing data logging

The **Extended HistoROM** application package must be enabled in the device (order option) for the **Data logging** submenu to appear. This contains all the parameters for the measured value history.

Data logging is also available via:
- Plant Asset Management Tool FieldCare → 69.
- Web browser

### Function range

- A total of 1000 measured values can be stored
- 4 logging channels
- Adjustable logging interval for data logging
- Display of the measured value trend for each logging channel in the form of a chart



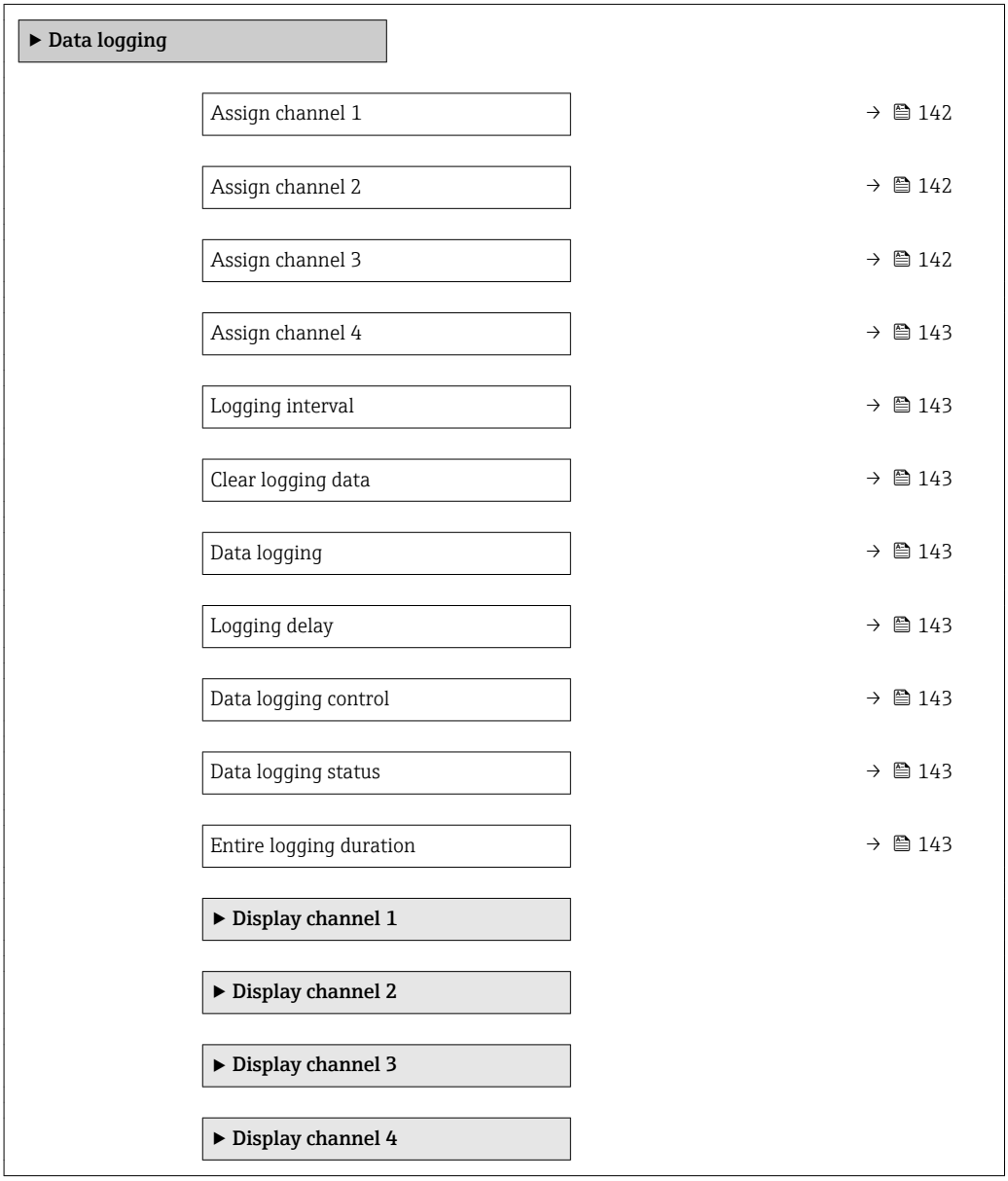

26 *Chart of a measured value trend*

- x-axis: depending on the number of channels selected displays 250 to 1000 measured values of a process variable.
- y-axis: displays the approximate measured value span and constantly adapts this to the ongoing measurement.

If the length of the logging interval or the assignment of the process variables to the channels is changed, the content of the data logging is deleted.

### Navigation

"Diagnostics" menu → Data logging



## Parameter overview with brief description

| Parameter | Prerequisite | Description | Selection / User entry / User interface | Factory setting |
|---|---|---|---|---|
| Assign channel 1 | The **Extended HistoROM** application package is available. | Assign process variable to logging channel. | ▪ Off<br>▪ Mass flow<br>▪ Volume flow<br>▪ Corrected volume flow *<br>▪ Target mass flow *<br>▪ Carrier mass flow *<br>▪ Target volume flow *<br>▪ Carrier volume flow *<br>▪ Target corrected volume flow *<br>▪ Carrier corrected volume flow *<br>▪ Density<br>▪ Reference density *<br>▪ Concentration *<br>▪ Temperature<br>▪ Carrier pipe temperature *<br>▪ Electronic temperature<br>▪ Oscillation frequency 0<br>▪ Oscillation amplitude *<br>▪ Frequency fluctuation 0 *<br>▪ Oscillation damping 0 *<br>▪ Oscillation damping fluctuation 0 *<br>▪ Signal asymmetry *<br>▪ Exciter current 0 *<br>▪ HBSI *<br>▪ Current output 1 *<br>▪ Current output 2 *<br>▪ Current output 3 *<br>▪ Current output 4 *<br>▪ Pressure | Off |
| Assign channel 2 | The **Extended HistoROM** application package is available.<br>The software options currently enabled are displayed in the **Software option overview** parameter. | Assign process variable to logging channel. | Picklist, see **Assign channel 1** parameter (→ 142) | Off |
| Assign channel 3 | The **Extended HistoROM** application package is available.<br>The software options currently enabled are displayed in the **Software option overview** parameter. | Assign process variable to logging channel. | Picklist, see **Assign channel 1** parameter (→ 142) | Off |

| Parameter | Prerequisite | Description | Selection / User entry / User interface | Factory setting |
|---|---|---|---|---|
| Assign channel 4 | The **Extended HistoROM** application package is available.<br>The software options currently enabled are displayed in the **Software option overview** parameter. | Assign process variable to logging channel. | Picklist, see **Assign channel 1** parameter (→ 142) | Off |
| Logging interval | The **Extended HistoROM** application package is available. | Define the logging interval for data logging. This value defines the time interval between the individual data points in the memory. | 0.1 to 3 600.0 s | 1.0 s |
| Clear logging data | The **Extended HistoROM** application package is available. | Clear the entire logging data. | ▪ Cancel<br>▪ Clear data | Cancel |
| Data logging | – | Select the data logging method. | ▪ Overwriting<br>▪ Not overwriting | Overwriting |
| Logging delay | In the **Data logging** parameter, the **Not overwriting** option is selected. | Enter the time delay for measured value logging. | 0 to 999 h | 0 h |
| Data logging control | In the **Data logging** parameter, the **Not overwriting** option is selected. | Start and stop measured value logging. | ▪ None<br>▪ Delete + start<br>▪ Stop | None |
| Data logging status | In the **Data logging** parameter, the **Not overwriting** option is selected. | Displays the measured value logging status. | ▪ Done<br>▪ Delay active<br>▪ Active<br>▪ Stopped | Done |
| Entire logging duration | In the **Data logging** parameter, the **Not overwriting** option is selected. | Displays the total logging duration. | Positive floating-point number | 0 s |

* Visibility depends on order options or device settings

# 12 Diagnostics and troubleshooting

## 12.1 General troubleshooting

*For local display*

| Error | Possible causes | Solution |
|---|---|---|
| Local display dark and no output signals | Supply voltage does not match the value indicated on the nameplate. | Apply the correct supply voltage → 36. |
| Local display dark and no output signals | The polarity of the supply voltage is wrong. | Correct the polarity. |
| Local display dark and no output signals | No contact between connecting cables and terminals. | Check the connection of the cables and correct if necessary. |
| Local display dark and no output signals | Terminals are not plugged into the I/O electronics module correctly. Terminals are not plugged into the main electronics module correctly. | Check terminals. |
| Local display dark and no output signals | I/O electronics module is defective. Main electronics module is defective. | Order spare part → 216. |
| Local display is dark, but signal output is within the valid range | Display is set too bright or too dark. | ▪ Set the display brighter by simultaneously pressing ⊞ + Ⓔ.<br>▪ Set the display darker by simultaneously pressing ⊟ + Ⓔ. |
| Local display is dark, but signal output is within the valid range | The cable of the display module is not plugged in correctly. | Insert the plug correctly into the main electronics module and display module. |
| Local display is dark, but signal output is within the valid range | Display module is defective. | Order spare part → 216. |
| Backlighting of local display is red | Diagnostic event with "Alarm" diagnostic behavior has occurred. | Take remedial measures |
| Text on local display appears in a foreign language and cannot be understood. | Incorrect operating language is configured. | 1. Press ⊟ + ⊞ for 2 s ("home position").<br>2. Press Ⓔ.<br>3. Set the desired language in the **Display language** parameter (→ 122). |
| Message on local display:<br>"Communication Error"<br>"Check Electronics" | Communication between the display module and the electronics is interrupted. | ▪ Check the cable and the connector between the main electronics module and display module.<br>▪ Order spare part → 216. |

*For output signals*

| Error | Possible causes | Solution |
|---|---|---|
| Signal output outside the valid range | Main electronics module is defective. | Order spare part → 216. |
| Device shows correct value on local display, but signal output is incorrect, though in the valid range. | Configuration error | Check and correct the parameter configuration. |
| Device measures incorrectly. | Configuration error or device is operated outside the application. | 1. Check and correct parameter configuration.<br>2. Observe limit values specified in the "Technical Data". |

*For access*

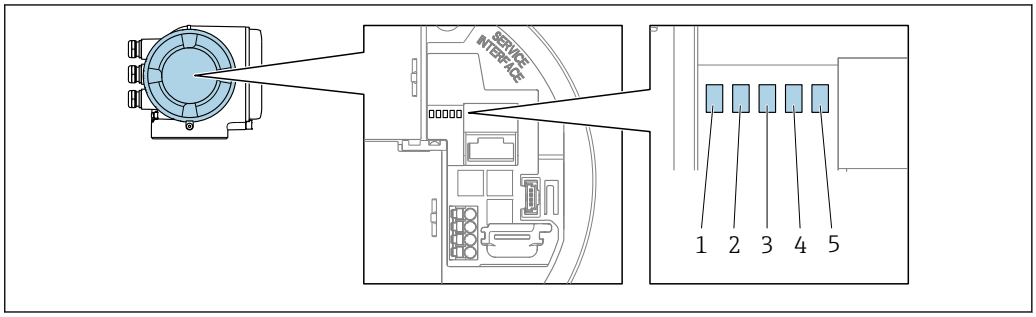
| Error | Possible causes | Solution |
|---|---|---|
| No write access to parameters | Hardware write protection enabled | Set the write protection switch on main electronics module to the **OFF** position → 131. |
| No write access to parameters | Current user role has limited access authorization | 1. Check user role → 59.<br>2. Enter correct customer-specific access code → 59. |
| No connection via PROFIBUS PA | Device plug connected incorrectly | Check the pin assignment of the connector . |
| No connection via PROFIBUS PA | PROFIBUS PA cable incorrectly terminated | Check terminating resistor . |
| Not connecting to Web server | Web server disabled | Using the "FieldCare" or "DeviceCare" operating tool, check whether the Web server of the measuring device is enabled, and enable it if necessary→ 66. |
| | Incorrect setting for the Ethernet interface of the computer | 1. Check the properties of the Internet protocol (TCP/IP) → 62.<br>2. Check the network settings with the IT manager. |
| Not connecting to Web server | Incorrect IP address | Check the IP address: 192.168.1.212 → 62 |
| Not connecting to Web server | Incorrect WLAN access data | ▪ Check WLAN network status.<br>▪ Log on to the device again using WLAN access data.<br>▪ Verify that WLAN is enabled on the measuring device and operating device . |
| | WLAN communication disabled | – |
| Not connecting to Web server, FieldCare or DeviceCare | No WLAN network available | ▪ Check if WLAN reception is present: LED on display module is lit blue<br>▪ Check if WLAN connection is enabled: LED on display module flashes blue<br>▪ Switch on instrument function. |
| Network connection not present or unstable | WLAN network is weak. | ▪ Operating device is outside of reception range: Check network status on operating device.<br>▪ To improve network performance, use an external WLAN antenna. |
| | Parallel WLAN and Ethernet communication | ▪ Check network settings.<br>▪ Temporarily enable only the WLAN as an interface. |
| Web browser frozen and operation no longer possible | Data transfer active | Wait until data transfer or current action is finished. |
| | Connection lost | 1. Check cable connection and power supply.<br>2. Refresh the Web browser and restart if necessary. |
| Content of Web browser incomplete or difficult to read | Not using optimum version of Web server. | 1. Use the correct Web browser version .<br>2. Clear the Web browser cache and restart the Web browser. |
| | Unsuitable view settings. | Change the font size/display ratio of the Web browser. |

| Error | Possible causes | Solution |
|---|---|---|
| No or incomplete display of contents in the Web browser | ▪ JavaScript not enabled<br>▪ JavaScript cannot be enabled | 1. Enable JavaScript.<br>2. Enter http://XXX.XXX.X.XXX/basic.html as the IP address. |
| Operation with FieldCare or DeviceCare via CDI-RJ45 service interface (port 8000) | Firewall of computer or network is preventing communication | Depending on the settings of the firewall used on the computer or in the network, the firewall must be adapted or disabled to allow FieldCare/DeviceCare access. |
| Flashing of firmware with FieldCare or DeviceCare via CDI-RJ45 service interface (via port 8000 or TFTP ports) | Firewall of computer or network is preventing communication | Depending on the settings of the firewall used on the computer or in the network, the firewall must be adapted or disabled to allow FieldCare/DeviceCare access. |

## 12.2 Diagnostic information via light emitting diodes

### 12.2.1 Transmitter

Different LEDs in the transmitter provide information on the device status.




A0029629

*1 Supply voltage*
*2 Device status*
*3 Not used*
*4 Communication*
*5 Service interface (CDI) active, Ethernet Link/Activity*

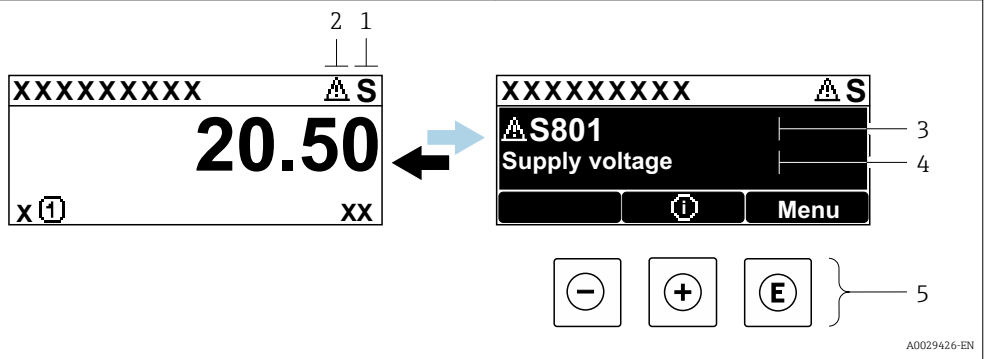
| LED | | Color | Meaning |
|---|---|---|---|
| 1 | Supply voltage | Off | Supply voltage is off or too low. |
| | | Green | Supply voltage is ok. |
| 2 | Device status | Off | Firmware error |
| | | Green | Device status is ok. |
| | | Flashing green | Device is not configured. |
| | | Red | A diagnostic event with "Alarm" diagnostic behavior has occurred. |
| | | Flashing red | A diagnostic event with "Warning" diagnostic behavior has occurred. |
| | | Flashing red/green | The device restarts. |
| 3 | Not used | – | – |
| 4 | Communication | Off | Device does not receive any Profibus data. |
| | | White | Device receives Profibus data. |
| 5 | Service interface (CDI), Ethernet Link/Activity | Off | Not connected or no connection established. |
| | | Yellow | Connected and connection established. |
| | | Flashing yellow | Service interface active. |

## 12.3 Diagnostic information on local display

### 12.3.1 Diagnostic message

Faults detected by the self-monitoring system of the measuring device are displayed as a diagnostic message in alternation with the operational display.

| Operational display in alarm condition | Diagnostic message |
|---|---|




1 *Status signal*
2 *Diagnostic behavior*
3 *Diagnostic behavior with diagnostic code*
4 *Short text*
5 *Operating elements*

If two or more diagnostic events are pending simultaneously, only the message of the diagnostic event with the highest priority is shown.

Other diagnostic events that have occurred can be displayed in the **Diagnostics** menu:
- Via parameter
- Via submenus → 208

#### Status signals

The status signals provide information on the state and reliability of the device by categorizing the cause of the diagnostic information (diagnostic event).

The status signals are categorized according to VDI/VDE 2650 and NAMUR Recommendation NE 107: F = Failure, C = Function Check, S = Out of Specification, M = Maintenance Required

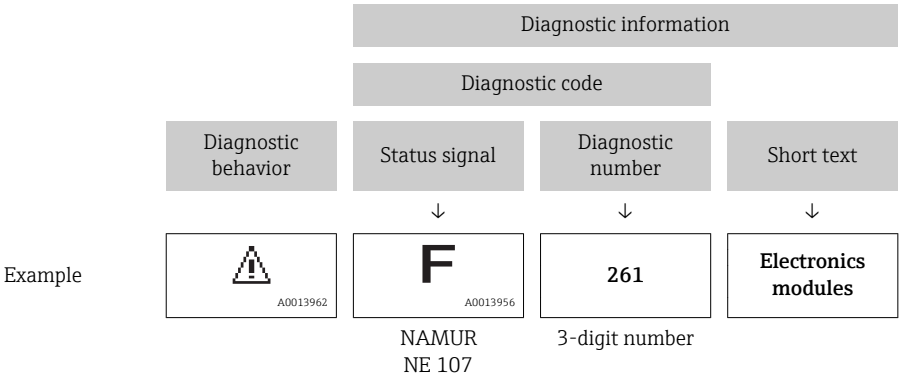
| Symbol | Meaning |
|---|---|
| F | **Failure**<br>A device error has occurred. The measured value is no longer valid. |
| C | **Function check**<br>The device is in service mode (e.g. during a simulation). |
| S | **Out of specification**<br>The device is operated:<br>Outside its technical specification limits (e.g. outside the process temperature range) |
| M | **Maintenance required**<br>Maintenance is required. The measured value remains valid. |

### Diagnostic behavior

| Symbol | Meaning |
|---|---|
| | **Alarm**<br>▪ Measurement is interrupted.<br>▪ Signal outputs and totalizers assume the defined alarm condition.<br>▪ A diagnostic message is generated. |
| | **Warning**<br>Measurement is resumed. The signal outputs and totalizers are not affected. A diagnostic message is generated. |

### Diagnostic information

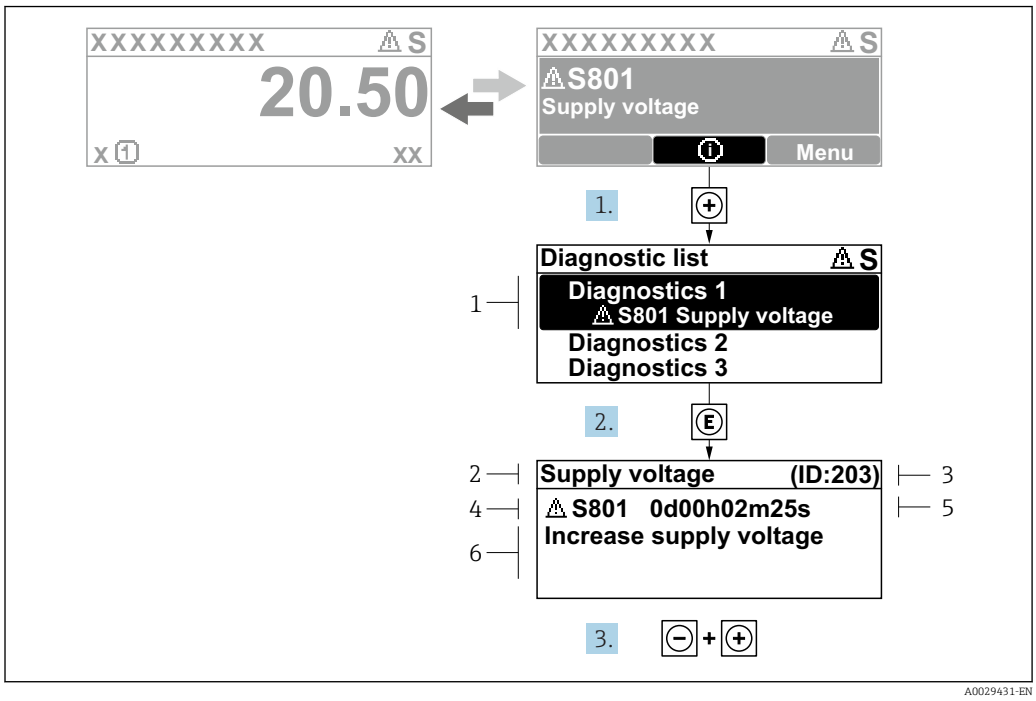
The fault can be identified using the diagnostic information. The short text helps you by providing information about the fault. In addition, the corresponding symbol for the diagnostic behavior is displayed in front of the diagnostic information on the local display.




### Operating elements

| Key | Meaning |
|---|---|
| | **Plus key**<br>*In a menu, submenu*<br>Opens the message about remedy information. |
| | **Enter key**<br>*In a menu, submenu*<br>Opens the operating menu. |

### 12.3.2 Calling up remedial measures




27 *Message about remedial measures*

1 *Diagnostic information*
2 *Short text*
3 *Service ID*
4 *Diagnostic behavior with diagnostic code*
5 *Operation time of occurrence*
6 *Remedial measures*

1. The user is in the diagnostic message.
   Press ⊞ (ⓘ symbol).
   ↳ The **Diagnostic list** submenu opens.
2. Select the desired diagnostic event with ⊞ or ⊟ and press Ⓔ .
   ↳ The message about the remedial measures opens.
3. Press ⊟ + ⊞ simultaneously.
   ↳ The message about the remedial measures closes.

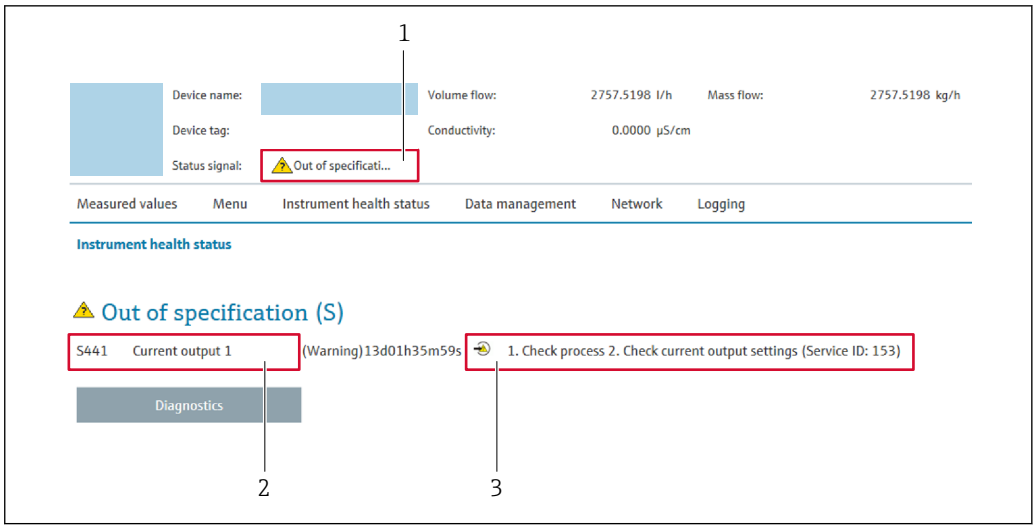
The user is in the **Diagnostics** menu at an entry for a diagnostics event, e.g. in the **Diagnostic list** submenu or **Previous diagnostics** parameter.

1. Press Ⓔ.
   ↳ The message for the remedial measures for the selected diagnostic event opens.
2. Press ⊟ + ⊞ simultaneously.
   ↳ The message for the remedial measures closes.

## 12.4 Diagnostic information in the Web browser

### 12.4.1 Diagnostic options

Any faults detected by the measuring device are displayed in the Web browser on the home page once the user has logged on.




A0031056

1 *Status area with status signal*
2 *Diagnostic information* → 🖹 *149*
3 *Remedy information with Service ID*

In addition, diagnostic events which have occurred can be shown in the **Diagnostics** menu:
- Via parameter
- Via submenu → 🖹 208

### Status signals

The status signals provide information on the state and reliability of the device by categorizing the cause of the diagnostic information (diagnostic event).

| Symbol | Meaning |
|---|---|
| | **Failure**<br>A device error has occurred. The measured value is no longer valid. |
| | **Function check**<br>The device is in service mode (e.g. during a simulation). |
| | **Out of specification**<br>The device is operated:<br>Outside its technical specification limits (e.g. outside the process temperature range) |
| | **Maintenance required**<br>Maintenance is required. The measured value is still valid. |

The status signals are categorized in accordance with VDI/VDE 2650 and NAMUR Recommendation NE 107.

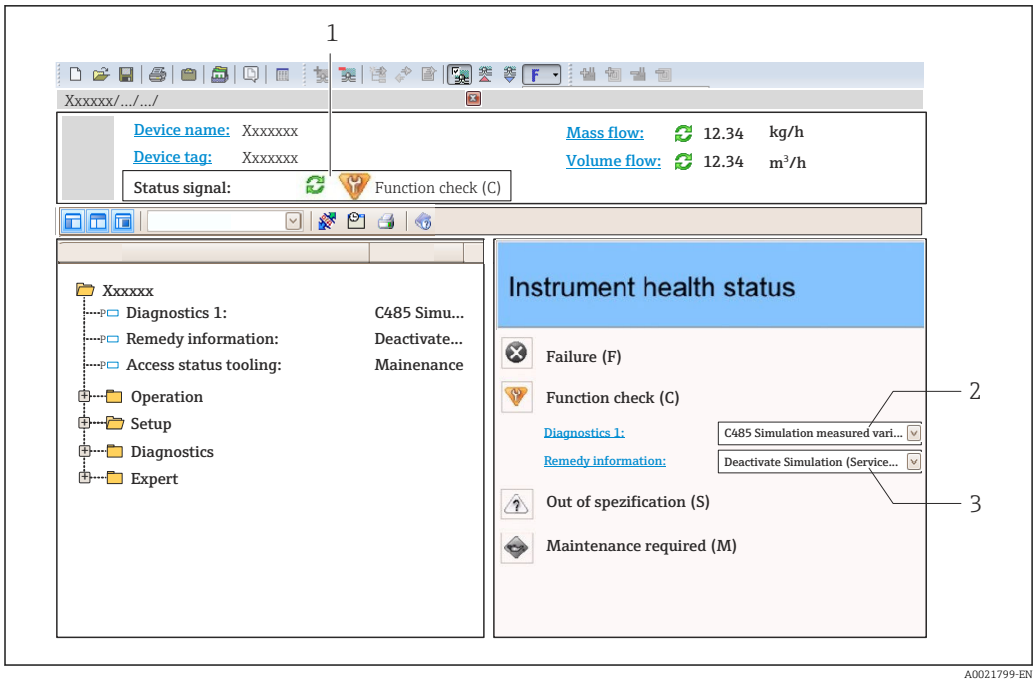
## 12.4.2 Calling up remedy information

Remedy information is provided for every diagnostic event to ensure that problems can be rectified quickly. These measures are displayed in red along with the diagnostic event and the related diagnostic information.

# 12.5 Diagnostic information in FieldCare or DeviceCare

## 12.5.1 Diagnostic options

Any faults detected by the measuring device are displayed on the home page of the operating tool once the connection has been established.

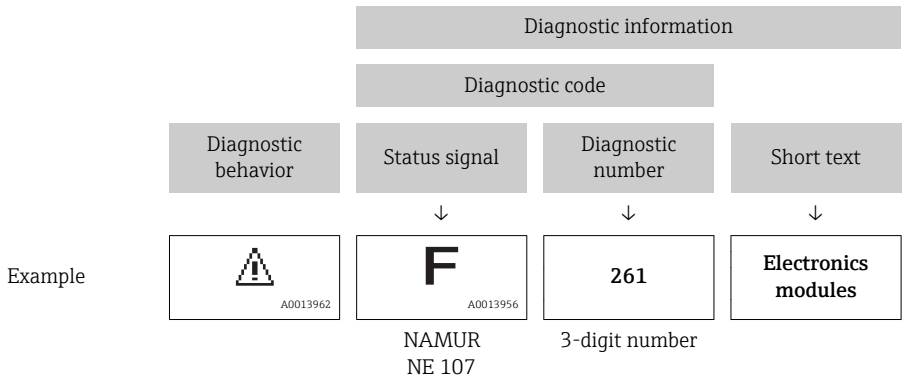



1 *Status area with status signal→ 148*
2 *Diagnostic information→ 149*
3 *Remedy information with Service ID*

In addition, diagnostic events which have occurred can be shown in the **Diagnostics** menu:
- Via parameter
- Via submenu → 208

### Diagnostic information

The fault can be identified using the diagnostic information. The short text helps you by providing information about the fault. In addition, the corresponding symbol for the diagnostic behavior is displayed in front of the diagnostic information on the local display.




## 12.5.2 Calling up remedy information

Remedy information is provided for every diagnostic event to ensure that problems can be rectified quickly:
- On the home page
  Remedy information is displayed in a separate field below the diagnostics information.
- In the **Diagnostics** menu
  Remedy information can be called up in the working area of the user interface.

The user is in the **Diagnostics** menu.

1. Call up the desired parameter.
2. On the right in the working area, mouse over the parameter.
   ↳ A tool tip with remedy information for the diagnostic event appears.

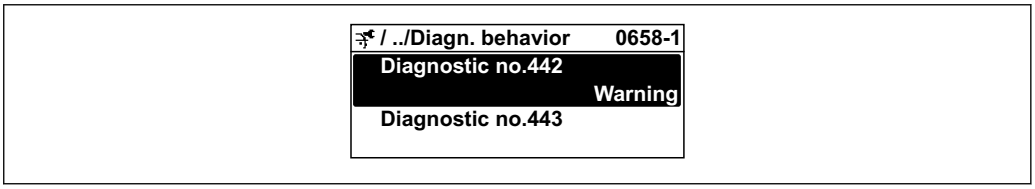
## 12.6 Adapting the diagnostic information

### 12.6.1 Adapting the diagnostic behavior

Each item of diagnostic information is assigned a specific diagnostic behavior at the factory. The user can change this assignment for specific diagnostic information in the **Diagnostic behavior** submenu.

Diagnostic behavior in accordance with Specification PROFIBUS PA Profile 3.02, Condensed Status.

Expert → System → Diagnostic handling → Diagnostic behavior

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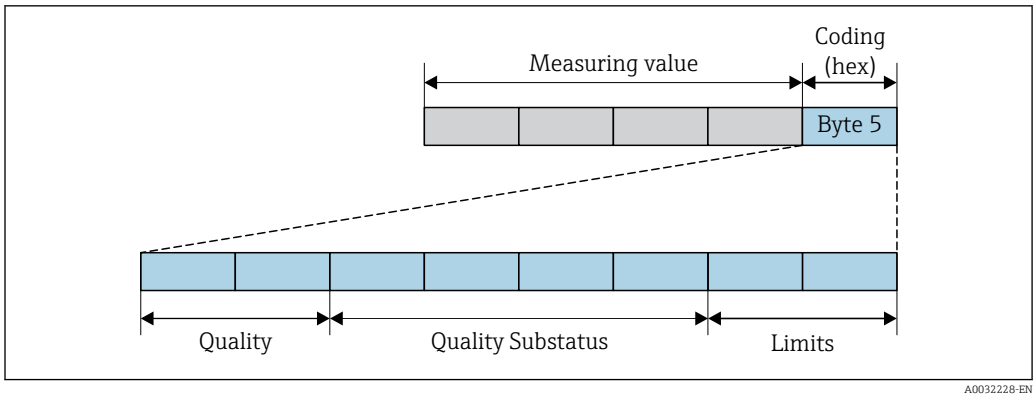
#### Available diagnostic behaviors

The following diagnostic behaviors can be assigned:

| Diagnostic behavior | Description |
|---|---|
| Alarm | The device stops measurement. The totalizers assume the defined alarm condition. A diagnostic message is generated. |
| Warning | The device continues to measure. The measured value output via PROFIBUS and the totalizers are not affected. A diagnostic message is generated. |
| Logbook entry only | The device continues to measure. The diagnostic message is displayed only in the **Event logbook** submenu (**Event list** submenu) and not in alternation with the operational display. |
| Off | The diagnostic event is ignored, and no diagnostic message is generated or entered. |

#### Displaying the measured value status

If the Analog Input, Digital Input and Totalizer function blocks are configured for cyclic data transmission, the device status is coded as per PROFIBUS PA Profile 3.02 Specification and transmitted along with the measured value to the PROFIBUS Master (Class 1) via the coding byte (byte 5). The coding byte is split into three segments: Quality, Quality Substatus and Limits.




