BA01396D/06/EN/03.24-00
71661660
2024-07-17

Valid as of version
01.01.zz (Device firmware)

Products   Solutions   Services

Operating Instructions
Proline Promag H 300 PROFIBUS PA

Electromagnetic flowmeter

Endress+Hauser

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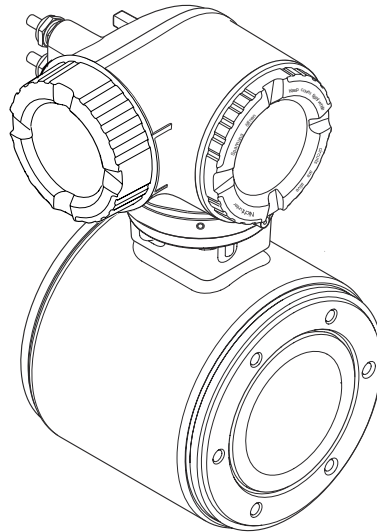
- Make sure the document is stored in a safe place such that it is always available when working on or with the device.
- To avoid danger to individuals or the facility, read the "Basic safety instructions" section carefully, as well as all other safety instructions in the document that are specific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

Table of contents

1   About this document

1.1   Document function

These Operating Instructions contain all the information required in the various life cycle phases of the device: from product identification, incoming acceptance and storage, to installation, 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 potentially dangerous situation. Failure to avoid this situation can result in serious or fatal injury.

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

NOTICE
This symbol alerts you to a potentially harmful situation. Failure to avoid this situation can result in damage to the product or something in its vicinity.

1.2.2   Electrical symbols

Symbol	Meaning
⎓	Direct current
∼	Alternating current
⏦	Direct current and alternating current
⏚	**Ground connection** A grounded terminal which, as far as the operator is concerned, is grounded via a grounding system.
⏚	**Potential equalization connection (PE: protective earth)** Ground terminals that must be connected to ground prior to establishing any other connections. The ground terminals are located on the interior and exterior of the device: • Interior ground terminal: potential equalization is connected to the supply network. • Exterior ground terminal: device is connected to the plant grounding system.

1.2.3   Communication-specific symbols

Symbol	Meaning
📶	**Wireless Local Area Network (WLAN)** Communication via a wireless, local network.
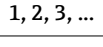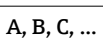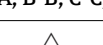
1.2.4 Tool symbols

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

1.2.5 Symbols for certain types of information

Symbol	Meaning
	Permitted Procedures, processes or actions that are permitted.
	Preferred Procedures, processes or actions that are preferred.
	Forbidden Procedures, processes or actions that are forbidden.
	Tip 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
	Safe area (non-hazardous area)
≈▶	Flow direction

1.3   Documentation

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

The following documentation may be available depending on the device version ordered:

Document type	Purpose and content of the document
Technical Information (TI)	**Planning aid for your device** 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.
Brief Operating Instructions (KA)	**Guide that takes you quickly to the 1st measured value** The Brief Operating Instructions contain all the essential information from incoming acceptance to initial commissioning.
Operating Instructions (BA)	**Your reference document** These Operating Instructions contain all the information that is required in the various life cycle phases of the device: from product identification, incoming acceptance and storage, to mounting, connection, operation and commissioning, through to troubleshooting, maintenance and disposal.
Description of Device Parameters (GP)	**Reference for your parameters** The document provides a detailed explanation of each individual parameter. The description is aimed at those who work with the device over the entire life cycle and perform specific configurations.
Safety Instructions (XA)	Depending on the approval, safety instructions for electrical equipment in hazardous areas are also supplied with the device. The Safety Instructions are a constituent part of the Operating Instructions. ℹ️ Information on the Safety Instructions (XA) that are relevant for the device is provided on the nameplate.
Supplementary device-dependent documentation (SD/FY)	Always comply strictly with the instructions in the relevant supplementary documentation. The supplementary documentation is a constituent part of the device documentation.

1.4   Registered trademarks

PROFIBUS®
Registered trademark of the PROFIBUS Nutzerorganisation e.V. (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 Intended use

Application and media
The measuring device described in this manual is intended only for the flow measurement of liquids with a minimum conductivity of 5 µS/cm.

Depending on the version ordered, the measuring instrument can also be used to measure potentially explosive [1], flammable, toxid and oxidizing media.

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

To ensure that the measuring instrument is in perfect condition during operation:
▶ Only use the measuring instrument in full compliance with the data on the nameplate and the general conditions listed in the Operating Instructions and supplementary documentation.
▶ Using 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 instrument only for media to which the process-wetted materials are sufficiently resistant.
▶ Keep within the specified pressure and temperature range.
▶ Keep within the specified ambient temperature range.
▶ Protect the measuring instrument 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.

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1) Not applicable for IO-Link measuring instruments

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

⚠ CAUTION

Risk of hot or cold burns! The use of media and electronics with high or low temperatures can produce hot or cold surfaces on the device.
▶ Mount suitable touch protection.

2.3 Workplace safety

When working on and with the device:
▶ Wear the required personal protective equipment as per national regulations.

2.4 Operational safety

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

Modifications to the device

Unauthorized modifications to the device are not permitted and can lead to unforeseeable dangers!
▶ If modifications are nevertheless required, consult with the manufacturer.

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 the repair of an electrical device.
▶ Use only original spare parts and accessories.

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. The manufacturer confirms this by affixing the CE mark to the device..

2.6 IT security

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

IT security measures, which provide additional protection for the product 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. The following list provides an overview of the most important functions:

Function/interface	Factory setting	Recommendation
Write protection via hardware write protection switch → 🖺 11	Not enabled	On an individual basis following risk assessment
Access code (also applies to web server login or FieldCare connection) → 🖺 11	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) → 🖺 12	Serial number	Assign an individual WLAN passphrase during commissioning
WLAN mode	Access point	On an individual basis following risk assessment
Web server → 🖺 12	Enabled	On an individual basis following risk assessment
Service interface CDI-RJ45 → 🖺 12	–	On an individual basis following risk assessment

2.7.1   Protecting access via hardware write protection

Write access to the parameters of the device 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 main electronics module). When hardware write protection is enabled, only read access to the parameters is possible.

Hardware write protection is disabled when the device is delivered → 🖺 122.

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 (→ 🖺 121).

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 (→ 🖺 67), 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 (→ 🖺 115).

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 for safety reasons.
- Follow the general rules for generating a secure password when defining and managing the access code and 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, for example, see "Write protection via access code" → 🖺 121.

2.7.3   Access via web server

The integrated web server can be used to operate and configure the device via a web browser → 🖺 59. The connection is established 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 via the **Web server functionality** parameter if necessary (e.g., after commissioning).

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

📖 Detailed information on the device parameters:
"Description of device parameters" document .

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.

ℹ️ 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 BB, C2, GB, MB, 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
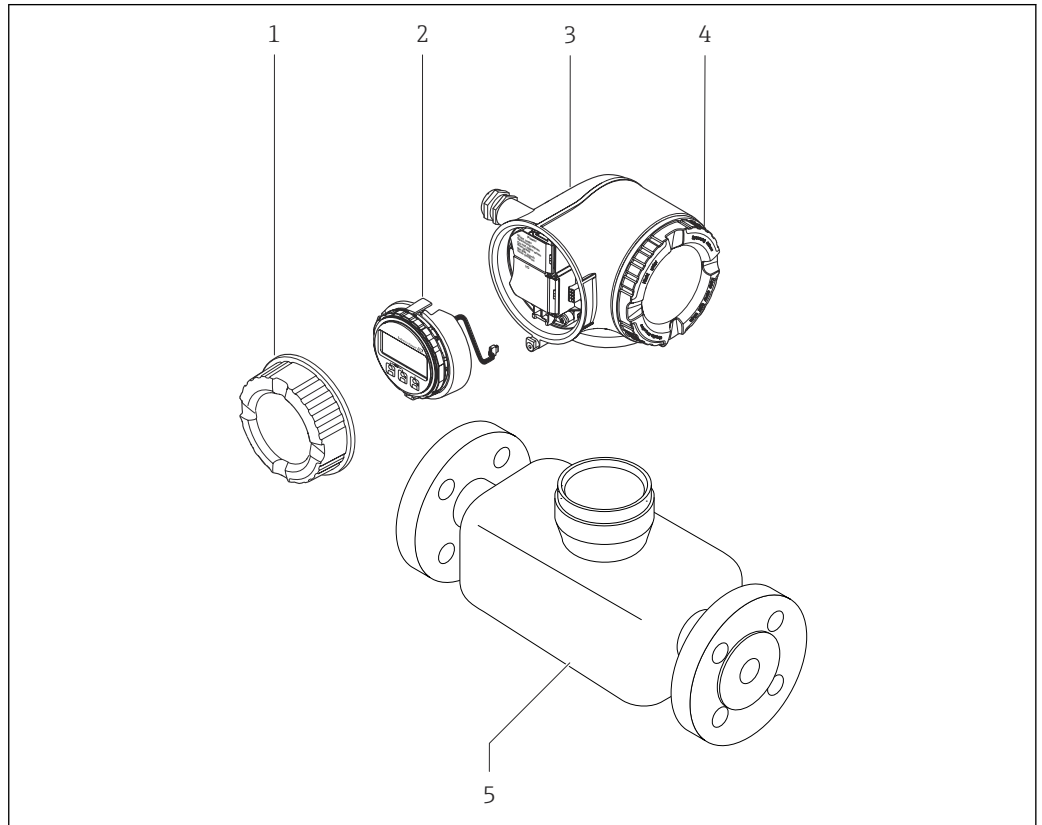
⊠ 1   Important components of a measuring device

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

On receipt of the delivery:

1. Check the packaging for damage.
   ↳ Report all damage immediately to the manufacturer.
   Do not install damaged components.

2. Check the scope of delivery using the delivery note.

3. Compare the data on the nameplate with the order specifications on the delivery note.

4. Check the technical documentation and all other necessary documents, e.g. certificates, to ensure they are complete.

If one of the conditions is not satisfied, contact the manufacturer.

4.2　Product identification

The device can be identified in the following ways:
- Nameplate
- Order code with details of the device features on the delivery note
- Enter the serial numbers from the nameplates in the *Device Viewer* (www.endress.com/deviceviewer): all the information about the device is displayed.
- Enter the serial numbers from the nameplates into the *Endress+Hauser Operations app* or scan the DataMatrix code on the nameplate with the *Endress+Hauser Operations app*: all the information about the device is displayed.

For an overview of the scope of the associated Technical Documentation, refer to the following:
- The "Additional standard device documentation" and "Supplementary device-dependent documentation" sections
- The *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 DataMatrix code on the nameplate.

4.2.1   Transmitter nameplate
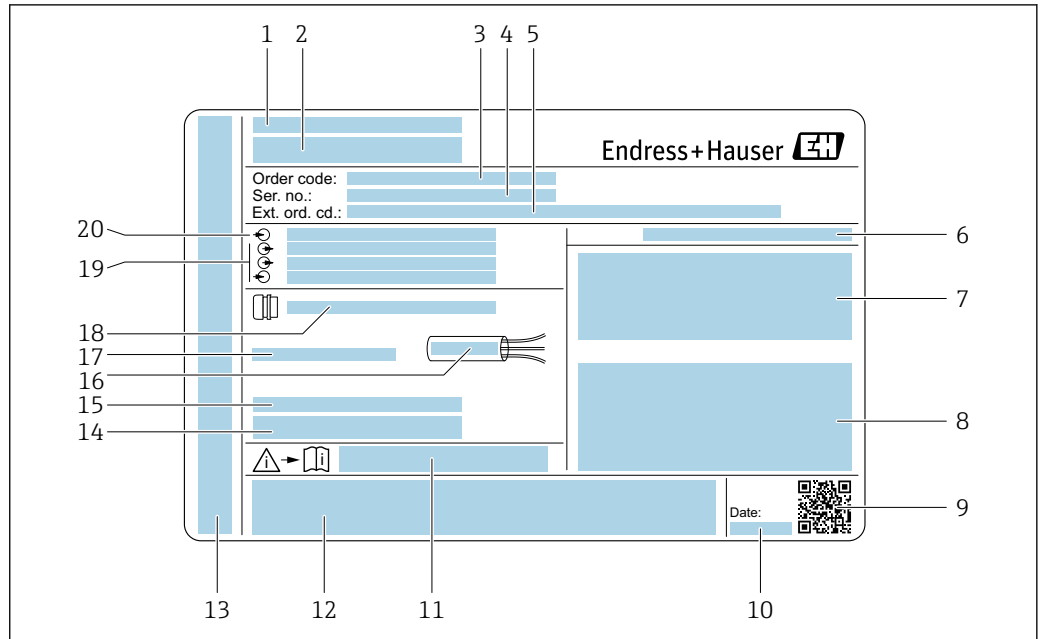
2   Example of a transmitter nameplate

1   Manufacturer address/certificate holder
2   Name of the transmitter
3   Order code
4   Serial number
5   Extended order code
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   Date of manufacture: year-month
11   Document number of safety-related supplementary documentation
12   Space for approvals and certificates: e.g. CE mark, RCM 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
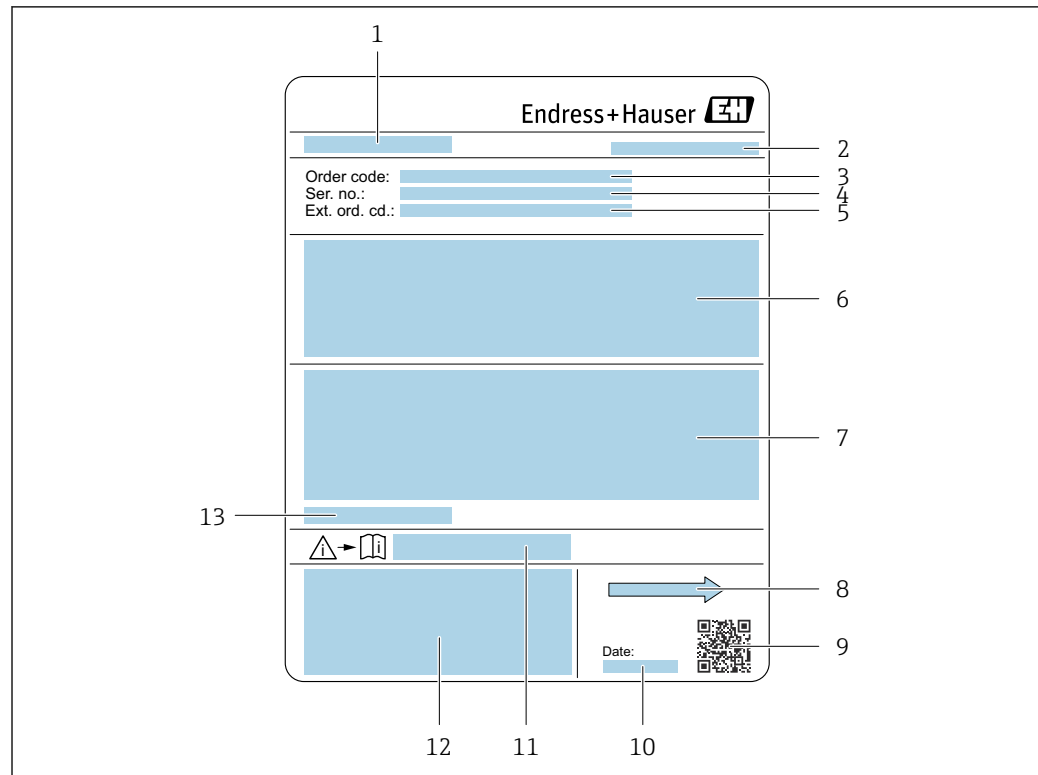
⊠ 3   Example of sensor nameplate

1   Name of sensor
2   Manufacturer address/certificate holder
3   Order code
4   Serial number (Ser. no.)
5   Extended order code (Ext. ord. cd.)
6   Flow; nominal diameter of the sensor; pressure rating; nominal pressure; static pressure; medium temperature range; material of liner and electrodes
7   Approval information for explosion protection, Pressure Equipment Directive and degree of protection
8   Flow direction
9   2-D matrix code
10   Date of manufacture: year-month
11   Document number of safety-related supplementary documentation
12   CE mark, RCM-Tick mark
13   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 the device

Symbol	Meaning
⚠	**WARNING!** This symbol alerts you to a dangerous situation. Failure to avoid this situation can result in serious or fatal injury. Please consult the documentation for the measuring instrument to discover the type of potential danger and measures to avoid it.
📖	**Reference to documentation** Refers to the corresponding device documentation.
⏚	**Protective ground connection** A terminal that must be connected to the 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. Avoid unacceptably high surface temperatures.
▸ Select a storage location that excludes the possibility of condensation forming on the measuring device. Fungi and bacteria can damage the liner.
▸ Store in a dry and dust-free place.
▸ Do not store outdoors.

Storage temperature → 🖺 195

5.2 Transporting the product

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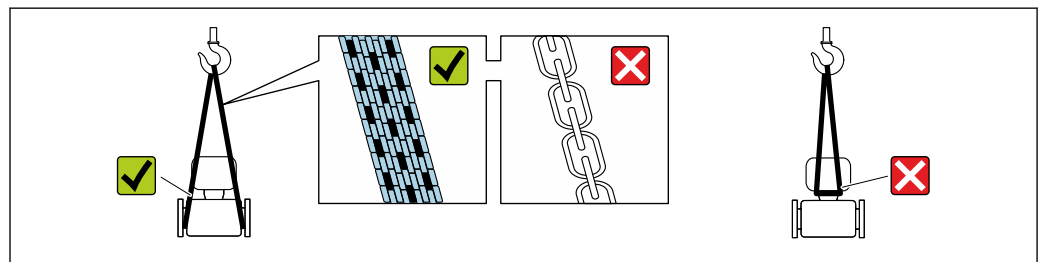
Do not remove protective covers or caps installed on process connections. They prevent mechanical damage to the sealing surfaces and contamination in the measuring tube.

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).
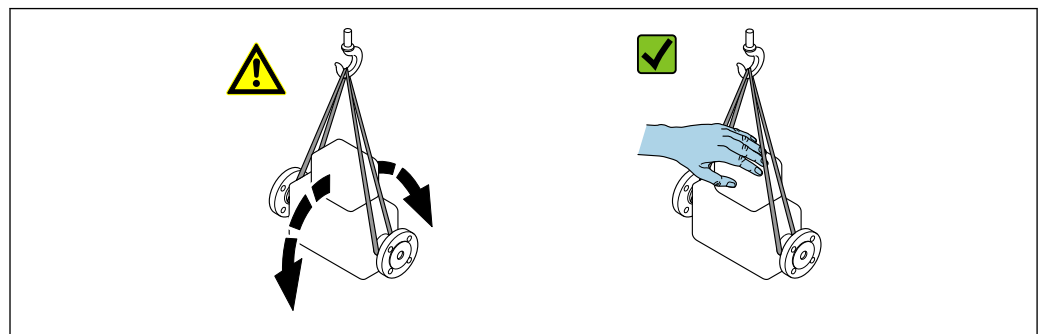
5.2.2 Measuring devices with lifting lugs

⚠ 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.

⚠ CAUTION

Risk of damaging the magnetic coil!

▸ If transporting by forklift, do not lift the sensor by the metal casing.
▸ This would buckle the casing and damage the internal magnetic coils.
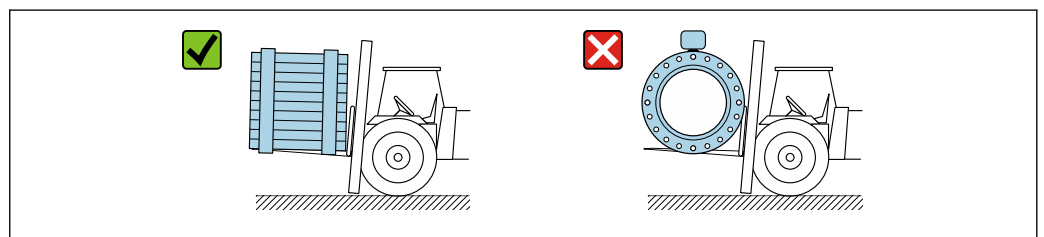
A0029319

5.3 Packaging disposal

All packaging materials are environmentally friendly and 100% recyclable:

- Outer packaging of device
  Stretch wrap made of polymer in accordance with EU Directive 2002/95/EC (RoHS)
- Packaging
  - Wood crate treated in accordance with ISPM 15 standard, confirmed by IPPC logo
  - Cardboard box in accordance with European packaging guideline 94/62/EC, recyclability confirmed by Resy symbol
- Transport material and fastening fixtures
  - Disposable plastic pallet
  - Plastic straps
  - Plastic adhesive strips
- Filler material
  Paper pads

6 Mounting

6.1 Mounting requirements

6.1.1 Mounting position

Mounting location

- Do not install the device at the highest point of the pipe.
- Do not install the device upstream from a free pipe outlet in a down pipe.
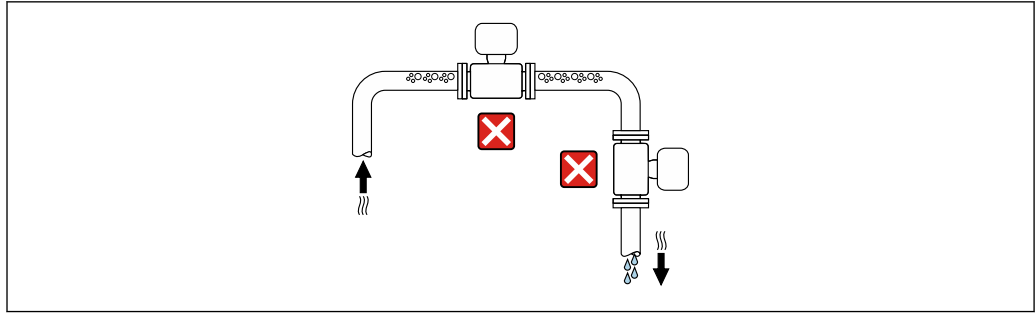
The device should ideally be installed in an ascending pipe.
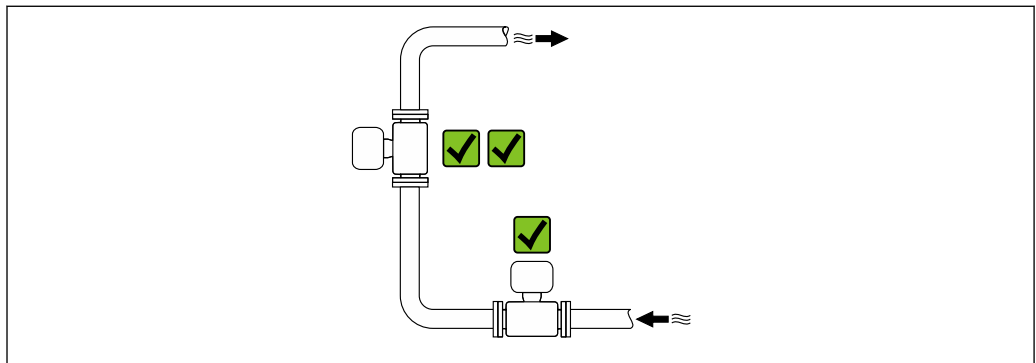
Installation upstream from a down pipe

NOTICE

Negative pressure in the measuring pipe can damage the liner!

▶ If installing upstream of down pipes whose length h ≥ 5 m (16.4 ft): install a siphon with a vent valve downstream of the device.