28 *Structure of the coding byte*

The content of the coding byte depends on the configured failsafe mode in the particular function block. Depending on which failsafe mode has been configured, status information in accordance with PROFIBUS PA Profile Specification 3.02 is transmitted to the PROFIBUS Master (Class 1) via the coding byte .

### Determining the measured value status and device status via the diagnostic behavior

When the diagnostic behavior is assigned, this also changes the measured value status and device status for the diagnostic information. The measured value status and device status depend on the choice of diagnostic behavior and on the group in which the diagnostic information is located.

The diagnostic information is grouped as follows:
- Diagnostic information pertaining to the sensor: diagnostic number 000 to 199 → 154
- Diagnostic information pertaining to the electronics: diagnostic number 200 to 399 → 155
- Diagnostic information pertaining to the configuration: diagnostic number 400 to 599 → 155
- Diagnostic information pertaining to the process: diagnostic number 800 to 999 → 155

Depending on the group in which the diagnostic information is located, the following measured value status and device status are firmly assigned to the particular diagnostic behavior:

*Diagnostic information pertaining to the sensor: diagnostic number 000 to 199*

| Diagnostic behavior (configurable) | Measured value status (fixed assignment) | | | | Device diagnosis (fixed assignment) |
|---|---|---|---|---|---|
| | Quality | Quality Substatus | Coding (hex) | Category (NE107) | |
| Alarm | BAD | Maintenance alarm | 0x24 to 0x27 | F (Failure) | Maintenance alarm |
| Warning | GOOD | Maintenance demanded | 0xA8 to 0xAB | M (Maintenance) | Maintenance demanded |
| Logbook entry only | GOOD | ok | 0x80 to 0x8E | – | – |
| Off | | | | | |

*Diagnostic information pertaining to the electronics: diagnostic number 200 to 399*

*Diagnostic number 200 to 301, 303 to 399*

| Diagnostic behavior (configurable) | Measured value status (fixed assignment) | | | | Device diagnosis (fixed assignment) |
|---|---|---|---|---|---|
| | Quality | Quality Substatus | Coding (hex) | Category (NE107) | |
| Alarm | BAD | Maintenance alarm | 0x24 to 0x27 | F (Failure) | Maintenance alarm |
| Warning | | | | | |
| Logbook entry only | GOOD | ok | 0x80 to 0x8E | – | – |
| Off | | | | | |

*Diagnostic information 302*

| Diagnostic behavior (configurable) | Measured value status (fixed assignment) | | | | Device diagnosis (fixed assignment) |
|---|---|---|---|---|---|
| | Quality | Quality Substatus | Coding (hex) | Category (NE107) | |
| Alarm | BAD | Function check, local override | 0x24 to 0x27 | C | Function check |
| Warning | GOOD | Function check | 0xBC to 0xBF | – | – |

Diagnostic information 302 (device verification active) is output during internal or external Heartbeat verification.
- Signal status: Function check
- Choice of diagnostic behavior: alarm or warning (factory setting)

When Heartbeat verification starts, data logging is interrupted, the last valid measured value is output and the totalizers are stopped.

*Diagnostic information pertaining to the configuration: diagnostic number 400 to 599*

| Diagnostic behavior (configurable) | Measured value status (fixed assignment) | | | | Device diagnosis (fixed assignment) |
|---|---|---|---|---|---|
| | Quality | Quality Substatus | Coding (hex) | Category (NE107) | |
| Alarm | BAD | Process related | 0x28 to 0x2B | F (Failure) | Invalid process condition |
| Warning | UNCERTAIN | Process related | 0x78 to 0x7B | S (Out of specification) | Invalid process condition |
| Logbook entry only | GOOD | ok | 0x80 to 0x8E | – | – |
| Off | | | | | |

*Diagnostic information pertaining to the process: diagnostic number 800 to 999*

| Diagnostic behavior (configurable) | Measured value status (fixed assignment) | | | | Device diagnosis (fixed assignment) |
|---|---|---|---|---|---|
| | Quality | Quality Substatus | Coding (hex) | Category (NE107) | |
| Alarm | BAD | Process related | 0x28 to 0x2B | F (Failure) | Invalid process condition |
| Warning | UNCERTAIN | Process related | 0x78 to 0x7B | S (Out of specification) | Invalid process condition |

| Diagnostic behavior (configurable) | Measured value status (fixed assignment) | | | | Device diagnosis (fixed assignment) |
|---|---|---|---|---|---|
| | Quality | Quality Substatus | Coding (hex) | Category (NE107) | |
| Logbook entry only | GOOD | ok | 0x80 to 0x8E | – | – |
| Off | | | | | |

## 12.7 Overview of diagnostic information

- The amount of diagnostic information and the number of measured variables affected increase if the measuring device has one or more application packages.
- All of the measured variables affected in the entire Promass instrument family are always listed under "Measured variables affected". The measured variables available for the device in question depend on the device version. When assigning the measured variables to the device functions, for example to the individual outputs, all of the measured variables available for the device version in question are available for selection.

In the case of some items of diagnostic information, the diagnostic behavior can be changed. Change the diagnostic information → 153

### 12.7.1 Diagnostic of sensor

| Diagnostic information | | | Remedy instructions |
|---|---|---|---|
| No. | Short text | | |
| 022 | Temperature sensor defective | | 1. Check or replace sensor electronic module (ISEM)<br>2. If available: Check connection cable between sensor and transmitter<br>3. Replace sensor |
| | **Measured variable status** | | |
| | Quality | Bad | |
| | Quality substatus | Maintenance alarm | |
| | Coding (hex) | 0x24 to 0x27 | |
| | Status signal | F | |
| | Diagnostic behavior | Alarm | |
| | **Influenced measured variables** | | |
| | ▪ Oscillation amplitude 1<br>▪ Oscillation amplitude 2<br>▪ Signal asymmetry<br>▪ Carrier mass flow<br>▪ Carrier pipe temperature<br>▪ Target corrected volume flow<br>▪ Carrier corrected volume flow<br>▪ Concentration<br>▪ Oscillation damping 1<br>▪ Oscillation damping 2<br>▪ Density<br>▪ Oil density<br>▪ Water density<br>▪ Dynamic viscosity<br>▪ Sensor electronic temperature (ISEM)<br>▪ Empty pipe detection<br>▪ GSV flow<br>▪ GSV flow alternative | ▪ Kinematic viscosity<br>▪ Low flow cut off<br>▪ Mass flow<br>▪ Oil mass flow<br>▪ Water mass flow<br>▪ HBSI<br>▪ NSV flow<br>▪ NSV flow alternative<br>▪ External pressure<br>▪ Exciter current 1<br>▪ Exciter current 2<br>▪ Oscillation frequency 1<br>▪ Oscillation frequency 2<br>▪ S&W volume flow<br>▪ Reference density<br>▪ Reference density alternative<br>▪ Corrected volume flow<br>▪ Oil corrected volume flow | ▪ Water corrected volume flow<br>▪ Oscillation damping fluctuation 1<br>▪ Oscillation damping fluctuation 2<br>▪ Frequency fluctuation 1<br>▪ Frequency fluctuation 2<br>▪ Target mass flow<br>▪ Carrier volume flow<br>▪ Target volume flow<br>▪ Temp. compensated dynamic viscosity<br>▪ Temp. compensated kinematic viscosity<br>▪ Temperature<br>▪ Status<br>▪ Volume flow<br>▪ Oil volume flow<br>▪ Water volume flow<br>▪ Water cut |

<table>
<tr><th colspan="2">Diagnostic information</th><th rowspan="2">Remedy instructions</th></tr>
<tr><th>No.</th><th>Short text</th></tr>
<tr><td rowspan="8">046</td><td colspan="2">Sensor limit exceeded</td><td rowspan="6">1. Inspect sensor<br>2. Check process condition</td></tr>
<tr><td colspan="2">Measured variable status [from the factory] 1)</td></tr>
<tr><td>Quality</td><td>Good</td></tr>
<tr><td>Quality substatus</td><td>Maintenance demanded</td></tr>
<tr><td>Coding (hex)</td><td>0xA8 to 0xAB</td></tr>
<tr><td>Status signal</td><td>S</td></tr>
<tr><td>Diagnostic behavior</td><td>Warning</td><td rowspan="2"></td></tr>
<tr><td colspan="3">Influenced measured variables</td></tr>
<tr><td colspan="3">
<ul>
<li>Oscillation amplitude 1</li>
<li>Oscillation amplitude 2</li>
<li>Signal asymmetry</li>
<li>Carrier mass flow</li>
<li>Carrier pipe temperature</li>
<li>Target corrected volume flow</li>
<li>Carrier corrected volume flow</li>
<li>Concentration</li>
<li>Oscillation damping 1</li>
<li>Oscillation damping 2</li>
<li>Density</li>
<li>Oil density</li>
<li>Water density</li>
<li>Dynamic viscosity</li>
<li>Sensor electronic temperature (ISEM)</li>
<li>Empty pipe detection</li>
<li>GSV flow</li>
<li>GSV flow alternative</li>
<li>Kinematic viscosity</li>
<li>Low flow cut off</li>
<li>Mass flow</li>
<li>Oil mass flow</li>
<li>Water mass flow</li>
<li>HBSI</li>
<li>NSV flow</li>
<li>NSV flow alternative</li>
<li>External pressure</li>
<li>Exciter current 1</li>
<li>Exciter current 2</li>
<li>Oscillation frequency 1</li>
<li>Oscillation frequency 2</li>
<li>S&W volume flow</li>
<li>Reference density</li>
<li>Reference density alternative</li>
<li>Corrected volume flow</li>
<li>Oil corrected volume flow</li>
<li>Water corrected volume flow</li>
<li>Oscillation damping fluctuation 1</li>
<li>Oscillation damping fluctuation 2</li>
<li>Frequency fluctuation 1</li>
<li>Frequency fluctuation 2</li>
<li>Target mass flow</li>
<li>Carrier volume flow</li>
<li>Target volume flow</li>
<li>Temp. compensated dynamic viscosity</li>
<li>Temp. compensated kinematic viscosity</li>
<li>Temperature</li>
<li>Status</li>
<li>Volume flow</li>
<li>Oil volume flow</li>
<li>Water volume flow</li>
<li>Water cut</li>
</ul>
</td></tr>
</table>

1) Diagnostic behavior can be changed. This causes the overall status of the measured variable to change.

| Diagnostic information | | | Remedy instructions |
|---|---|---|---|
| No. | Short text | | |
| 062 | Sensor connection faulty | | 1. Check or replace sensor electronic module (ISEM)<br>2. If available: Check connection cable between sensor and transmitter<br>3. Replace sensor |
| | **Measured variable status** | | |
| | Quality | Bad | |
| | Quality substatus | Maintenance alarm | |
| | Coding (hex) | 0x24 to 0x27 | |
| | Status signal | F | |
| | Diagnostic behavior | Alarm | |
| | **Influenced measured variables** | | |
| | ▪ Oscillation amplitude 1<br>▪ Oscillation amplitude 2<br>▪ Signal asymmetry<br>▪ Carrier mass flow<br>▪ Carrier pipe temperature<br>▪ Target corrected volume flow<br>▪ Carrier corrected volume flow<br>▪ Concentration<br>▪ Oscillation damping 1<br>▪ Oscillation damping 2<br>▪ Density<br>▪ Oil density<br>▪ Water density<br>▪ Dynamic viscosity<br>▪ Sensor electronic temperature (ISEM)<br>▪ Empty pipe detection<br>▪ GSV flow<br>▪ GSV flow alternative | ▪ Kinematic viscosity<br>▪ Low flow cut off<br>▪ Mass flow<br>▪ Oil mass flow<br>▪ Water mass flow<br>▪ HBSI<br>▪ NSV flow<br>▪ NSV flow alternative<br>▪ External pressure<br>▪ Exciter current 1<br>▪ Exciter current 2<br>▪ Oscillation frequency 1<br>▪ Oscillation frequency 2<br>▪ S&W volume flow<br>▪ Reference density<br>▪ Reference density alternative<br>▪ Corrected volume flow<br>▪ Oil corrected volume flow | ▪ Water corrected volume flow<br>▪ Oscillation damping fluctuation 1<br>▪ Oscillation damping fluctuation 2<br>▪ Frequency fluctuation 1<br>▪ Frequency fluctuation 2<br>▪ Target mass flow<br>▪ Carrier volume flow<br>▪ Target volume flow<br>▪ Temp. compensated dynamic viscosity<br>▪ Temp. compensated kinematic viscosity<br>▪ Temperature<br>▪ Status<br>▪ Volume flow<br>▪ Oil volume flow<br>▪ Water volume flow<br>▪ Water cut |

<table>
<tr><th colspan="3">Diagnostic information</th><th>Remedy instructions</th></tr>
<tr><th>No.</th><th colspan="2">Short text</th><th></th></tr>
<tr><td rowspan="7">063</td><td colspan="2">Exciter current faulty</td><td rowspan="6">1. Check or replace sensor electronic module (ISEM)<br>2. If available: Check connection cable between sensor and transmitter<br>3. Replace sensor</td></tr>
<tr><td colspan="2">Measured variable status</td></tr>
<tr><td>Quality</td><td>Bad</td></tr>
<tr><td>Quality substatus</td><td>Maintenance alarm</td></tr>
<tr><td>Coding (hex)</td><td>0x24 to 0x27</td></tr>
<tr><td>Status signal</td><td>S</td></tr>
<tr><td>Diagnostic behavior</td><td>Alarm</td></tr>
<tr><td></td><td colspan="3">Influenced measured variables</td></tr>
<tr><td></td><td colspan="3">▪ Oscillation amplitude 1<br>▪ Oscillation amplitude 2<br>▪ Signal asymmetry<br>▪ Carrier mass flow<br>▪ Carrier pipe temperature<br>▪ Target corrected volume flow<br>▪ Carrier corrected volume flow<br>▪ Concentration<br>▪ Oscillation damping 1<br>▪ Oscillation damping 2<br>▪ Density<br>▪ Oil density<br>▪ Water density<br>▪ Dynamic viscosity<br>▪ Sensor electronic temperature (ISEM)<br>▪ Empty pipe detection<br>▪ GSV flow<br>▪ GSV flow alternative<br>▪ Kinematic viscosity<br>▪ Low flow cut off<br>▪ Mass flow<br>▪ Oil mass flow<br>▪ Water mass flow<br>▪ HBSI<br>▪ NSV flow<br>▪ NSV flow alternative<br>▪ External pressure<br>▪ Exciter current 1<br>▪ Exciter current 2<br>▪ Oscillation frequency 1<br>▪ Oscillation frequency 2<br>▪ S&W volume flow<br>▪ Reference density<br>▪ Reference density alternative<br>▪ Corrected volume flow<br>▪ Oil corrected volume flow<br>▪ Water corrected volume flow<br>▪ Oscillation damping fluctuation 1<br>▪ Oscillation damping fluctuation 2<br>▪ Frequency fluctuation 1<br>▪ Frequency fluctuation 2<br>▪ Target mass flow<br>▪ Carrier volume flow<br>▪ Target volume flow<br>▪ Temp. compensated dynamic viscosity<br>▪ Temp. compensated kinematic viscosity<br>▪ Temperature<br>▪ Status<br>▪ Volume flow<br>▪ Oil volume flow<br>▪ Water volume flow<br>▪ Water cut</td></tr>
</table>

| Diagnostic information | | | Remedy instructions |
|---|---|---|---|
| No. | Short text | | |
| 082 | Data storage | | 1. Check module connections<br>2. Contact service |
| | **Measured variable status** | | |
| | Quality | Bad | |
| | Quality substatus | Maintenance alarm | |
| | Coding (hex) | 0x24 to 0x27 | |
| | Status signal | F | |
| | Diagnostic behavior | Alarm | |
| | **Influenced measured variables** | | |
| | ▪ Oscillation amplitude 1<br>▪ Oscillation amplitude 2<br>▪ Signal asymmetry<br>▪ Carrier mass flow<br>▪ Carrier pipe temperature<br>▪ Target corrected volume flow<br>▪ Carrier corrected volume flow<br>▪ Concentration<br>▪ Measured values 1<br>▪ Measured values 2<br>▪ Measured values 3<br>▪ Oscillation damping 1<br>▪ Oscillation damping 2<br>▪ Density<br>▪ Oil density<br>▪ Water density<br>▪ Dynamic viscosity<br>▪ Sensor electronic temperature (ISEM)<br>▪ Empty pipe detection | ▪ GSV flow<br>▪ GSV flow alternative<br>▪ Kinematic viscosity<br>▪ Low flow cut off<br>▪ Mass flow<br>▪ Oil mass flow<br>▪ Water mass flow<br>▪ HBSI<br>▪ NSV flow<br>▪ NSV flow alternative<br>▪ External pressure<br>▪ Exciter current 1<br>▪ Exciter current 2<br>▪ Oscillation frequency 1<br>▪ Oscillation frequency 2<br>▪ S&W volume flow<br>▪ Reference density<br>▪ Reference density alternative<br>▪ Corrected volume flow | ▪ Oil corrected volume flow<br>▪ Water corrected volume flow<br>▪ Oscillation damping fluctuation 1<br>▪ Oscillation damping fluctuation 2<br>▪ Frequency fluctuation 1<br>▪ Frequency fluctuation 2<br>▪ Target mass flow<br>▪ Carrier volume flow<br>▪ Target volume flow<br>▪ Temp. compensated dynamic viscosity<br>▪ Temp. compensated kinematic viscosity<br>▪ Temperature<br>▪ Status<br>▪ Volume flow<br>▪ Oil volume flow<br>▪ Water volume flow<br>▪ Water cut |

<table>
<tr><th colspan="2">Diagnostic information</th><th>Remedy instructions</th></tr>
<tr><th>No.</th><th colspan="2">Short text</th><th></th></tr>
<tr><td rowspan="7">083</td><td colspan="2">Memory content</td><td rowspan="6">1. Restart device<br>2. Restore HistoROM S-DAT backup ('Device reset' parameter)<br>3. Replace HistoROM S-DAT</td></tr>
<tr><td colspan="2">Measured variable status</td></tr>
<tr><td>Quality</td><td>Bad</td></tr>
<tr><td>Quality substatus</td><td>Maintenance alarm</td></tr>
<tr><td>Coding (hex)</td><td>0x24 to 0x27</td></tr>
<tr><td>Status signal</td><td>F</td></tr>
<tr><td>Diagnostic behavior</td><td>Alarm</td></tr>
<tr><td></td><td colspan="3">Influenced measured variables</td></tr>
<tr><td></td><td colspan="3">
<ul>
<li>Oscillation amplitude 1</li>
<li>Oscillation amplitude 2</li>
<li>Signal asymmetry</li>
<li>Carrier mass flow</li>
<li>Carrier pipe temperature</li>
<li>Target corrected volume flow</li>
<li>Carrier corrected volume flow</li>
<li>Concentration</li>
<li>Measured values 1</li>
<li>Measured values 2</li>
<li>Measured values 3</li>
<li>Oscillation damping 1</li>
<li>Oscillation damping 2</li>
<li>Density</li>
<li>Oil density</li>
<li>Water density</li>
<li>Dynamic viscosity</li>
<li>Sensor electronic temperature (ISEM)</li>
<li>Empty pipe detection</li>
<li>GSV flow</li>
<li>GSV flow alternative</li>
<li>Kinematic viscosity</li>
<li>Low flow cut off</li>
<li>Mass flow</li>
<li>Oil mass flow</li>
<li>Water mass flow</li>
<li>HBSI</li>
<li>NSV flow</li>
<li>NSV flow alternative</li>
<li>External pressure</li>
<li>Exciter current 1</li>
<li>Exciter current 2</li>
<li>Oscillation frequency 1</li>
<li>Oscillation frequency 2</li>
<li>S&W volume flow</li>
<li>Reference density</li>
<li>Reference density alternative</li>
<li>Corrected volume flow</li>
<li>Oil corrected volume flow</li>
<li>Water corrected volume flow</li>
<li>Oscillation damping fluctuation 1</li>
<li>Oscillation damping fluctuation 2</li>
<li>Frequency fluctuation 1</li>
<li>Frequency fluctuation 2</li>
<li>Target mass flow</li>
<li>Carrier volume flow</li>
<li>Target volume flow</li>
<li>Temp. compensated dynamic viscosity</li>
<li>Temp. compensated kinematic viscosity</li>
<li>Temperature</li>
<li>Status</li>
<li>Volume flow</li>
<li>Oil volume flow</li>
<li>Water volume flow</li>
<li>Water cut</li>
</ul>
</td></tr>
</table>

| Diagnostic information | | | Remedy instructions |
|---|---|---|---|
| No. | Short text | | |
| 140 | Sensor signal asymmetrical | | 1. Check or replace sensor electronic module (ISEM)<br>2. If available: Check connection cable between sensor and transmitter<br>3. Replace sensor |
| | **Measured variable status [from the factory]** [1] | | |
| | Quality | Bad | |
| | Quality substatus | Maintenance alarm | |
| | Coding (hex) | 0x24 to 0x27 | |
| | Status signal | S | |
| | Diagnostic behavior | Alarm | |
| | **Influenced measured variables** | | |
| | ▪ Oscillation amplitude 1<br>▪ Oscillation amplitude 2<br>▪ Signal asymmetry<br>▪ Carrier mass flow<br>▪ Carrier pipe temperature<br>▪ Target corrected volume flow<br>▪ Carrier corrected volume flow<br>▪ Concentration<br>▪ Measured values 1<br>▪ Measured values 2<br>▪ Measured values 3<br>▪ Oscillation damping 1<br>▪ Oscillation damping 2<br>▪ Density<br>▪ Oil density<br>▪ Water density<br>▪ Dynamic viscosity<br>▪ Sensor electronic temperature (ISEM)<br>▪ Empty pipe detection | ▪ GSV flow<br>▪ GSV flow alternative<br>▪ Kinematic viscosity<br>▪ Low flow cut off<br>▪ Mass flow<br>▪ Oil mass flow<br>▪ Water mass flow<br>▪ HBSI<br>▪ NSV flow<br>▪ NSV flow alternative<br>▪ External pressure<br>▪ Exciter current 1<br>▪ Exciter current 2<br>▪ Oscillation frequency 1<br>▪ Oscillation frequency 2<br>▪ S&W volume flow<br>▪ Reference density<br>▪ Reference density alternative<br>▪ Corrected volume flow | ▪ Oil corrected volume flow<br>▪ Water corrected volume flow<br>▪ Oscillation damping fluctuation 1<br>▪ Oscillation damping fluctuation 2<br>▪ Frequency fluctuation 1<br>▪ Frequency fluctuation 2<br>▪ Target mass flow<br>▪ Carrier volume flow<br>▪ Target volume flow<br>▪ Temp. compensated dynamic viscosity<br>▪ Temp. compensated kinematic viscosity<br>▪ Temperature<br>▪ Status<br>▪ Volume flow<br>▪ Oil volume flow<br>▪ Water volume flow<br>▪ Water cut |

1) Diagnostic behavior can be changed. This causes the overall status of the measured variable to change.

<table>
<tr><th colspan="2">Diagnostic information</th><th rowspan="2">Remedy instructions</th></tr>
<tr><th>No.</th><th>Short text</th></tr>
<tr><td rowspan="8">144</td><td colspan="2">Measuring error too high</td><td rowspan="6">1. Check or change sensor<br>2. Check process conditions</td></tr>
<tr><td colspan="2">Measured variable status [from the factory] 1)</td></tr>
<tr><td>Quality</td><td>Bad</td></tr>
<tr><td>Quality substatus</td><td>Maintenance alarm</td></tr>
<tr><td>Coding (hex)</td><td>0x24 to 0x27</td></tr>
<tr><td>Status signal</td><td>F</td></tr>
<tr><td>Diagnostic behavior</td><td>Alarm</td><td></td></tr>
<tr><td colspan="3">Influenced measured variables</td></tr>
<tr><td colspan="3">
<ul>
<li>Oscillation amplitude 1</li>
<li>Oscillation amplitude 2</li>
<li>Signal asymmetry</li>
<li>Carrier mass flow</li>
<li>Carrier pipe temperature</li>
<li>Target corrected volume flow</li>
<li>Carrier corrected volume flow</li>
<li>Concentration</li>
<li>Oscillation damping 1</li>
<li>Oscillation damping 2</li>
<li>Density</li>
<li>Oil density</li>
<li>Water density</li>
<li>Dynamic viscosity</li>
<li>Sensor electronic temperature (ISEM)</li>
<li>Empty pipe detection</li>
<li>GSV flow</li>
<li>GSV flow alternative</li>
<li>Kinematic viscosity</li>
<li>Low flow cut off</li>
<li>Mass flow</li>
<li>Oil mass flow</li>
<li>Water mass flow</li>
<li>HBSI</li>
<li>NSV flow</li>
<li>NSV flow alternative</li>
<li>External pressure</li>
<li>Exciter current 1</li>
<li>Exciter current 2</li>
<li>Oscillation frequency 1</li>
<li>Oscillation frequency 2</li>
<li>S&W volume flow</li>
<li>Reference density</li>
<li>Reference density alternative</li>
<li>Corrected volume flow</li>
<li>Oil corrected volume flow</li>
<li>Water corrected volume flow</li>
<li>Oscillation damping fluctuation 1</li>
<li>Oscillation damping fluctuation 2</li>
<li>Frequency fluctuation 1</li>
<li>Frequency fluctuation 2</li>
<li>Target mass flow</li>
<li>Carrier volume flow</li>
<li>Target volume flow</li>
<li>Temp. compensated dynamic viscosity</li>
<li>Temp. compensated kinematic viscosity</li>
<li>Temperature</li>
<li>Status</li>
<li>Volume flow</li>
<li>Oil volume flow</li>
<li>Water volume flow</li>
<li>Water cut</li>
</ul>
</td></tr>
</table>

1) Diagnostic behavior can be changed. This causes the overall status of the measured variable to change.

## 12.7.2 Diagnostic of electronic

<table>
<tr><th colspan="2">Diagnostic information</th><th>Remedy instructions</th></tr>
<tr><th>No.</th><th colspan="2">Short text</th><th></th></tr>
<tr><td rowspan="7">201</td><td colspan="2">Device failure</td><td rowspan="6">1. Restart device<br>2. Contact service</td></tr>
<tr><td colspan="2">Measured variable status</td></tr>
<tr><td>Quality</td><td>Bad</td></tr>
<tr><td>Quality substatus</td><td>Maintenance alarm</td></tr>
<tr><td>Coding (hex)</td><td>0x24 to 0x27</td></tr>
<tr><td>Status signal</td><td>F</td></tr>
<tr><td>Diagnostic behavior</td><td>Alarm</td><td></td></tr>
<tr><td></td><td colspan="3">Influenced measured variables</td></tr>
<tr><td></td><td colspan="3">
<ul>
<li>Oscillation amplitude 1</li>
<li>Oscillation amplitude 2</li>
<li>Signal asymmetry</li>
<li>Carrier mass flow</li>
<li>Carrier pipe temperature</li>
<li>Target corrected volume flow</li>
<li>Carrier corrected volume flow</li>
<li>Concentration</li>
<li>Measured values 1</li>
<li>Measured values 2</li>
<li>Measured values 3</li>
<li>Oscillation damping 1</li>
<li>Oscillation damping 2</li>
<li>Density</li>
<li>Oil density</li>
<li>Water density</li>
<li>Dynamic viscosity</li>
<li>Sensor electronic temperature (ISEM)</li>
<li>Empty pipe detection</li>
<li>GSV flow</li>
<li>GSV flow alternative</li>
<li>Kinematic viscosity</li>
<li>Low flow cut off</li>
<li>Mass flow</li>
<li>Oil mass flow</li>
<li>Water mass flow</li>
<li>HBSI</li>
<li>NSV flow</li>
<li>NSV flow alternative</li>
<li>External pressure</li>
<li>Exciter current 1</li>
<li>Exciter current 2</li>
<li>Oscillation frequency 1</li>
<li>Oscillation frequency 2</li>
<li>S&W volume flow</li>
<li>Reference density</li>
<li>Reference density alternative</li>
<li>Corrected volume flow</li>
<li>Oil corrected volume flow</li>
<li>Water corrected volume flow</li>
<li>Oscillation damping fluctuation 1</li>
<li>Oscillation damping fluctuation 2</li>
<li>Frequency fluctuation 1</li>
<li>Frequency fluctuation 2</li>
<li>Target mass flow</li>
<li>Carrier volume flow</li>
<li>Target volume flow</li>
<li>Temp. compensated dynamic viscosity</li>
<li>Temp. compensated kinematic viscosity</li>
<li>Temperature</li>
<li>Status</li>
<li>Volume flow</li>
<li>Oil volume flow</li>
<li>Water volume flow</li>
<li>Water cut</li>
</ul>
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</table>

<table>
<tr><th colspan="3">Diagnostic information</th><th>Remedy instructions</th></tr>
<tr><th>No.</th><th colspan="2">Short text</th><th></th></tr>
<tr><td rowspan="7">242</td><td colspan="2">Software incompatible</td><td rowspan="6">1. Check software<br>2. Flash or change main electronics module</td></tr>
<tr><td colspan="2">Measured variable status</td></tr>
<tr><td>Quality</td><td>Bad</td></tr>
<tr><td>Quality substatus</td><td>Maintenance alarm</td></tr>
<tr><td>Coding (hex)</td><td>0x24 to 0x27</td></tr>
<tr><td>Status signal</td><td>F</td></tr>
<tr><td>Diagnostic behavior</td><td>Alarm</td></tr>
<tr><td colspan="4">Influenced measured variables</td></tr>
<tr><td colspan="4">
<ul>
<li>Oscillation amplitude 1</li>
<li>Oscillation amplitude 2</li>
<li>Signal asymmetry</li>
<li>Carrier mass flow</li>
<li>Carrier pipe temperature</li>
<li>Target corrected volume flow</li>
<li>Carrier corrected volume flow</li>
<li>Concentration</li>
<li>Measured values 1</li>
<li>Measured values 2</li>
<li>Measured values 3</li>
<li>Oscillation damping 1</li>
<li>Oscillation damping 2</li>
<li>Density</li>
<li>Oil density</li>
<li>Water density</li>
<li>Dynamic viscosity</li>
<li>Sensor electronic temperature (ISEM)</li>
<li>Empty pipe detection</li>
<li>GSV flow</li>
<li>GSV flow alternative</li>
<li>Kinematic viscosity</li>
<li>Low flow cut off</li>
<li>Mass flow</li>
<li>Oil mass flow</li>
<li>Water mass flow</li>
<li>HBSI</li>
<li>NSV flow</li>
<li>NSV flow alternative</li>
<li>External pressure</li>
<li>Exciter current 1</li>
<li>Exciter current 2</li>
<li>Oscillation frequency 1</li>
<li>Oscillation frequency 2</li>
<li>S&W volume flow</li>
<li>Reference density</li>
<li>Reference density alternative</li>
<li>Corrected volume flow</li>
<li>Oil corrected volume flow</li>
<li>Water corrected volume flow</li>
<li>Oscillation damping fluctuation 1</li>
<li>Oscillation damping fluctuation 2</li>
<li>Frequency fluctuation 1</li>
<li>Frequency fluctuation 2</li>
<li>Target mass flow</li>
<li>Carrier volume flow</li>
<li>Target volume flow</li>
<li>Temp. compensated dynamic viscosity</li>
<li>Temp. compensated kinematic viscosity</li>
<li>Temperature</li>
<li>Status</li>
<li>Volume flow</li>
<li>Oil volume flow</li>
<li>Water volume flow</li>
<li>Water cut</li>
</ul>
</td></tr>
</table>

| Diagnostic information | | | Remedy instructions |
|---|---|---|---|
| No. | Short text | | |
| 252 | Modules incompatible | | 1. Check electronic modules<br>2. Check if correct modules are available (e.g. NEx, Ex)<br>3. Replace electronic modules |
| | **Measured variable status** | | |
| | Quality | Bad | |
| | Quality substatus | Maintenance alarm | |
| | Coding (hex) | 0x24 to 0x27 | |
| | Status signal | F | |
| | Diagnostic behavior | Alarm | |
| | **Influenced measured variables** | | |
| | ▪ Oscillation amplitude 1<br>▪ Oscillation amplitude 2<br>▪ Signal asymmetry<br>▪ Carrier mass flow<br>▪ Carrier pipe temperature<br>▪ Target corrected volume flow<br>▪ Carrier corrected volume flow<br>▪ Concentration<br>▪ Measured values 1<br>▪ Measured values 2<br>▪ Measured values 3<br>▪ Oscillation damping 1<br>▪ Oscillation damping 2<br>▪ Density<br>▪ Oil density<br>▪ Water density<br>▪ Dynamic viscosity<br>▪ Sensor electronic temperature (ISEM)<br>▪ Empty pipe detection | ▪ GSV flow<br>▪ GSV flow alternative<br>▪ Kinematic viscosity<br>▪ Low flow cut off<br>▪ Mass flow<br>▪ Oil mass flow<br>▪ Water mass flow<br>▪ HBSI<br>▪ NSV flow<br>▪ NSV flow alternative<br>▪ External pressure<br>▪ Exciter current 1<br>▪ Exciter current 2<br>▪ Oscillation frequency 1<br>▪ Oscillation frequency 2<br>▪ S&W volume flow<br>▪ Reference density<br>▪ Reference density alternative<br>▪ Corrected volume flow | ▪ Oil corrected volume flow<br>▪ Water corrected volume flow<br>▪ Oscillation damping fluctuation 1<br>▪ Oscillation damping fluctuation 2<br>▪ Frequency fluctuation 1<br>▪ Frequency fluctuation 2<br>▪ Target mass flow<br>▪ Carrier volume flow<br>▪ Target volume flow<br>▪ Temp. compensated dynamic viscosity<br>▪ Temp. compensated kinematic viscosity<br>▪ Temperature<br>▪ Status<br>▪ Volume flow<br>▪ Oil volume flow<br>▪ Water volume flow<br>▪ Water cut |

| Diagnostic information | | | Remedy instructions |
|---|---|---|---|
| No. | Short text | | |
| 252 | Modules incompatible | | 1. Check if correct electronic modul is plugged<br>2. Replace electronic module |
| | **Measured variable status** | | |
| | Quality | Bad | |
| | Quality substatus | Maintenance alarm | |
| | Coding (hex) | 0x24 to 0x27 | |
| | Status signal | F | |
| | Diagnostic behavior | Alarm | |
| | **Influenced measured variables** | | |
| | ▪ Oscillation amplitude 1<br>▪ Oscillation amplitude 2<br>▪ Signal asymmetry<br>▪ Carrier mass flow<br>▪ Carrier pipe temperature<br>▪ Concentration<br>▪ Measured values 1<br>▪ Measured values 2<br>▪ Measured values 3<br>▪ Oscillation damping 1<br>▪ Oscillation damping 2<br>▪ Density | ▪ Dynamic viscosity<br>▪ Sensor electronic temperature (ISEM)<br>▪ Empty pipe detection<br>▪ Kinematic viscosity<br>▪ Low flow cut off<br>▪ Mass flow<br>▪ HBSI<br>▪ External pressure<br>▪ Exciter current 1<br>▪ Exciter current 2<br>▪ Oscillation frequency 1<br>▪ Oscillation frequency 2 | ▪ Reference density<br>▪ Corrected volume flow<br>▪ Oscillation damping fluctuation 1<br>▪ Oscillation damping fluctuation 2<br>▪ Frequency fluctuation 1<br>▪ Frequency fluctuation 2<br>▪ Target mass flow<br>▪ Temp. compensated dynamic viscosity<br>▪ Temp. compensated kinematic viscosity<br>▪ Temperature<br>▪ Status<br>▪ Volume flow |

<table>
<tr><th colspan="3">Diagnostic information</th><th>Remedy instructions</th></tr>
<tr><th>No.</th><th colspan="2">Short text</th><th></th></tr>
<tr><td rowspan="7">262</td><td colspan="2">Sensor electronic connection faulty</td><td rowspan="6">1. Check or replace connection cable between sensor electronic module (ISEM) and main electronics<br>2. Check or replace ISEM or main electronics</td></tr>
<tr><td colspan="2">Measured variable status</td></tr>
<tr><td>Quality</td><td>Bad</td></tr>
<tr><td>Quality substatus</td><td>Maintenance alarm</td></tr>
<tr><td>Coding (hex)</td><td>0x24 to 0x27</td></tr>
<tr><td>Status signal</td><td>F</td></tr>
<tr><td>Diagnostic behavior</td><td>Alarm</td></tr>
<tr><td colspan="4">Influenced measured variables</td></tr>
<tr><td colspan="4">
<ul>
<li>Oscillation amplitude 1</li>
<li>Oscillation amplitude 2</li>
<li>Signal asymmetry</li>
<li>Carrier mass flow</li>
<li>Carrier pipe temperature</li>
<li>Target corrected volume flow</li>
<li>Carrier corrected volume flow</li>
<li>Concentration</li>
<li>Measured values 1</li>
<li>Measured values 2</li>
<li>Measured values 3</li>
<li>Oscillation damping 1</li>
<li>Oscillation damping 2</li>
<li>Density</li>
<li>Oil density</li>
<li>Water density</li>
<li>Dynamic viscosity</li>
<li>Sensor electronic temperature (ISEM)</li>
<li>Empty pipe detection</li>
<li>GSV flow</li>
<li>GSV flow alternative</li>
<li>Kinematic viscosity</li>
<li>Low flow cut off</li>
<li>Mass flow</li>
<li>Oil mass flow</li>
<li>Water mass flow</li>
<li>HBSI</li>
<li>NSV flow</li>
<li>NSV flow alternative</li>
<li>External pressure</li>
<li>Exciter current 1</li>
<li>Exciter current 2</li>
<li>Oscillation frequency 1</li>
<li>Oscillation frequency 2</li>
<li>S&W volume flow</li>
<li>Reference density</li>
<li>Reference density alternative</li>
<li>Corrected volume flow</li>
<li>Oil corrected volume flow</li>
<li>Water corrected volume flow</li>
<li>Oscillation damping fluctuation 1</li>
<li>Oscillation damping fluctuation 2</li>
<li>Frequency fluctuation 1</li>
<li>Frequency fluctuation 2</li>
<li>Target mass flow</li>
<li>Carrier volume flow</li>
<li>Target volume flow</li>
<li>Temp. compensated dynamic viscosity</li>
<li>Temp. compensated kinematic viscosity</li>
<li>Temperature</li>
<li>Status</li>
<li>Volume flow</li>
<li>Oil volume flow</li>
<li>Water volume flow</li>
<li>Water cut</li>
</ul>
</td></tr>
</table>

| Diagnostic information | | | Remedy instructions |
|---|---|---|---|
| No. | Short text | | |
| 270 | Main electronic failure | | Change main electronic module |
| | **Measured variable status** | | |
| | Quality | Bad | |
| | Quality substatus | Maintenance alarm | |
| | Coding (hex) | 0x24 to 0x27 | |
| | Status signal | F | |
| | Diagnostic behavior | Alarm | |
| | **Influenced measured variables** | | |
| | ▪ Oscillation amplitude 1<br>▪ Oscillation amplitude 2<br>▪ Signal asymmetry<br>▪ Carrier mass flow<br>▪ Carrier pipe temperature<br>▪ Target corrected volume flow<br>▪ Carrier corrected volume flow<br>▪ Concentration<br>▪ Measured values 1<br>▪ Measured values 2<br>▪ Measured values 3<br>▪ Oscillation damping 1<br>▪ Oscillation damping 2<br>▪ Density<br>▪ Oil density<br>▪ Water density<br>▪ Dynamic viscosity<br>▪ Sensor electronic temperature (ISEM)<br>▪ Empty pipe detection | ▪ GSV flow<br>▪ GSV flow alternative<br>▪ Kinematic viscosity<br>▪ Low flow cut off<br>▪ Mass flow<br>▪ Oil mass flow<br>▪ Water mass flow<br>▪ HBSI<br>▪ NSV flow<br>▪ NSV flow alternative<br>▪ External pressure<br>▪ Exciter current 1<br>▪ Exciter current 2<br>▪ Oscillation frequency 1<br>▪ Oscillation frequency 2<br>▪ S&W volume flow<br>▪ Reference density<br>▪ Reference density alternative<br>▪ Corrected volume flow | ▪ Oil corrected volume flow<br>▪ Water corrected volume flow<br>▪ Oscillation damping fluctuation 1<br>▪ Oscillation damping fluctuation 2<br>▪ Frequency fluctuation 1<br>▪ Frequency fluctuation 2<br>▪ Target mass flow<br>▪ Carrier volume flow<br>▪ Target volume flow<br>▪ Temp. compensated dynamic viscosity<br>▪ Temp. compensated kinematic viscosity<br>▪ Temperature<br>▪ Status<br>▪ Volume flow<br>▪ Oil volume flow<br>▪ Water volume flow<br>▪ Water cut |

<table>
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<tr><th>No.</th><th colspan="2">Short text</th><th></th></tr>
<tr><td rowspan="7">271</td><td colspan="2">Main electronic failure</td><td rowspan="6">1. Restart device<br>2. Change main electronic module</td></tr>
<tr><td colspan="2">Measured variable status</td></tr>
<tr><td>Quality</td><td>Bad</td></tr>
<tr><td>Quality substatus</td><td>Maintenance alarm</td></tr>
<tr><td>Coding (hex)</td><td>0x24 to 0x27</td></tr>
<tr><td>Status signal</td><td>F</td></tr>
<tr><td>Diagnostic behavior</td><td>Alarm</td></tr>
<tr><td></td><td colspan="3">Influenced measured variables</td></tr>
<tr><td></td><td colspan="3">
<ul>
<li>Oscillation amplitude 1</li>
<li>Oscillation amplitude 2</li>
<li>Signal asymmetry</li>
<li>Carrier mass flow</li>
<li>Carrier pipe temperature</li>
<li>Target corrected volume flow</li>
<li>Carrier corrected volume flow</li>
<li>Concentration</li>
<li>Measured values 1</li>
<li>Measured values 2</li>
<li>Measured values 3</li>
<li>Oscillation damping 1</li>
<li>Oscillation damping 2</li>
<li>Density</li>
<li>Oil density</li>
<li>Water density</li>
<li>Dynamic viscosity</li>
<li>Sensor electronic temperature (ISEM)</li>
<li>Empty pipe detection</li>
<li>GSV flow</li>
<li>GSV flow alternative</li>
<li>Kinematic viscosity</li>
<li>Low flow cut off</li>
<li>Mass flow</li>
<li>Oil mass flow</li>
<li>Water mass flow</li>
<li>HBSI</li>
<li>NSV flow</li>
<li>NSV flow alternative</li>
<li>External pressure</li>
<li>Exciter current 1</li>
<li>Exciter current 2</li>
<li>Oscillation frequency 1</li>
<li>Oscillation frequency 2</li>
<li>S&W volume flow</li>
<li>Reference density</li>
<li>Reference density alternative</li>
<li>Corrected volume flow</li>
<li>Oil corrected volume flow</li>
<li>Water corrected volume flow</li>
<li>Oscillation damping fluctuation 1</li>
<li>Oscillation damping fluctuation 2</li>
<li>Frequency fluctuation 1</li>
<li>Frequency fluctuation 2</li>
<li>Target mass flow</li>
<li>Carrier volume flow</li>
<li>Target volume flow</li>
<li>Temp. compensated dynamic viscosity</li>
<li>Temp. compensated kinematic viscosity</li>
<li>Temperature</li>
<li>Status</li>
<li>Volume flow</li>
<li>Oil volume flow</li>
<li>Water volume flow</li>
<li>Water cut</li>
</ul>
</td></tr>
</table>

<table>
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<tr><th>No.</th><th>Short text</th></tr>
<tr><td rowspan="7">272</td><td colspan="2">Main electronic failure</td><td rowspan="6">1. Restart device<br>2. Contact service</td></tr>
<tr><td colspan="2">Measured variable status</td></tr>
<tr><td>Quality</td><td>Bad</td></tr>
<tr><td>Quality substatus</td><td>Maintenance alarm</td></tr>
<tr><td>Coding (hex)</td><td>0x24 to 0x27</td></tr>
<tr><td>Status signal</td><td>F</td></tr>
<tr><td>Diagnostic behavior</td><td>Alarm</td></tr>
<tr><td></td><td colspan="3">Influenced measured variables</td></tr>
<tr><td></td><td colspan="3">
<ul>
<li>Oscillation amplitude 1</li>
<li>Oscillation amplitude 2</li>
<li>Signal asymmetry</li>
<li>Carrier mass flow</li>
<li>Carrier pipe temperature</li>
<li>Target corrected volume flow</li>
<li>Carrier corrected volume flow</li>
<li>Concentration</li>
<li>Measured values 1</li>
<li>Measured values 2</li>
<li>Measured values 3</li>
<li>Oscillation damping 1</li>
<li>Oscillation damping 2</li>
<li>Density</li>
<li>Oil density</li>
<li>Water density</li>
<li>Dynamic viscosity</li>
<li>Sensor electronic temperature (ISEM)</li>
<li>Empty pipe detection</li>
<li>GSV flow</li>
<li>GSV flow alternative</li>
<li>Kinematic viscosity</li>
<li>Low flow cut off</li>
<li>Mass flow</li>
<li>Oil mass flow</li>
<li>Water mass flow</li>
<li>HBSI</li>
<li>NSV flow</li>
<li>NSV flow alternative</li>
<li>External pressure</li>
<li>Exciter current 1</li>
<li>Exciter current 2</li>
<li>Oscillation frequency 1</li>
<li>Oscillation frequency 2</li>
<li>S&W volume flow</li>
<li>Reference density</li>
<li>Reference density alternative</li>
<li>Corrected volume flow</li>
<li>Oil corrected volume flow</li>
<li>Water corrected volume flow</li>
<li>Oscillation damping fluctuation 1</li>
<li>Oscillation damping fluctuation 2</li>
<li>Frequency fluctuation 1</li>
<li>Frequency fluctuation 2</li>
<li>Target mass flow</li>
<li>Carrier volume flow</li>
<li>Target volume flow</li>
<li>Temp. compensated dynamic viscosity</li>
<li>Temp. compensated kinematic viscosity</li>
<li>Temperature</li>
<li>Status</li>
<li>Volume flow</li>
<li>Oil volume flow</li>
<li>Water volume flow</li>
<li>Water cut</li>
</ul>
</td></tr>
</table>

| Diagnostic information | | | Remedy instructions |
|---|---|---|---|
| No. | Short text | | |
| 273 | Main electronic failure | | Change electronic |
| | **Measured variable status** | | |
| | Quality | Bad | |
| | Quality substatus | Maintenance alarm | |
| | Coding (hex) | 0x24 to 0x27 | |
| | Status signal | F | |
| | Diagnostic behavior | Alarm | |
| | **Influenced measured variables** | | |
| | ▪ Oscillation amplitude 1<br>▪ Oscillation amplitude 2<br>▪ Signal asymmetry<br>▪ Carrier mass flow<br>▪ Carrier pipe temperature<br>▪ Target corrected volume flow<br>▪ Carrier corrected volume flow<br>▪ Concentration<br>▪ Measured values 1<br>▪ Measured values 2<br>▪ Measured values 3<br>▪ Oscillation damping 1<br>▪ Oscillation damping 2<br>▪ Density<br>▪ Oil density<br>▪ Water density<br>▪ Dynamic viscosity<br>▪ Sensor electronic temperature (ISEM)<br>▪ Empty pipe detection | ▪ GSV flow<br>▪ GSV flow alternative<br>▪ Kinematic viscosity<br>▪ Low flow cut off<br>▪ Mass flow<br>▪ Oil mass flow<br>▪ Water mass flow<br>▪ HBSI<br>▪ NSV flow<br>▪ NSV flow alternative<br>▪ External pressure<br>▪ Exciter current 1<br>▪ Exciter current 2<br>▪ Oscillation frequency 1<br>▪ Oscillation frequency 2<br>▪ S&W volume flow<br>▪ Reference density<br>▪ Reference density alternative<br>▪ Corrected volume flow | ▪ Oil corrected volume flow<br>▪ Water corrected volume flow<br>▪ Oscillation damping fluctuation 1<br>▪ Oscillation damping fluctuation 2<br>▪ Frequency fluctuation 1<br>▪ Frequency fluctuation 2<br>▪ Target mass flow<br>▪ Carrier volume flow<br>▪ Target volume flow<br>▪ Temp. compensated dynamic viscosity<br>▪ Temp. compensated kinematic viscosity<br>▪ Temperature<br>▪ Status<br>▪ Volume flow<br>▪ Oil volume flow<br>▪ Water volume flow<br>▪ Water cut |

| Diagnostic information | | | Remedy instructions |
|---|---|---|---|
| No. | Short text | | |
| 275 | I/O module 1 to n defective | | Change I/O module |
| | **Measured variable status** | | |
| | Quality | Bad | |
| | Quality substatus | Maintenance alarm | |
| | Coding (hex) | 0x24 to 0x27 | |
| | Status signal | F | |
| | Diagnostic behavior | Alarm | |
| | **Influenced measured variables** | | |
| | ▪ Oscillation amplitude 1<br>▪ Oscillation amplitude 2<br>▪ Signal asymmetry<br>▪ Carrier mass flow<br>▪ Carrier pipe temperature<br>▪ Concentration<br>▪ Measured values 1<br>▪ Measured values 2<br>▪ Measured values 3<br>▪ Oscillation damping 1<br>▪ Oscillation damping 2<br>▪ Density | ▪ Dynamic viscosity<br>▪ Sensor electronic temperature (ISEM)<br>▪ Empty pipe detection<br>▪ Kinematic viscosity<br>▪ Low flow cut off<br>▪ Mass flow<br>▪ HBSI<br>▪ External pressure<br>▪ Exciter current 1<br>▪ Exciter current 2<br>▪ Oscillation frequency 1<br>▪ Oscillation frequency 2 | ▪ Reference density<br>▪ Corrected volume flow<br>▪ Oscillation damping fluctuation 1<br>▪ Oscillation damping fluctuation 2<br>▪ Frequency fluctuation 1<br>▪ Frequency fluctuation 2<br>▪ Target mass flow<br>▪ Temp. compensated dynamic viscosity<br>▪ Temp. compensated kinematic viscosity<br>▪ Temperature<br>▪ Status<br>▪ Volume flow |

| Diagnostic information | | | Remedy instructions |
|---|---|---|---|
| No. | Short text | | |
| 276 | I/O module 1 to n faulty | | 1. Restart device<br>2. Change I/O module |
| | **Measured variable status** | | |
| | Quality | Bad | |
| | Quality substatus | Maintenance alarm | |
| | Coding (hex) | 0x24 to 0x27 | |
| | Status signal | F | |
| | Diagnostic behavior | Alarm | |
| | **Influenced measured variables** | | |
| | ▪ Oscillation amplitude 1<br>▪ Oscillation amplitude 2<br>▪ Signal asymmetry<br>▪ Carrier mass flow<br>▪ Carrier pipe temperature<br>▪ Target corrected volume flow<br>▪ Carrier corrected volume flow<br>▪ Concentration<br>▪ Measured values 1<br>▪ Measured values 2<br>▪ Measured values 3<br>▪ Oscillation damping 1<br>▪ Oscillation damping 2<br>▪ Density | ▪ Dynamic viscosity<br>▪ Sensor electronic temperature (ISEM)<br>▪ Empty pipe detection<br>▪ Kinematic viscosity<br>▪ Low flow cut off<br>▪ Mass flow<br>▪ HBSI<br>▪ External pressure<br>▪ Exciter current 1<br>▪ Exciter current 2<br>▪ Oscillation frequency 1<br>▪ Oscillation frequency 2<br>▪ Reference density<br>▪ Corrected volume flow | ▪ Oscillation damping fluctuation 1<br>▪ Oscillation damping fluctuation 2<br>▪ Frequency fluctuation 1<br>▪ Frequency fluctuation 2<br>▪ Target mass flow<br>▪ Carrier volume flow<br>▪ Target volume flow<br>▪ Temp. compensated dynamic viscosity<br>▪ Temp. compensated kinematic viscosity<br>▪ Temperature<br>▪ Status<br>▪ Volume flow |

| Diagnostic information | | | Remedy instructions |
|---|---|---|---|
| No. | Short text | | |
| 283 | Memory content | | 1. Reset device<br>2. Contact service |
| | **Measured variable status** | | |
| | Quality | Bad | |
| | Quality substatus | Maintenance alarm | |
| | Coding (hex) | 0x24 to 0x27 | |
| | Status signal | F | |
| | Diagnostic behavior | Alarm | |
| | **Influenced measured variables** | | |
| | ▪ Oscillation amplitude 1<br>▪ Oscillation amplitude 2<br>▪ Signal asymmetry<br>▪ Carrier mass flow<br>▪ Carrier pipe temperature<br>▪ Target corrected volume flow<br>▪ Carrier corrected volume flow<br>▪ Concentration<br>▪ Measured values 1<br>▪ Measured values 2<br>▪ Measured values 3<br>▪ Oscillation damping 1<br>▪ Oscillation damping 2<br>▪ Density<br>▪ Oil density<br>▪ Water density<br>▪ Dynamic viscosity<br>▪ Sensor electronic temperature (ISEM)<br>▪ Empty pipe detection | ▪ GSV flow<br>▪ GSV flow alternative<br>▪ Kinematic viscosity<br>▪ Low flow cut off<br>▪ Mass flow<br>▪ Oil mass flow<br>▪ Water mass flow<br>▪ HBSI<br>▪ NSV flow<br>▪ NSV flow alternative<br>▪ External pressure<br>▪ Exciter current 1<br>▪ Exciter current 2<br>▪ Oscillation frequency 1<br>▪ Oscillation frequency 2<br>▪ S&W volume flow<br>▪ Reference density<br>▪ Reference density alternative<br>▪ Corrected volume flow | ▪ Oil corrected volume flow<br>▪ Water corrected volume flow<br>▪ Oscillation damping fluctuation 1<br>▪ Oscillation damping fluctuation 2<br>▪ Frequency fluctuation 1<br>▪ Frequency fluctuation 2<br>▪ Target mass flow<br>▪ Carrier volume flow<br>▪ Target volume flow<br>▪ Temp. compensated dynamic viscosity<br>▪ Temp. compensated kinematic viscosity<br>▪ Temperature<br>▪ Status<br>▪ Volume flow<br>▪ Oil volume flow<br>▪ Water volume flow<br>▪ Water cut |

| Diagnostic information | | | Remedy instructions |
|---|---|---|---|
| **No.** | **Short text** | | |
| 302 | Device verification active | | Device verification active, please wait. |
| | **Measured variable status [from the factory]** [1] | | |
| | Quality | Good | |
| | Quality substatus | Function check | |
| | Coding (hex) | 0xBC to 0xBF | |
| | Status signal | C | |
| | Diagnostic behavior | Warning | |
| | **Influenced measured variables** | | |
| | ▪ Oscillation amplitude 1<br>▪ Oscillation amplitude 2<br>▪ Signal asymmetry<br>▪ Carrier mass flow<br>▪ Carrier pipe temperature<br>▪ Target corrected volume flow<br>▪ Carrier corrected volume flow<br>▪ Concentration<br>▪ Measured values 1<br>▪ Measured values 2<br>▪ Measured values 3<br>▪ Oscillation damping 1<br>▪ Oscillation damping 2<br>▪ Density<br>▪ Oil density<br>▪ Water density<br>▪ Dynamic viscosity<br>▪ Sensor electronic temperature (ISEM)<br>▪ Empty pipe detection | ▪ GSV flow<br>▪ GSV flow alternative<br>▪ Kinematic viscosity<br>▪ Low flow cut off<br>▪ Mass flow<br>▪ Oil mass flow<br>▪ Water mass flow<br>▪ HBSI<br>▪ NSV flow<br>▪ NSV flow alternative<br>▪ External pressure<br>▪ Exciter current 1<br>▪ Exciter current 2<br>▪ Oscillation frequency 1<br>▪ Oscillation frequency 2<br>▪ S&W volume flow<br>▪ Reference density<br>▪ Reference density alternative<br>▪ Corrected volume flow | ▪ Oil corrected volume flow<br>▪ Water corrected volume flow<br>▪ Oscillation damping fluctuation 1<br>▪ Oscillation damping fluctuation 2<br>▪ Frequency fluctuation 1<br>▪ Frequency fluctuation 2<br>▪ Target mass flow<br>▪ Carrier volume flow<br>▪ Target volume flow<br>▪ Temp. compensated dynamic viscosity<br>▪ Temp. compensated kinematic viscosity<br>▪ Temperature<br>▪ Status<br>▪ Volume flow<br>▪ Oil volume flow<br>▪ Water volume flow<br>▪ Water cut |

1) Diagnostic behavior can be changed. This causes the overall status of the measured variable to change.

| Diagnostic information | | | Remedy instructions |
|---|---|---|---|
| **No.** | **Short text** | | |
| 303 | I/O 1 to n configuration changed | | 1. Apply I/O module configuration (parameter 'Apply I/O configuration')<br>2. Afterwards reload device description and check wiring |
| | **Measured variable status** | | |
| | Quality | Bad | |
| | Quality substatus | Maintenance alarm | |
| | Coding (hex) | 0x24 to 0x27 | |
| | Status signal | M | |
| | Diagnostic behavior | Warning | |
| | **Influenced measured variables** | | |
| | – | | |

<table>
<tr><th colspan="2">Diagnostic information</th><th rowspan="2">Remedy instructions</th></tr>
<tr><th>No.</th><th>Short text</th></tr>
<tr><td rowspan="7">311</td><td colspan="2">Electronic failure</td><td rowspan="6">1. Do not reset device<br>2. Contact service</td></tr>
<tr><td colspan="2">Measured variable status</td></tr>
<tr><td>Quality</td><td>Bad</td></tr>
<tr><td>Quality substatus</td><td>Maintenance alarm</td></tr>
<tr><td>Coding (hex)</td><td>0x24 to 0x27</td></tr>
<tr><td>Status signal</td><td>M</td></tr>
<tr><td>Diagnostic behavior</td><td>Warning</td></tr>
<tr><td></td><td colspan="3">Influenced measured variables</td></tr>
<tr><td></td><td colspan="3">
<ul>
<li>Oscillation amplitude 1</li>
<li>Oscillation amplitude 2</li>
<li>Signal asymmetry</li>
<li>Carrier mass flow</li>
<li>Carrier pipe temperature</li>
<li>Target corrected volume flow</li>
<li>Carrier corrected volume flow</li>
<li>Concentration</li>
<li>Measured values 1</li>
<li>Measured values 2</li>
<li>Measured values 3</li>
<li>Oscillation damping 1</li>
<li>Oscillation damping 2</li>
<li>Density</li>
<li>Oil density</li>
<li>Water density</li>
<li>Dynamic viscosity</li>
<li>Sensor electronic temperature (ISEM)</li>
<li>Empty pipe detection</li>
<li>GSV flow</li>
<li>GSV flow alternative</li>
<li>Kinematic viscosity</li>
<li>Low flow cut off</li>
<li>Mass flow</li>
<li>Oil mass flow</li>
<li>Water mass flow</li>
<li>HBSI</li>
<li>NSV flow</li>
<li>NSV flow alternative</li>
<li>External pressure</li>
<li>Exciter current 1</li>
<li>Exciter current 2</li>
<li>Oscillation frequency 1</li>
<li>Oscillation frequency 2</li>
<li>S&W volume flow</li>
<li>Reference density</li>
<li>Reference density alternative</li>
<li>Corrected volume flow</li>
<li>Oil corrected volume flow</li>
<li>Water corrected volume flow</li>
<li>Oscillation damping fluctuation 1</li>
<li>Oscillation damping fluctuation 2</li>
<li>Frequency fluctuation 1</li>
<li>Frequency fluctuation 2</li>
<li>Target mass flow</li>
<li>Carrier volume flow</li>
<li>Target volume flow</li>
<li>Temp. compensated dynamic viscosity</li>
<li>Temp. compensated kinematic viscosity</li>
<li>Temperature</li>
<li>Status</li>
<li>Volume flow</li>
<li>Oil volume flow</li>
<li>Water volume flow</li>
<li>Water cut</li>
</ul>
</td></tr>
</table>

| Diagnostic information | | | Remedy instructions |
|---|---|---|---|
| No. | Short text | | |
| 332 | Writing in HistoROM backup failed | | Replace user interface board<br>Ex d/XP: replace transmitter |
| | **Measured variable status** | | |
| | Quality | Bad | |
| | Quality substatus | Maintenance alarm | |
| | Coding (hex) | 0x24 to 0x27 | |
| | Status signal | F | |
| | Diagnostic behavior | Alarm | |
| | **Influenced measured variables** | | |
| | ▪ Oscillation amplitude 1<br>▪ Oscillation amplitude 2<br>▪ Signal asymmetry<br>▪ Carrier mass flow<br>▪ Carrier pipe temperature<br>▪ Target corrected volume flow<br>▪ Carrier corrected volume flow<br>▪ Concentration<br>▪ Oscillation damping 1<br>▪ Oscillation damping 2<br>▪ Density<br>▪ Oil density<br>▪ Water density<br>▪ Dynamic viscosity<br>▪ Sensor electronic temperature (ISEM)<br>▪ Empty pipe detection<br>▪ GSV flow<br>▪ GSV flow alternative | ▪ Kinematic viscosity<br>▪ Low flow cut off<br>▪ Mass flow<br>▪ Oil mass flow<br>▪ Water mass flow<br>▪ HBSI<br>▪ NSV flow<br>▪ NSV flow alternative<br>▪ External pressure<br>▪ Exciter current 1<br>▪ Exciter current 2<br>▪ Oscillation frequency 1<br>▪ Oscillation frequency 2<br>▪ S&W volume flow<br>▪ Reference density<br>▪ Reference density alternative<br>▪ Corrected volume flow<br>▪ Oil corrected volume flow | ▪ Water corrected volume flow<br>▪ Oscillation damping fluctuation 1<br>▪ Oscillation damping fluctuation 2<br>▪ Frequency fluctuation 1<br>▪ Frequency fluctuation 2<br>▪ Target mass flow<br>▪ Carrier volume flow<br>▪ Target volume flow<br>▪ Temp. compensated dynamic viscosity<br>▪ Temp. compensated kinematic viscosity<br>▪ Temperature<br>▪ Status<br>▪ Volume flow<br>▪ Oil volume flow<br>▪ Water volume flow<br>▪ Water cut |

| Diagnostic information | | | Remedy instructions |
|---|---|---|---|
| No. | Short text | | |
| 361 | I/O module 1 to n faulty | | 1. Restart device<br>2. Check electronic modules<br>3. Change I/O Modul or main electronics |
| | **Measured variable status** | | |
| | Quality | Bad | |
| | Quality substatus | Maintenance alarm | |
| | Coding (hex) | 0x24 to 0x27 | |
| | Status signal | F | |
| | Diagnostic behavior | Alarm | |
| | **Influenced measured variables** | | |
| | ▪ Oscillation amplitude 1<br>▪ Oscillation amplitude 2<br>▪ Signal asymmetry<br>▪ Carrier mass flow<br>▪ Carrier pipe temperature<br>▪ Concentration<br>▪ Measured values 1<br>▪ Measured values 2<br>▪ Measured values 3<br>▪ Oscillation damping 1<br>▪ Oscillation damping 2<br>▪ Density | ▪ Dynamic viscosity<br>▪ Sensor electronic temperature (ISEM)<br>▪ Empty pipe detection<br>▪ Kinematic viscosity<br>▪ Low flow cut off<br>▪ Mass flow<br>▪ HBSI<br>▪ External pressure<br>▪ Exciter current 1<br>▪ Exciter current 2<br>▪ Oscillation frequency 1<br>▪ Oscillation frequency 2 | ▪ Reference density<br>▪ Corrected volume flow<br>▪ Oscillation damping fluctuation 1<br>▪ Oscillation damping fluctuation 2<br>▪ Frequency fluctuation 1<br>▪ Frequency fluctuation 2<br>▪ Target mass flow<br>▪ Temp. compensated dynamic viscosity<br>▪ Temp. compensated kinematic viscosity<br>▪ Temperature<br>▪ Status<br>▪ Volume flow |