This arrangement prevents the flow of liquid stopping in the pipe and air entrainment.
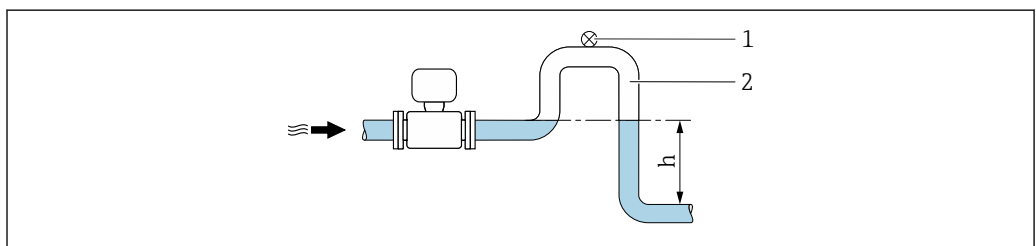
1   Vent valve
2   Pipe siphon
h   Length of down pipe

Installation with partially filled pipes

- Partially filled pipes with a gradient require a drain-type configuration.
- The installation of a cleaning valve is recommended.
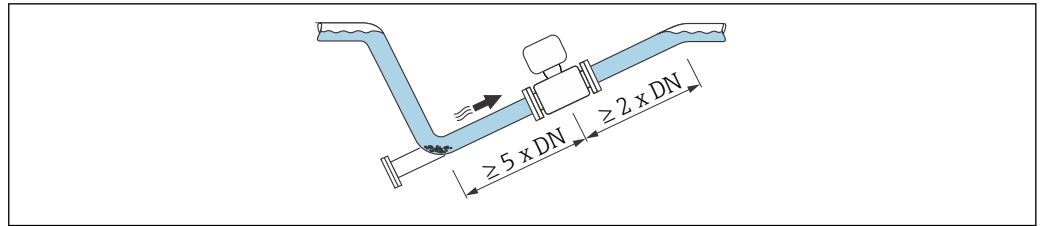
A0041088

Installation near pumps

NOTICE

Negative pressure in the measuring tube can damage the liner!

▸ In order to maintain the system pressure, install the device in the flow direction downstream from the pump.

▸ Install pulsation dampers if reciprocating, diaphragm or peristaltic pumps are used.
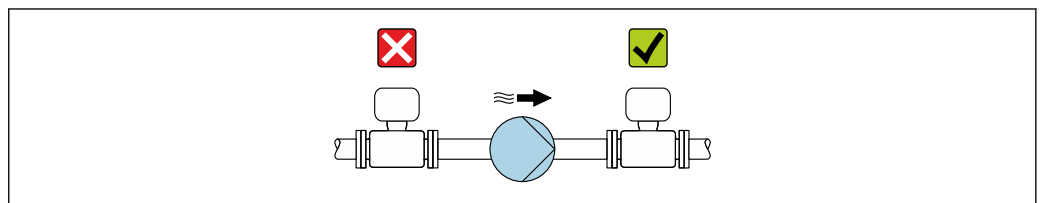
A0041083

- Information on the liner's resistance to partial vacuum
- Information on the measuring system's resistance to vibration and shock → 🗎 196

Installation in event of pipe vibrations

NOTICE

Pipe vibrations can damage the device!

▸ Do not expose the device to strong vibrations.

▸ Support the pipe and fix it in place.

▸ Support the device and fix it in place.
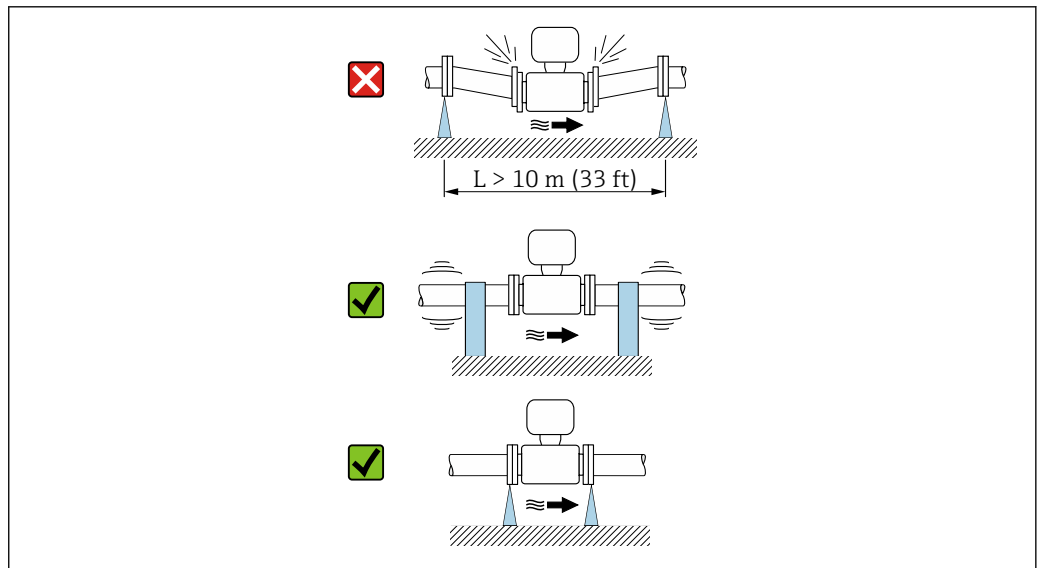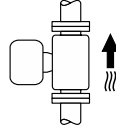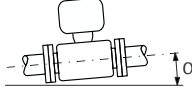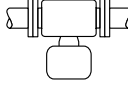
A0041092

Information on the measuring system's resistance to vibration and shock → 🗎 196

Orientation

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

Orientation		Recommendation
Vertical orientation	A0015591	✅✅
Horizontal orientation	α A0041328	✅ [1]
Horizontal orientation, transmitter at bottom	A0015590	✅✅ [2] [3] ❌ [4]
Horizontal orientation, transmitter at side	A0015592	❌

1) The measuring device should be self-draining for hygiene applications. A vertical orientation is recommended for this. If only a horizontal orientation is possible, an angle of inclination α ≥ 10° is recommended.
2) Applications with high process temperatures may increase the ambient temperature. To maintain the maximum ambient temperature for the transmitter, this orientation is recommended.
3) To prevent the electronics from overheating in the event of strong heat formation (e.g. CIP or SIP cleaning process), install the device with the transmitter part pointing downwards.
4) With the empty pipe detection function switched on: empty pipe detection only works if the transmitter housing is pointing upwards.

Vertical

Optimum for self-emptying pipe systems and for use in conjunction with empty pipe detection.
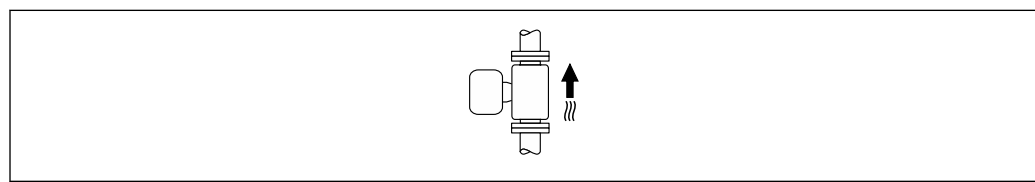
A0015591

Horizontal

• Ideally, the measuring electrode plane should be horizontal. This prevents brief insulation of the measuring electrodes by entrained air bubbles.
• Empty pipe detection only works if the transmitter housing is pointing upwards as otherwise there is no guarantee that the empty pipe detection function will actually respond to a partially filled or empty measuring tube.
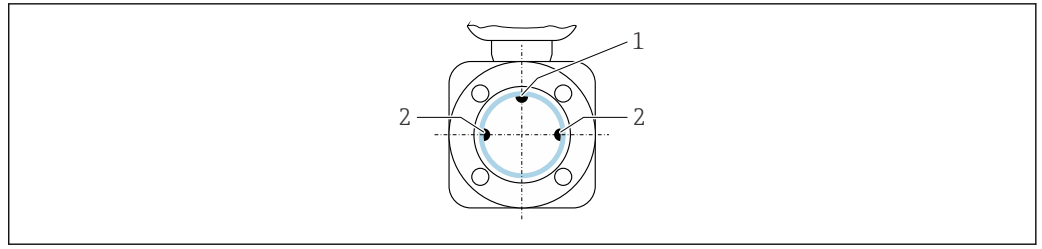
A0028998

1   EPD electrode for empty pipe detection, available from ≥ DN 15 (½")
2   Measuring electrodes for signal detection

Measuring instruments with a nominal diameter < DN 15 (½") do not have an EPD electrode. In this case, empty pipe detection is performed via the measuring electrodes.

Inlet and outlet runs

Installation with inlet and outlet runs

To avoid a vacuum and to maintain the specified level of measurement accuracy, install the device upstream from assemblies that produce turbulence (e.g. valves, T-sections) and downstream from pumps.

Maintain straight, unimpeded inlet and outlet runs.
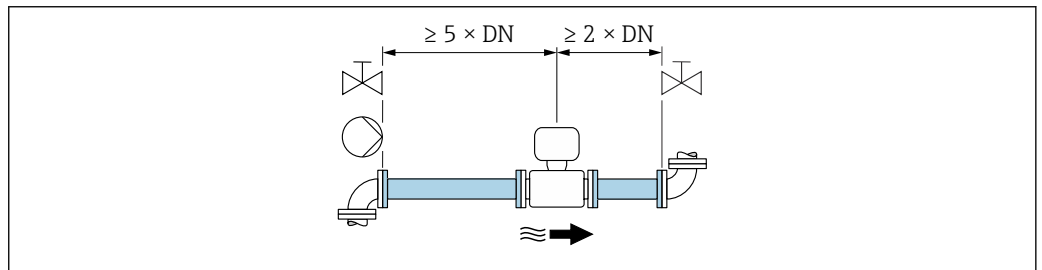
A0028997
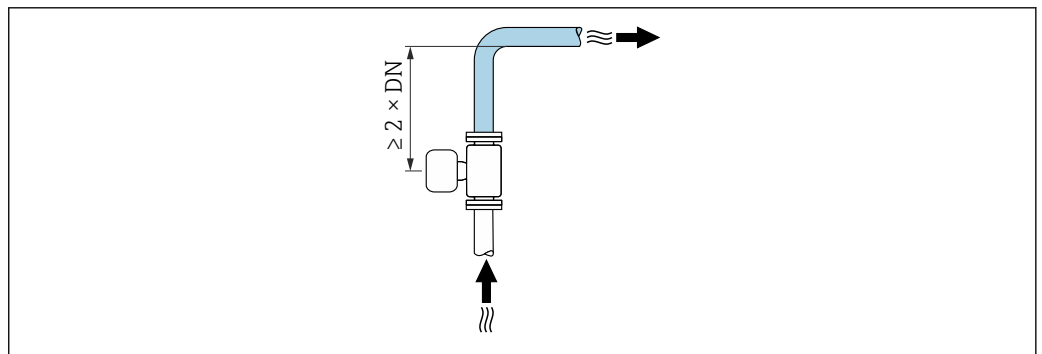
A0042132

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

Transmitter	Standard: –40 to +60 °C (–40 to +140 °F)
Local display	–20 to +60 °C (–4 to +140 °F), the readability of the display may be impaired at temperatures outside the temperature range.
Sensor	–40 to +60 °C (–40 to +140 °F)
Liner	Do not exceed or fall below the permitted temperature range of the liner .

If operating outdoors:
- Install the measuring device in a shady location.
- Avoid direct sunlight, particularly in warm climatic regions.
- Avoid direct exposure to weather conditions.

System pressure

Installation near pumps → 🖹 21

Vibrations

Installation in event of pipe vibrations → 🖹 21

Adapters

The sensor can also be installed in larger-diameter pipes with the aid of suitable adapters according to DIN EN 545 (double-flange reducers). The resultant increase in the rate of flow improves measuring accuracy with very slow-moving fluids. The nomogram shown here can be used to calculate the pressure loss caused by reducers and expanders.

ℹ️ - The nomogram only applies to liquids with a viscosity similar to that of water.
- If the medium has a high viscosity, a larger measuring tube diameter can be considered in order to reduce pressure loss.

1. Calculate the ratio of the diameters d/D.

2. From the nomogram read off the pressure loss as a function of flow velocity (downstream from the reduction) and the d/D ratio.
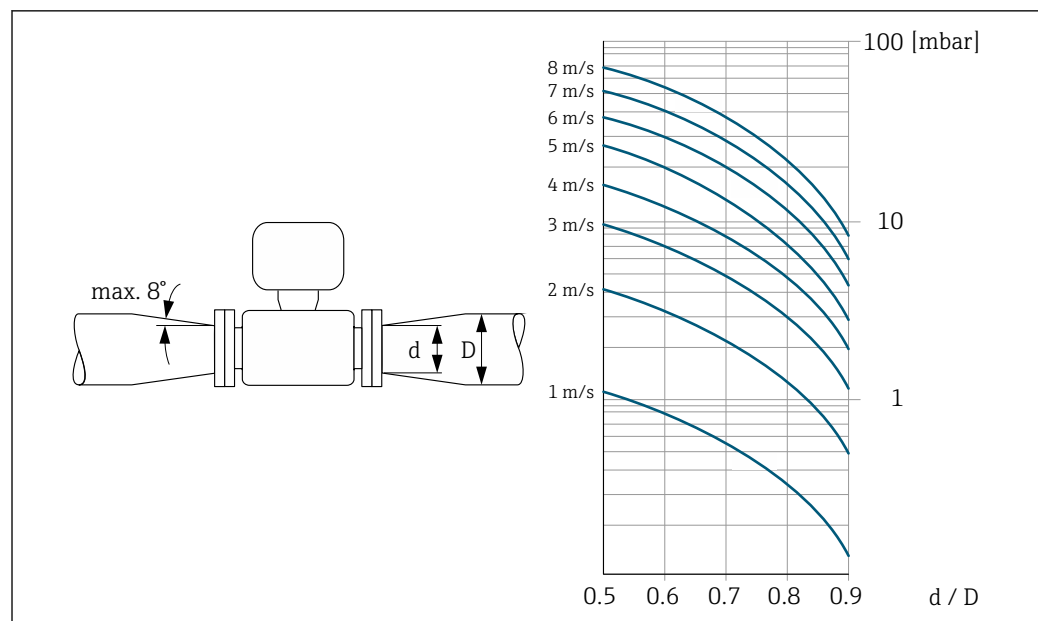
A0029002

6.1.3   Special mounting instructions

Weather protection cover
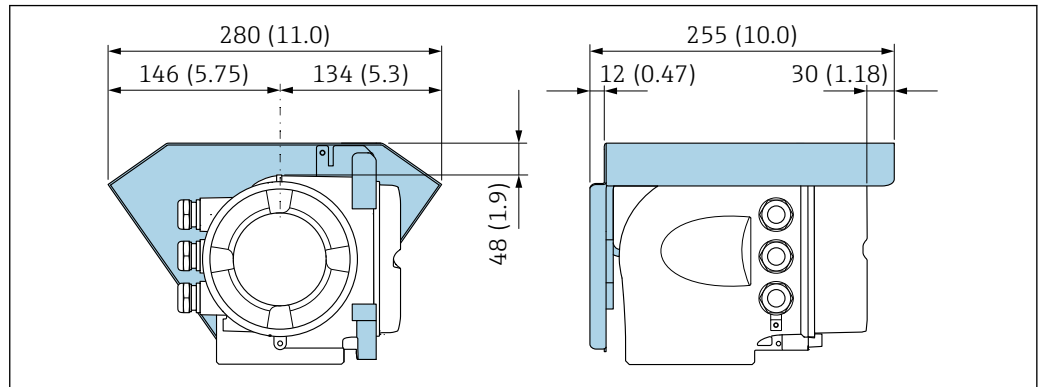
🗷 4   Engineering unit mm (in)

Hygienic compatibility

- When installing in hygienic applications, please refer to the information in the "Certificates and approvals/hygienic compatibility" section → 🖺 207
- 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 tighten it by another 45° (corresponds to 15 Nm).

6.2   Mounting the measuring instrument

6.2.1   Required tools

For sensor

For flanges and other process connections: Use a suitable mounting tool.

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   Turning the transmitter housing

To provide easier access to the connection compartment or display module, the transmitter housing can be turned.
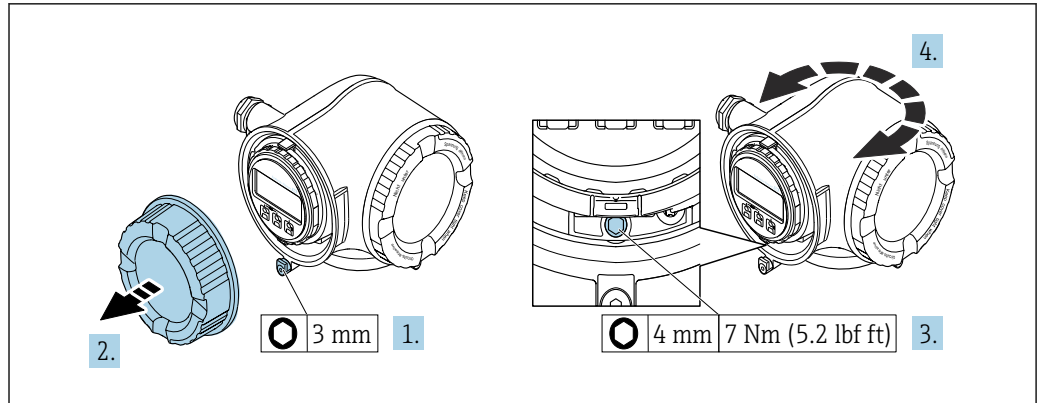
🖻 5   Housing in non-Ex version

1. Depending on the device version: Loosen the securing clamp of the connection compartment cover.

2. Unscrew the connection compartment cover.

3. Loosen the fixing screw.

4. Turn the housing to the desired position.

5. 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.
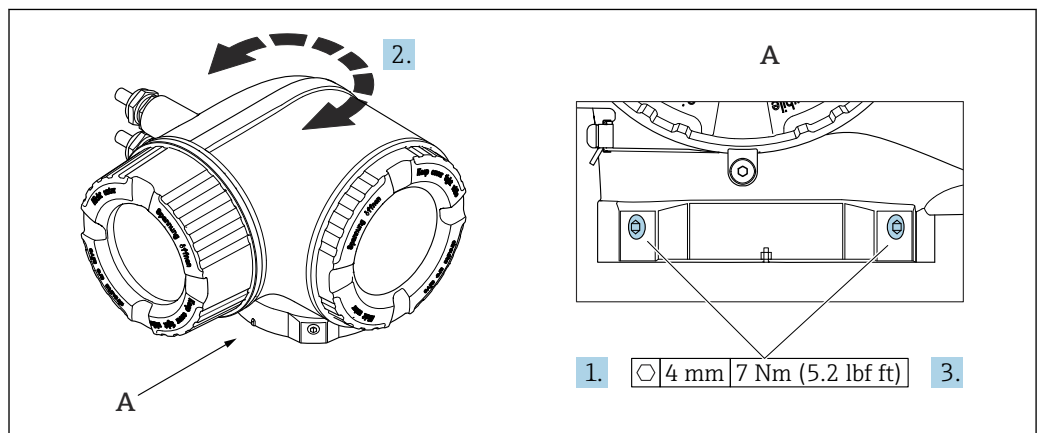
🖻 6   Ex housing

1. Loosen the fixing screws.

2. Turn the housing to the desired position.

3. Tighten the securing screws.

6.2.4   Turning the display module

The display module can be turned to optimize display readability and operability.
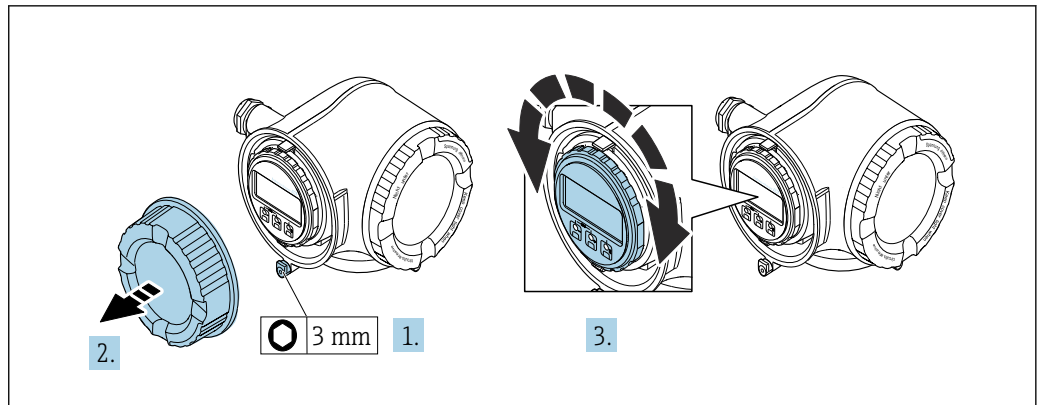
A0030035

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-mounting check

Is the device undamaged (visual inspection)?	❏
Does the measuring device conform to the measuring point specifications? For example: • Process temperature • Pressure (refer to the section on "Pressure-temperature ratings" in the "Technical Information" document. • Ambient temperature • Measuring range	❏
Has the correct orientation been selected for the sensor → 🗎 22 ? • According to sensor type • According to medium temperature • According to medium properties (outgassing, with entrained solids)	❏
Does the arrow on the sensor nameplate match the actual direction of flow of the fluid through the piping → 🗎 22?	❏
Are the measuring point identification and labeling correct (visual inspection)?	❏
Have the fixing screws been tightened with the correct tightening torque?	❏

7   Electrical connection

⚠ WARNING

Live parts! Incorrect work performed on the electrical connections can result in an electric shock.

▸ Set up a disconnecting device (switch or power-circuit breaker) to easily disconnect the device from the supply voltage.
▸ In addition to the device fuse, include an overcurrent protection unit with max. 10 A in the plant installation.

7.1   Electrical safety

In accordance with applicable national regulations.

7.2   Connecting requirements

7.2.1   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)

7.2.2   Requirements for connection cable

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

Protective grounding cable for the outer ground terminal

Conductor cross-section < 2.1 mm^2 (14 AWG)

The use of a cable lug enables the connection of larger cross-sections.

The grounding impedance must be less than 2 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 (incl. conductor for the inner ground terminal)

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 mm^2 (24 to 12 AWG).

Requirements for 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 mm^2 (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
Shield	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 ℃ (−58 to +221 ℉); when cable can move freely: −25 to +105 ℃ (−13 to +221 ℉)

Standard cable - customer-specific cable

With the following order option, no cable is supplied with the device and must be provided by the customer:
Order code for DKX001: Order code **040** for "Cable", option **1** "None, provided by customer, max 300 m"

A standard cable with the following minimum requirements can be used as the connecting cable, even in the hazardous area (Zone 2, Class I, Division 2 and Zone 1, Class I, Division 1):

Standard cable	4 wires (2 pairs); pair-stranded with common shield, minimum wire cross-section 0.34 mm² (22 AWG)
Shield	Tin-plated copper braid, optical cover ≥ 85 %
Cable impedance (pair)	Minimum 80 Ω
Cable length	Maximum 300 m (1 000 ft), maximum loop impedance 20 Ω
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

7.2.3 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.					

ℹ️ Terminal assignment of the remote display and operating module → 🗏 36.
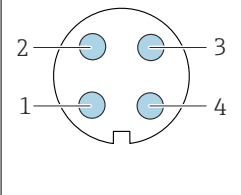
7.2.4 Available device plugs

ℹ️ 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	–

7.2.5 device plug pin assignment

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

7.2.6 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.