<table>
<tr><th colspan="2">Diagnostic information</th><th>Remedy instructions</th></tr>
<tr><th>No.</th><th>Short text</th><th></th></tr>
<tr><td rowspan="7">372</td><td colspan="2">Sensor electronic (ISEM) faulty</td><td rowspan="6">1. Restart device<br>2. Check if failure recurs<br>3. Replace sensor electronic module (ISEM)</td></tr>
<tr><td colspan="2">Measured variable status</td></tr>
<tr><td>Quality</td><td>Bad</td></tr>
<tr><td>Quality substatus</td><td>Maintenance alarm</td></tr>
<tr><td>Coding (hex)</td><td>0x24 to 0x27</td></tr>
<tr><td>Status signal</td><td>F</td></tr>
<tr><td>Diagnostic behavior</td><td>Alarm</td></tr>
<tr><td></td><td colspan="2">Influenced measured variables</td></tr>
<tr><td></td><td colspan="2">
<ul>
<li>Oscillation amplitude 1</li>
<li>Oscillation amplitude 2</li>
<li>Signal asymmetry</li>
<li>Carrier mass flow</li>
<li>Carrier pipe temperature</li>
<li>Target corrected volume flow</li>
<li>Carrier corrected volume flow</li>
<li>Concentration</li>
<li>Measured values 1</li>
<li>Measured values 2</li>
<li>Measured values 3</li>
<li>Oscillation damping 1</li>
<li>Oscillation damping 2</li>
<li>Density</li>
<li>Oil density</li>
<li>Water density</li>
<li>Dynamic viscosity</li>
<li>Sensor electronic temperature (ISEM)</li>
<li>Empty pipe detection</li>
<li>GSV flow</li>
<li>GSV flow alternative</li>
<li>Kinematic viscosity</li>
<li>Low flow cut off</li>
<li>Mass flow</li>
<li>Oil mass flow</li>
<li>Water mass flow</li>
<li>HBSI</li>
<li>NSV flow</li>
<li>NSV flow alternative</li>
<li>External pressure</li>
<li>Exciter current 1</li>
<li>Exciter current 2</li>
<li>Oscillation frequency 1</li>
<li>Oscillation frequency 2</li>
<li>S&W volume flow</li>
<li>Reference density</li>
<li>Reference density alternative</li>
<li>Corrected volume flow</li>
<li>Oil corrected volume flow</li>
<li>Water corrected volume flow</li>
<li>Oscillation damping fluctuation 1</li>
<li>Oscillation damping fluctuation 2</li>
<li>Frequency fluctuation 1</li>
<li>Frequency fluctuation 2</li>
<li>Target mass flow</li>
<li>Carrier volume flow</li>
<li>Target volume flow</li>
<li>Temp. compensated dynamic viscosity</li>
<li>Temp. compensated kinematic viscosity</li>
<li>Temperature</li>
<li>Status</li>
<li>Volume flow</li>
<li>Oil volume flow</li>
<li>Water volume flow</li>
<li>Water cut</li>
</ul>
</td></tr>
</table>

| Diagnostic information | | | Remedy instructions |
|---|---|---|---|
| No. | Short text | | |
| 373 | Sensor electronic (ISEM) faulty | | 1. Transfer data or reset device<br>2. Contact service |
| | **Measured variable status** | | |
| | Quality | Bad | |
| | Quality substatus | Maintenance alarm | |
| | Coding (hex) | 0x24 to 0x27 | |
| | Status signal | F | |
| | Diagnostic behavior | Alarm | |
| | **Influenced measured variables** | | |
| | ▪ Oscillation amplitude 1<br>▪ Oscillation amplitude 2<br>▪ Signal asymmetry<br>▪ Carrier mass flow<br>▪ Carrier pipe temperature<br>▪ Target corrected volume flow<br>▪ Carrier corrected volume flow<br>▪ Concentration<br>▪ Measured values 1<br>▪ Measured values 2<br>▪ Measured values 3<br>▪ Oscillation damping 1<br>▪ Oscillation damping 2<br>▪ Density<br>▪ Oil density<br>▪ Water density<br>▪ Dynamic viscosity<br>▪ Sensor electronic temperature (ISEM)<br>▪ Empty pipe detection | ▪ GSV flow<br>▪ GSV flow alternative<br>▪ Kinematic viscosity<br>▪ Low flow cut off<br>▪ Mass flow<br>▪ Oil mass flow<br>▪ Water mass flow<br>▪ HBSI<br>▪ NSV flow<br>▪ NSV flow alternative<br>▪ External pressure<br>▪ Exciter current 1<br>▪ Exciter current 2<br>▪ Oscillation frequency 1<br>▪ Oscillation frequency 2<br>▪ S&W volume flow<br>▪ Reference density<br>▪ Reference density alternative<br>▪ Corrected volume flow | ▪ Oil corrected volume flow<br>▪ Water corrected volume flow<br>▪ Oscillation damping fluctuation 1<br>▪ Oscillation damping fluctuation 2<br>▪ Frequency fluctuation 1<br>▪ Frequency fluctuation 2<br>▪ Target mass flow<br>▪ Carrier volume flow<br>▪ Target volume flow<br>▪ Temp. compensated dynamic viscosity<br>▪ Temp. compensated kinematic viscosity<br>▪ Temperature<br>▪ Status<br>▪ Volume flow<br>▪ Oil volume flow<br>▪ Water volume flow<br>▪ Water cut |

| Diagnostic information | | | Remedy instructions |
|---|---|---|---|
| No. | Short text | | |
| 374 | Sensor electronic (ISEM) faulty | | 1. Restart device<br>2. Check if failure recurs<br>3. Replace sensor electronic module (ISEM) |
| | **Measured variable status [from the factory]** [1] | | |
| | Quality | Bad | |
| | Quality substatus | Maintenance alarm | |
| | Coding (hex) | 0x24 to 0x27 | |
| | Status signal | S | |
| | Diagnostic behavior | Warning | |
| | **Influenced measured variables** | | |
| | ▪ Oscillation amplitude 1<br>▪ Oscillation amplitude 2<br>▪ Signal asymmetry<br>▪ Carrier mass flow<br>▪ Carrier pipe temperature<br>▪ Concentration<br>▪ Oscillation damping 1<br>▪ Oscillation damping 2<br>▪ Density<br>▪ Dynamic viscosity<br>▪ Sensor electronic temperature (ISEM) | ▪ Empty pipe detection<br>▪ Kinematic viscosity<br>▪ Low flow cut off<br>▪ Mass flow<br>▪ HBSI<br>▪ External pressure<br>▪ Exciter current 1<br>▪ Exciter current 2<br>▪ Oscillation frequency 1<br>▪ Oscillation frequency 2<br>▪ Reference density | ▪ Corrected volume flow<br>▪ Oscillation damping fluctuation 1<br>▪ Oscillation damping fluctuation 2<br>▪ Frequency fluctuation 1<br>▪ Frequency fluctuation 2<br>▪ Target mass flow<br>▪ Temp. compensated dynamic viscosity<br>▪ Temp. compensated kinematic viscosity<br>▪ Temperature<br>▪ Status<br>▪ Volume flow |

1) Diagnostic behavior can be changed. This causes the overall status of the measured variable to change.

| Diagnostic information | | | Remedy instructions |
|---|---|---|---|
| No. | Short text | | |
| 375 | I/O- 1 to n communication failed | | 1. Restart device<br>2. Check if failure recurs<br>3. Replace module rack inclusive electronic modules |
| | **Measured variable status** | | |
| | Quality | Bad | |
| | Quality substatus | Maintenance alarm | |
| | Coding (hex) | 0x24 to 0x27 | |
| | Status signal | F | |
| | Diagnostic behavior | Alarm | |
| | **Influenced measured variables** | | |
| | ▪ Oscillation amplitude 1<br>▪ Oscillation amplitude 2<br>▪ Signal asymmetry<br>▪ Carrier mass flow<br>▪ Carrier pipe temperature<br>▪ Target corrected volume flow<br>▪ Carrier corrected volume flow<br>▪ Concentration<br>▪ Measured values 1<br>▪ Measured values 2<br>▪ Measured values 3<br>▪ Oscillation damping 1<br>▪ Oscillation damping 2<br>▪ Density<br>▪ Oil density<br>▪ Water density<br>▪ Dynamic viscosity<br>▪ Sensor electronic temperature (ISEM) | ▪ Empty pipe detection<br>▪ GSV flow<br>▪ GSV flow alternative<br>▪ Kinematic viscosity<br>▪ Low flow cut off<br>▪ Mass flow<br>▪ Oil mass flow<br>▪ Water mass flow<br>▪ HBSI<br>▪ NSV flow<br>▪ NSV flow alternative<br>▪ External pressure<br>▪ Exciter current 1<br>▪ Exciter current 2<br>▪ Oscillation frequency 1<br>▪ Oscillation frequency 2<br>▪ S&W volume flow<br>▪ Reference density | ▪ Reference density alternative<br>▪ Corrected volume flow<br>▪ Oil corrected volume flow<br>▪ Water corrected volume flow<br>▪ Oscillation damping fluctuation 1<br>▪ Oscillation damping fluctuation 2<br>▪ Frequency fluctuation 1<br>▪ Frequency fluctuation 2<br>▪ Target mass flow<br>▪ Carrier volume flow<br>▪ Target volume flow<br>▪ Temp. compensated dynamic viscosity<br>▪ Temp. compensated kinematic viscosity<br>▪ Temperature<br>▪ Status<br>▪ Volume flow |

<table>
<tr><th colspan="2">Diagnostic information</th><th rowspan="2">Remedy instructions</th></tr>
<tr><th>No.</th><th>Short text</th></tr>
<tr><td rowspan="7">382</td><td colspan="2">Data storage</td><td rowspan="6">1. Insert T-DAT<br>2. Replace T-DAT</td></tr>
<tr><td colspan="2">Measured variable status</td></tr>
<tr><td>Quality</td><td>Bad</td></tr>
<tr><td>Quality substatus</td><td>Maintenance alarm</td></tr>
<tr><td>Coding (hex)</td><td>0x24 to 0x27</td></tr>
<tr><td>Status signal</td><td>F</td></tr>
<tr><td>Diagnostic behavior</td><td>Alarm</td></tr>
<tr><td></td><td colspan="3">Influenced measured variables</td></tr>
<tr><td></td><td colspan="3">
<ul>
<li>Oscillation amplitude 1</li>
<li>Oscillation amplitude 2</li>
<li>Signal asymmetry</li>
<li>Carrier mass flow</li>
<li>Carrier pipe temperature</li>
<li>Target corrected volume flow</li>
<li>Carrier corrected volume flow</li>
<li>Concentration</li>
<li>Measured values 1</li>
<li>Measured values 2</li>
<li>Measured values 3</li>
<li>Oscillation damping 1</li>
<li>Oscillation damping 2</li>
<li>Density</li>
<li>Oil density</li>
<li>Water density</li>
<li>Dynamic viscosity</li>
<li>Sensor electronic temperature (ISEM)</li>
<li>Empty pipe detection</li>
<li>GSV flow</li>
<li>GSV flow alternative</li>
<li>Kinematic viscosity</li>
<li>Low flow cut off</li>
<li>Mass flow</li>
<li>Oil mass flow</li>
<li>Water mass flow</li>
<li>HBSI</li>
<li>NSV flow</li>
<li>NSV flow alternative</li>
<li>External pressure</li>
<li>Exciter current 1</li>
<li>Exciter current 2</li>
<li>Oscillation frequency 1</li>
<li>Oscillation frequency 2</li>
<li>S&W volume flow</li>
<li>Reference density</li>
<li>Reference density alternative</li>
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<li>Water corrected volume flow</li>
<li>Oscillation damping fluctuation 1</li>
<li>Oscillation damping fluctuation 2</li>
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<li>Frequency fluctuation 2</li>
<li>Target mass flow</li>
<li>Carrier volume flow</li>
<li>Target volume flow</li>
<li>Temp. compensated dynamic viscosity</li>
<li>Temp. compensated kinematic viscosity</li>
<li>Temperature</li>
<li>Status</li>
<li>Volume flow</li>
<li>Oil volume flow</li>
<li>Water volume flow</li>
<li>Water cut</li>
</ul>
</td></tr>
</table>

| Diagnostic information | | | Remedy instructions |
|---|---|---|---|
| No. | Short text | | |
| 383 | Memory content | | 1. Restart device<br>2. Delete T-DAT via 'Reset device' parameter<br>3. Replace T-DAT |
| | **Measured variable status** | | |
| | Quality | Bad | |
| | Quality substatus | Maintenance alarm | |
| | Coding (hex) | 0x24 to 0x27 | |
| | Status signal | F | |
| | Diagnostic behavior | Alarm | |
| | **Influenced measured variables** | | |
| | ▪ Oscillation amplitude 1<br>▪ Oscillation amplitude 2<br>▪ Signal asymmetry<br>▪ Carrier mass flow<br>▪ Carrier pipe temperature<br>▪ Target corrected volume flow<br>▪ Carrier corrected volume flow<br>▪ Concentration<br>▪ Measured values 1<br>▪ Measured values 2<br>▪ Measured values 3<br>▪ Oscillation damping 1<br>▪ Oscillation damping 2<br>▪ Density<br>▪ Oil density<br>▪ Water density<br>▪ Dynamic viscosity<br>▪ Sensor electronic temperature (ISEM) | ▪ Empty pipe detection<br>▪ GSV flow<br>▪ GSV flow alternative<br>▪ Kinematic viscosity<br>▪ Low flow cut off<br>▪ Mass flow<br>▪ Oil mass flow<br>▪ Water mass flow<br>▪ HBSI<br>▪ NSV flow<br>▪ NSV flow alternative<br>▪ External pressure<br>▪ Exciter current 1<br>▪ Exciter current 2<br>▪ Oscillation frequency 1<br>▪ Oscillation frequency 2<br>▪ S&W volume flow<br>▪ Reference density | ▪ Reference density alternative<br>▪ Corrected volume flow<br>▪ Oil corrected volume flow<br>▪ Water corrected volume flow<br>▪ Oscillation damping fluctuation 1<br>▪ Oscillation damping fluctuation 2<br>▪ Frequency fluctuation 1<br>▪ Frequency fluctuation 2<br>▪ Target mass flow<br>▪ Carrier volume flow<br>▪ Target volume flow<br>▪ Temp. compensated dynamic viscosity<br>▪ Temp. compensated kinematic viscosity<br>▪ Temperature<br>▪ Status<br>▪ Volume flow |

| Diagnostic information | | | Remedy instructions |
|---|---|---|---|
| No. | Short text | | |
| 387 | HistoROM backup failed | | Contact service organization |
| | **Measured variable status** | | |
| | Quality | Bad | |
| | Quality substatus | Maintenance alarm | |
| | Coding (hex) | 0x24 to 0x27 | |
| | Status signal | F | |
| | Diagnostic behavior | Alarm | |
| | **Influenced measured variables** | | |
| | ▪ Oscillation amplitude 1<br>▪ Oscillation amplitude 2<br>▪ Signal asymmetry<br>▪ Carrier mass flow<br>▪ Carrier pipe temperature<br>▪ Target corrected volume flow<br>▪ Carrier corrected volume flow<br>▪ Concentration<br>▪ Measured values 1<br>▪ Measured values 2<br>▪ Measured values 3<br>▪ Oscillation damping 1<br>▪ Oscillation damping 2<br>▪ Density<br>▪ Oil density<br>▪ Water density<br>▪ Dynamic viscosity<br>▪ Sensor electronic temperature (ISEM)<br>▪ Empty pipe detection | ▪ GSV flow<br>▪ GSV flow alternative<br>▪ Kinematic viscosity<br>▪ Low flow cut off<br>▪ Mass flow<br>▪ Oil mass flow<br>▪ Water mass flow<br>▪ HBSI<br>▪ NSV flow<br>▪ NSV flow alternative<br>▪ External pressure<br>▪ Exciter current 1<br>▪ Exciter current 2<br>▪ Oscillation frequency 1<br>▪ Oscillation frequency 2<br>▪ S&W volume flow<br>▪ Reference density<br>▪ Reference density alternative<br>▪ Corrected volume flow | ▪ Oil corrected volume flow<br>▪ Water corrected volume flow<br>▪ Oscillation damping fluctuation 1<br>▪ Oscillation damping fluctuation 2<br>▪ Frequency fluctuation 1<br>▪ Frequency fluctuation 2<br>▪ Target mass flow<br>▪ Carrier volume flow<br>▪ Target volume flow<br>▪ Temp. compensated dynamic viscosity<br>▪ Temp. compensated kinematic viscosity<br>▪ Temperature<br>▪ Status<br>▪ Volume flow<br>▪ Oil volume flow<br>▪ Water volume flow<br>▪ Water cut |

## 12.7.3 Diagnostic of configuration

| Diagnostic information | | | Remedy instructions |
|---|---|---|---|
| No. | Short text | | |
| 330 | Flash file invalid | | 1. Update firmware of device<br>2. Restart device |
| | **Measured variable status** | | |
| | Quality | Bad | |
| | Quality substatus | Maintenance alarm | |
| | Coding (hex) | 0x24 to 0x27 | |
| | Status signal | M | |
| | Diagnostic behavior | Warning | |
| | **Influenced measured variables** | | |
| | ▪ Oscillation amplitude 1<br>▪ Oscillation amplitude 2<br>▪ Signal asymmetry<br>▪ Carrier mass flow<br>▪ Carrier pipe temperature<br>▪ Concentration<br>▪ Measured values 1<br>▪ Measured values 2<br>▪ Measured values 3<br>▪ Oscillation damping 1<br>▪ Oscillation damping 2<br>▪ Density | ▪ Dynamic viscosity<br>▪ Sensor electronic temperature (ISEM)<br>▪ Empty pipe detection<br>▪ Kinematic viscosity<br>▪ Low flow cut off<br>▪ Mass flow<br>▪ HBSI<br>▪ External pressure<br>▪ Exciter current 1<br>▪ Exciter current 2<br>▪ Oscillation frequency 1<br>▪ Oscillation frequency 2 | ▪ Reference density<br>▪ Corrected volume flow<br>▪ Oscillation damping fluctuation 1<br>▪ Oscillation damping fluctuation 2<br>▪ Frequency fluctuation 1<br>▪ Frequency fluctuation 2<br>▪ Target mass flow<br>▪ Temp. compensated dynamic viscosity<br>▪ Temp. compensated kinematic viscosity<br>▪ Temperature<br>▪ Status<br>▪ Volume flow |

| Diagnostic information | | | Remedy instructions |
|---|---|---|---|
| No. | Short text | | |
| 331 | Firmware update failed | | 1. Update firmware of device<br>2. Restart device |
| | **Measured variable status** | | |
| | Quality | Bad | |
| | Quality substatus | Maintenance alarm | |
| | Coding (hex) | 0x24 to 0x27 | |
| | Status signal | F | |
| | Diagnostic behavior | Warning | |
| | **Influenced measured variables** | | |
| | ▪ Oscillation amplitude 1<br>▪ Oscillation amplitude 2<br>▪ Signal asymmetry<br>▪ Carrier mass flow<br>▪ Carrier pipe temperature<br>▪ Target corrected volume flow<br>▪ Carrier corrected volume flow<br>▪ Concentration<br>▪ Measured values 1<br>▪ Measured values 2<br>▪ Measured values 3<br>▪ Oscillation damping 1<br>▪ Oscillation damping 2<br>▪ Density<br>▪ Oil density<br>▪ Water density<br>▪ Dynamic viscosity<br>▪ Sensor electronic temperature (ISEM)<br>▪ Empty pipe detection | ▪ GSV flow<br>▪ GSV flow alternative<br>▪ Kinematic viscosity<br>▪ Low flow cut off<br>▪ Mass flow<br>▪ Oil mass flow<br>▪ Water mass flow<br>▪ HBSI<br>▪ NSV flow<br>▪ NSV flow alternative<br>▪ External pressure<br>▪ Exciter current 1<br>▪ Exciter current 2<br>▪ Oscillation frequency 1<br>▪ Oscillation frequency 2<br>▪ S&W volume flow<br>▪ Reference density<br>▪ Reference density alternative<br>▪ Corrected volume flow | ▪ Oil corrected volume flow<br>▪ Water corrected volume flow<br>▪ Oscillation damping fluctuation 1<br>▪ Oscillation damping fluctuation 2<br>▪ Frequency fluctuation 1<br>▪ Frequency fluctuation 2<br>▪ Target mass flow<br>▪ Carrier volume flow<br>▪ Target volume flow<br>▪ Temp. compensated dynamic viscosity<br>▪ Temp. compensated kinematic viscosity<br>▪ Temperature<br>▪ Status<br>▪ Volume flow<br>▪ Oil volume flow<br>▪ Water volume flow<br>▪ Water cut |

<table>
<tr><th colspan="3">Diagnostic information</th><th>Remedy instructions</th></tr>
<tr><th>No.</th><th colspan="2">Short text</th><th></th></tr>
<tr><td rowspan="8">410</td><td colspan="2">Data transfer</td><td rowspan="6">1. Check connection<br>2. Retry data transfer</td></tr>
<tr><td colspan="2">Measured variable status</td></tr>
<tr><td>Quality</td><td>Bad</td></tr>
<tr><td>Quality substatus</td><td>Maintenance alarm</td></tr>
<tr><td>Coding (hex)</td><td>0x24 to 0x27</td></tr>
<tr><td>Status signal</td><td>F</td></tr>
<tr><td>Diagnostic behavior</td><td>Alarm</td><td rowspan="2"></td></tr>
<tr><td colspan="3">Influenced measured variables</td></tr>
<tr><td colspan="3">
<ul>
<li>Oscillation amplitude 1</li>
<li>Oscillation amplitude 2</li>
<li>Signal asymmetry</li>
<li>Carrier mass flow</li>
<li>Carrier pipe temperature</li>
<li>Target corrected volume flow</li>
<li>Carrier corrected volume flow</li>
<li>Concentration</li>
<li>Measured values 1</li>
<li>Measured values 2</li>
<li>Measured values 3</li>
<li>Oscillation damping 1</li>
<li>Oscillation damping 2</li>
<li>Density</li>
<li>Oil density</li>
<li>Water density</li>
<li>Dynamic viscosity</li>
<li>Sensor electronic temperature (ISEM)</li>
<li>Empty pipe detection</li>
<li>GSV flow</li>
<li>GSV flow alternative</li>
<li>Kinematic viscosity</li>
<li>Low flow cut off</li>
<li>Mass flow</li>
<li>Oil mass flow</li>
<li>Water mass flow</li>
<li>HBSI</li>
<li>NSV flow</li>
<li>NSV flow alternative</li>
<li>External pressure</li>
<li>Exciter current 1</li>
<li>Exciter current 2</li>
<li>Oscillation frequency 1</li>
<li>Oscillation frequency 2</li>
<li>S&W volume flow</li>
<li>Reference density</li>
<li>Reference density alternative</li>
<li>Corrected volume flow</li>
<li>Oil corrected volume flow</li>
<li>Water corrected volume flow</li>
<li>Oscillation damping fluctuation 1</li>
<li>Oscillation damping fluctuation 2</li>
<li>Frequency fluctuation 1</li>
<li>Frequency fluctuation 2</li>
<li>Target mass flow</li>
<li>Carrier volume flow</li>
<li>Target volume flow</li>
<li>Temp. compensated dynamic viscosity</li>
<li>Temp. compensated kinematic viscosity</li>
<li>Temperature</li>
<li>Status</li>
<li>Volume flow</li>
<li>Oil volume flow</li>
<li>Water volume flow</li>
<li>Water cut</li>
</ul>
</td></tr>
</table>

| Diagnostic information | | | Remedy instructions |
|---|---|---|---|
| No. | Short text | | |
| 412 | Processing download | | Download active, please wait |
| | **Measured variable status** | | |
| | Quality | Uncertain | |
| | Quality substatus | Initial value | |
| | Coding (hex) | 0x4C to 0x4F | |
| | Status signal | C | |
| | Diagnostic behavior | Warning | |
| | **Influenced measured variables** | | |
| | ▪ Oscillation amplitude 1<br>▪ Oscillation amplitude 2<br>▪ Signal asymmetry<br>▪ Carrier mass flow<br>▪ Carrier pipe temperature<br>▪ Target corrected volume flow<br>▪ Carrier corrected volume flow<br>▪ Concentration<br>▪ Measured values 1<br>▪ Measured values 2<br>▪ Measured values 3<br>▪ Oscillation damping 1<br>▪ Oscillation damping 2<br>▪ Density<br>▪ Oil density<br>▪ Water density<br>▪ Dynamic viscosity<br>▪ Sensor electronic temperature (ISEM)<br>▪ Empty pipe detection | ▪ GSV flow<br>▪ GSV flow alternative<br>▪ Kinematic viscosity<br>▪ Low flow cut off<br>▪ Mass flow<br>▪ Oil mass flow<br>▪ Water mass flow<br>▪ HBSI<br>▪ NSV flow<br>▪ NSV flow alternative<br>▪ External pressure<br>▪ Exciter current 1<br>▪ Exciter current 2<br>▪ Oscillation frequency 1<br>▪ Oscillation frequency 2<br>▪ S&W volume flow<br>▪ Reference density<br>▪ Reference density alternative<br>▪ Corrected volume flow | ▪ Oil corrected volume flow<br>▪ Water corrected volume flow<br>▪ Oscillation damping fluctuation 1<br>▪ Oscillation damping fluctuation 2<br>▪ Frequency fluctuation 1<br>▪ Frequency fluctuation 2<br>▪ Target mass flow<br>▪ Carrier volume flow<br>▪ Target volume flow<br>▪ Temp. compensated dynamic viscosity<br>▪ Temp. compensated kinematic viscosity<br>▪ Temperature<br>▪ Status<br>▪ Volume flow<br>▪ Oil volume flow<br>▪ Water volume flow<br>▪ Water cut |

| Diagnostic information | | | Remedy instructions |
|---|---|---|---|
| No. | Short text | | |
| 431 | Trim 1 to n | | Carry out trim |
| | **Measured variable status** | | |
| | Quality | Good | |
| | Quality substatus | Function check | |
| | Coding (hex) | 0xBC to 0xBF | |
| | Status signal | C | |
| | Diagnostic behavior | Warning | |
| | **Influenced measured variables** | | |
| | – | | |

<table>
<tr><th colspan="2">Diagnostic information</th><th rowspan="2">Remedy instructions</th></tr>
<tr><th>No.</th><th>Short text</th></tr>
<tr><td rowspan="7">437</td><td colspan="2">Configuration incompatible</td><td rowspan="6">1. Restart device<br>2. Contact service</td></tr>
<tr><td colspan="2">Measured variable status</td></tr>
<tr><td>Quality</td><td>Bad</td></tr>
<tr><td>Quality substatus</td><td>Maintenance alarm</td></tr>
<tr><td>Coding (hex)</td><td>0x24 to 0x27</td></tr>
<tr><td>Status signal</td><td>F</td></tr>
<tr><td>Diagnostic behavior</td><td>Alarm</td></tr>
<tr><td></td><td colspan="3">Influenced measured variables</td></tr>
<tr><td></td><td colspan="3">
<ul>
<li>Oscillation amplitude 1</li>
<li>Oscillation amplitude 2</li>
<li>Signal asymmetry</li>
<li>Carrier mass flow</li>
<li>Carrier pipe temperature</li>
<li>Target corrected volume flow</li>
<li>Carrier corrected volume flow</li>
<li>Concentration</li>
<li>Measured values 1</li>
<li>Measured values 2</li>
<li>Measured values 3</li>
<li>Oscillation damping 1</li>
<li>Oscillation damping 2</li>
<li>Density</li>
<li>Oil density</li>
<li>Water density</li>
<li>Dynamic viscosity</li>
<li>Sensor electronic temperature (ISEM)</li>
<li>Empty pipe detection</li>
<li>GSV flow</li>
<li>GSV flow alternative</li>
<li>Kinematic viscosity</li>
<li>Low flow cut off</li>
<li>Mass flow</li>
<li>Oil mass flow</li>
<li>Water mass flow</li>
<li>HBSI</li>
<li>NSV flow</li>
<li>NSV flow alternative</li>
<li>External pressure</li>
<li>Exciter current 1</li>
<li>Exciter current 2</li>
<li>Oscillation frequency 1</li>
<li>Oscillation frequency 2</li>
<li>S&W volume flow</li>
<li>Reference density</li>
<li>Reference density alternative</li>
<li>Corrected volume flow</li>
<li>Oil corrected volume flow</li>
<li>Water corrected volume flow</li>
<li>Oscillation damping fluctuation 1</li>
<li>Oscillation damping fluctuation 2</li>
<li>Frequency fluctuation 1</li>
<li>Frequency fluctuation 2</li>
<li>Target mass flow</li>
<li>Carrier volume flow</li>
<li>Target volume flow</li>
<li>Temp. compensated dynamic viscosity</li>
<li>Temp. compensated kinematic viscosity</li>
<li>Temperature</li>
<li>Status</li>
<li>Volume flow</li>
<li>Oil volume flow</li>
<li>Water volume flow</li>
<li>Water cut</li>
</ul>
</td></tr>
</table>

| Diagnostic information | | | Remedy instructions |
|---|---|---|---|
| No. | Short text | | |
| 438 | Dataset | | 1. Check data set file<br>2. Check device configuration<br>3. Up- and download new configuration |
| | **Measured variable status** | | |
| | Quality | Uncertain | |
| | Quality substatus | Maintenance demanded | |
| | Coding (hex) | 0x68 to 0x6B | |
| | Status signal | M | |
| | Diagnostic behavior | Warning | |
| | **Influenced measured variables** | | |
| | ▪ Oscillation amplitude 1<br>▪ Oscillation amplitude 2<br>▪ Signal asymmetry<br>▪ Carrier mass flow<br>▪ Carrier pipe temperature<br>▪ Target corrected volume flow<br>▪ Carrier corrected volume flow<br>▪ Concentration<br>▪ Measured values 1<br>▪ Measured values 2<br>▪ Measured values 3<br>▪ Oscillation damping 1<br>▪ Oscillation damping 2<br>▪ Density<br>▪ Oil density<br>▪ Water density<br>▪ Dynamic viscosity<br>▪ Sensor electronic temperature (ISEM)<br>▪ Empty pipe detection | ▪ GSV flow<br>▪ GSV flow alternative<br>▪ Kinematic viscosity<br>▪ Low flow cut off<br>▪ Mass flow<br>▪ Oil mass flow<br>▪ Water mass flow<br>▪ HBSI<br>▪ NSV flow<br>▪ NSV flow alternative<br>▪ External pressure<br>▪ Exciter current 1<br>▪ Exciter current 2<br>▪ Oscillation frequency 1<br>▪ Oscillation frequency 2<br>▪ S&W volume flow<br>▪ Reference density<br>▪ Reference density alternative<br>▪ Corrected volume flow | ▪ Oil corrected volume flow<br>▪ Water corrected volume flow<br>▪ Oscillation damping fluctuation 1<br>▪ Oscillation damping fluctuation 2<br>▪ Frequency fluctuation 1<br>▪ Frequency fluctuation 2<br>▪ Target mass flow<br>▪ Carrier volume flow<br>▪ Target volume flow<br>▪ Temp. compensated dynamic viscosity<br>▪ Temp. compensated kinematic viscosity<br>▪ Temperature<br>▪ Status<br>▪ Volume flow<br>▪ Oil volume flow<br>▪ Water volume flow<br>▪ Water cut |

| Diagnostic information | | | Remedy instructions |
|---|---|---|---|
| No. | Short text | | |
| 441 | Current output 1 to n | | 1. Check process<br>2. Check current output settings |
| | **Measured variable status [from the factory]** [1] | | |
| | Quality | Good | |
| | Quality substatus | Function check | |
| | Coding (hex) | 0xBC to 0xBF | |
| | Status signal | S | |
| | Diagnostic behavior | Warning | |
| | **Influenced measured variables** | | |
| | – | | |

1) Diagnostic behavior can be changed. This causes the overall status of the measured variable to change.

| Diagnostic information | | | Remedy instructions |
|---|---|---|---|
| No. | Short text | | |
| 442 | Frequency output 1 to n | | 1. Check process<br>2. Check frequency output settings |
| | **Measured variable status [from the factory] [1)]** | | |
| | Quality | Good | |
| | Quality substatus | Function check | |
| | Coding (hex) | 0xBC to 0xBF | |
| | Status signal | S | |
| | Diagnostic behavior | Warning | |
| | **Influenced measured variables** | | |
| | – | | |

1) Diagnostic behavior can be changed. This causes the overall status of the measured variable to change.

| Diagnostic information | | | Remedy instructions |
|---|---|---|---|
| No. | Short text | | |
| 443 | Pulse output 1 to n | | 1. Check process<br>2. Check pulse output settings |
| | **Measured variable status [from the factory] [1)]** | | |
| | Quality | Good | |
| | Quality substatus | Function check | |
| | Coding (hex) | 0xBC to 0xBF | |
| | Status signal | S | |
| | Diagnostic behavior | Warning | |
| | **Influenced measured variables** | | |
| | – | | |

1) Diagnostic behavior can be changed. This causes the overall status of the measured variable to change.

| Diagnostic information | | | Remedy instructions |
|---|---|---|---|
| No. | Short text | | |
| 444 | Current input 1 to n | | 1. Check process<br>2. Check current input settings |
| | **Measured variable status [from the factory] [1)]** | | |
| | Quality | Good | |
| | Quality substatus | Function check | |
| | Coding (hex) | 0xBC to 0xBF | |
| | Status signal | S | |
| | Diagnostic behavior | Warning | |
| | **Influenced measured variables** | | |
| | ▪ Measured values 1<br>▪ Measured values 2<br>▪ Measured values 3 | | |

1) Diagnostic behavior can be changed. This causes the overall status of the measured variable to change.

| Diagnostic information | | | Remedy instructions |
|---|---|---|---|
| No. | Short text | | |
| 453 | Flow override | | Deactivate flow override |
| | **Measured variable status** | | |
| | Quality | Good | |
| | Quality substatus | Function check | |
| | Coding (hex) | 0xBC to 0xBF | |
| | Status signal | C | |
| | Diagnostic behavior | Warning | |
| | **Influenced measured variables** | | |
| | ▪ Oscillation amplitude 1<br>▪ Oscillation amplitude 2<br>▪ Signal asymmetry<br>▪ Carrier mass flow<br>▪ Carrier pipe temperature<br>▪ Target corrected volume flow<br>▪ Carrier corrected volume flow<br>▪ Concentration<br>▪ Oscillation damping 1<br>▪ Oscillation damping 2<br>▪ Density<br>▪ Oil density<br>▪ Water density<br>▪ Dynamic viscosity<br>▪ Sensor electronic temperature (ISEM)<br>▪ Empty pipe detection<br>▪ GSV flow<br>▪ GSV flow alternative | ▪ Kinematic viscosity<br>▪ Low flow cut off<br>▪ Mass flow<br>▪ Oil mass flow<br>▪ Water mass flow<br>▪ HBSI<br>▪ NSV flow<br>▪ NSV flow alternative<br>▪ External pressure<br>▪ Exciter current 1<br>▪ Exciter current 2<br>▪ Oscillation frequency 1<br>▪ Oscillation frequency 2<br>▪ S&W volume flow<br>▪ Reference density<br>▪ Reference density alternative<br>▪ Corrected volume flow<br>▪ Oil corrected volume flow | ▪ Water corrected volume flow<br>▪ Oscillation damping fluctuation 1<br>▪ Oscillation damping fluctuation 2<br>▪ Frequency fluctuation 1<br>▪ Frequency fluctuation 2<br>▪ Target mass flow<br>▪ Carrier volume flow<br>▪ Target volume flow<br>▪ Temp. compensated dynamic viscosity<br>▪ Temp. compensated kinematic viscosity<br>▪ Temperature<br>▪ Status<br>▪ Volume flow<br>▪ Oil volume flow<br>▪ Water volume flow<br>▪ Water cut |

| Diagnostic information | | | Remedy instructions |
|---|---|---|---|
| No. | Short text | | |
| 463 | Analog input 1 to n selection invalid | | 1. Check module/channel configuration<br>2. Check I/O module configuration |
| | **Measured variable status** | | |
| | Quality | Bad | |
| | Quality substatus | Maintenance alarm | |
| | Coding (hex) | 0x24 to 0x27 | |
| | Status signal | F | |
| | Diagnostic behavior | Alarm | |
| | **Influenced measured variables** | | |
| | ▪ Measured values 1<br>▪ Measured values 2<br>▪ Measured values 3 | | |

| Diagnostic information | | | Remedy instructions |
|---|---|---|---|
| No. | Short text | | |
| 482 | FB not Auto/Cas | | Set Block in AUTO mode |
| | **Measured variable status** | | |
| | Quality | Good | |
| | Quality substatus | Ok | |
| | Coding (hex) | 0x80 to 0x83 | |
| | Status signal | F | |
| | Diagnostic behavior | Alarm | |
| | **Influenced measured variables** | | |
| | – | | |

| Diagnostic information | | | Remedy instructions |
|---|---|---|---|
| No. | Short text | | |
| 484 | Failure mode simulation | | Deactivate simulation |
| | **Measured variable status** | | |
| | Quality | Bad | |
| | Quality substatus | Function check | |
| | Coding (hex) | 0x3C to 0x3F | |
| | Status signal | C | |
| | Diagnostic behavior | Alarm | |
| | **Influenced measured variables** | | |
| | ▪ Oscillation amplitude 1<br>▪ Oscillation amplitude 2<br>▪ Signal asymmetry<br>▪ Carrier mass flow<br>▪ Carrier pipe temperature<br>▪ Target corrected volume flow<br>▪ Carrier corrected volume flow<br>▪ Concentration<br>▪ Oscillation damping 1<br>▪ Oscillation damping 2<br>▪ Density<br>▪ Oil density<br>▪ Water density<br>▪ Dynamic viscosity<br>▪ Sensor electronic temperature (ISEM)<br>▪ Empty pipe detection<br>▪ GSV flow<br>▪ GSV flow alternative | ▪ Kinematic viscosity<br>▪ Low flow cut off<br>▪ Mass flow<br>▪ Oil mass flow<br>▪ Water mass flow<br>▪ HBSI<br>▪ NSV flow<br>▪ NSV flow alternative<br>▪ External pressure<br>▪ Exciter current 1<br>▪ Exciter current 2<br>▪ Oscillation frequency 1<br>▪ Oscillation frequency 2<br>▪ S&W volume flow<br>▪ Reference density<br>▪ Reference density alternative<br>▪ Corrected volume flow<br>▪ Oil corrected volume flow | ▪ Water corrected volume flow<br>▪ Oscillation damping fluctuation 1<br>▪ Oscillation damping fluctuation 2<br>▪ Frequency fluctuation 1<br>▪ Frequency fluctuation 2<br>▪ Target mass flow<br>▪ Carrier volume flow<br>▪ Target volume flow<br>▪ Temp. compensated dynamic viscosity<br>▪ Temp. compensated kinematic viscosity<br>▪ Temperature<br>▪ Status<br>▪ Volume flow<br>▪ Oil volume flow<br>▪ Water volume flow<br>▪ Water cut |

| Diagnostic information | | | Remedy instructions |
|---|---|---|---|
| No. | Short text | | |
| 485 | Measured variable simulation | | Deactivate simulation |
| | **Measured variable status** | | |
| | Quality | Good | |
| | Quality substatus | Function check | |
| | Coding (hex) | 0xBC to 0xBF | |
| | Status signal | C | |
| | Diagnostic behavior | Warning | |
| | **Influenced measured variables** | | |
| | ▪ Oscillation amplitude 1<br>▪ Oscillation amplitude 2<br>▪ Signal asymmetry<br>▪ Carrier mass flow<br>▪ Carrier pipe temperature<br>▪ Target corrected volume flow<br>▪ Carrier corrected volume flow<br>▪ Concentration<br>▪ Oscillation damping 1<br>▪ Oscillation damping 2<br>▪ Density<br>▪ Oil density<br>▪ Water density<br>▪ Dynamic viscosity<br>▪ Sensor electronic temperature (ISEM)<br>▪ Empty pipe detection<br>▪ GSV flow<br>▪ GSV flow alternative | ▪ Kinematic viscosity<br>▪ Low flow cut off<br>▪ Mass flow<br>▪ Oil mass flow<br>▪ Water mass flow<br>▪ HBSI<br>▪ NSV flow<br>▪ NSV flow alternative<br>▪ External pressure<br>▪ Exciter current 1<br>▪ Exciter current 2<br>▪ Oscillation frequency 1<br>▪ Oscillation frequency 2<br>▪ S&W volume flow<br>▪ Reference density<br>▪ Reference density alternative<br>▪ Corrected volume flow<br>▪ Oil corrected volume flow | ▪ Water corrected volume flow<br>▪ Oscillation damping fluctuation 1<br>▪ Oscillation damping fluctuation 2<br>▪ Frequency fluctuation 1<br>▪ Frequency fluctuation 2<br>▪ Target mass flow<br>▪ Carrier volume flow<br>▪ Target volume flow<br>▪ Temp. compensated dynamic viscosity<br>▪ Temp. compensated kinematic viscosity<br>▪ Temperature<br>▪ Status<br>▪ Volume flow<br>▪ Oil volume flow<br>▪ Water volume flow<br>▪ Water cut |

| Diagnostic information | | | Remedy instructions |
|---|---|---|---|
| No. | Short text | | |
| 486 | Current input 1 to n simulation | | Deactivate simulation |
| | **Measured variable status** | | |
| | Quality | Good | |
| | Quality substatus | Function check | |
| | Coding (hex) | 0xBC to 0xBF | |
| | Status signal | C | |
| | Diagnostic behavior | Warning | |
| | **Influenced measured variables** | | |
| | ▪ Measured values 1<br>▪ Measured values 2<br>▪ Measured values 3 | | |

| Diagnostic information | | | Remedy instructions |
|---|---|---|---|
| No. | Short text | | |
| 491 | Current output 1 to n simulation | | Deactivate simulation |
| | **Measured variable status** | | |
| | Quality | Good | |
| | Quality substatus | Function check | |
| | Coding (hex) | 0xBC to 0xBF | |
| | Status signal | C | |
| | Diagnostic behavior | Warning | |
| | **Influenced measured variables** | | |
| | – | | |

| Diagnostic information | | | Remedy instructions |
|---|---|---|---|
| No. | Short text | | |
| 492 | Simulation frequency output 1 to n | | Deactivate simulation frequency output |
| | **Measured variable status** | | |
| | Quality | Good | |
| | Quality substatus | Function check | |
| | Coding (hex) | 0xBC to 0xBF | |
| | Status signal | C | |
| | Diagnostic behavior | Warning | |
| | **Influenced measured variables** | | |
| | – | | |

| Diagnostic information | | | Remedy instructions |
|---|---|---|---|
| No. | Short text | | |
| 493 | Simulation pulse output 1 to n | | Deactivate simulation pulse output |
| | **Measured variable status** | | |
| | Quality | Good | |
| | Quality substatus | Function check | |
| | Coding (hex) | 0xBC to 0xBF | |
| | Status signal | C | |
| | Diagnostic behavior | Warning | |
| | **Influenced measured variables** | | |
| | – | | |

| Diagnostic information | | | Remedy instructions |
|---|---|---|---|
| No. | Short text | | |
| 494 | Switch output simulation 1 to n | | Deactivate simulation switch output |
| | **Measured variable status** | | |
| | Quality | Good | |
| | Quality substatus | Function check | |
| | Coding (hex) | 0xBC to 0xBF | |
| | Status signal | C | |
| | Diagnostic behavior | Warning | |
| | **Influenced measured variables** | | |
| | – | | |

| Diagnostic information | | | Remedy instructions |
|---|---|---|---|
| No. | Short text | | |
| 495 | Diagnostic event simulation | | Deactivate simulation |
| | **Measured variable status** | | |
| | Quality | Good | |
| | Quality substatus | Ok | |
| | Coding (hex) | 0x80 to 0x83 | |
| | Status signal | C | |
| | Diagnostic behavior | Warning | |
| | **Influenced measured variables** | | |
| | – | | |

| Diagnostic information | | | Remedy instructions |
|---|---|---|---|
| No. | Short text | | |
| 496 | Status input simulation | | Deactivate simulation status input |
| | **Measured variable status** | | |
| | Quality | Good | |
| | Quality substatus | Function check | |
| | Coding (hex) | 0xBC to 0xBF | |
| | Status signal | C | |
| | Diagnostic behavior | Warning | |
| | **Influenced measured variables** | | |
| | – | | |

| Diagnostic information | | | Remedy instructions |
|---|---|---|---|
| No. | Short text | | |
| 497 | Simulation block output | | Deactivate simulation |
| | **Measured variable status** | | |
| | Quality | Good | |
| | Quality substatus | Ok | |
| | Coding (hex) | 0x80 to 0x83 | |
| | Status signal | C | |
| | Diagnostic behavior | Warning | |
| | **Influenced measured variables** | | |
| | – | | |

| Diagnostic information | | | Remedy instructions |
|---|---|---|---|
| No. | Short text | | |
| 520 | I/O 1 to n hardware configuration invalid | | 1. Check I/O hardware configuration<br>2. Replace wrong I/O module<br>3. Plug the module of double pulse output on correct slot |
| | **Measured variable status** | | |
| | Quality | Bad | |
| | Quality substatus | Function check | |
| | Coding (hex) | 0x3C to 0x3F | |
| | Status signal | F | |
| | Diagnostic behavior | Alarm | |
| | **Influenced measured variables** | | |
| | – | | |

| Diagnostic information | | | Remedy instructions |
|---|---|---|---|
| No. | Short text | | |
| 528 | Concentration settings faulty | | 1. Check concentration settings<br>2. Check input values e.g. pressure, temperature |
| | **Measured variable status** | | |
| | Quality | Bad | |
| | Quality substatus | Function check | |
| | Coding (hex) | 0x3C to 0x3F | |
| | Status signal | S | |
| | Diagnostic behavior | Alarm | |
| | **Influenced measured variables** | | |
| | ▪ Carrier mass flow<br>▪ Target corrected volume flow<br>▪ Carrier corrected volume flow<br>▪ Concentration | ▪ Density<br>▪ Mass flow<br>▪ Target mass flow<br>▪ Carrier volume flow | ▪ Target volume flow<br>▪ Volume flow |

| Diagnostic information | | | Remedy instructions |
|---|---|---|---|
| No. | Short text | | |
| 529 | Concentration settings faulty | | 1. Check concentration settings<br>2. Check input values e.g. pressure, temperature |
| | **Measured variable status** | | |
| | Quality | Bad | |
| | Quality substatus | Function check | |
| | Coding (hex) | 0x3C to 0x3F | |
| | Status signal | S | |
| | Diagnostic behavior | Warning | |
| | **Influenced measured variables** | | |
| | ▪ Carrier mass flow<br>▪ Target corrected volume flow<br>▪ Carrier corrected volume flow<br>▪ Concentration<br>▪ Density<br>▪ Mass flow<br>▪ Target mass flow<br>▪ Carrier volume flow<br>▪ Target volume flow<br>▪ Volume flow | | |

| Diagnostic information | | | Remedy instructions |
|---|---|---|---|
| No. | Short text | | |
| 537 | Configuration | | 1. Check IP addresses in network<br>2. Change IP address |
| | **Measured variable status** | | |
| | Quality | Good | |
| | Quality substatus | Function check | |
| | Coding (hex) | 0xBC to 0xBF | |
| | Status signal | F | |
| | Diagnostic behavior | Warning | |
| | **Influenced measured variables** | | |
| | – | | |

| Diagnostic information | | | Remedy instructions |
|---|---|---|---|
| No. | Short text | | |
| 594 | Relay output simulation | | Deactivate simulation switch output |
| | **Measured variable status** | | |
| | Quality | Good | |
| | Quality substatus | Function check | |
| | Coding (hex) | 0xBC to 0xBF | |
| | Status signal | C | |
| | Diagnostic behavior | Warning | |
| | **Influenced measured variables** | | |
| | – | | |

### 12.7.4 Diagnostic of process

| Diagnostic information | | | Remedy instructions |
|---|---|---|---|
| No. | Short text | | |
| 803 | Current loop | | 1. Check wiring<br>2. Change I/O module |
| | **Measured variable status** | | |
| | Quality | Bad | |
| | Quality substatus | Process related | |
| | Coding (hex) | 0x28 to 0x2B | |
| | Status signal | F | |
| | Diagnostic behavior | Alarm | |
| | **Influenced measured variables** | | |
| | – | | |

| Diagnostic information | | | Remedy instructions |
|---|---|---|---|
| No. | Short text | | |
| 830 | Sensor temperature too high | | Reduce ambient temp. around the sensor housing |
| | **Measured variable status [from the factory]** [1] | | |
| | Quality | Uncertain | |
| | Quality substatus | Process related | |
| | Coding (hex) | 0x78 to 0x7B | |
| | Status signal | S | |
| | Diagnostic behavior | Warning | |
| | **Influenced measured variables** | | |
| | ▪ Oscillation amplitude 1<br>▪ Oscillation amplitude 2<br>▪ Signal asymmetry<br>▪ Carrier mass flow<br>▪ Carrier pipe temperature<br>▪ Target corrected volume flow<br>▪ Carrier corrected volume flow<br>▪ Concentration<br>▪ Oscillation damping 1<br>▪ Oscillation damping 2<br>▪ Density<br>▪ Oil density<br>▪ Water density<br>▪ Dynamic viscosity<br>▪ Sensor electronic temperature (ISEM)<br>▪ Empty pipe detection<br>▪ GSV flow<br>▪ GSV flow alternative | ▪ Kinematic viscosity<br>▪ Low flow cut off<br>▪ Mass flow<br>▪ Oil mass flow<br>▪ Water mass flow<br>▪ HBSI<br>▪ NSV flow<br>▪ NSV flow alternative<br>▪ External pressure<br>▪ Exciter current 1<br>▪ Exciter current 2<br>▪ Oscillation frequency 1<br>▪ Oscillation frequency 2<br>▪ S&W volume flow<br>▪ Reference density<br>▪ Reference density alternative<br>▪ Corrected volume flow<br>▪ Oil corrected volume flow | ▪ Water corrected volume flow<br>▪ Oscillation damping fluctuation 1<br>▪ Oscillation damping fluctuation 2<br>▪ Frequency fluctuation 1<br>▪ Frequency fluctuation 2<br>▪ Target mass flow<br>▪ Carrier volume flow<br>▪ Target volume flow<br>▪ Temp. compensated dynamic viscosity<br>▪ Temp. compensated kinematic viscosity<br>▪ Temperature<br>▪ Status<br>▪ Volume flow<br>▪ Oil volume flow<br>▪ Water volume flow<br>▪ Water cut |

1) Diagnostic behavior can be changed. This causes the overall status of the measured variable to change.

| Diagnostic information | | | Remedy instructions |
|---|---|---|---|
| **No.** | **Short text** | | |
| 831 | Sensor temperature too low | | Increase ambient temp. around the sensor housing |
| | **Measured variable status [from the factory]** [1] | | |
| | Quality | Uncertain | |
| | Quality substatus | Process related | |
| | Coding (hex) | 0x78 to 0x7B | |
| | Status signal | S | |
| | Diagnostic behavior | Warning | |
| | **Influenced measured variables** | | |
| | ▪ Oscillation amplitude 1<br>▪ Oscillation amplitude 2<br>▪ Signal asymmetry<br>▪ Carrier mass flow<br>▪ Carrier pipe temperature<br>▪ Target corrected volume flow<br>▪ Carrier corrected volume flow<br>▪ Concentration<br>▪ Oscillation damping 1<br>▪ Oscillation damping 2<br>▪ Density<br>▪ Oil density<br>▪ Water density<br>▪ Dynamic viscosity<br>▪ Sensor electronic temperature (ISEM)<br>▪ Empty pipe detection<br>▪ GSV flow<br>▪ GSV flow alternative | ▪ Kinematic viscosity<br>▪ Low flow cut off<br>▪ Mass flow<br>▪ Oil mass flow<br>▪ Water mass flow<br>▪ HBSI<br>▪ NSV flow<br>▪ NSV flow alternative<br>▪ External pressure<br>▪ Exciter current 1<br>▪ Exciter current 2<br>▪ Oscillation frequency 1<br>▪ Oscillation frequency 2<br>▪ S&W volume flow<br>▪ Reference density<br>▪ Reference density alternative<br>▪ Corrected volume flow<br>▪ Oil corrected volume flow | ▪ Water corrected volume flow<br>▪ Oscillation damping fluctuation 1<br>▪ Oscillation damping fluctuation 2<br>▪ Frequency fluctuation 1<br>▪ Frequency fluctuation 2<br>▪ Target mass flow<br>▪ Carrier volume flow<br>▪ Target volume flow<br>▪ Temp. compensated dynamic viscosity<br>▪ Temp. compensated kinematic viscosity<br>▪ Temperature<br>▪ Status<br>▪ Volume flow<br>▪ Oil volume flow<br>▪ Water volume flow<br>▪ Water cut |

1) Diagnostic behavior can be changed. This causes the overall status of the measured variable to change.

<table>
<tr><th colspan="2">Diagnostic information</th><th rowspan="2">Remedy instructions</th></tr>
<tr><th>No.</th><th>Short text</th></tr>
<tr><td rowspan="8">832</td><td colspan="2">Electronic temperature too high</td><td rowspan="7">Reduce ambient temperature</td></tr>
<tr><td colspan="2">Measured variable status [from the factory] [1]</td></tr>
<tr><td>Quality</td><td>Bad</td></tr>
<tr><td>Quality substatus</td><td>Process related</td></tr>
<tr><td>Coding (hex)</td><td>0x28 to 0x2B</td></tr>
<tr><td>Status signal</td><td>S</td></tr>
<tr><td>Diagnostic behavior</td><td>Warning</td></tr>
<tr><td colspan="3">Influenced measured variables</td></tr>
<tr><td colspan="3">
<ul>
<li>Oscillation amplitude 1</li>
<li>Oscillation amplitude 2</li>
<li>Signal asymmetry</li>
<li>Carrier mass flow</li>
<li>Carrier pipe temperature</li>
<li>Target corrected volume flow</li>
<li>Carrier corrected volume flow</li>
<li>Concentration</li>
<li>Measured values 1</li>
<li>Measured values 2</li>
<li>Measured values 3</li>
<li>Oscillation damping 1</li>
<li>Oscillation damping 2</li>
<li>Density</li>
<li>Oil density</li>
<li>Water density</li>
<li>Dynamic viscosity</li>
<li>Sensor electronic temperature (ISEM)</li>
<li>Empty pipe detection</li>
<li>GSV flow</li>
<li>GSV flow alternative</li>
<li>Kinematic viscosity</li>
<li>Low flow cut off</li>
<li>Mass flow</li>
<li>Oil mass flow</li>
<li>Water mass flow</li>
<li>HBSI</li>
<li>NSV flow</li>
<li>NSV flow alternative</li>
<li>External pressure</li>
<li>Exciter current 1</li>
<li>Exciter current 2</li>
<li>Oscillation frequency 1</li>
<li>Oscillation frequency 2</li>
<li>S&W volume flow</li>
<li>Reference density</li>
<li>Reference density alternative</li>
<li>Corrected volume flow</li>
<li>Oil corrected volume flow</li>
<li>Water corrected volume flow</li>
<li>Oscillation damping fluctuation 1</li>
<li>Oscillation damping fluctuation 2</li>
<li>Frequency fluctuation 1</li>
<li>Frequency fluctuation 2</li>
<li>Target mass flow</li>
<li>Carrier volume flow</li>
<li>Target volume flow</li>
<li>Temp. compensated dynamic viscosity</li>
<li>Temp. compensated kinematic viscosity</li>
<li>Temperature</li>
<li>Status</li>
<li>Volume flow</li>
<li>Oil volume flow</li>
<li>Water volume flow</li>
<li>Water cut</li>
</ul>
</td></tr>
</table>

1) Diagnostic behavior can be changed. This causes the overall status of the measured variable to change.

<table>
<tr><th colspan="2">Diagnostic information</th><th>Remedy instructions</th></tr>
<tr><th>No.</th><th colspan="2">Short text</th><th></th></tr>
<tr><td rowspan="8">833</td><td colspan="2">Electronic temperature too low</td><td rowspan="7">Increase ambient temperature</td></tr>
<tr><td colspan="2">Measured variable status [from the factory] 1)</td></tr>
<tr><td>Quality</td><td>Bad</td></tr>
<tr><td>Quality substatus</td><td>Process related</td></tr>
<tr><td>Coding (hex)</td><td>0x28 to 0x2B</td></tr>
<tr><td>Status signal</td><td>S</td></tr>
<tr><td>Diagnostic behavior</td><td>Warning</td></tr>
<tr><td colspan="3">Influenced measured variables</td></tr>
<tr><td></td><td colspan="2">
<ul>
<li>Oscillation amplitude 1</li>
<li>Oscillation amplitude 2</li>
<li>Signal asymmetry</li>
<li>Carrier mass flow</li>
<li>Carrier pipe temperature</li>
<li>Target corrected volume flow</li>
<li>Carrier corrected volume flow</li>
<li>Concentration</li>
<li>Measured values 1</li>
<li>Measured values 2</li>
<li>Measured values 3</li>
<li>Oscillation damping 1</li>
<li>Oscillation damping 2</li>
<li>Density</li>
<li>Oil density</li>
<li>Water density</li>
<li>Dynamic viscosity</li>
<li>Sensor electronic temperature (ISEM)</li>
<li>Empty pipe detection</li>
<li>GSV flow</li>
<li>GSV flow alternative</li>
<li>Kinematic viscosity</li>
<li>Low flow cut off</li>
<li>Mass flow</li>
<li>Oil mass flow</li>
<li>Water mass flow</li>
<li>HBSI</li>
<li>NSV flow</li>
<li>NSV flow alternative</li>
<li>External pressure</li>
<li>Exciter current 1</li>
<li>Exciter current 2</li>
<li>Oscillation frequency 1</li>
<li>Oscillation frequency 2</li>
<li>S&W volume flow</li>
<li>Reference density</li>
<li>Reference density alternative</li>
<li>Corrected volume flow</li>
<li>Oil corrected volume flow</li>
<li>Water corrected volume flow</li>
<li>Oscillation damping fluctuation 1</li>
<li>Oscillation damping fluctuation 2</li>
<li>Frequency fluctuation 1</li>
<li>Frequency fluctuation 2</li>
<li>Target mass flow</li>
<li>Carrier volume flow</li>
<li>Target volume flow</li>
<li>Temp. compensated dynamic viscosity</li>
<li>Temp. compensated kinematic viscosity</li>
<li>Temperature</li>
<li>Status</li>
<li>Volume flow</li>
<li>Oil volume flow</li>
<li>Water volume flow</li>
<li>Water cut</li>
</ul>
</td><td></td></tr>
</table>

1) Diagnostic behavior can be changed. This causes the overall status of the measured variable to change.

<table>
<tr><th colspan="2">Diagnostic information</th><th rowspan="2">Remedy instructions</th></tr>
<tr><th>No.</th><th>Short text</th></tr>
<tr><td rowspan="8">834</td><td colspan="2">Process temperature too high</td><td rowspan="7">Reduce process temperature</td></tr>
<tr><td colspan="2">Measured variable status [from the factory] 1)</td></tr>
<tr><td>Quality</td><td>Uncertain</td></tr>
<tr><td>Quality substatus</td><td>Process related</td></tr>
<tr><td>Coding (hex)</td><td>0x78 to 0x7B</td></tr>
<tr><td>Status signal</td><td>S</td></tr>
<tr><td>Diagnostic behavior</td><td>Warning</td></tr>
<tr><td colspan="3">Influenced measured variables</td></tr>
<tr><td></td><td colspan="3">
<ul>
<li>Oscillation amplitude 1</li>
<li>Oscillation amplitude 2</li>
<li>Signal asymmetry</li>
<li>Carrier mass flow</li>
<li>Carrier pipe temperature</li>
<li>Target corrected volume flow</li>
<li>Carrier corrected volume flow</li>
<li>Concentration</li>
<li>Oscillation damping 1</li>
<li>Oscillation damping 2</li>
<li>Density</li>
<li>Oil density</li>
<li>Water density</li>
<li>Dynamic viscosity</li>
<li>Sensor electronic temperature (ISEM)</li>
<li>Empty pipe detection</li>
<li>GSV flow</li>
<li>GSV flow alternative</li>
<li>Kinematic viscosity</li>
<li>Low flow cut off</li>
<li>Mass flow</li>
<li>Oil mass flow</li>
<li>Water mass flow</li>
<li>HBSI</li>
<li>NSV flow</li>
<li>NSV flow alternative</li>
<li>External pressure</li>
<li>Exciter current 1</li>
<li>Exciter current 2</li>
<li>Oscillation frequency 1</li>
<li>Oscillation frequency 2</li>
<li>S&W volume flow</li>
<li>Reference density</li>
<li>Reference density alternative</li>
<li>Corrected volume flow</li>
<li>Oil corrected volume flow</li>
<li>Water corrected volume flow</li>
<li>Oscillation damping fluctuation 1</li>
<li>Oscillation damping fluctuation 2</li>
<li>Frequency fluctuation 1</li>
<li>Frequency fluctuation 2</li>
<li>Target mass flow</li>
<li>Carrier volume flow</li>
<li>Target volume flow</li>
<li>Temp. compensated dynamic viscosity</li>
<li>Temp. compensated kinematic viscosity</li>
<li>Temperature</li>
<li>Status</li>
<li>Volume flow</li>
<li>Oil volume flow</li>
<li>Water volume flow</li>
<li>Water cut</li>
</ul>
</td></tr>
</table>

1) Diagnostic behavior can be changed. This causes the overall status of the measured variable to change.

| Diagnostic information | | | Remedy instructions |
|---|---|---|---|
| **No.** | **Short text** | | |
| 835 | Process temperature too low | | Increase process temperature |
| | **Measured variable status [from the factory]** [1] | | |
| | Quality | Uncertain | |
| | Quality substatus | Process related | |
| | Coding (hex) | 0x78 to 0x7B | |
| | Status signal | S | |
| | Diagnostic behavior | Warning | |
| | **Influenced measured variables** | | |
| | ▪ Oscillation amplitude 1<br>▪ Oscillation amplitude 2<br>▪ Signal asymmetry<br>▪ Carrier mass flow<br>▪ Carrier pipe temperature<br>▪ Target corrected volume flow<br>▪ Carrier corrected volume flow<br>▪ Concentration<br>▪ Oscillation damping 1<br>▪ Oscillation damping 2<br>▪ Density<br>▪ Oil density<br>▪ Water density<br>▪ Dynamic viscosity<br>▪ Sensor electronic temperature (ISEM)<br>▪ Empty pipe detection<br>▪ GSV flow<br>▪ GSV flow alternative | ▪ Kinematic viscosity<br>▪ Low flow cut off<br>▪ Mass flow<br>▪ Oil mass flow<br>▪ Water mass flow<br>▪ HBSI<br>▪ NSV flow<br>▪ NSV flow alternative<br>▪ External pressure<br>▪ Exciter current 1<br>▪ Exciter current 2<br>▪ Oscillation frequency 1<br>▪ Oscillation frequency 2<br>▪ S&W volume flow<br>▪ Reference density<br>▪ Reference density alternative<br>▪ Corrected volume flow<br>▪ Oil corrected volume flow | ▪ Water corrected volume flow<br>▪ Oscillation damping fluctuation 1<br>▪ Oscillation damping fluctuation 2<br>▪ Frequency fluctuation 1<br>▪ Frequency fluctuation 2<br>▪ Target mass flow<br>▪ Carrier volume flow<br>▪ Target volume flow<br>▪ Temp. compensated dynamic viscosity<br>▪ Temp. compensated kinematic viscosity<br>▪ Temperature<br>▪ Status<br>▪ Volume flow<br>▪ Oil volume flow<br>▪ Water volume flow<br>▪ Water cut |

1) Diagnostic behavior can be changed. This causes the overall status of the measured variable to change.

| Diagnostic information | | | Remedy instructions |
|---|---|---|---|
| No. | Short text | | |
| 842 | Process limit | | Low flow cut off active!<br>1. Check low flow cut off configuration |
| | **Measured variable status [from the factory] [1)]** | | |
| | Quality | Uncertain | |
| | Quality substatus | Process related | |
| | Coding (hex) | 0x78 to 0x7B | |
| | Status signal | S | |
| | Diagnostic behavior | Warning | |
| | **Influenced measured variables** | | |
| | ▪ Oscillation amplitude 1<br>▪ Oscillation amplitude 2<br>▪ Signal asymmetry<br>▪ Carrier mass flow<br>▪ Carrier pipe temperature<br>▪ Target corrected volume flow<br>▪ Carrier corrected volume flow<br>▪ Concentration<br>▪ Oscillation damping 1<br>▪ Oscillation damping 2<br>▪ Density<br>▪ Oil density<br>▪ Water density<br>▪ Dynamic viscosity<br>▪ Sensor electronic temperature (ISEM)<br>▪ Empty pipe detection<br>▪ GSV flow<br>▪ GSV flow alternative | ▪ Kinematic viscosity<br>▪ Low flow cut off<br>▪ Mass flow<br>▪ Oil mass flow<br>▪ Water mass flow<br>▪ HBSI<br>▪ NSV flow<br>▪ NSV flow alternative<br>▪ External pressure<br>▪ Exciter current 1<br>▪ Exciter current 2<br>▪ Oscillation frequency 1<br>▪ Oscillation frequency 2<br>▪ S&W volume flow<br>▪ Reference density<br>▪ Reference density alternative<br>▪ Corrected volume flow<br>▪ Oil corrected volume flow | ▪ Water corrected volume flow<br>▪ Oscillation damping fluctuation 1<br>▪ Oscillation damping fluctuation 2<br>▪ Frequency fluctuation 1<br>▪ Frequency fluctuation 2<br>▪ Target mass flow<br>▪ Carrier volume flow<br>▪ Target volume flow<br>▪ Temp. compensated dynamic viscosity<br>▪ Temp. compensated kinematic viscosity<br>▪ Temperature<br>▪ Status<br>▪ Volume flow<br>▪ Oil volume flow<br>▪ Water volume flow<br>▪ Water cut |

1) Diagnostic behavior can be changed. This causes the overall status of the measured variable to change.

| Diagnostic information | | | Remedy instructions |
|---|---|---|---|
| No. | Short text | | |
| 862 | Partly filled pipe | | 1. Check for gas in process<br>2. Adjust detection limits |
| | **Measured variable status [from the factory] [1)]** | | |
| | Quality | Bad | |
| | Quality substatus | Process related | |
| | Coding (hex) | 0x28 to 0x2B | |
| | Status signal | S | |
| | Diagnostic behavior | Warning | |
| | **Influenced measured variables** | | |
| | ▪ Carrier mass flow<br>▪ Target corrected volume flow<br>▪ Carrier corrected volume flow<br>▪ Concentration<br>▪ Density<br>▪ Oil density<br>▪ Water density<br>▪ Dynamic viscosity<br>▪ Empty pipe detection<br>▪ GSV flow<br>▪ GSV flow alternative<br>▪ Kinematic viscosity<br>▪ Low flow cut off | ▪ Mass flow<br>▪ Oil mass flow<br>▪ Water mass flow<br>▪ HBSI<br>▪ NSV flow<br>▪ NSV flow alternative<br>▪ External pressure<br>▪ S&W volume flow<br>▪ Reference density<br>▪ Reference density alternative<br>▪ Corrected volume flow<br>▪ Oil corrected volume flow<br>▪ Water corrected volume flow | ▪ Target mass flow<br>▪ Carrier volume flow<br>▪ Target volume flow<br>▪ Temp. compensated dynamic viscosity<br>▪ Temp. compensated kinematic viscosity<br>▪ Temperature<br>▪ Status<br>▪ Volume flow<br>▪ Oil volume flow<br>▪ Water volume flow<br>▪ Water cut |

1) Diagnostic behavior can be changed. This causes the overall status of the measured variable to change.