A0028768
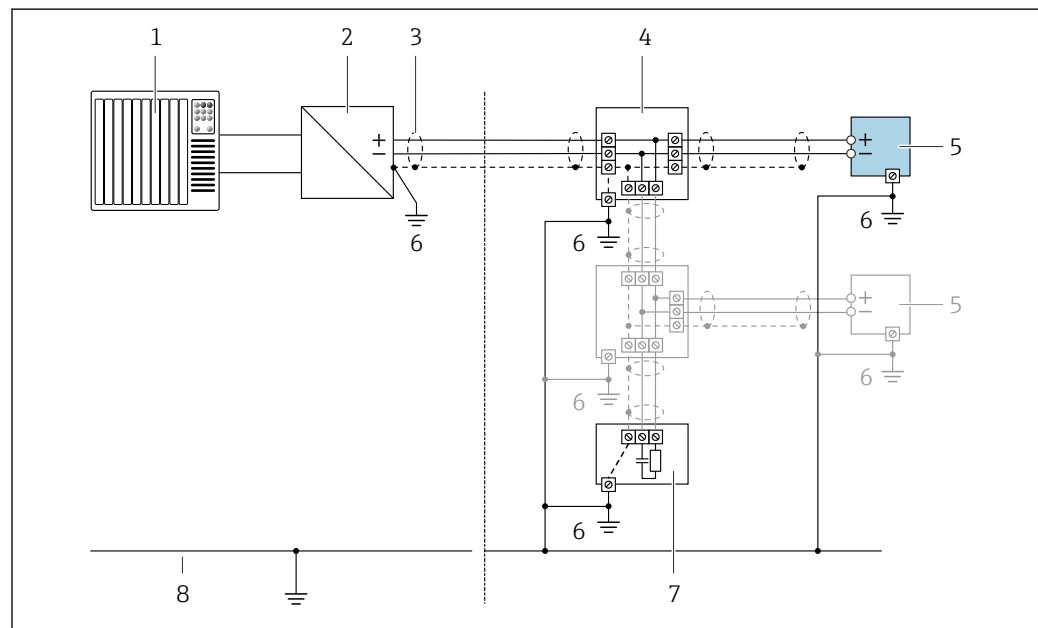
🖾 *7   Connection example for PROFIBUS PA*

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

7.2.7   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 → 🗐 28.

7.3 Connecting the measuring instrument

> **NOTICE**
>
> **An incorrect connection compromises electrical safety!**
> ▸ Only properly trained specialist staff may perform electrical connection work.
> ▸ Observe applicable federal/national installation codes and regulations.
> ▸ Comply with local workplace safety regulations.
> ▸ Always connect the protective ground cable ⏚ before connecting additional cables.
> ▸ When using in potentially explosive atmospheres, observe the information in the device-specific Ex documentation.

7.3.1 Connecting the transmitter
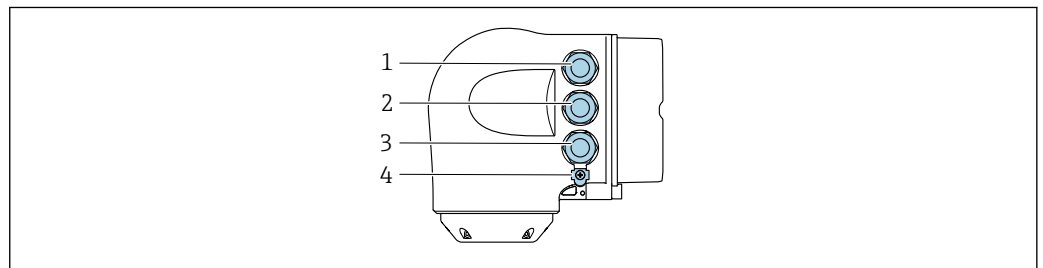
A0026781

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)
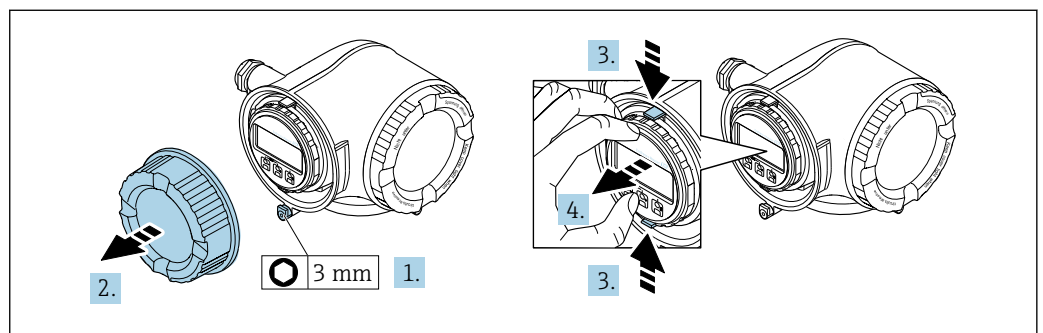
A0029813

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.
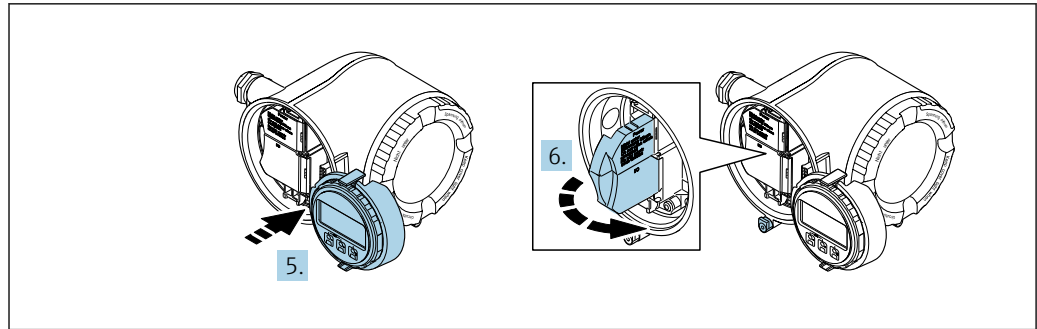
A0029814

5. Attach the holder to the edge of the electronics compartment.

6. Open the terminal cover.
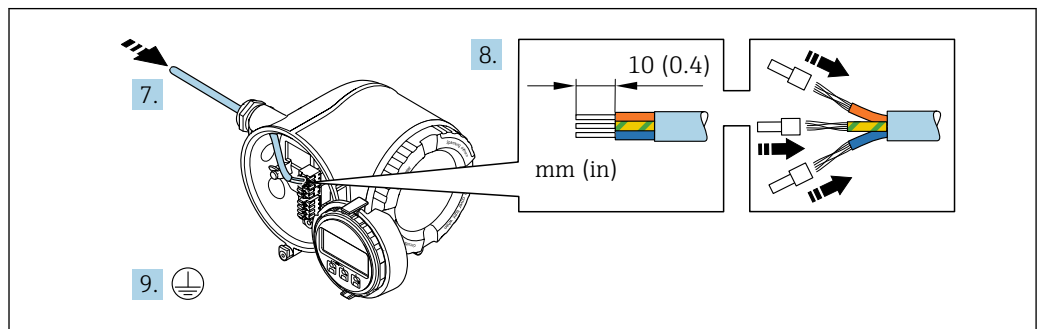
A0029815

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.
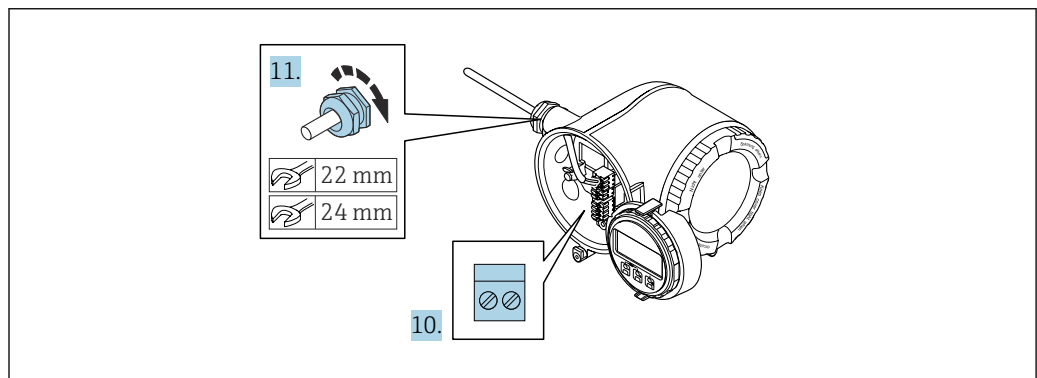
A0029816

10. Connect the cable according to the terminal assignment.

   ↳ **Signal cable terminal assignment:** The device-specific terminal assignment is documented on an adhesive label in the terminal cover.
   Supply voltage connection terminal assignment: Adhesive label in the terminal cover or → 🖺 31.

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

To remove a cable from the terminal:
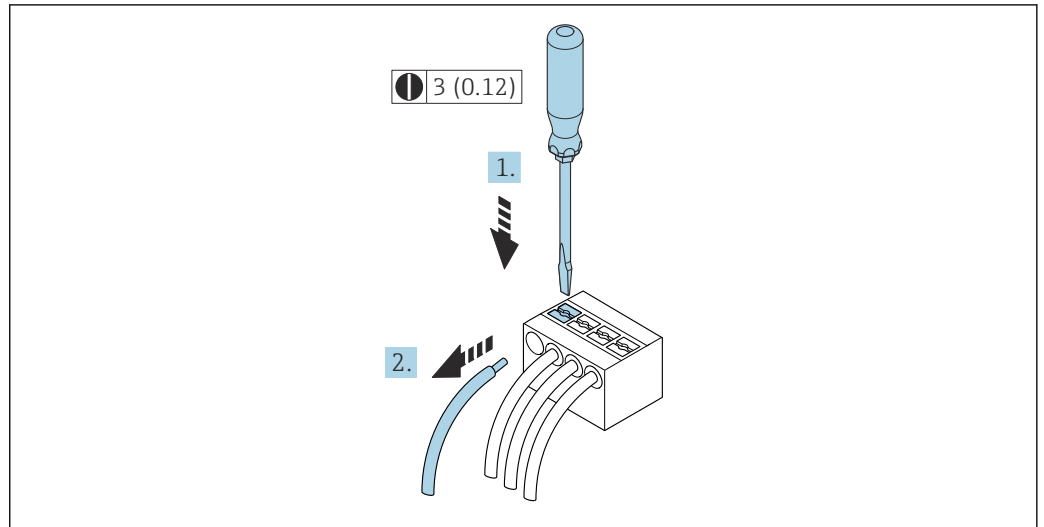
⊠ 8   Engineering unit mm (in)

1. Use a flat-blade screwdriver to press down on the slot between the two terminal holes.

2. Remove the cable end from the terminal.

7.3.2   Connecting the remote display and operating module DKX001

The remote display and operating module DKX001 is available as an optional extra → 🗎 179..

- 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 instrument is always supplied with a dummy cover when the remote display and operating module DKX001 is ordered directly with the measuring instrument. 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 instrument display module. Only one display or operation unit may be connected to the transmitter at any one time.

A0027518

1   Remote display and operating module DKX001
2   Terminal connection for potential equalization (PE)
3   Connecting cable
4   Measuring instrument
5   Terminal connection for potential equalization (PE)

7.4   Ensuring potential equalization

7.4.1   Requirements

For potential equalization:
- Pay attention to in-house grounding concepts
- Take account of operating conditions like the pipe material and grounding
- Connect the medium, sensor and transmitter to the same electric potential
- Use a ground cable with a minimum cross-section of 6 mm² (10 AWG) and a cable lug for potential equalization connections

7.4.2   Connection example, standard scenario

Metal process connections

Potential equalization is generally via the metal process connections that are in contact with the medium and mounted directly on the sensor. Therefore there is generally no need for additional potential equalization measures.

7.4.3   Connection example in special situations

Plastic process connections

In the case of plastic process connections, additional grounding rings or process connections with an integrated grounding electrode must be used to ensure potential matching between the sensor and the fluid. If there is no potential matching, this can affect the measuring accuracy or cause the destruction of the sensor as a result of the electrochemical decomposition of the electrodes.

Note the following when using grounding rings:
- Depending on the option ordered, plastic disks are used instead of grounding rings on some process connections. These plastic disks only act as "spacers" and do not have any potential matching function. Furthermore, they also perform a significant sealing function at the sensor/connection interface. Therefore, in the case of process connections without metal grounding rings, these plastic disks/seals should never be removed and should always be installed!
- Grounding rings can be ordered separately as accessory DK5HR* from Endress+Hauser (does not contain any seals). When ordering make sure that the grounding rings are compatible with the material used for the electrodes, as otherwise there is the danger that the electrodes could be destroyed by electrochemical corrosion!
- If seals are required, they can be additionally ordered with seal set DK5G*.
- Grounding rings including seals are mounted inside the process connections. This does not affect the installed length.