<table>
<tr><th colspan="2">Diagnostic information</th><th rowspan="2">Remedy instructions</th></tr>
<tr><th>No.</th><th>Short text</th></tr>
<tr><td rowspan="7">882</td><td colspan="2">Input signal</td><td rowspan="6">1. Check input configuration<br>2. Check external device or process conditions</td></tr>
<tr><td colspan="2">Measured variable status</td></tr>
<tr><td>Quality</td><td>Bad</td></tr>
<tr><td>Quality substatus</td><td>Maintenance alarm</td></tr>
<tr><td>Coding (hex)</td><td>0x24 to 0x27</td></tr>
<tr><td>Status signal</td><td>F</td></tr>
<tr><td>Diagnostic behavior</td><td>Alarm</td></tr>
<tr><td></td><td colspan="3">Influenced measured variables</td></tr>
<tr><td></td><td colspan="3">
<ul>
<li>Oscillation amplitude 1</li>
<li>Oscillation amplitude 2</li>
<li>Signal asymmetry</li>
<li>Carrier mass flow</li>
<li>Carrier pipe temperature</li>
<li>Target corrected volume flow</li>
<li>Carrier corrected volume flow</li>
<li>Concentration</li>
<li>Measured values 1</li>
<li>Measured values 2</li>
<li>Measured values 3</li>
<li>Oscillation damping 1</li>
<li>Oscillation damping 2</li>
<li>Density</li>
<li>Oil density</li>
<li>Water density</li>
<li>Dynamic viscosity</li>
<li>Sensor electronic temperature (ISEM)</li>
<li>Empty pipe detection</li>
<li>GSV flow</li>
<li>GSV flow alternative</li>
<li>Kinematic viscosity</li>
<li>Low flow cut off</li>
<li>Mass flow</li>
<li>Oil mass flow</li>
<li>Water mass flow</li>
<li>HBSI</li>
<li>NSV flow</li>
<li>NSV flow alternative</li>
<li>External pressure</li>
<li>Exciter current 1</li>
<li>Exciter current 2</li>
<li>Oscillation frequency 1</li>
<li>Oscillation frequency 2</li>
<li>S&W volume flow</li>
<li>Reference density</li>
<li>Reference density alternative</li>
<li>Corrected volume flow</li>
<li>Oil corrected volume flow</li>
<li>Water corrected volume flow</li>
<li>Oscillation damping fluctuation 1</li>
<li>Oscillation damping fluctuation 2</li>
<li>Frequency fluctuation 1</li>
<li>Frequency fluctuation 2</li>
<li>Target mass flow</li>
<li>Carrier volume flow</li>
<li>Target volume flow</li>
<li>Temp. compensated dynamic viscosity</li>
<li>Temp. compensated kinematic viscosity</li>
<li>Temperature</li>
<li>Status</li>
<li>Volume flow</li>
<li>Oil volume flow</li>
<li>Water volume flow</li>
<li>Water cut</li>
</ul>
</td></tr>
</table>

<table>
<tr><th colspan="2">Diagnostic information</th><th rowspan="2">Remedy instructions</th></tr>
<tr><th>No.</th><th>Short text</th></tr>
<tr><td rowspan="7">910</td><td colspan="2">Tubes not oscillating</td><td rowspan="6">1. Check electronic<br>2. Inspect sensor</td></tr>
<tr><td colspan="2">Measured variable status</td></tr>
<tr><td>Quality</td><td>Bad</td></tr>
<tr><td>Quality substatus</td><td>Maintenance alarm</td></tr>
<tr><td>Coding (hex)</td><td>0x24 to 0x27</td></tr>
<tr><td>Status signal</td><td>F</td></tr>
<tr><td>Diagnostic behavior</td><td>Alarm</td></tr>
<tr><td></td><td colspan="3">Influenced measured variables</td></tr>
<tr><td></td><td colspan="3">
<ul>
<li>Oscillation amplitude 1</li>
<li>Oscillation amplitude 2</li>
<li>Signal asymmetry</li>
<li>Carrier mass flow</li>
<li>Carrier pipe temperature</li>
<li>Target corrected volume flow</li>
<li>Carrier corrected volume flow</li>
<li>Concentration</li>
<li>Oscillation damping 1</li>
<li>Oscillation damping 2</li>
<li>Density</li>
<li>Oil density</li>
<li>Water density</li>
<li>Dynamic viscosity</li>
<li>Sensor electronic temperature (ISEM)</li>
<li>Empty pipe detection</li>
<li>GSV flow</li>
<li>GSV flow alternative</li>
<li>Kinematic viscosity</li>
<li>Low flow cut off</li>
<li>Mass flow</li>
<li>Oil mass flow</li>
<li>Water mass flow</li>
<li>HBSI</li>
<li>NSV flow</li>
<li>NSV flow alternative</li>
<li>External pressure</li>
<li>Exciter current 1</li>
<li>Exciter current 2</li>
<li>Oscillation frequency 1</li>
<li>Oscillation frequency 2</li>
<li>S&W volume flow</li>
<li>Reference density</li>
<li>Reference density alternative</li>
<li>Corrected volume flow</li>
<li>Oil corrected volume flow</li>
<li>Water corrected volume flow</li>
<li>Oscillation damping fluctuation 1</li>
<li>Oscillation damping fluctuation 2</li>
<li>Frequency fluctuation 1</li>
<li>Frequency fluctuation 2</li>
<li>Target mass flow</li>
<li>Carrier volume flow</li>
<li>Target volume flow</li>
<li>Temp. compensated dynamic viscosity</li>
<li>Temp. compensated kinematic viscosity</li>
<li>Temperature</li>
<li>Status</li>
<li>Volume flow</li>
<li>Oil volume flow</li>
<li>Water volume flow</li>
<li>Water cut</li>
</ul>
</td></tr>
</table>

| Diagnostic information | | | Remedy instructions |
|---|---|---|---|
| **No.** | **Short text** | | |
| 912 | Medium inhomogeneous | | 1. Check process cond.<br>2. Increase system pressure |
| | **Measured variable status [from the factory]** [1] | | |
| | Quality | Uncertain | |
| | Quality substatus | Process related | |
| | Coding (hex) | 0x78 to 0x7B | |
| | Status signal | S | |
| | Diagnostic behavior | Warning | |
| | **Influenced measured variables** | | |
| | ▪ Oscillation amplitude 1<br>▪ Oscillation amplitude 2<br>▪ Signal asymmetry<br>▪ Carrier mass flow<br>▪ Carrier pipe temperature<br>▪ Target corrected volume flow<br>▪ Carrier corrected volume flow<br>▪ Concentration<br>▪ Oscillation damping 1<br>▪ Oscillation damping 2<br>▪ Density<br>▪ Oil density<br>▪ Water density<br>▪ Dynamic viscosity<br>▪ Sensor electronic temperature (ISEM)<br>▪ Empty pipe detection<br>▪ GSV flow<br>▪ GSV flow alternative | ▪ Kinematic viscosity<br>▪ Low flow cut off<br>▪ Mass flow<br>▪ Oil mass flow<br>▪ Water mass flow<br>▪ HBSI<br>▪ NSV flow<br>▪ NSV flow alternative<br>▪ External pressure<br>▪ Exciter current 1<br>▪ Exciter current 2<br>▪ Oscillation frequency 1<br>▪ Oscillation frequency 2<br>▪ S&W volume flow<br>▪ Reference density<br>▪ Reference density alternative<br>▪ Corrected volume flow<br>▪ Oil corrected volume flow | ▪ Water corrected volume flow<br>▪ Oscillation damping fluctuation 1<br>▪ Oscillation damping fluctuation 2<br>▪ Frequency fluctuation 1<br>▪ Frequency fluctuation 2<br>▪ Target mass flow<br>▪ Carrier volume flow<br>▪ Target volume flow<br>▪ Temp. compensated dynamic viscosity<br>▪ Temp. compensated kinematic viscosity<br>▪ Temperature<br>▪ Status<br>▪ Volume flow<br>▪ Oil volume flow<br>▪ Water volume flow<br>▪ Water cut |

1) Diagnostic behavior can be changed. This causes the overall status of the measured variable to change.

| Diagnostic information | | | Remedy instructions |
|---|---|---|---|
| **No.** | **Short text** | | |
| 913 | Medium unsuitable | | 1. Check process conditions<br>2. Check electronic modules or sensor |
| | **Measured variable status [from the factory]** [1] | | |
| | Quality | Uncertain | |
| | Quality substatus | Process related | |
| | Coding (hex) | 0x78 to 0x7B | |
| | Status signal | S | |
| | Diagnostic behavior | Warning | |
| | **Influenced measured variables** | | |
| | ▪ Oscillation amplitude 1<br>▪ Oscillation amplitude 2<br>▪ Signal asymmetry<br>▪ Carrier mass flow<br>▪ Carrier pipe temperature<br>▪ Target corrected volume flow<br>▪ Carrier corrected volume flow<br>▪ Concentration<br>▪ Oscillation damping 1<br>▪ Oscillation damping 2<br>▪ Density<br>▪ Oil density<br>▪ Water density<br>▪ Dynamic viscosity<br>▪ Sensor electronic temperature (ISEM)<br>▪ Empty pipe detection<br>▪ GSV flow<br>▪ GSV flow alternative | ▪ Kinematic viscosity<br>▪ Low flow cut off<br>▪ Mass flow<br>▪ Oil mass flow<br>▪ Water mass flow<br>▪ HBSI<br>▪ NSV flow<br>▪ NSV flow alternative<br>▪ External pressure<br>▪ Exciter current 1<br>▪ Exciter current 2<br>▪ Oscillation frequency 1<br>▪ Oscillation frequency 2<br>▪ S&W volume flow<br>▪ Reference density<br>▪ Reference density alternative<br>▪ Corrected volume flow<br>▪ Oil corrected volume flow | ▪ Water corrected volume flow<br>▪ Oscillation damping fluctuation 1<br>▪ Oscillation damping fluctuation 2<br>▪ Frequency fluctuation 1<br>▪ Frequency fluctuation 2<br>▪ Target mass flow<br>▪ Carrier volume flow<br>▪ Target volume flow<br>▪ Temp. compensated dynamic viscosity<br>▪ Temp. compensated kinematic viscosity<br>▪ Temperature<br>▪ Status<br>▪ Volume flow<br>▪ Oil volume flow<br>▪ Water volume flow<br>▪ Water cut |

1) Diagnostic behavior can be changed. This causes the overall status of the measured variable to change.

| Diagnostic information | | | Remedy instructions |
|---|---|---|---|
| **No.** | **Short text** | | |
| 941 | API temperature out of specification | | 1. Check process temperature with selected API commodity group<br>2. Check API related parameters |
| | **Measured variable status** | | |
| | Quality | Bad | |
| | Quality substatus | Maintenance alarm | |
| | Coding (hex) | 0x24 to 0x27 | |
| | Status signal | S | |
| | Diagnostic behavior | Alarm | |
| | **Influenced measured variables** | | |
| | ▪ Oil density<br>▪ Water density<br>▪ GSV flow<br>▪ GSV flow alternative<br>▪ Mass flow<br>▪ Oil mass flow | ▪ Water mass flow<br>▪ NSV flow<br>▪ NSV flow alternative<br>▪ External pressure<br>▪ S&W volume flow<br>▪ Reference density alternative | ▪ Corrected volume flow<br>▪ Oil corrected volume flow<br>▪ Water corrected volume flow<br>▪ Oil volume flow<br>▪ Water volume flow<br>▪ Water cut |

| Diagnostic information | | | Remedy instructions |
|---|---|---|---|
| No. | Short text | | |
| 942 | API density out of specification | | 1. Check process density with selected API commodity group<br>2. Check API related parameters |
| | **Measured variable status** | | |
| | Quality | Bad | |
| | Quality substatus | Maintenance alarm | |
| | Coding (hex) | 0x24 to 0x27 | |
| | Status signal | S | |
| | Diagnostic behavior | Alarm | |
| | **Influenced measured variables** | | |
| | Mass flow | | |

| Diagnostic information | | | Remedy instructions |
|---|---|---|---|
| No. | Short text | | |
| 943 | API pressure out of specification | | 1. Check process pressure with selected API commodity group<br>2. Check API related parameters |
| | **Measured variable status** | | |
| | Quality | Bad | |
| | Quality substatus | Maintenance alarm | |
| | Coding (hex) | 0x24 to 0x27 | |
| | Status signal | S | |
| | Diagnostic behavior | Alarm | |
| | **Influenced measured variables** | | |
| | ▪ Oil density<br>▪ Water density<br>▪ GSV flow<br>▪ GSV flow alternative<br>▪ Mass flow<br>▪ Oil mass flow | ▪ Water mass flow<br>▪ NSV flow<br>▪ NSV flow alternative<br>▪ External pressure<br>▪ S&W volume flow<br>▪ Reference density alternative | ▪ Corrected volume flow<br>▪ Oil corrected volume flow<br>▪ Water corrected volume flow<br>▪ Oil volume flow<br>▪ Water volume flow<br>▪ Water cut |

| Diagnostic information | | | Remedy instructions |
|---|---|---|---|
| No. | Short text | | |
| 944 | Monitoring failed | | Check process conditions for Heartbeat Monitoring |
| | **Measured variable status [from the factory] [1)]** | | |
| | Quality | Bad | |
| | Quality substatus | Maintenance alarm | |
| | Coding (hex) | 0x24 to 0x27 | |
| | Status signal | S | |
| | Diagnostic behavior | Warning | |
| | **Influenced measured variables** | | |
| | ▪ Oscillation amplitude 1<br>▪ Oscillation amplitude 2<br>▪ Signal asymmetry<br>▪ Carrier mass flow<br>▪ Carrier pipe temperature<br>▪ Concentration<br>▪ Oscillation damping 1<br>▪ Oscillation damping 2<br>▪ Density<br>▪ Dynamic viscosity<br>▪ Sensor electronic temperature (ISEM) | ▪ Empty pipe detection<br>▪ Kinematic viscosity<br>▪ Low flow cut off<br>▪ Mass flow<br>▪ HBSI<br>▪ External pressure<br>▪ Exciter current 1<br>▪ Exciter current 2<br>▪ Oscillation frequency 1<br>▪ Oscillation frequency 2<br>▪ Reference density | ▪ Corrected volume flow<br>▪ Oscillation damping fluctuation 1<br>▪ Oscillation damping fluctuation 2<br>▪ Frequency fluctuation 1<br>▪ Frequency fluctuation 2<br>▪ Target mass flow<br>▪ Temp. compensated dynamic viscosity<br>▪ Temp. compensated kinematic viscosity<br>▪ Temperature<br>▪ Status<br>▪ Volume flow |

1) Diagnostic behavior can be changed. This causes the overall status of the measured variable to change.

| Diagnostic information | | | Remedy instructions |
|---|---|---|---|
| No. | Short text | | |
| 948 | Oscillation damping too high | | Check process conditions |
| | **Measured variable status [from the factory] [1)]** | | |
| | Quality | Uncertain | |
| | Quality substatus | Process related | |
| | Coding (hex) | 0x78 to 0x7B | |
| | Status signal | S | |
| | Diagnostic behavior | Warning | |
| | **Influenced measured variables** | | |
| | ▪ Oscillation amplitude 1<br>▪ Oscillation amplitude 2<br>▪ Signal asymmetry<br>▪ Carrier mass flow<br>▪ Carrier pipe temperature<br>▪ Target corrected volume flow<br>▪ Carrier corrected volume flow<br>▪ Concentration<br>▪ Oscillation damping 1<br>▪ Oscillation damping 2<br>▪ Density<br>▪ Oil density<br>▪ Water density<br>▪ Dynamic viscosity<br>▪ Sensor electronic temperature (ISEM)<br>▪ Empty pipe detection<br>▪ GSV flow<br>▪ GSV flow alternative | ▪ Kinematic viscosity<br>▪ Low flow cut off<br>▪ Mass flow<br>▪ Oil mass flow<br>▪ Water mass flow<br>▪ HBSI<br>▪ NSV flow<br>▪ NSV flow alternative<br>▪ External pressure<br>▪ Exciter current 1<br>▪ Exciter current 2<br>▪ Oscillation frequency 1<br>▪ Oscillation frequency 2<br>▪ S&W volume flow<br>▪ Reference density<br>▪ Reference density alternative<br>▪ Corrected volume flow<br>▪ Oil corrected volume flow | ▪ Water corrected volume flow<br>▪ Oscillation damping fluctuation 1<br>▪ Oscillation damping fluctuation 2<br>▪ Frequency fluctuation 1<br>▪ Frequency fluctuation 2<br>▪ Target mass flow<br>▪ Carrier volume flow<br>▪ Target volume flow<br>▪ Temp. compensated dynamic viscosity<br>▪ Temp. compensated kinematic viscosity<br>▪ Temperature<br>▪ Status<br>▪ Volume flow<br>▪ Oil volume flow<br>▪ Water volume flow<br>▪ Water cut |

1) Diagnostic behavior can be changed. This causes the overall status of the measured variable to change.

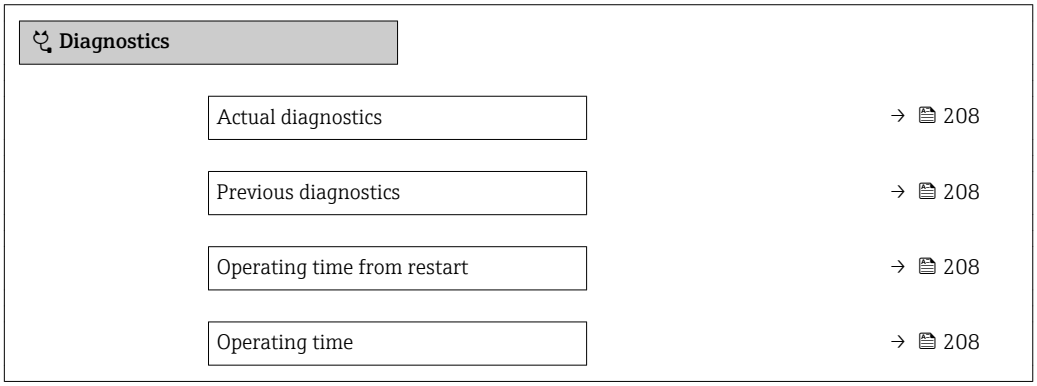
## 12.8 Pending diagnostic events

The **Diagnostics** menu allows the user to view the current diagnostic event and the previous diagnostic event separately.

To call up the measures to rectify a diagnostic event:
- Via local display → 150
- Via Web browser → 151
- Via "FieldCare" operating tool → 152
- Via "DeviceCare" operating tool → 152

Other pending diagnostic events can be displayed in the **Diagnostic list** submenu → 208

### Navigation
"Diagnostics" menu



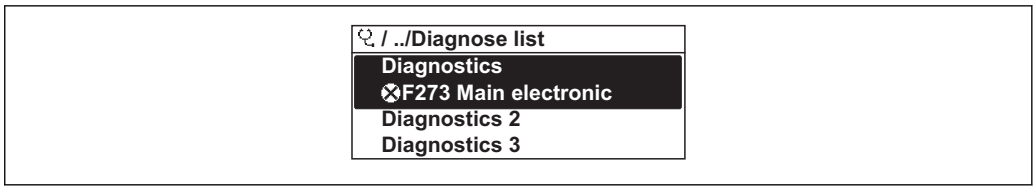

### Parameter overview with brief description

| Parameter | Prerequisite | Description | User interface |
|---|---|---|---|
| Actual diagnostics | A diagnostic event has occurred. | Shows the current occured diagnostic event along with its diagnostic information.<br>If two or more messages occur simultaneously, the message with the highest priority is shown on the display. | Symbol for diagnostic behavior, diagnostic code and short message. |
| Previous diagnostics | Two diagnostic events have already occurred. | Shows the diagnostic event that occurred prior to the current diagnostic event along with its diagnostic information. | Symbol for diagnostic behavior, diagnostic code and short message. |
| Operating time from restart | – | Shows the time the device has been in operation since the last device restart. | Days (d), hours (h), minutes (m) and seconds (s) |
| Operating time | – | Indicates how long the device has been in operation. | Days (d), hours (h), minutes (m) and seconds (s) |

## 12.9 Diagnostic list

Up to 5 currently pending diagnostic events can be displayed in the **Diagnostic list** submenu along with the associated diagnostic information. If more than 5 diagnostic events are pending, the events with the highest priority are shown on the display.

### Navigation path
Diagnostics → Diagnostic list




29 *Taking the example of the local display*

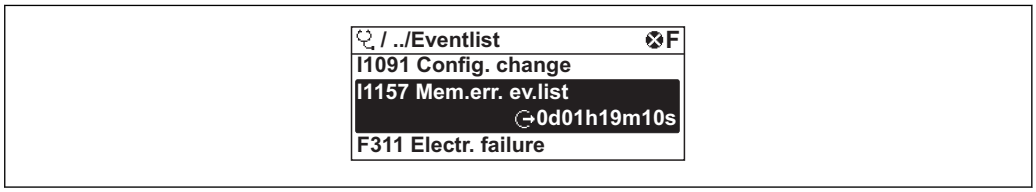
To call up the measures to rectify a diagnostic event:
- Via local display → 150
- Via Web browser → 151
- Via "FieldCare" operating tool → 152
- Via "DeviceCare" operating tool → 152

## 12.10 Event logbook

### 12.10.1 Reading out the event logbook

A chronological overview of the event messages that have occurred is provided in the **Events list** submenu.

**Navigation path**
**Diagnostics** menu → **Event logbook** submenu → Event list




30 *Taking the example of the local display*

- A maximum of 20 event messages can be displayed in chronological order.
- If the **Extended HistoROM** application package (order option) is enabled in the device, the event list can contain up to 100 entries .

The event history includes entries for:
- Diagnostic events → 156
- Information events → 210

In addition to the operation time of its occurrence, each event is also assigned a symbol that indicates whether the event has occurred or is ended:
- Diagnostic event
  - : Occurrence of the event
  - : End of the event
- Information event
  : Occurrence of the event

To call up the measures to rectify a diagnostic event:
- Via local display → 150
- Via Web browser → 151
- Via "FieldCare" operating tool → 152
- Via "DeviceCare" operating tool → 152

For filtering the displayed event messages → 210

## 12.10.2 Filtering the event logbook

Using the **Filter options** parameter you can define which category of event message is displayed in the **Events list** submenu.

**Navigation path**
Diagnostics → Event logbook → Filter options

**Filter categories**
- All
- Failure (F)
- Function check (C)
- Out of specification (S)
- Maintenance required (M)
- Information (I)

## 12.10.3 Overview of information events

Unlike a diagnostic event, an information event is displayed in the event logbook only and not in the diagnostic list.

| Info number | Info name |
|---|---|
| I1000 | --------(Device ok) |
| I1079 | Sensor changed |
| I1089 | Power on |
| I1090 | Configuration reset |
| I1091 | Configuration changed |
| I1092 | HistoROM backup deleted |
| I1111 | Density adjust failure |
| I1137 | Electronic changed |
| I1151 | History reset |
| I1155 | Reset electronic temperature |
| I1156 | Memory error trend |
| I1157 | Memory error event list |
| I1184 | Display connected |
| I1209 | Density adjustment ok |
| I1221 | Zero point adjust failure |
| I1222 | Zero point adjustment ok |
| I1256 | Display: access status changed |
| I1278 | I/O module reset detected |
| I1335 | Firmware changed |
| I1361 | Web server: login failed |
| I1397 | Fieldbus: access status changed |
| I1398 | CDI: access status changed |
| I1444 | Device verification passed |
| I1445 | Device verification failed |
| I1447 | Record application reference data |
| I1448 | Application reference data recorded |
| I1449 | Recording application ref. data failed |
| I1450 | Monitoring off |

| Info number | Info name |
|---|---|
| I1451 | Monitoring on |
| I1457 | Measured error verification failed |
| I1459 | I/O module verification failed |
| I1460 | HBSI verification failed |
| I1461 | Sensor verification failed |
| I1462 | Sensor electronic module verific. failed |
| I1512 | Download started |
| I1513 | Download finished |
| I1514 | Upload started |
| I1515 | Upload finished |
| I1618 | I/O module 2 replaced |
| I1619 | I/O module 3 replaced |
| I1621 | I/O module 4 replaced |
| I1622 | Calibration changed |
| I1624 | Reset all totalizers |
| I1625 | Write protection activated |
| I1626 | Write protection deactivated |
| I1627 | Web server: login successful |
| I1628 | Display: login successful |
| I1629 | CDI: login successful |
| I1631 | Web server access changed |
| I1632 | Display: login failed |
| I1633 | CDI: login failed |
| I1634 | Reset to factory settings |
| I1635 | Reset to delivery settings |
| I1636 | Fieldbus address reset |
| I1639 | Max. switch cycles number reached |
| I1649 | Hardware write protection activated |
| I1650 | Hardware write protection deactivated |
| I1712 | New flash file received |
| I1725 | Sensor electronic module (ISEM) changed |
| I1726 | Configuration backup failed |

## 12.11 Resetting the measuring device

Using the**Device reset** parameter (→ 127) it is possible to reset the entire device configuration or some of the configuration to a defined state.

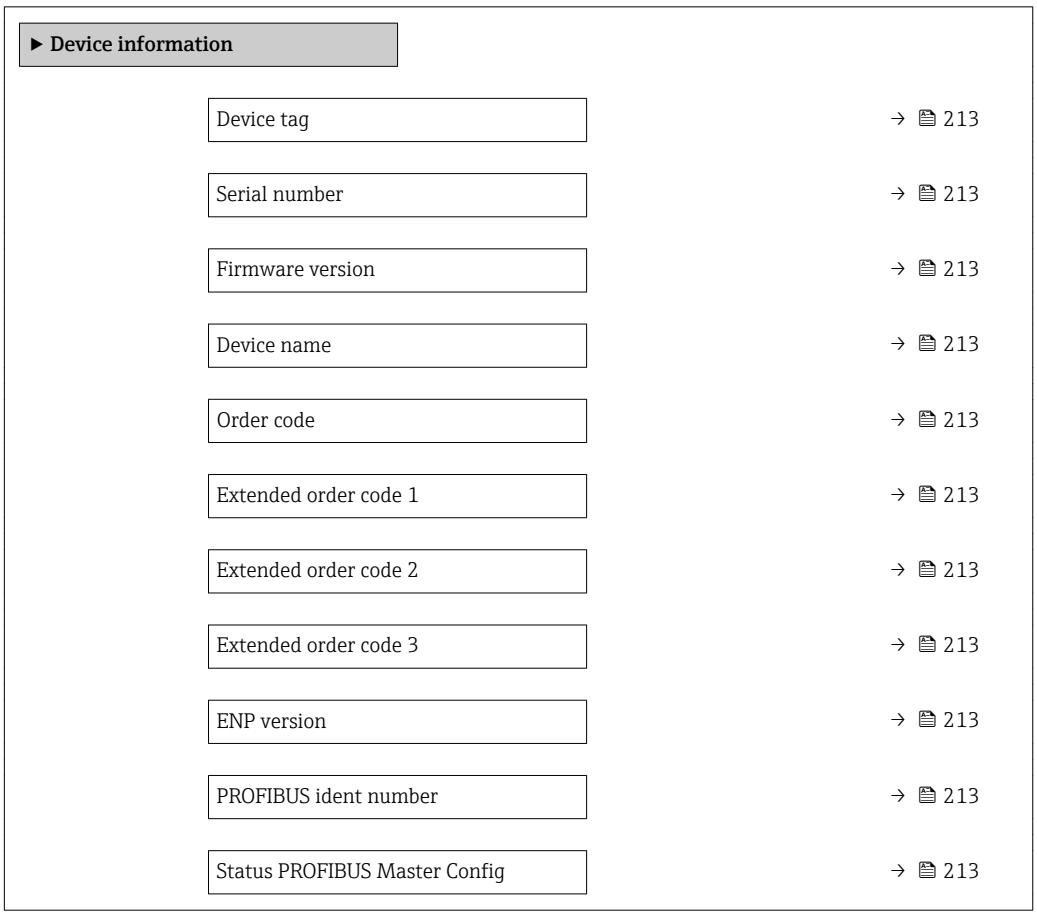
### 12.11.1 Function scope of the "Device reset" parameter

| Options | Description |
|---|---|
| Cancel | No action is executed and the user exits the parameter. |
| To delivery settings | Every parameter for which a customer-specific default setting was ordered is reset to this customer-specific value. All other parameters are reset to the factory setting. |
| Restart device | The restart resets every parameter whose data are in the volatile memory (RAM) to the factory setting (e.g. measured value data). The device configuration remains unchanged. |
| Restore S-DAT backup | Restore the data that are saved on the S-DAT. The data record is restored from the electronics memory to the S-DAT.<br>This option is displayed only in an alarm condition. |

## 12.12 Device information

The **Device information** submenu contains all parameters that display different information for device identification.

**Navigation**
"Diagnostics" menu → Device information



## Parameter overview with brief description

| Parameter | Description | User interface | Factory setting |
|---|---|---|---|
| Device tag | Shows name of measuring point. | Max. 32 characters, such as letters, numbers or special characters (e.g. @, %, /). | Promass 300 PA |
| Serial number | Shows the serial number of the measuring device. | Max. 11-digit character string comprising letters and numbers. | – |
| Firmware version | Shows the device firmware version installed. | Character string in the format xx.yy.zz | – |
| Device name | Shows the name of the transmitter.<br>The name can be found on the nameplate of the transmitter. | Promass 300/500 | – |
| Order code | Shows the device order code.<br>The order code can be found on the nameplate of the sensor and transmitter in the "Order code" field. | Character string composed of letters, numbers and certain punctuation marks (e.g. /). | – |
| Extended order code 1 | Shows the 1st part of the extended order code.<br>The extended order code can also be found on the nameplate of the sensor and transmitter in the "Ext. ord. cd." field. | Character string | – |
| Extended order code 2 | Shows the 2nd part of the extended order code.<br>The extended order code can also be found on the nameplate of the sensor and transmitter in the "Ext. ord. cd." field. | Character string | – |
| Extended order code 3 | Shows the 3rd part of the extended order code.<br>The extended order code can also be found on the nameplate of the sensor and transmitter in the "Ext. ord. cd." field. | Character string | – |
| ENP version | Shows the version of the electronic nameplate (ENP). | Character string | 2.02.00 |
| PROFIBUS ident number | Displays the PROFIBUS identification number. | 0 to FFFF | 0x156D |
| Status PROFIBUS Master Config | Displays the status of the PROFIBUS Master configuration. | ▪ Active<br>▪ Not active | Not active |

## 12.13 Firmware history

| Release date | Firmware version | Order code for "Firmware version" | Firmware changes | Documentation type | Documentation |
|---|---|---|---|---|---|
| 08.2016 | 01.00.zz | Option **72** | Original firmware | Operating Instructions | BA01841D/06/EN/01.18 |
| 11.2018 | 01.01.zz | Option **68** | ▪ Concentration update<br>▪ Local display - enhanced performance and data entry via text editor<br>▪ Optimized keypad lock for local display<br>▪ Web server feature update<br>  ▪ Support for trend data function<br>  ▪ Heartbeat function enhanced to include detailed results (page 3/4 of the report)<br>  ▪ Device configuration as PDF (parameter log, similar to FDT print)<br>▪ Network capability of Ethernet (service) interface<br>▪ Comprehensive Heartbeat feature update<br>▪ Local display - support for WLAN infrastructure mode<br>▪ Implementation of reset code | Operating Instructions | BA01841D/06/EN/02.18 |

It is possible to flash the firmware to the current version or the previous version using the service interface.

For the compatibility of the firmware version with the previous version, the installed device description files and operating tools, observe the information about the device in the "Manufacturer's information" document.

The manufacturer's information is available:
- In the Download Area of the Endress+Hauser web site: www.endress.com → Downloads
- Specify the following details:
  - Product root: e.g. 8A3B
    The product root is the first part of the order code: see the nameplate on the device.
  - Text search: Manufacturer's information
  - Media type: Documentation – Technical Documentation

# 13 Maintenance

## 13.1 Maintenance tasks

No special maintenance work is required.

### 13.1.1 Exterior cleaning

When cleaning the exterior of measuring devices, always use cleaning agents that do not attack the surface of the housing or the seals.

### 13.1.2 Interior cleaning

Observe the following points for CIP and SIP cleaning:
- Use only cleaning agents to which the process-wetted materials are adequately resistant.
- Observe the maximum permitted medium temperature for the measuring device → 236.

## 13.2 Measuring and test equipment

Endress+Hauser offers a wide variety of measuring and test equipment, such as W@M or device tests.

Your Endress+Hauser Sales Center can provide detailed information on the services.

List of some of the measuring and testing equipment: → 218

## 13.3 Endress+Hauser services

Endress+Hauser offers a wide variety of services for maintenance such as recalibration, maintenance service or device tests.

Your Endress+Hauser Sales Center can provide detailed information on the services.

# 14 Repairs

## 14.1 General notes

### 14.1.1 Repair and conversion concept

The Endress+Hauser repair and conversion concept provides for the following:
- The measuring devices have a modular design.
- Spare parts are grouped into logical kits with the associated Installation Instructions.
- Repairs are carried out by Endress+Hauser Service or by appropriately trained customers.
- Certified devices can only be converted to other certified devices by Endress+Hauser Service or at the factory.

### 14.1.2 Notes for repair and conversion

For repair and modification of a measuring device, observe the following notes:
- ▶ Use only original Endress+Hauser spare parts.
- ▶ Carry out the repair according to the Installation Instructions.
- ▶ Observe the applicable standards, federal/national regulations, Ex documentation (XA) and certificates.
- ▶ Document every repair and each conversion and enter them into the *W@M* life cycle management database.

## 14.2 Spare parts

*W@M Device Viewer* (www.endress.com/deviceviewer):
All the spare parts for the measuring device, along with the order code, are listed here and can be ordered. If available, users can also download the associated Installation Instructions.

Measuring device serial number:
- Is located on the nameplate of the device.
- Can be read out via the **Serial number** parameter (→ 213) in the **Device information** submenu.

## 14.3 Endress+Hauser services

Endress+Hauser offers a wide range of services.

Your Endress+Hauser Sales Center can provide detailed information on the services.

## 14.4 Return

The measuring device must be returned if it is need of repair or a factory calibration, or if the wrong measuring device has been delivered or ordered. Legal specifications require Endress+Hauser, as an ISO-certified company, to follow certain procedures when handling products that are in contact with the medium.

To ensure safe, swift and professional device returns, please refer to the procedure and conditions for returning devices provided on the Endress+Hauser website at http://www.endress.com/support/return-material

## 14.5 Disposal

### 14.5.1 Removing the measuring device

1. Switch off the device.

**⚠ WARNING**

**Danger to persons from process conditions.**

- Beware of hazardous process conditions such as pressure in the measuring device, high temperatures or aggressive fluids.

2. Carry out the mounting and connection steps from the "Mounting the measuring device" and "Connecting the measuring device" sections in reverse order. Observe the safety instructions.

### 14.5.2 Disposing of the measuring device

**⚠ WARNING**

**Danger to personnel and environment from fluids that are hazardous to health.**

- Ensure that the measuring device and all cavities are free of fluid residues that are hazardous to health or the environment, e.g. substances that have permeated into crevices or diffused through plastic.

Observe the following notes during disposal:

- Observe valid federal/national regulations.
- Ensure proper separation and reuse of the device components.

# 15 Accessories

Various accessories, which can be ordered with the device or subsequently from Endress +Hauser, are available for the device. Detailed information on the order code in question is available from your local Endress+Hauser sales center or on the product page of the Endress+Hauser website: www.endress.com.

## 15.1 Device-specific accessories

### 15.1.1 For the transmitter

| Accessories | Description |
|---|---|
| Proline 300 transmitter | Transmitter for replacement or storage. Use the order code to define the following specifications:<br>▪ Approvals<br>▪ Output<br>▪ Input<br>▪ Display/operation<br>▪ Housing<br>▪ Software<br>Order code: 8X3BXX<br>Installation Instructions EA01200D |
| Remote display and operating module DKX001 | ▪ If ordered directly with the measuring device:<br>Order code for "Display; operation", option O "Remote display 4-line illum.; 10 m (30 ft) Cable; touch control"<br>▪ If ordered separately:<br>▪ Measuring device: order code for "Display; operation", option M "W/o, prepared for remote display"<br>▪ DKX001: Via the separate product structure DKX001<br>▪ If ordered subsequently:<br>DKX001: Via the separate product structure DKX001<br>**Mounting bracket for DKX001**<br>▪ If ordered directly: order code for "Accessory enclosed", option RA "Mounting bracket, pipe 1/2"'<br>▪ If ordered subsequently: order number: 71340960<br>**Connecting cable (replacement cable)**<br>Via the separate product structure: DKX002<br>Further information on display and operating module DKX001→ 🖹 243.<br>Special Documentation SD01763D |
| External WLAN antenna | External WLAN antenna with 1.5 m (59.1 in) connecting cable and two angle brackets. Order code for "Accessory enclosed", option P8 "Wireless antenna wide area".<br>▪ The external WLAN antenna is not suitable for use in hygienic applications.<br>▪ Further information on the WLAN interface → 🖹 68.<br>Order number: 71351317<br>Installation Instructions EA01238D |
| Protective cover | Is used to protect the measuring device from the effects of the weather: e.g. rainwater, excess heating from direct sunlight.<br>Order number: 71343505<br>Installation Instructions EA01160D |

### 15.1.2 For the sensor

| Accessories | Description |
|---|---|
| Heating jacket | Is used to stabilize the temperature of the fluids in the sensor. Water, water vapor and other non-corrosive liquids are permitted for use as fluids.<br>If using oil as a heating medium, please consult with Endress+Hauser.<br>▪ If ordered together with the measuring device: order code for "Enclosed accessories"<br>  ▪ Option RB "heating jacket, G 1/2" internal thread"<br>  ▪ Option RD "Heating jacket, NPT 1/2" internal thread"<br>▪ If ordered subsequently: Use the order code with the product root DK8003.<br>Special Documentation SD02173D |
| Sensor holder | For wall, tabletop and pipe mounting.<br>Order number: 71392563 |

## 15.2 Service-specific accessories

| Accessories | Description |
|---|---|
| Applicator | Software for selecting and sizing Endress+Hauser measuring devices:<br>▪ Choice of measuring devices for industrial requirements<br>▪ Calculation of all the necessary data for identifying the optimum flowmeter: e.g. nominal diameter, pressure loss, flow velocity and accuracy.<br>▪ Graphic illustration of the calculation results<br>▪ Determination of the partial order code, administration, documentation and access to all project-related data and parameters over the entire life cycle of a project.<br>Applicator is available:<br>▪ Via the Internet: https://portal.endress.com/webapp/applicator<br>▪ As a downloadable DVD for local PC installation. |
| W@M | W@M Life Cycle Management<br>Improved productivity with information at your fingertips. Data relevant to a plant and its components is generated from the first stages of planning and during the asset's complete life cycle.<br>W@M Life Cycle Management is an open and flexible information platform with online and on-site tools. Instant access for your staff to current, in-depth data shortens your plant's engineering time, speeds up procurement processes and increases plant uptime.<br>Combined with the right services, W@M Life Cycle Management boosts productivity in every phase. For more information, visit www.endress.com/lifecyclemanagement |
| FieldCare | FDT-based plant asset management tool from Endress+Hauser.<br>It can configure all smart field units in your system and helps you manage them. By using the status information, it is also a simple but effective way of checking their status and condition.<br>Operating Instructions BA00027S and BA00059S |
| DeviceCare | Tool to connect and configure Endress+Hauser field devices.<br>Innovation brochure IN01047S |

## 15.3 System components

| Accessories | Description |
|---|---|
| Memograph M graphic data manager | The Memograph M graphic data manager provides information on all the relevant measured variables. Measured values are recorded correctly, limit values are monitored and measuring points analyzed. The data are stored in the 256 MB internal memory and also on a SD card or USB stick.<br>▪ Technical Information TI00133R<br>▪ Operating Instructions BA00247R |
| Cerabar M | The pressure transmitter for measuring the absolute and gauge pressure of gases, steam and liquids. It can be used to read in the operating pressure value.<br>▪ Technical Information TI00426P and TI00436P<br>▪ Operating Instructions BA00200P and BA00382P |
| Cerabar S | The pressure transmitter for measuring the absolute and gauge pressure of gases, steam and liquids. It can be used to read in the operating pressure value.<br>▪ Technical Information TI00383P<br>▪ Operating Instructions BA00271P |
| iTEMP | The temperature transmitters can be used in all applications and are suitable for the measurement of gases, steam and liquids. They can be used to read in the medium temperature.<br>"Fields of Activity" document FA00006T |

# 16 Technical data

## 16.1 Application

The measuring device is intended only for the flow measurement of liquids and gases.

Depending on the version ordered, the measuring device can also measure potentially explosive, flammable, poisonous and oxidizing media.

To ensure that the device remains in proper operating condition for its service life, use the measuring device only for media against which the process-wetted materials are sufficiently resistant.

## 16.2 Function and system design

| | |
|---|---|
| Measuring principle | Mass flow measurement based on the Coriolis measuring principle |
| Measuring system | The device consists of a transmitter and a sensor.<br>The device is available as a compact version:<br>The transmitter and sensor form a mechanical unit.<br>For information on the structure of the device → 15 |

## 16.3 Input

Measured variable

### Direct measured variables

- Mass flow
- Density
- Temperature

### Calculated measured variables

- Volume flow
- Corrected volume flow
- Reference density

Measuring range

### Measuring range for liquids

| DN | | Measuring range full scale values $\dot{m}_{min(F)}$ to $\dot{m}_{max(F)}$ | |
|---|---|---|---|
| [mm] | [in] | [kg/h] | [lb/min] |
| 1 | 1/24 | 0 to 20 | 0 to 0.735 |
| 2 | 1/12 | 0 to 100 | 0 to 3.675 |
| 4 | 1/8 | 0 to 450 | 0 to 16.54 |

### Measuring range for gases

The full scale value depends on the density and the sound velocity of the gas used and can be calculated with the formula below:

$\dot{m}_{max(G)}$ = minimum ($\dot{m}_{max(F)} \cdot \rho_G : x ; \rho_G \cdot c_G \cdot \pi/2 \cdot (d_i)^2 \cdot 3600$)

| | |
|---|---|
| $\dot{m}_{max(G)}$ | Maximum full scale value for gas [kg/h] |
| $\dot{m}_{max(F)}$ | Maximum full scale value for liquid [kg/h] |
| $\dot{m}_{max(G)} < \dot{m}_{max(F)}$ | $\dot{m}_{max(G)}$ can never be greater than $\dot{m}_{max(F)}$ |
| $\rho_G$ | Gas density in [kg/m³] at operating conditions |
| x | Constant dependent on nominal diameter |
| $c_G$ | Sound velocity (gas) [m/s] |
| $d_i$ | Measuring tube internal diameter [m] |

| DN | | x |
|---|---|---|
| [mm] | [in] | [kg/m³] |
| 1 | 1/24 | 32 |
| 2 | 1/12 | 32 |
| 4 | 1/8 | 32 |

### Calculation example for gas

- Sensor: Promass A, DN 2
- Gas: Air with a density of 11.9 kg/m³ (at 20 °C and 10 bar)
- Measuring range (liquid): 100 kg/h
- x = 32 kg/m³ (for Promass A DN 2)

Maximum possible full scale value:

$\dot{m}_{max(G)} = \dot{m}_{max(F)} \cdot \rho_G : x = 100$ kg/h · 11.9 kg/m³ : 32 kg/m³ = 37.2 kg/h

### Recommended measuring range

Flow limit → 238

Operable flow range

Over 1000 : 1.

Flow rates above the preset full scale value do not override the electronics unit, with the result that the totalizer values are registered correctly.

Input signal

### External measured values

To increase the accuracy of certain measured variables or to calculate the corrected volume flow for gases, the automation system can continuously write different measured values to the measuring device:

- Operating pressure to increase accuracy (Endress+Hauser recommends the use of a pressure measuring device for absolute pressure, e.g. Cerabar M or Cerabar S)
- Medium temperature to increase accuracy (e.g. iTEMP)
- Reference density for calculating the corrected volume flow for gases

Various pressure and temperature measuring devices can be ordered from Endress +Hauser: see "Accessories" section → 220

It is recommended to read in external measured values to calculate the corrected volume flow.

*Current input*

The measured values are written from the automation system to the measuring device via the current input → 223.

*Digital communication*

The measured values are written from the automation system to the measuring device via PROFIBUS PA.

### Current input 0/4 to 20 mA

| | |
|---|---|
| **Current input** | 0/4 to 20 mA (active/passive) |
| **Current span** | ▪ 4 to 20 mA (active)<br>▪ 0/4 to 20 mA (passive) |
| **Resolution** | 1 µA |
| **Voltage drop** | Typically: 0.6 to 2 V for 3.6 to 22 mA (passive) |
| **Maximum input voltage** | ≤ 30 V (passive) |
| **Open-circuit voltage** | ≤ 28.8 V (active) |
| **Possible input variables** | ▪ Pressure<br>▪ Temperature<br>▪ Density |

### Status input

| | |
|---|---|
| **Maximum input values** | ▪ DC −3 to 30 V<br>▪ If status input is active (ON): $R_i$ >3 kΩ |
| **Response time** | Configurable: 5 to 200 ms |

| | |
|---|---|
| **Input signal level** | ▪ Low signal: DC −3 to +5 V<br>▪ High signal: DC 12 to 30 V |
| **Assignable functions** | ▪ Off<br>▪ Reset the individual totalizers separately<br>▪ Reset all totalizers<br>▪ Flow override |

# 16.4 Output

Output signal

## PROFIBUS PA

| | |
|---|---|
| **PROFIBUS PA** | In accordance with EN 50170 Volume 2, IEC 61158-2 (MBP), galvanically isolated |
| **Data transmission** | 31.25 kbit/s |
| **Current consumption** | 10 mA |
| **Permitted supply voltage** | 9 to 32 V |
| **Bus connection** | With integrated reverse polarity protection |

### Current output 4 to 20 mA

| | |
|---|---|
| **Signal mode** | Can be set to:<br>▪ Active<br>▪ Passive |
| **Current span** | Can be set to:<br>▪ 4 to 20 mA NAMUR<br>▪ 4 to 20 mA US<br>▪ 4 to 20 mA<br>▪ 0 to 20 mA (only if the signal mode is active)<br>▪ Fixed current |
| **Maximum output values** | 22.5 mA |
| **Open-circuit voltage** | DC 28.8 V (active) |
| **Maximum input voltage** | DC 30 V (passive) |
| **Load** | 0 to 700 Ω |
| **Resolution** | 0.38 µA |
| **Damping** | Configurable: 0 to 999.9 s |
| **Assignable measured variables** | ▪ Mass flow<br>▪ Volume flow<br>▪ Corrected volume flow<br>▪ Density<br>▪ Reference density<br>▪ Temperature<br>▪ Electronics temperature<br>▪ Oscillation frequency 0<br>▪ Oscillation damping 0<br>▪ Signal asymmetry<br>▪ Exciter current 0<br>The range of options increases if the measuring device has one or more application packages. |

### Current output 4 to 20 mA Ex i passive

| | |
|---|---|
| **Order code** | "Output; input 2" (21), "Output; input 3" (022):<br>Option C: current output 4 to 20 mA Ex i passive |
| **Signal mode** | Passive |
| **Current span** | Can be set to:<br>▪ 4 to 20 mA NAMUR<br>▪ 4 to 20 mA US<br>▪ 4 to 20 mA<br>▪ Fixed current |
| **Maximum output values** | 22.5 mA |
| **Maximum input voltage** | DC 30 V |

| | |
|---|---|
| **Load** | 0 to 700 Ω |
| **Resolution** | 0.38 µA |
| **Damping** | Configurable: 0 to 999 s |
| **Assignable measured variables** | ▪ Mass flow<br>▪ Volume flow<br>▪ Corrected volume flow<br>▪ Density<br>▪ Reference density<br>▪ Temperature<br>▪ Electronics temperature<br>▪ Oscillation frequency 0<br>▪ Oscillation damping 0<br>▪ Signal asymmetry<br>▪ Exciter current 0<br>The range of options increases if the measuring device has one or more application packages. |

## Pulse/frequency/switch output

| | |
|---|---|
| **Function** | Can be set to pulse, frequency or switch output |
| **Version** | Open collector<br>Can be set to:<br>▪ Active<br>▪ Passive<br>▪ Passive NAMUR<br>Ex-i, passive |
| **Maximum input values** | DC 30 V, 250 mA (passive) |
| **Open-circuit voltage** | DC 28.8 V (active) |
| **Voltage drop** | For 22.5 mA: ≤ DC 2 V |
| **Pulse output** | |
| **Maximum input values** | DC 30 V, 250 mA (passive) |
| **Maximum output current** | 22.5 mA (active) |
| **Open-circuit voltage** | DC 28.8 V (active) |
| **Pulse width** | Configurable: 0.05 to 2 000 ms |
| **Maximum pulse rate** | 10 000 Impulse/s |
| **Pulse value** | Adjustable |
| **Assignable measured variables** | ▪ Mass flow<br>▪ Volume flow<br>▪ Corrected volume flow |
| **Frequency output** | |
| **Maximum input values** | DC 30 V, 250 mA (passive) |
| **Maximum output current** | 22.5 mA (active) |
| **Open-circuit voltage** | DC 28.8 V (active) |
| **Output frequency** | Adjustable: end value frequency 2 to 10 000 Hz ($f_{max}$ = 12 500 Hz) |
| **Damping** | Configurable: 0 to 999.9 s |
| **Pulse/pause ratio** | 1:1 |

| | |
|---|---|
| **Assignable measured variables** | ▪ Mass flow<br>▪ Volume flow<br>▪ Corrected volume flow<br>▪ Density<br>▪ Reference density<br>▪ Temperature<br>▪ Electronics temperature<br>▪ Oscillation frequency 0<br>▪ Oscillation damping 0<br>▪ Signal asymmetry<br>▪ Exciter current 0<br>The range of options increases if the measuring device has one or more application packages. |
| **Switch output** | |
| **Maximum input values** | DC 30 V, 250 mA (passive) |
| **Open-circuit voltage** | DC 28.8 V (active) |
| **Switching behavior** | Binary, conductive or non-conductive |
| **Switching delay** | Configurable: 0 to 100 s |
| **Number of switching cycles** | Unlimited |
| **Assignable functions** | ▪ Off<br>▪ On<br>▪ Diagnostic behavior<br>▪ Limit value<br>  ▪ Mass flow<br>  ▪ Volume flow<br>  ▪ Corrected volume flow<br>  ▪ Density<br>  ▪ Reference density<br>  ▪ Temperature<br>  ▪ Totalizer 1-3<br>▪ Flow direction monitoring<br>▪ Status<br>  ▪ Partially filled pipe detection<br>  ▪ Low flow cut off<br>The range of options increases if the measuring device has one or more application packages. |

## Relay output

| | |
|---|---|
| **Function** | Switch output |
| **Version** | Relay output, galvanically isolated |
| **Switching behavior** | Can be set to:<br>▪ NO (normally open), factory setting<br>▪ NC (normally closed) |

| | |
|---|---|
| **Maximum switching capacity (passive)** | ▪ DC 30 V, 0.1 A<br>▪ AC 30 V, 0.5 A |
| **Assignable functions** | ▪ Off<br>▪ On<br>▪ Diagnostic behavior<br>▪ Limit value<br>  ▪ Mass flow<br>  ▪ Volume flow<br>  ▪ Corrected volume flow<br>  ▪ Density<br>  ▪ Reference density<br>  ▪ Temperature<br>  ▪ Totalizer 1-3<br>▪ Flow direction monitoring<br>▪ Status<br>  ▪ Partially filled pipe detection<br>  ▪ Low flow cut off<br>The range of options increases if the measuring device has one or more application packages. |

### User-configurable input/output

**One** specific input or output is assigned to a user-configurable input/output (configurable I/O) during device commissioning.

The following inputs and outputs are available for assignment:
- Choice of current output: 4 to 20 mA (active), 0/4 to 20 mA (passive)
- Pulse/frequency/switch output
- Choice of current input: 4 to 20 mA (active), 0/4 to 20 mA (passive)
- Status input

## Signal on alarm

Depending on the interface, failure information is displayed as follows:

### PROFIBUS PA

| | |
|---|---|
| **Status and alarm messages** | Diagnostics in accordance with PROFIBUS PA Profile 3.02 |
| **Failure current FDE (Fault Disconnection Electronic)** | 0 mA |

### Current output 0/4 to 20 mA

*4 to 20 mA*

| | |
|---|---|
| **Failure mode** | Choose from:<br>▪ 4 to 20 mA in accordance with NAMUR recommendation NE 43<br>▪ 4 to 20 mA in accordance with US<br>▪ Min. value: 3.59 mA<br>▪ Max. value: 22.5 mA<br>▪ Freely definable value between: 3.59 to 22.5 mA<br>▪ Actual value<br>▪ Last valid value |

*0 to 20 mA*

| | |
|---|---|
| **Failure mode** | Choose from:<br>▪ Maximum alarm: 22 mA<br>▪ Freely definable value between: 0 to 20.5 mA |

### Pulse/frequency/switch output

| | |
|---|---|
| **Pulse output** | |
| **Failure mode** | Choose from:<br>▪ Actual value<br>▪ No pulses |
| **Frequency output** | |
| **Failure mode** | Choose from:<br>▪ Actual value<br>▪ 0 Hz<br>▪ Defined value ($f_{max}$ 2 to 12 500 Hz) |
| **Switch output** | |
| **Failure mode** | Choose from:<br>▪ Current status<br>▪ Open<br>▪ Closed |

### Relay output

| | |
|---|---|
| **Failure mode** | Choose from:<br>▪ Current status<br>▪ Open<br>▪ Closed |

### Local display

| | |
|---|---|
| **Plain text display** | With information on cause and remedial measures |
| **Backlight** | Red backlighting indicates a device error. |

Status signal as per NAMUR recommendation NE 107

### Interface/protocol

- Via digital communication:
  PROFIBUS PA
- Via service interface
  - CDI-RJ45 service interface
  - WLAN interface

| | |
|---|---|
| **Plain text display** | With information on cause and remedial measures |

### Web browser

| | |
|---|---|
| **Plain text display** | With information on cause and remedial measures |

### Light emitting diodes (LED)

| | |
|---|---|
| **Status information** | Status indicated by various light emitting diodes<br>The following information is displayed depending on the device version:<br>▪ Supply voltage active<br>▪ Data transmission active<br>▪ Device alarm/error has occurred<br>Diagnostic information via light emitting diodes → 147 |

Low flow cut off

The switch points for low flow cut off are user-selectable.

Galvanic isolation

The outputs are galvanically isolated from one another and from earth (PE).

Protocol-specific data

| | |
|---|---|
| **Manufacturer ID** | 0x11 |
| **Ident number** | 0x156D |
| **Profile version** | 3.02 |
| **Device description files (GSD, DTM, DD)** | Information and files under:<br>▪ www.endress.com<br>▪ www.profibus.org |
| **Supported functions** | ▪ Identification & Maintenance<br>Simplest device identification on the part of the control system and nameplate<br>▪ PROFIBUS upload/download<br>Reading and writing parameters is up to ten times faster with PROFIBUS upload/download<br>▪ Condensed status<br>Simplest and self-explanatory diagnostic information by categorizing diagnostic messages that occur |
| **Configuration of the device address** | ▪ DIP switches on the I/O electronics module<br>▪ Local display<br>▪ Via operating tools (e.g. FieldCare) |
| **Compatibility with earlier model** | If the device is replaced, the measuring device Promass 300 supports the compatibility of the cyclic data with previous models. It is not necessary to adjust the engineering parameters of the PROFIBUS network with the Promass 300 GSD file.<br>Earlier models:<br>▪ Promass 80 PROFIBUS PA<br>▪ ID No.: 1528 (hex)<br>▪ Extended GSD file: EH3x1528.gsd<br>▪ Standard GSD file: EH3_1528.gsd<br>▪ Promass 83 PROFIBUS PA<br>▪ ID No.: 152A (hex)<br>▪ Extended GSD file: EH3x152A.gsd<br>▪ Standard GSD file: EH3_152A.gsd |
| **System integration** | Information regarding system integration → 78.<br>▪ Cyclic data transmission<br>▪ Block model<br>▪ Description of the modules |

## 16.5 Power supply

Terminal assignment

→ 34

Device plugs available

→ 34

Pin assignment, device plug

→ 34

Supply voltage

| Order code for "Power supply" | Terminal voltage | | Frequency range |
|---|---|---|---|
| Option **D** | DC 24 V | ±20% | – |
| Option **E** | AC 100 to 240 V | −15 to +10% | 50/60 Hz |

| Order code for "Power supply" | Terminal voltage | | Frequency range |
|---|---|---|---|
| Option **I** | DC 24 V | ±20% | – |
| | AC 100 to 240 V | −15 to +10% | 50/60 Hz |

Power consumption

**Transmitter**

Max. 10 W (active power)

| | |
|---|---|
| **switch-on current** | Max. 36 A (<5 ms) as per NAMUR Recommendation NE 21 |

Current consumption

**Transmitter**

- Max. 400 mA (24 V)
- Max. 200 mA (110 V, 50/60 Hz; 230 V, 50/60 Hz)

Power supply failure

- Totalizers stop at the last value measured.
- Depending on the device version, the configuration is retained in the device memoryor in the pluggable data memory (HistoROM DAT).
- Error messages (incl. total operated hours) are stored.

Electrical connection

→ 📄 36

Potential equalization

→ 📄 39

Terminals

Spring-loaded terminals: Suitable for strands and strands with ferrules.
Conductor cross-section 0.2 to 2.5 mm² (24 to 12 AWG).

Cable entries

- Cable gland: M20 × 1.5 with cable Ø 6 to 12 mm (0.24 to 0.47 in)
- Thread for cable entry:
  - NPT ½"
  - G ½"
  - M20
- Device plug for digital communication: M12

Cable specification

→ 📄 31

## 16.6 Performance characteristics

Reference operating conditions

- Error limits based on ISO 11631
- Water with +15 to +45 °C (+59 to +113 °F) at2 to 6 bar (29 to 87 psi)
- Specifications as per calibration protocol
- Accuracy based on accredited calibration rigs that are traced to ISO 17025.

To obtain measured errors, use the *Applicator* sizing tool → 📄 219

Maximum measured error

o.r. = of reading; 1 g/cm³ = 1 kg/l; T = medium temperature

### Base accuracy

Design fundamentals → 234

*Mass flow and volume flow (liquids)*

±0.10 % o.r.

*Mass flow (gases)*

±0.35 % o.r.

*Density (liquids)*

| Under reference conditions [g/cm³] | Standard density calibration [1] [g/cm³] | Wide-range Density specification [2] [3] [g/cm³] |
|---|---|---|
| ±0.0005 | ±0.02 | ±0.002 |

1) Valid over the entire temperature and density range
2) Valid range for special density calibration: 0 to 2 g/cm³, +5 to +80 °C (+41 to +176 °F)
3) Order code for "Application package", option EE "Special density"

*Temperature*

±0.5 °C ± 0.005 · T °C (±0.9 °F ± 0.003 · (T − 32) °F)

### Zero point stability

*Standard version: order code for "Measuring tube mat., wetted surface", option BB, BF, HA, SA*

| DN | | Zero point stability | |
|---|---|---|---|
| [mm] | [in] | [kg/h] | [lb/min] |
| 1 | 1/24 | 0.0005 | 0.000018 |
| 2 | 1/12 | 0.0025 | 0.00009 |
| 4 | 1/8 | 0.0100 | 0.00036 |

*High-pressure version: order code for "Measuring tube mat., wetted surface", option HB*

| DN | | Zero point stability | |
|---|---|---|---|
| [mm] | [in] | [kg/h] | [lb/min] |
| 1 | 1/24 | 0.0008 | 0.0000288 |
| 2 | 1/12 | 0.0040 | 0.000144 |
| 4 | 1/8 | 0.0160 | 0.000576 |

### Flow values

Flow values as turndown parameter depending on nominal diameter.

*SI units*

| DN [mm] | 1:1 [kg/h] | 1:10 [kg/h] | 1:20 [kg/h] | 1:50 [kg/h] | 1:100 [kg/h] | 1:500 [kg/h] |
|---|---|---|---|---|---|---|
| 1 | 20 | 2 | 1 | 0.4 | 0.2 | 0.04 |
| 2 | 100 | 10 | 5 | 2 | 1 | 0.2 |
| 4 | 450 | 45 | 22.5 | 9 | 4.5 | 0.9 |

*US units*

| DN [inch] | 1:1 [lb/min] | 1:10 [lb/min] | 1:20 [lb/min] | 1:50 [lb/min] | 1:100 [lb/min] | 1:500 [lb/min] |
|---|---|---|---|---|---|---|
| 1/24 | 0.735 | 0.074 | 0.037 | 0.015 | 0.007 | 0.001 |
| 1/12 | 3.675 | 0.368 | 0.184 | 0.074 | 0.037 | 0.007 |
| 1/8 | 16.54 | 1.654 | 0.827 | 0.331 | 0.165 | 0.033 |

### Accuracy of outputs

The outputs have the following base accuracy specifications.

*Current output*

| | |
|---|---|
| **Accuracy** | ±5 µA |

*Pulse/frequency output*

o.r. = of reading

| | |
|---|---|
| **Accuracy** | Max. ±50 ppm o.r. (over the entire ambient temperature range) |

Repeatability

o.r. = of reading; 1 g/cm³ = 1 kg/l; T = medium temperature

### Base repeatability

Design fundamentals → 234

*Mass flow and volume flow (liquids)*

±0.05 % o.r.

*Mass flow (gases)*

±0.15 % o.r.

*Density (liquids)*

±0.00025 g/cm³

*Temperature*

±0.25 °C ± 0.0025 · T °C (±0.45 °F ± 0.0015 · (T−32) °F)

Response time

The response time depends on the configuration (damping).

Influence of ambient temperature

**Current output**

| | |
|---|---|
| **Temperature coefficient** | Max. 1 µA/°C |

**Pulse/frequency output**

| | |
|---|---|
| **Temperature coefficient** | No additional effect. Included in accuracy. |

Influence of medium temperature

**Mass flow and volume flow**

o.f.s. = of full scale value

When there is a difference between the temperature for zero point adjustment and the process temperature, the additional measured error of the sensor is typically ±0.0002 % o.f.s./°C (±0.0001 % o. f.s./°F).

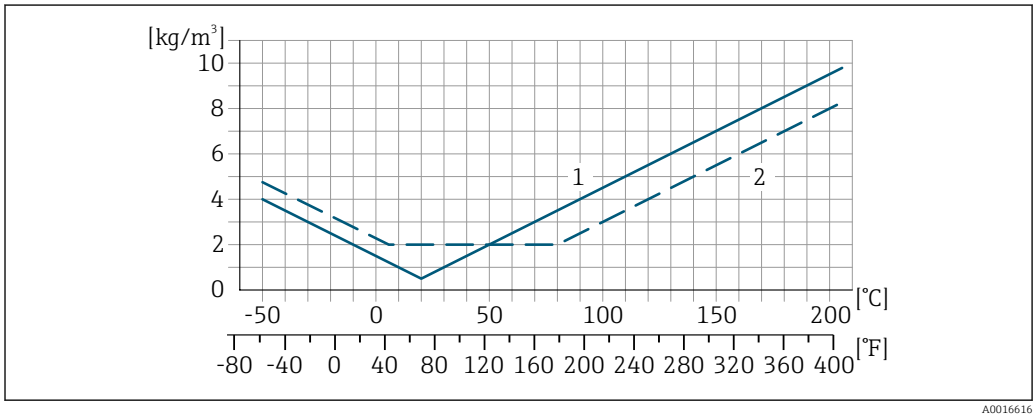
The effect is reduced if zero point adjustment is performed at process temperature.

**Density**

When there is a difference between the density calibration temperature and the process temperature, the typical measured error of the sensor is ±0.00005 g/cm³ /°C (±0.000025 g/cm³ /°F). Field density calibration is possible.

**Wide-range density specification (special density calibration)**

If the process temperature is outside the valid range (→ 231) the measured error is ±0.00005 g/cm³ /°C (±0.000025 g/cm³ /°F)




*1 Field density calibration, for example at +20 °C (+68 °F)*
*2 Special density calibration*

Influence of medium pressure

A difference between the calibration pressure and process pressure does not affect accuracy.

Design fundamentals

o.r. = of reading, o.f.s. = of full scale value

BaseAccu = base accuracy in % o.r., BaseRepeat = base repeatability in % o.r.

MeasValue = measured value; ZeroPoint = zero point stability

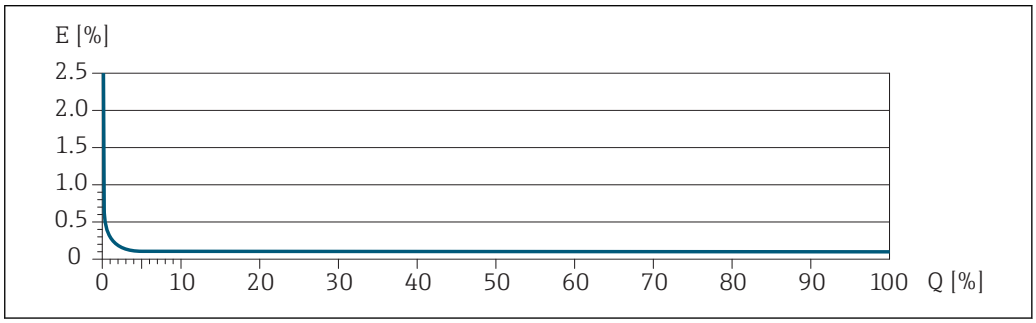
*Calculation of the maximum measured error as a function of the flow rate*

| Flow rate | Maximum measured error in % o.r. |
|---|---|
| $\geq \frac{\text{ZeroPoint}}{\text{BaseAccu}} \cdot 100$ A0021332 | $\pm$ BaseAccu A0021339 |
| $< \frac{\text{ZeroPoint}}{\text{BaseAccu}} \cdot 100$ A0021333 | $\pm \frac{\text{ZeroPoint}}{\text{MeasValue}} \cdot 100$ A0021334 |

*Calculation of the maximum repeatability as a function of the flow rate*

| Flow rate | Maximum repeatability in % o.r. |
|---|---|
| $\geq \frac{½ \cdot \text{ZeroPoint}}{\text{BaseRepeat}} \cdot 100$ A0021335 | $\pm$ BaseRepeat A0021340 |
| $< \frac{½ \cdot \text{ZeroPoint}}{\text{BaseRepeat}} \cdot 100$ A0021336 | $\pm ½ \cdot \frac{\text{ZeroPoint}}{\text{MeasValue}} \cdot 100$ A0021337 |

**Example for maximum measured error**

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*E Maximum measured error in % o.r. (example)*
*Q Flow rate in % of maximum full scale value*

## 16.7 Installation

Installation conditions → 📄 22

## 16.8 Environment

Ambient temperature range → 📄 24→ 📄 24

**Temperature tables**

Observe the interdependencies between the permitted ambient and fluid temperatures when operating the device in hazardous areas.

For detailed information on the temperature tables, see the separate document entitled "Safety Instructions" (XA) for the device.