Potential equalization via additional grounding ring
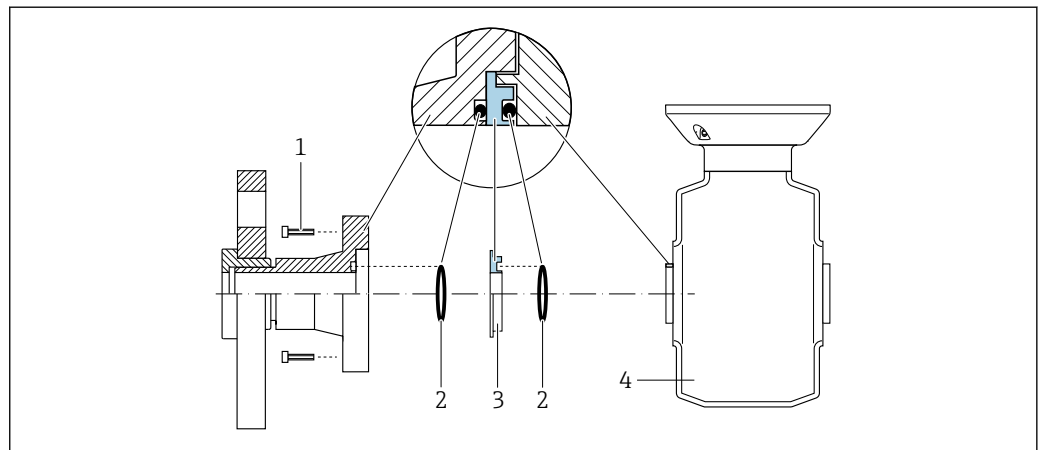
A0028971

1   Hexagonal-headed bolts of process connection
2   O-ring seals
3   Plastic disk (spacer) or grounding ring
4   Sensor

Potential equalization via grounding electrodes on process connection
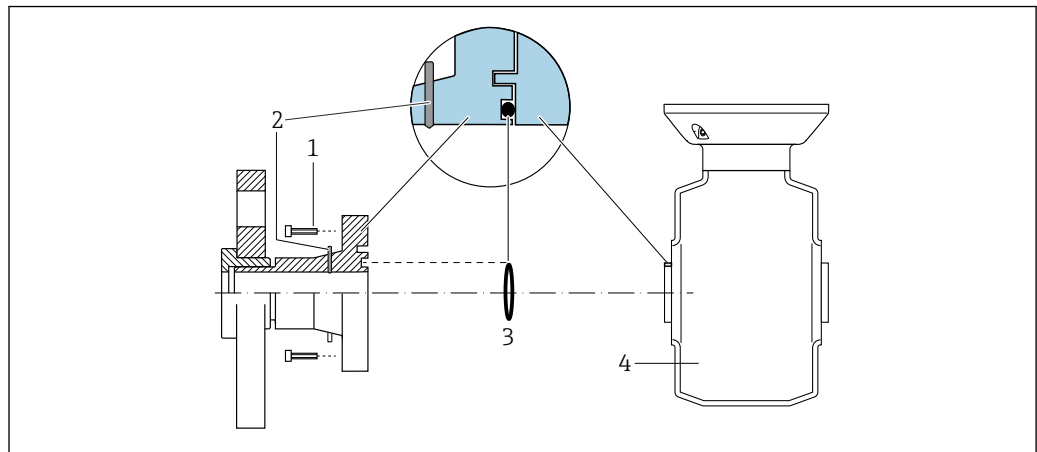
A0028972

1   *Hexagonal-headed bolts of process connection*
2   *Integrated grounding electrodes*
3   *O-ring seal*
4   *Sensor*

7.5 Special connection instructions

7.5.1 Connection examples

PROFIBUS PA
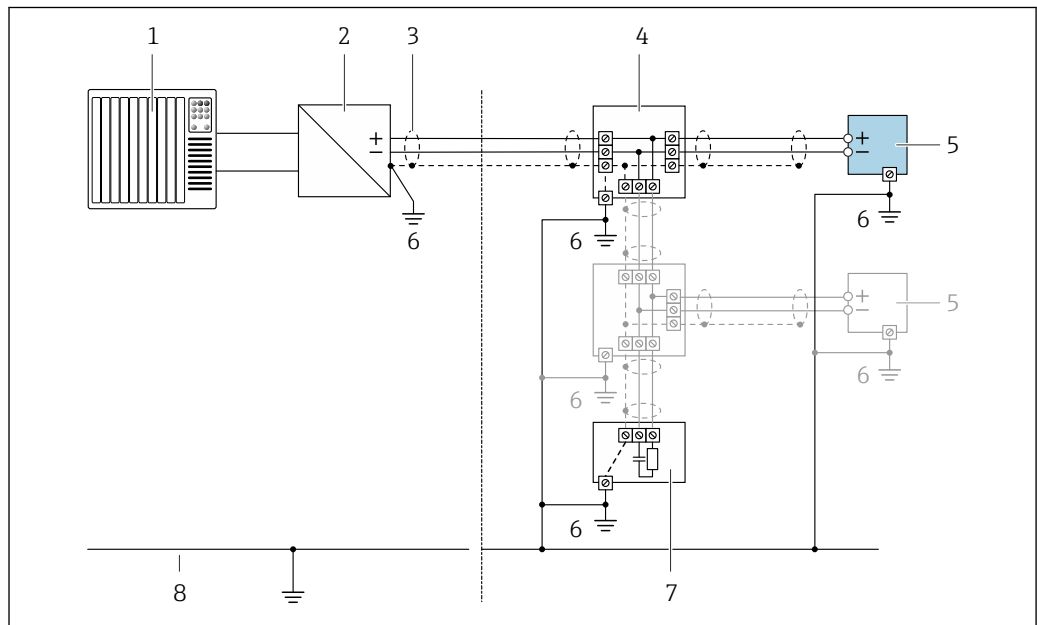
A0028768

⊡ *9   Connection example for PROFIBUS PA*

1   *Control system (e.g. PLC)*
2   *PROFIBUS PA segment coupler*
3   *Cable shield provided at one end. 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
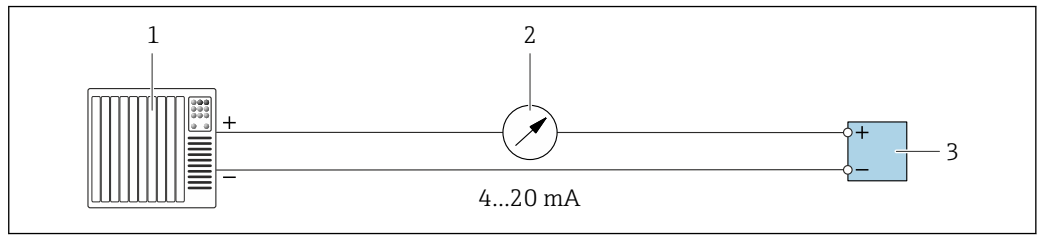
 10   *Connection example for 4-20 mA current output (active)*

1   Automation system with current input (e.g. PLC)
2   Analog display unit: observe maximum load
3   Transmitter
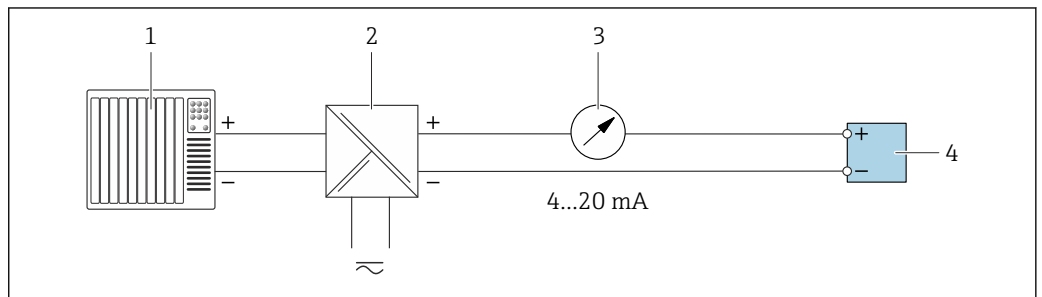
 11   *Connection example for 4-20 mA current output (passive)*

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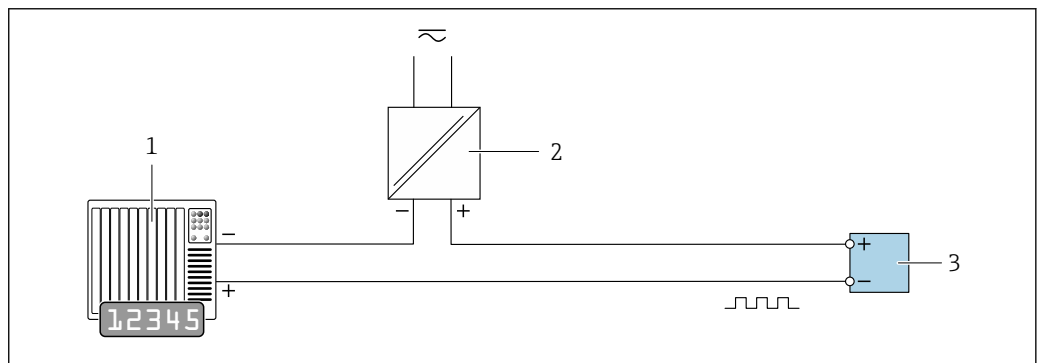
 12   *Connection example for pulse/frequency output (passive)*

1   Automation system with pulse/frequency input (e.g. PLC with 10 kΩ pull-up or pull-down resistor)
2   Power supply
3   Transmitter: observe input values → 🖹 187

Switch output
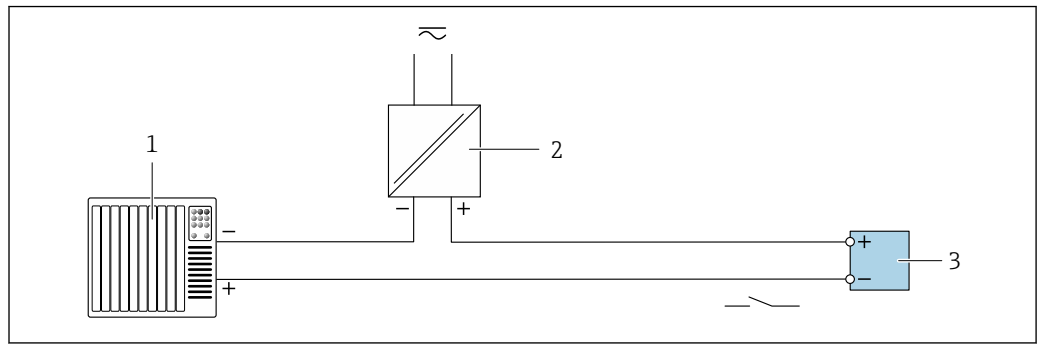
⊡ 13   Connection example for switch output (passive)

1   Automation system with switch input (e.g. PLC with a 10 kΩ pull-up or pull-down resistor)

2   Power supply

3   Transmitter: observe input values → 🗎 187

Relay output
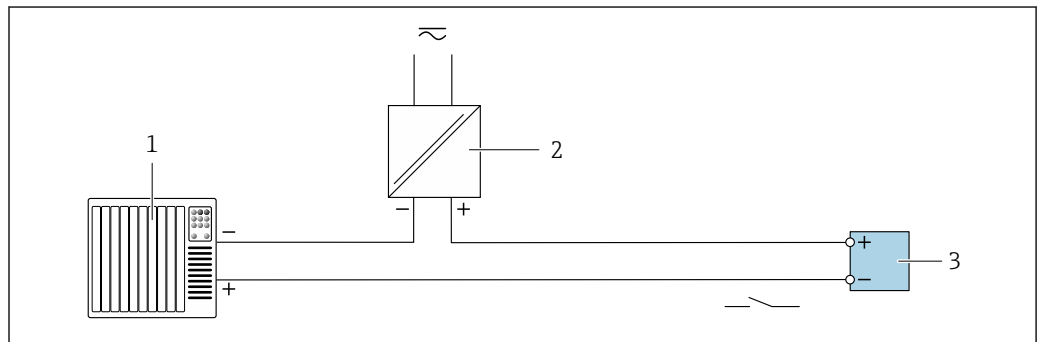
⊡ 14   Connection example for relay output (passive)