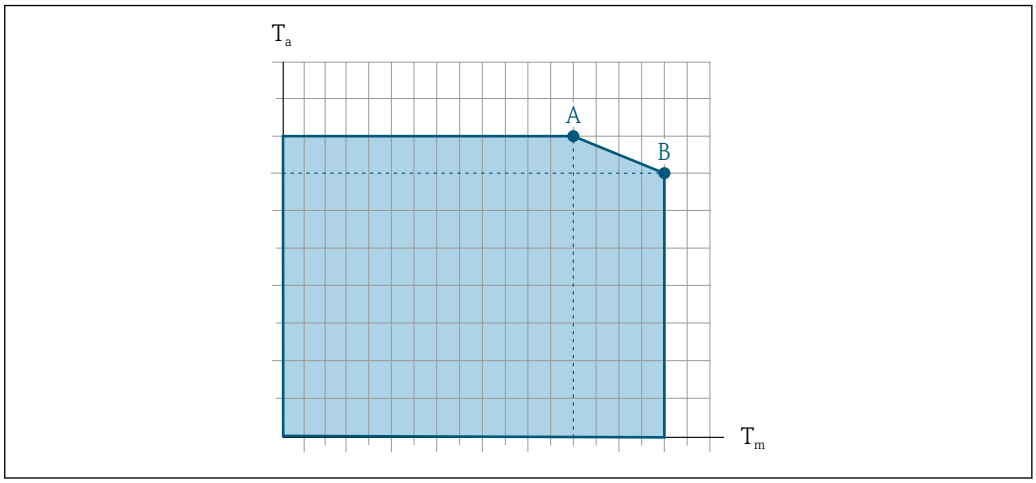
Storage temperature –50 to +80 °C (–58 to +176 °F)

| | |
|---|---|
| Climate class | DIN EN 60068-2-38 (test Z/AD) |
| Degree of protection | **Measuring device**<br>▪ As standard: IP66/67, type 4X enclosure<br>▪ When housing is open: IP20, type 1 enclosure<br>▪ Display module: IP20, type 1 enclosure<br>▪ With the order code for "Sensor options", option CM: IP69 can also be ordered<br>**External WLAN antenna**<br>IP67 |
| Vibration- and shock-resistance | **Vibration sinusoidal, in accordance with IEC 60068-2-6**<br>▪ 2 to 8.4 Hz, 3.5 mm peak<br>▪ 8.4 to 2 000 Hz, 1 g peak<br>**Vibration broad-band random, according to IEC 60068-2-64**<br>▪ 10 to 200 Hz, 0.003 $g^2$/Hz<br>▪ 200 to 2 000 Hz, 0.001 $g^2$/Hz<br>▪ Total: 1.54 g rms<br>**Shock half-sine, according to IEC 60068-2-27**<br>6 ms 30 g<br>**Rough handling shocks, according to IEC 60068-2-31** |
| Mechanical load | Never use the transmitter housing as a ladder or climbing aid. |
| Electromagnetic compatibility (EMC) | As per IEC/EN 61326 and NAMUR Recommendation 21 (NE 21)<br>Details are provided in the Declaration of Conformity. |

## 16.9 Process

| | |
|---|---|
| Medium temperature range | −50 to +205 °C (−58 to +401 °F) |

### Dependency of ambient temperature on medium temperature




31 *Exemplary representation, values in the table below.*

$T_a$ *Ambient temperature range*
$T_m$ *Medium temperature*
A *Maximum permitted medium temperature $T_m$ at $T_{a\,max}$ = 60 °C (140 °F); higher medium temperatures $T_m$ require a reduced ambient temperature $T_a$*
B *Maximum permitted ambient temperature $T_a$ for the maximum specified medium temperature $T_m$ of the sensor*

Values for devices used in the hazardous area:
Separate Ex documentation (XA) for the device → 251.

| Not insulated | | | | Insulated | | | |
|---|---|---|---|---|---|---|---|
| A | | B | | A | | B | |
| $T_a$ | $T_m$ | $T_a$ | $T_m$ | $T_a$ | $T_m$ | $T_a$ | $T_m$ |
| 60 °C (140 °F) | 205 °C (401 °F) | – | – | 60 °C (140 °F) | 120 °C (248 °F) | 55 °C (131 °F) | 205 °C (401 °F) |

Density

0 to 5 000 kg/m³ (0 to 312 lb/cf)

Pressure-temperature ratings

An overview of the pressure-temperature ratings for the process connections is provided in the "Technical Information" document

Sensor housing

The sensor housing is filled with dry nitrogen gas and protects the electronics and mechanics inside.

If a measuring tube fails (e.g. due to process characteristics like corrosive or abrasive fluids), the fluid will initially be contained by the sensor housing.

In the event of a tube failure, the pressure level inside the sensor housing will rise according to the operating process pressure. If the user judges that the sensor housing burst pressure does not provide an adequate safety margin, the device can be fitted with a rupture disk. This prevents excessively high pressure from forming inside the sensor housing. Therefore, the use of a rupture disk is strongly recommended in applications involving high gas pressures, and particularly in applications in which the process pressure is greater than 2/3 of the sensor housing burst pressure.

High-pressure devices are always fitted with a rupture disk: order code for "Measuring tube mat., wetted surface", option HB

### Burst pressure of the sensor housing

If the device is fitted with a rupture disk (order code for "Sensor option", option CA "Rupture disk"), the rupture disk trigger pressure is decisive .

The sensor housing burst pressure refers to a typical internal pressure which is reached prior to mechanical failure of the sensor housing and which was determined during type testing. The corresponding type test declaration can be ordered with the device (order code for "Additional approval", option LN "Sensor housing burst pressure, type test").

| DN | | Sensor housing burst pressure | |
|---|---|---|---|
| [mm] | [in] | [bar] | [psi] |
| 1 | 1/24 | 220 | 3 190 |
| 2 | 1/12 | 140 | 2 030 |
| 4 | 1/8 | 105 | 1 520 |

For information on the dimensions: see the "Mechanical construction" section of the "Technical Information" document

Rupture disk

To increase the level of safety, a device version with a rupture disk with a trigger pressure of 10 to 15 bar (145 to 217.5 psi)can be used (order code for "Sensor option", option CA "rupture disk").

### Drain connection for rupture disk

To allow any escaping medium to drain in a controlled manner in the event of an error, an optional drain connection can be ordered in addition to the rupture disk.

The function of the rupture disk is not compromised in any way.

Flow limit

Select the nominal diameter by optimizing between the required flow range and permissible pressure loss.

For an overview of the full scale values for the measuring range, see the "Measuring range" section → 222

- The minimum recommended full scale value is approx. 1/20 of the maximum full scale value
- In most applications, 20 to 50 % of the maximum full scale value can be considered ideal
- A low full scale value must be selected for abrasive media (such as liquids with entrained solids): flow velocity < 1 m/s (< 3 ft/s).
- For gas measurement the following rules apply:
  - The flow velocity in the measuring tubes should not exceed half the sound velocity (0.5 Mach).
  - The maximum mass flow depends on the density of the gas: formula → 222

To calculate the flow limit, use the *Applicator* sizing tool → 219

Pressure loss

To calculate the pressure loss, use the *Applicator* sizing tool → 219

System pressure

→ 24

## 16.10 Mechanical construction

Design, dimensions

For the dimensions and installation lengths of the device, see the "Technical Information" document, "Mechanical construction" section.

Weight

All values (weight exclusive of packaging material) refer to devices with VCO couplings. Weight specifications including transmitter as per order code for "Housing", option A "Aluminum, coated".

Different values due to different transmitter versions:
- Transmitter version for the hazardous area
  (Order code for "Housing", option A "Aluminum, coated"; Ex d): +2 kg (+4.4 lbs)
- Transmitter version for hygienic area
  (Order code for "Housing", option B "Stainless, hygienic"): +0.2 kg (+0.44 lbs)

**Weight in SI units**

| DN [mm] | Weight [kg] |
|---|---|
| 1 | 5.35 |
| 2 | 6.9 |
| 4 | 8.75 |

**Weight in US units**

| DN [in] | Weight [lbs] |
|---|---|
| 1/24 | 12 |
| 1/12 | 15 |
| 1/8 | 19 |

Materials

**Transmitter housing**

Order code for "Housing":
- Option **A** "Aluminum, coated": aluminum, AlSi10Mg, coated
- Option **B** "Stainless, hygienic": stainless steel, 1.4404 (316L)

*Window material*

Order code for "Housing":
- Option **A** "Aluminum, coated": glass
- Option **B** "Stainless, hygienic": polycarbonate

*Seals*

Order code for "Housing":
Option **B** "Stainless, hygienic": EPDM and silicone

**Cable entries/cable glands**

*Order code for "Housing", option A "Aluminum, coated"*

The various cable entries are suitable for hazardous and non-hazardous areas.

| Cable entry/cable gland | Material |
|---|---|
| Coupling M20 × 1.5 | Non-Ex: plastic |
| | Z2, D2, Ex d/de: brass with plastic |
| Adapter for cable entry with female thread G ½" | Nickel-plated brass |
| Adapter for cable entry with female thread NPT ½" | |

*Order code for "Housing", option B "Stainless, hygienic"*

The various cable entries are suitable for hazardous and non-hazardous areas.

| Cable entry/cable gland | Material |
|---|---|
| Cable gland M20 × 1.5 | Plastic |
| Adapter for cable entry with female thread G ½" | Nickel-plated brass |
| Adapter for cable entry with female thread NPT ½" | |

### Device plug

| Electrical connection | Material |
|---|---|
| Plug M12x1 | ▪ Socket: Stainless steel, 1.4404 (316L)<br>▪ Contact housing: Polyamide<br>▪ Contacts: Gold-plated brass |

### Sensor housing

- Acid and alkali-resistant outer surface
- Stainless steel, 1.4404 (316L)

### Measuring tubes

Order code for "Measuring tube mat., wetted surface", option BB, BF, SA

Stainless steel, 1.4435 (316/316L)

Order code for "Measuring tube mat., wetted surface", option HA, HB, HC, HD

Alloy C22, 2.4602 (UNS N06022)

### Process connections

Order code for "Measuring tube mat., wetted surface", option SA

| | |
|---|---|
| **VCO coupling** | Stainless steel, 1.4404 (316/316L) |
| **G¼", G½" female thread** | Stainless steel, 1.4404 (316/316L) |
| **NPT¼", NPT½" female thread** | Stainless steel, 1.4404 (316/316L) |
| **Tri-Clamp½"** | Stainless steel, 1.4435 (316L) |
| **Fixed flange EN 1092-1, ASME B16.5, JIS B2220** | Stainless steel, 1.4404 (316/316L) |

Order code for "Measuring tube mat., wetted surface", option BB, BF

| | |
|---|---|
| **VCO coupling** | Stainless steel, 1.4404 (316/316L) |
| **Tri-Clamp½"** | Stainless steel, 1.4435 (316L) |

Order code for "Measuring tube mat., wetted surface", option HC, HD

| | |
|---|---|
| **VCO coupling** | Alloy C22, 2.4602 (UNS N06022) |
| **Tri-Clamp½"** | Alloy C22, 2.4602 (UNS N06022) |

Order code for "Measuring tube mat., wetted surface", option HA

| | |
|---|---|
| **VCO coupling** | Alloy C22, 2.4602 (UNS N06022) |
| **G¼", G½" female thread** | Alloy C22, 2.4602 (UNS N06022) |
| **NPT¼", NPT½" female thread** | Alloy C22, 2.4602 (UNS N06022) |
| **Fixed flange EN 1092-1, ASME B16.5, JIS B2220** | Alloy C22, 2.4602 (UNS N06022) |
| **Lap joint flange EN 1092-1, ASME B16.5, JIS B2220** | Stainless steel, 1.4301 (F304), wetted parts Alloy C22, 2.4602 (UNS N06022) |

Order code for "Measuring tube mat., wetted surface", option HB (high-pressure option)

| | |
|---|---|
| **VCO coupling** | Alloy C22, 2.4602 (UNS N06022) |
| **G¼", G½" female thread** | Alloy C22, 2.4602 (UNS N06022) |
| **NPT¼", NPT½" female thread** | Alloy C22, 2.4602 (UNS N06022) |
| **Fixed flange EN 1092-1, ASME B16.5, JIS B2220** | Stainless steel, 1.4404 (316/316L); Alloy C22, 2.4602 (UNS N06022) |

Available process connections→ 242

### Seals

Welded process connections without internal seals

### Accessories

*Sensor holder*

Stainless steel, 1.4404 (316L)

*Heating jacket*

- Heating jacket housing: stainless steel, 1.4571 (316Ti)
- NPT adapter ½": stainless steel, 1.4404 (316)
- G½" adapter: stainless steel, 1.4404

*Protective cover*

Stainless steel, 1.4404 (316L)

*External WLAN antenna*

- Antenna: ASA plastic (acrylic ester-styrene-acrylonitrile) and nickel-plated brass
- Adapter: Stainless steel and nickel-plated brass
- Cable: Polyethylene
- Plug: Nickel-plated brass
- Angle bracket: Stainless steel

Process connections

- Fixed flange connections:
  - EN 1092-1 (DIN 2501) flange
  - EN 1092-1 (DIN 2512N) flange
  - ASME B16.5 flange
  - JIS B2220 flange
- Clamp connections:
  Tri-Clamp (OD tubes), DIN 11866 series C
- VCO connections:
  4-VCO-4
- Female thread:
  - Cylindrical female thread BSPP (G) in accordance with ISO 228-1
  - NPT

Process connection materials → 240

Surface roughness

All data relate to parts in contact with fluid. The following surface roughness quality can be ordered.

- Not polished
- $Ra_{max}$ = 0.76 µm (30 µin) mechanically polished
- $Ra_{max}$ = 0.38 µm (15 µin) mechanically polished

## 16.11 Human interface

Languages

Can be operated in the following languages:

- Via local operation
  English, German, French, Spanish, Italian, Dutch, Portuguese, Polish, Russian, Turkish, Chinese, Japanese, Korean, Bahasa (Indonesian), Vietnamese, Czech, Swedish
- Via Web browser
  English, German, French, Spanish, Italian, Dutch, Portuguese, Polish, Russian, Turkish, Chinese, Japanese, Korean, Bahasa (Indonesian), Vietnamese, Czech, Swedish
- Via "FieldCare", "DeviceCare" operating tool: English, German, French, Spanish, Italian, Chinese, Japanese

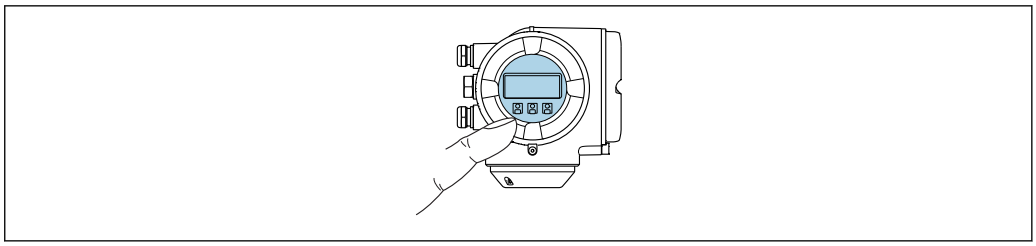
Local operation

**Via display module**

Equipment:

- Order code for "Display; operation", option F "4-line, illuminated, graphic display; touch control"
- Order code for "Display; operation", option G "4-line, illuminated, graphic display; touch control + WLAN"

Information about WLAN interface → 68



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32 *Operation with touch control*

*Display elements*

- 4-line, illuminated, graphic display
- White background lighting; switches to red in event of device errors
- Format for displaying measured variables and status variables can be individually configured
- Permitted ambient temperature for the display: −20 to +60 °C (−4 to +140 °F)
  The readability of the display may be impaired at temperatures outside the temperature range.

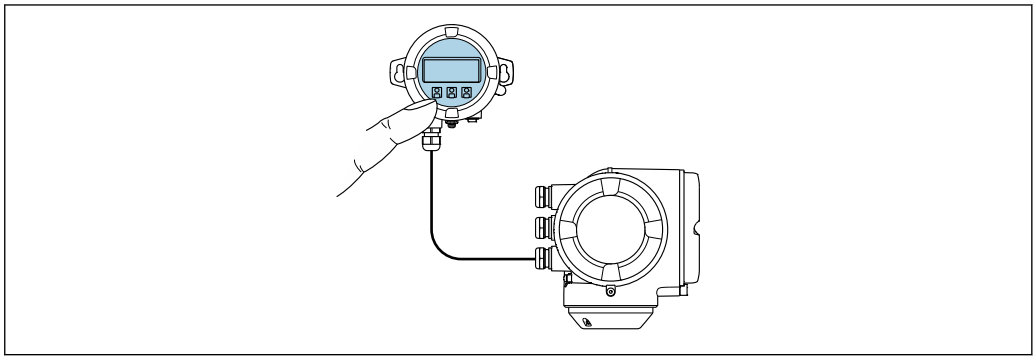
*Operating elements*

- External operation via touch control (3 optical keys) without opening the housing: ⊞, ⊟, E
- Operating elements also accessible in the various zones of the hazardous area

**Via remote display and operating module DKX001**

The remote display and operating module DKX001 is available as an optional extra → 218.

- The remote display and operating module DKX001 is only available for the following housing version: order code for "Housing": option A "Aluminum, coated"
- The measuring device is always supplied with a dummy cover when the remote display and operating module DKX001 is ordered directly with the measuring device. Display or operation at the transmitter is not possible in this case.
- If ordered subsequently, the remote display and operating module DKX001 may not be connected at the same time as the existing measuring device display module. Only one display or operation unit may be connected to the transmitter at any one time.



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33 *Operation via remote display and operating module DKX001*

*Display and operating elements*

The display and operating elements correspond to those of the display module → 242.

*Housing material*

The housing material of the display and operating module DKX001 depends on the choice of transmitter housing material.

| Transmitter housing | | Remote display and operating module |
|---|---|---|
| **Order code for "Housing"** | **Material** | **Material** |
| Option **A** "Aluminum, coated" | AlSi10Mg, coated | AlSi10Mg, coated |

*Cable entry*

Corresponds to the choice of transmitter housing, order code for "Electrical connection".

*Connecting cable*

→ 32

*Dimensions*

Information on the dimensions:

"Mechanical construction" section of the "Technical Information" document.

Remote operation

→ 67

Service interface

→ 67

Supported operating tools

Different operating tools can be used for local or remote access to the measuring device. Depending on the operating tool used, access is possible with different operating units and via a variety of interfaces.

| Supported operating tools | Operating unit | Interface | Additional information |
|---|---|---|---|
| Web browser | Notebook, PC or tablet with Web browser | ▪ CDI-RJ45 service interface<br>▪ WLAN interface | Special Documentation for device → 251 |
| DeviceCare SFE100 | Notebook, PC or tablet with Microsoft Windows system | ▪ CDI-RJ45 service interface<br>▪ WLAN interface<br>▪ Fieldbus protocol | → 219 |
| FieldCare SFE500 | Notebook, PC or tablet with Microsoft Windows system | ▪ CDI-RJ45 service interface<br>▪ WLAN interface<br>▪ Fieldbus protocol | → 219 |

Other operating tools based on FDT technology with a device driver such as DTM/iDTM or DD/EDD can be used for device operation. These operating tools are available from the individual manufacturers. Integration into the following operating tools, among others, is supported:

- FactoryTalk AssetCentre (FTAC) by Rockwell Automation → www.rockwellautomation.com
- Process Device Manager (PDM) by Siemens → www.siemens.com
- Field Device Manager (FDM) by Honeywell → www.honeywellprocess.com
- FieldMate by Yokogawa → www.yokogawa.com
- PACTWare → www.pactware.com

The associated device description files are available at: www.endress.com → Downloads

### Web server

Thanks to the integrated Web server, the device can be operated and configured via a Web browser and via a service interface (CDI-RJ45) or via a WLAN interface. The structure of the operating menu is the same as for the local display. In addition to the measured values, status information on the device is also displayed and allows the user to monitor the status of the device. Furthermore the device data can be managed and the network parameters can be configured.

A device that has a WLAN interface (can be ordered as an option) is required for the WLAN connection: order code for "Display; operation", option G "4-line, illuminated; touch control + WLAN". The device acts as an Access Point and enables communication by computer or a mobile handheld terminal.

*Supported functions*
Data exchange between the operating unit (such as a notebook for example) and the measuring device:
- Upload the configuration from the measuring device (XML format, configuration backup)
- Save the configuration to the measuring device (XML format, restore configuration)
- Export event list (.csv file)
- Export parameter settings (.csv file or PDF file, document the measuring point configuration)
- Export the Heartbeat verification log (PDF file, only available with the "Heartbeat Verification" application package)
- Flash firmware version for device firmware upgrade, for instance
- Download driver for system integration
- Visualize up to 1000 saved measured values (only available with the **Extended HistoROM** application package → 📄 249)

Web server special documentation → 📄 251

HistoROM data management

The measuring device features HistoROM data management. HistoROM data management comprises both the storage and import/export of key device and process data, making operation and servicing far more reliable, secure and efficient.

When the device is delivered, the factory settings of the configuration data are stored as a backup in the device memory. This memory can be overwritten with an updated data record, for example after commissioning.

### Additional information on the data storage concept

*There are different types of data storage units in which device data are stored and used by the device:*

| | Device memory | T-DAT | S-DAT |
|---|---|---|---|
| **Available data** | ▪ Event logbook such as diagnostic events for example<br>▪ Parameter data record backup<br>▪ Device firmware package<br>▪ Driver for system integration for exporting via Web server, e.g:<br>GSD for PROFIBUS PA | ▪ Measured value logging ("Extended HistoROM" order option)<br>▪ Current parameter data record (used by firmware at run time)<br>▪ Peakhold indicator (min/max values)<br>▪ Totalizer values | ▪ Sensor data: nominal diameter etc.<br>▪ Serial number<br>▪ Calibration data<br>▪ Device configuration (e.g. SW options, fixed I/O or multi I/O) |
| **Storage location** | Fixed on the user interface board in the connection compartment | Attachable to the user interface board in the connection compartment | In the sensor plug in the transmitter neck part |

### Data backup

**Automatic**

- The most important device data (sensor and transmitter) are automatically saved in the DAT modules
- If the transmitter or measuring device is replaced: once the T-DAT containing the previous device data has been exchanged, the new measuring device is ready for operation again immediately without any errors
- If the sensor is replaced: once the sensor has been replaced, new sensor data are transferred from the S-DAT in the measuring device and the measuring device is ready for operation again immediately without any errors
- If exchanging the electronics module (e.g. I/O electronics module): Once the electronics module has been replaced, the software of the module is compared against the current device firmware. The module software is upgraded or downgraded where necessary. The electronics module is available for use immediately afterwards and no compatibility problems occur.

**Manual**

Additional parameter data record (complete parameter settings) in the integrated device memory HistoROM backup for:

- Data backup function
  Backup and subsequent restoration of a device configuration in the device memory HistoROM backup
- Data comparison function
  Comparison of the current device configuration with the device configuration saved in the device memory HistoROM backup

### Data transfer

**Manual**

- Transfer of a device configuration to another device using the export function of the specific operating tool, e.g. with FieldCare, DeviceCare or Web server: to duplicate the configuration or to store in an archive (e.g. for backup purposes)
- Transmission of the drivers for system integration via Web server, e.g.:
  GSD for PROFIBUS PA

### Event list

**Automatic**

- Chronological display of up to 20 event messages in the events list
- If the **Extended HistoROM** application package (order option) is enabled: up to 100 event messages are displayed in the events list along with a time stamp, plain text description and remedial measures
- The events list can be exported and displayed via a variety of interfaces and operating tools e.g. DeviceCare, FieldCare or Web server

### Data logging

**Manual**

If the **Extended HistoROM** application package (order option) is enabled:

- Record up to 1 000 measured values via 1 to 4 channels
- User configurable recording interval
- Record up to 250 measured values via each of the 4 memory channels
- Export the measured value log via a variety of interfaces and operating tools e.g. FieldCare, DeviceCare or web server

## 16.12 Certificates and approvals

Currently available certificates and approvals can be called up via the product configurator.

| | |
|---|---|
| CE mark | The device meets the legal requirements of the applicable EU Directives. These are listed in the corresponding EU Declaration of Conformity along with the standards applied.<br>Endress+Hauser confirms successful testing of the device by affixing to it the CE mark. |
| RCM-tick symbol | The measuring system meets the EMC requirements of the "Australian Communications and Media Authority (ACMA)". |
| Ex approval | The devices are certified for use in hazardous areas and the relevant safety instructions are provided in the separate "Safety Instructions" (XA) document. Reference is made to this document on the nameplate. |
| Sanitary compatibility | ▪ 3-A approval<br>  ▪ Only measuring devices with the order code for "Additional approval", option LP "3A" have 3-A approval.<br>  ▪ The 3-A approval refers to the measuring device.<br>  ▪ When installing the measuring device, ensure that no liquid can accumulate on the outside of the measuring device.<br>  Remote transmitters must be installed in accordance with the 3-A Standard.<br>  ▪ Accessories (e.g. heating jacket, weather protection cover, wall holder unit) must be installed in accordance with the 3-A Standard.<br>  Each accessory can be cleaned. Disassembly may be necessary under certain circumstances.<br>▪ FDA<br>▪ Food Contact Materials Regulation (EC) 1935/2004 |
| Pharmaceutical compatibility | ▪ FDA 21 CFR 177<br>▪ USP <87><br>▪ USP <88> Class VI 121 °C<br>▪ TSE/BSE Certificate of Suitability<br>▪ cGMP<br>Devices with order code for "Test, certificate", option JG "Compliance with requirements derived from cGMP, declaration" are in accordance with cGMP requirements relating to the surfaces of wetted parts, design, FDA 21 CFR material conformity, USP Class VI tests and TSE/BSE-compliance.<br>A manufacturer's declaration specific to the serial number is supplied with the device. |
| Certification PROFIBUS | **PROFIBUS interface**<br>The measuring device is certified and registered by the PNO (PROFIBUS User Organization Organization). The measuring system meets all the requirements of the following specifications:<br>▪ Certified in accordance with PROFIBUS PA Profile 3.02<br>▪ The device can also be operated with certified devices of other manufacturers (interoperability) |
| Radio approval | The measuring device has radio approval.<br>For detailed information regarding radio approval, see Special Documentation → 251 |
| Additional certification | **CRN approval**<br>Some device versions have CRN approval. A CRN-approved process connection with a CSA approval must be ordered for a CRN-approved device. |

### Tests and certificates

- EN10204-3.1 material certificate, parts and sensor housing in contact with medium
- Pressure testing, internal procedure, inspection certificate
- PMI test (XRF), internal procedure, wetted parts, test report
- Compliance with requirements derived from cGMP, Declaration
- NACE MR0175 / ISO 15156
- NACE MR0103 / ISO 17945

*Testing of welded connections*

| Option | Test standard | | | | Process connection |
|---|---|---|---|---|---|
| | ISO 10675-1 AL1 | ASME B31.3 NFS | ASME VIII Div.1 | NORSOK M-601 | |
| KE | x | | | | RT |
| KI | | x | | | RT |
| KN | | | x | | RT |
| KS | | | | x | RT |
| K5 | x | | | | DR |
| K6 | | x | | | DR |
| K7 | | | x | | DR |
| K8 | | | | x | DR |
| RT = Radiographic testing, DR = Digital radiography<br>All options with test report | | | | | |

Other standards and guidelines

- EN 60529
  Degrees of protection provided by enclosures (IP code)
- IEC/EN 60068-2-6
  Environmental influences: Test procedure - Test Fc: vibrate (sinusoidal).
- IEC/EN 60068-2-31
  Environmental influences: Test procedure - Test Ec: shocks due to rough handling, primarily for devices.
- EN 61010-1
  Safety requirements for electrical equipment for measurement, control and laboratory use - general requirements
- IEC/EN 61326
  Emission in accordance with Class A requirements. Electromagnetic compatibility (EMC requirements).
- NAMUR NE 21
  Electromagnetic compatibility (EMC) of industrial process and laboratory control equipment
- NAMUR NE 32
  Data retention in the event of a power failure in field and control instruments with microprocessors
- NAMUR NE 43
  Standardization of the signal level for the breakdown information of digital transmitters with analog output signal.
- NAMUR NE 53
  Software of field devices and signal-processing devices with digital electronics
- NAMUR NE 105
  Specifications for integrating fieldbus devices in engineering tools for field devices
- NAMUR NE 107
  Self-monitoring and diagnosis of field devices
- NAMUR NE 131
  Requirements for field devices for standard applications

- NAMUR NE 132
  Coriolis mass meter
- ETSI EN 300 328
  Guidelines for 2.4 GHz radio components.
- EN 301489
  Electromagnetic compatibility and radio spectrum matters (ERM).

## 16.13 Application packages

Many different application packages are available to enhance the functionality of the device. Such packages might be needed to address safety aspects or specific application requirements.

The application packages can be ordered with the device or subsequently from Endress+Hauser. Detailed information on the order code in question is available from your local Endress+Hauser sales center or on the product page of the Endress+Hauser website: www.endress.com.

Detailed information on the application packages:
Special Documentation for the device → 251

Diagnostics functions

| Package | Description |
|---|---|
| Extended HistoROM | Comprises extended functions concerning the event log and the activation of the measured value memory.<br><br>Event log:<br>Memory volume is extended from 20 message entries (standard version) to up to 100 entries.<br><br>Data logging (line recorder):<br>▪ Memory capacity for up to 1000 measured values is activated.<br>▪ 250 measured values can be output via each of the 4 memory channels. The recording interval can be defined and configured by the user.<br>▪ Measured value logs can be accessed via the local display or operating tool e.g. FieldCare, DeviceCare or Web server. |

Heartbeat Technology

| Package | Description |
|---|---|
| Heartbeat Verification +Monitoring | **Heartbeat Verification**<br>Meets the requirement for traceable verification to DIN ISO 9001:2008 Chapter 7.6 a) "Control of monitoring and measuring equipment".<br>▪ Functional testing in the installed state without interrupting the process.<br>▪ Traceable verification results on request, including a report.<br>▪ Simple testing process via local operation or other operating interfaces.<br>▪ Clear measuring point assessment (pass/fail) with high test coverage within the framework of manufacturer specifications.<br>▪ Extension of calibration intervals according to operator's risk assessment.<br><br>**Heartbeat Monitoring**<br>Continuously supplies data, which are characteristic of the measuring principle, to an external condition monitoring system for the purpose of preventive maintenance or process analysis. These data enable the operator to:<br>▪ Draw conclusions - using these data and other information - about the impact process influences (such as corrosion, abrasion, buildup etc.) have on the measuring performance over time.<br>▪ Schedule servicing in time.<br>▪ Monitor the process or product quality, e.g. gas pockets. |

Concentration

| Package | Description |
|---|---|
| Concentration | **Calculation and outputting of fluid concentrations**<br>The measured density is converted to the concentration of a substance of a binary mixture using the "Concentration" application package:<br>▪ Choice of predefined fluids (e.g. various sugar solutions, acids, alkalis, salts, ethanol etc.)<br>▪ Common or user-defined units (°Brix, °Plato, % mass, % volume, mol/l etc.) for standard applications.<br>▪ Concentration calculation from user-defined tables. |

Special density

| Package | Description |
|---|---|
| Special density | Many applications use density as a key measured value for monitoring quality or controlling processes. The device measures the density of the fluid as standard and makes this value available to the control system.<br>The "Special Density" application package offers high-precision density measurement over a wide density and temperature range particularly for applications subject to varying process conditions. |

## 16.14 Accessories

Overview of accessories available for order → 218

## 16.15 Supplementary documentation

For an overview of the scope of the associated Technical Documentation, refer to the following:
- *W@M Device Viewer* (www.endress.com/deviceviewer): Enter the serial number from nameplate
- *Endress+Hauser Operations App*: Enter the serial number from the nameplate or scan the 2D matrix code (QR code) on the nameplate

Standard documentation

### Brief Operating Instructions

*Brief Operating Instructions for the sensor*

| Measuring device | Documentation code |
|---|---|
| Proline Promass A | KA01282D |

*Brief Operating Instructions for transmitter*

| Measuring device | Documentation code |
|---|---|
| Proline 300 | KA01227D |

### Technical Information

| Measuring device | Documentation code |
|---|---|
| Promass A 300 | TI01374D |

### Description of Device Parameters

| Measuring device | Documentation code |
|---|---|
| Promass 300 | GP01058D |

Device-dependent additional documentation

### Safety instructions

Safety instructions for electrical equipment for hazardous areas.

*Remote display and operating module DKX001*

| Contents | Documentation code |
|---|---|
| ATEX/IECEx Ex i | XA01494D |
| ATEX/IECEx Ex ec | XA01498D |
| cCSAus IS | XA01499D |
| cCSAus Ex nA | XA01513D |
| INMETRO Ex i | XA01500D |
| INMETRO Ex ec | XA01501D |
| NEPSI Ex i | XA01502D |
| NEPSI Ex nA | XA01503D |

### Special Documentation

| Contents | Documentation code |
|---|---|
| Information on the Pressure Equipment Directive | SD01614D |
| Remote display and operating module DKX001 | SD01763D |
| Radio approvals for WLAN interface for A309/A310 display module | SD01793D |
| Web server | SD01664D |
| Heartbeat Technology | SD01698D |
| Concentration measurement | SD01708D |

### Installation Instructions

| Contents | Comment |
|---|---|
| Installation instructions for spare part sets and accessories | ▪ Access the overview of all the available spare part sets via *W@M Device Viewer* → 🖹 216<br>▪ Accessories available for order with Installation Instructions → 🖹 218 |

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People for Process Automation