1   Automation system with relay input (e.g. PLC)

2   Power supply

3   Transmitter: observe input values → 🗎 188

Current input
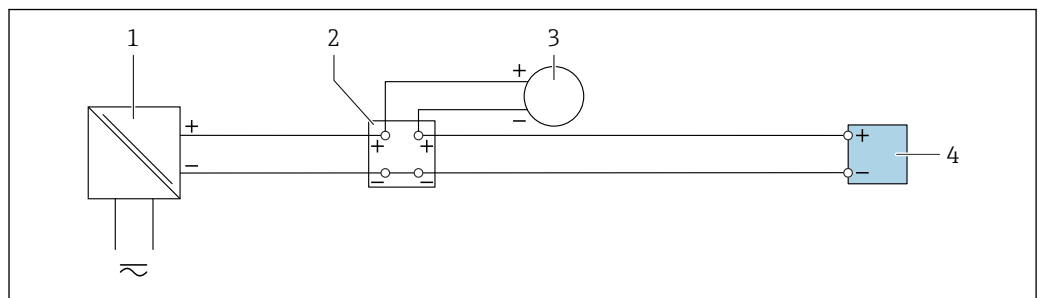
⊡ 15   Connection example for 4 to 20 mA current input

1   Power supply

2   Terminal box

3   External measuring device (to read in pressure or temperature, for instance)

4   Transmitter

Status input
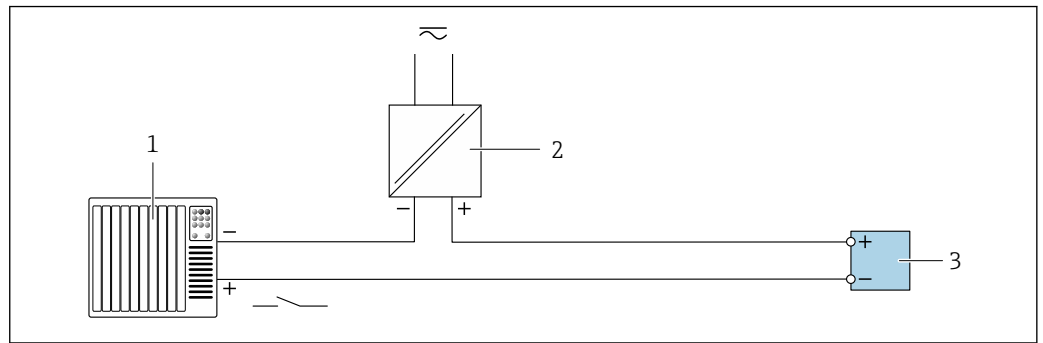
🖼 *16   Connection example for status input*

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

7.6   Hardware settings

7.6.1   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.
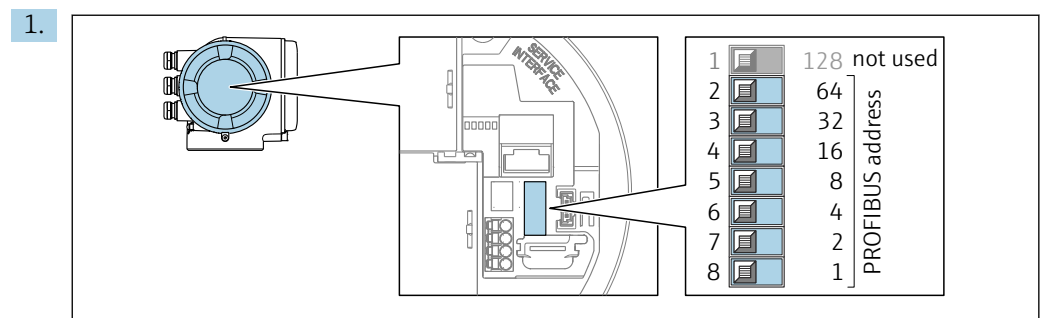
Set the desired device address using the DIP switches in the connection compartment.

2.

A0029633
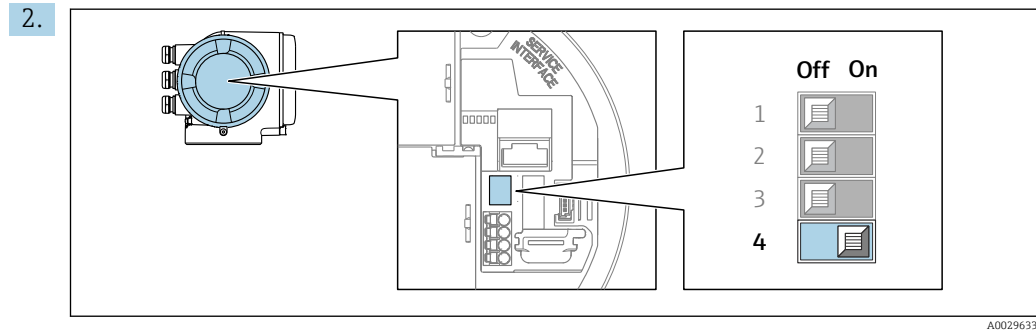
To switch addressing from software addressing to hardware addressing: set the DIP switch to **On**.

⮡ 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 (→ 🖺 88) takes effect after 10 seconds. The device is restarted.

7.6.2   Activating the default IP address

Activating the default IP address by DIP switch

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

A0034499
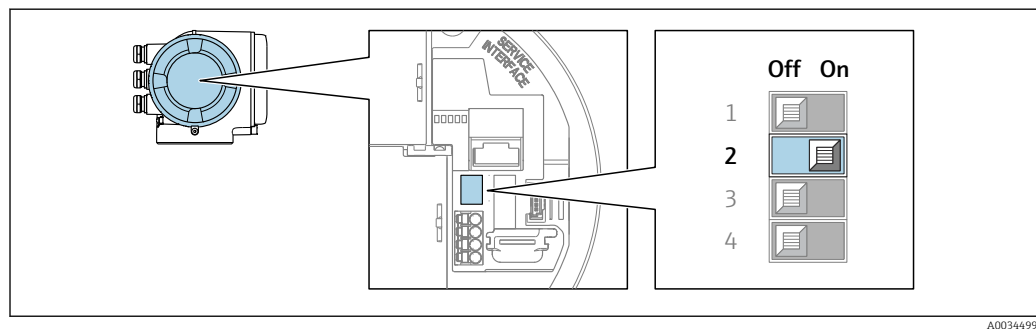
1. Depending on the housing version, loosen the securing clamp or fixing screw of the housing cover.

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. Reassemble the transmitter in the reverse order.

5. Reconnect the device to the power supply.

⮡ The default IP address is used once the device is restarted.

7.7   Ensuring the degree of protection

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

To guarantee the degree of protection IP66/67, 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
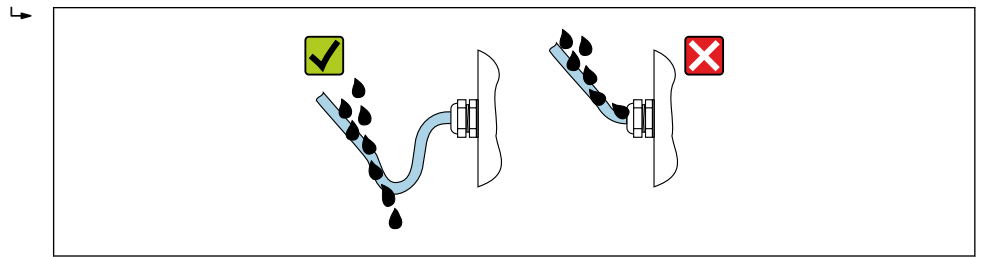
6. The cable glands supplied do not ensure housing protection when not in use. They must therefore be replaced by dummy plugs corresponding to the housing protection.

7.8 Post-connection check

Are cables or the device undamaged (visual inspection)?	❑
Is the protective earthing established correctly?	❑
Do the cables used comply with the requirements ?	❑
Are the mounted cables relieved of tension?	❑
Are all cable glands installed, securely tightened and leak-tight? Cable run with "water trap" → 🗎 42?	❑
Is the terminal assignment correct ?	❑
If supply voltage is present, do values appear on the display module?	❑
Is the potential equalization established correctly ?	❑
Are dummy plugs inserted in unused cable entries and have transportation plugs been replaced with dummy plugs?	❑

8   Operation options

8.1   Overview of operation options
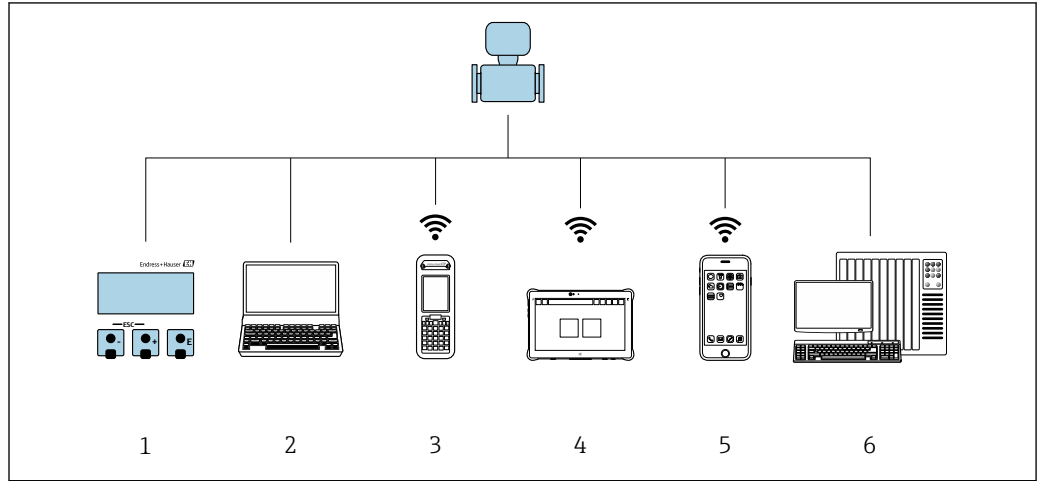
1   Local operation via display module
2   Computer with web browser or operating tool (e.g. FieldCare, DeviceCare, AMS Device Manager, SIMATIC PDM)
3   Field Xpert SFX350 or SFX370
4   Field Xpert SMT70
5   Mobile handheld terminal
6   Automation system (e.g. PLC)

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: see the "Description of Device Parameters" document supplied with the device → 🖹 210

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 (e.g. operator, maintenance etc.). Each user role contains typical tasks within the device life cycle.

Menu/parameter		User role and tasks	Content/meaning
Language	Task-oriented	**Role "Operator", "Maintenance"** Tasks during operation: • Configuration of the operational display • Reading measured values	• Defining the operating language • Defining the Web server operating language • Resetting and controlling totalizers
Operation			• Configuration of the operational display (e.g. display format, display contrast) • Resetting and controlling totalizers
Setup		**"Maintenance" role** Commissioning: • Configuration of the measurement • Configuration of the inputs and outputs • Configuration of the communication interface	Wizards for fast commissioning: • Configuring the system units • Displaying the I/O configuration • Configuring the inputs • Configuring the outputs • Configuration of the operational display • Configuring the low flow cut off • Configuring empty pipe detection Advanced setup • For more customized configuration of the measurement (adaptation to special measuring conditions) • Configuration of totalizers • Configuration of electrode cleaning (optional) • Configuration of WLAN settings • Administration (define access code, reset measuring device)
Diagnostics		**"Maintenance" role** Troubleshooting: • Diagnostics and elimination of process and device errors • Measured value simulation	Contains all parameters for error detection and analyzing process and device errors: • Diagnostic list Contains up to 5 currently pending diagnostic messages. • Event logbook Contains event messages that have occurred. • Device information Contains information for identifying the device • Measured values Contains all current measured values. • Analog inputs Is used to display the analog input. • **Data logging** submenu with the "Extended HistoROM" order option Storage and visualization of measured values • Heartbeat Technology Verification of device functionality on request and documentation of verification results • Simulation 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: • Commissioning measurements under difficult conditions • Optimal adaptation of the measurement to difficult conditions • Detailed configuration of the communication interface • Error diagnostics in difficult cases	Contains all of the device parameters and allows direct access to these by means of an access code. The structure of this menu is based on the function blocks of the device: • System Contains all higher-level device parameters that do not affect measurement or measured value communication • Sensor Configuration of the measurement. • Output Configuration of the pulse/frequency/switch output • Input Configuration of the status input • Output Configuration of the analog current outputs as well as the pulse/frequency and switch output • Communication Configuration of the digital communication interface and the Web server • Submenus for function blocks (e.g. "Analog Inputs") Configuration of function blocks • Application Configuration of the functions that go beyond the actual measurement (e.g. totalizer) • Diagnostics Error detection and analysis of process and device errors and for device simulation and Heartbeat Technology.

8.3 Access to operating menu via local display

8.3.1 Operational display
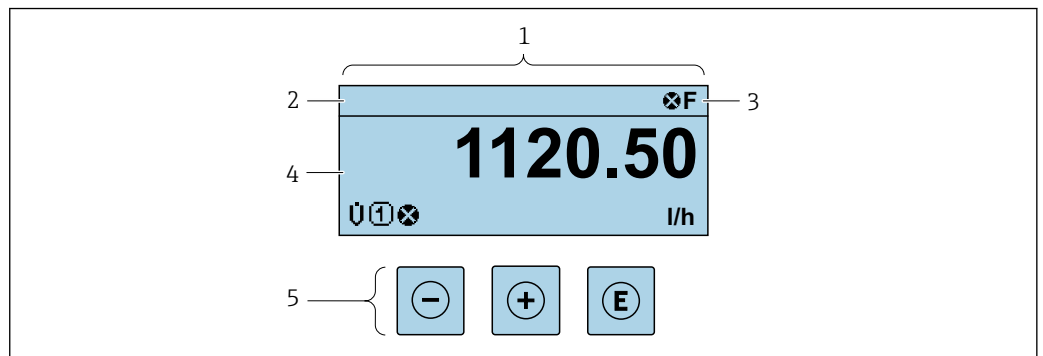
1 Operational display
2 Device tag → 🖹 85
3 Status area
4 Display range for measured values (up to 4 lines)
5 Operating elements → 🖹 54

Status area

The following symbols appear in the status area of the operational display at the top right:
- Status signals→ 🖹 138
  - **F**: Failure
  - **C**: Function check
  - **S**: Out of specification
  - **M**: Maintenance required
- Diagnostic behavior→ 🖹 139
  - ⊗: 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 variable	Measurement channel number	Diagnostic behavior
	↓	↓	↓
Example	ṁ	1	⚠
			Appears only if a diagnostics event is present for this measured variable.
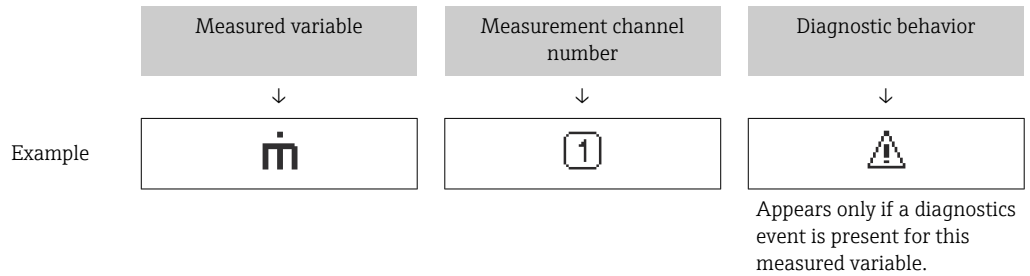
Measured variables

Symbol	Meaning
G	Conductivity
ṁ	Mass flow

ℹ The number and display format of the measured variables can be configured via the **Format display** parameter (→ 🖹 103).

Totalizer

Symbol	Meaning
Σ	Totalizer ℹ The measurement channel number indicates which of the three totalizers is displayed.

Input

Symbol	Meaning
⟿	Status input

Measurement channel numbers

Symbol	Meaning
1 ... 4	Measurement channel 1 to 4 ℹ 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

Symbol	Meaning
⊗	**Alarm** • Measurement is interrupted. • Signal outputs and totalizers assume the defined alarm condition. • A diagnostic message is generated.
⚠	**Warning** • Measurement is resumed. • The signal outputs and totalizers are not affected. • A diagnostic message is generated.

The diagnostic behavior pertains to a diagnostic event that is relevant to the displayed measured variable.

8.3.2 Navigation view

In the submenu	In the wizard

1 Navigation view
2 Navigation path to current position
3 Status area
4 Display area for navigation
5 Operating elements → 🖪 54
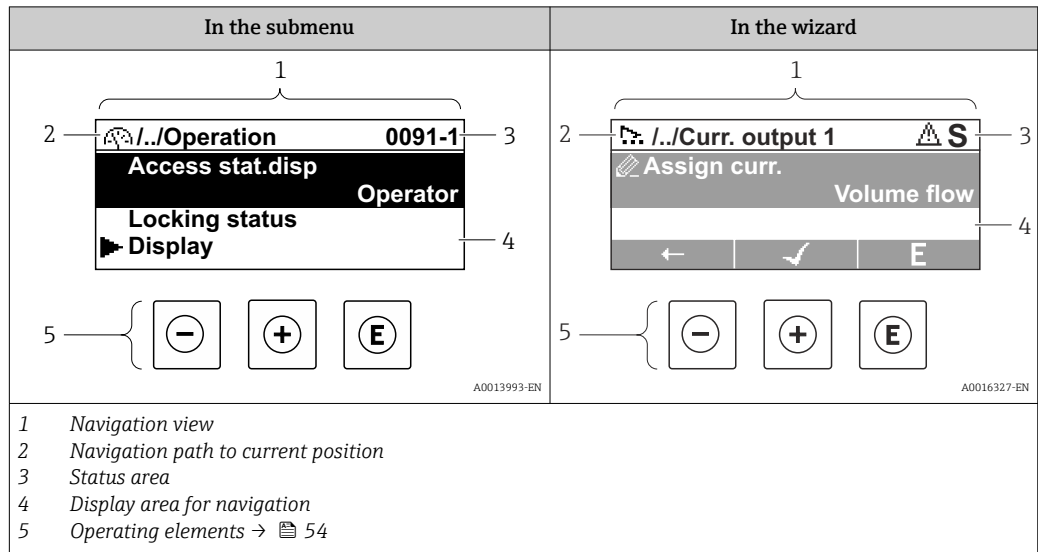
Navigation path

The navigation path to the current position is displayed at the top left in the navigation view and consists of the following elements:
• The display symbol for the menu/submenu (▶) or the wizard (⮡).
• An omission symbol (/ ../) for operating menu levels in between.
• Name of the current submenu, wizard or parameter

Display symbol	Omission symbol	Parameter
↓	↓	↓

Example

▶	/ ../	Indication

ℹ️ For more information about the icons in the menu, refer to the "Display area" section → 🖪 50

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 to the parameter (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

ℹ️ • For information on the diagnostic behavior and status signal → 🖪 138
  • For information on the function and entry of the direct access code → 🖪 56

Display area

Menus

Symbol	Meaning
〰️	**Operation** Is displayed: • In the menu next to the "Operation" selection • At the left in the navigation path in the **Operation** menu

| | Setup
Is displayed:
• In the menu next to the "Setup" selection
• At the left in the navigation path in the **Setup** menu |
|---|---|
| | Diagnosis
Is displayed:
• In the menu next to the "Diagnostics" selection
• At the left in the navigation path in the **Diagnostics** menu |
| | Expert
Is displayed:
• In the menu next to the "Expert" selection
• At the left in the navigation path in the **Expert** menu |

Submenus, wizards, parameters

Symbol	Meaning
	Submenu
	Wizards
	Parameters within a wizard

ⓘ No display symbol exists for parameters in submenus. |

Locking procedure

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

Wizards

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

8.3.3 Editing view

Numeric editor
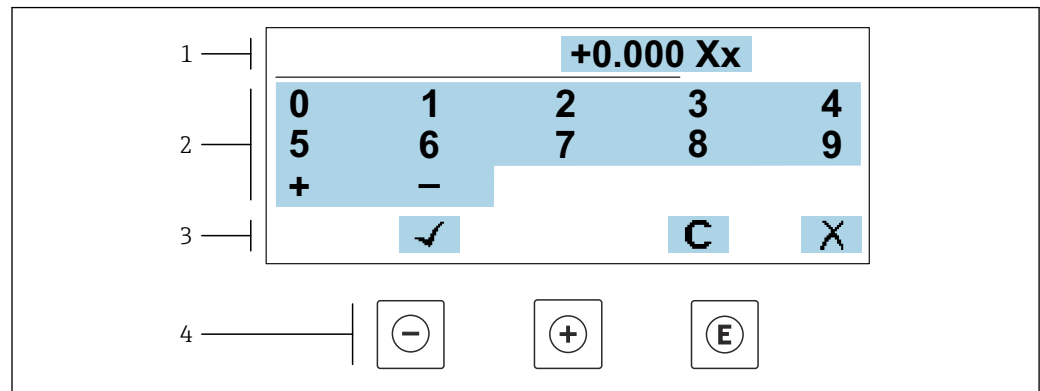
🖾 18   For entering values in parameters (e.g. limit values)

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

Text editor
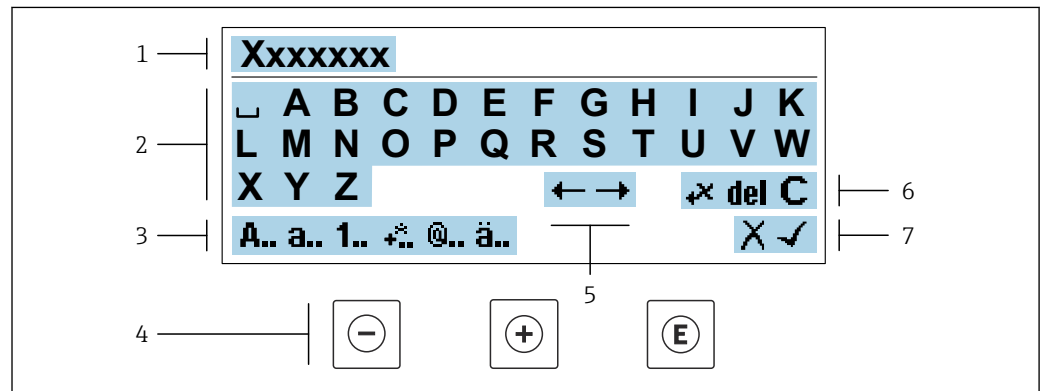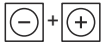
🖾 19   For entering text in parameters (e.g. device tag)

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	Meaning
⊖	**Minus key** Move the entry position to the left.
⊕	**Plus key** Move the entry position to the right.

Operating key	Meaning
Ⓔ	**Enter key** • Pressing the key briefly confirms your selection. • Pressing the key for 2 s confirms your entry.
⊟+⊞	**Escape key combination (press keys simultaneously)** Close the editing view without accepting a change.

Input screens

Symbol	Meaning
🄰..	Upper case
🄰..	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
✗	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	Meaning
⊖	**Minus key** *In menu, submenu* Moves the selection bar upwards in a picklist *In wizards* Goes to previous parameter *In the text and numeric editor* Move the entry position to the left.
⊕	**Plus key** *In menu, submenu* Moves the selection bar downwards in a picklist *In wizards* Goes to the next parameter *In the text and numeric editor* Move the entry position to the right.

Ⓔ	**Enter key**
	
	In the operational display
	Pressing the key briefly opens the operating menu.
	
	In menu, submenu
	• Pressing the key briefly:
	  • Opens the selected menu, submenu or parameter.
	  • Starts the wizard.
	  • If help text is open, closes the help text of the parameter.
	• Pressing the key for 2 s in a parameter:
	  If present, opens the help text for the function of the parameter.
	
	In wizards
	Opens the editing view of the parameter and confirms the parameter value
	
	In the text and numeric editor
	• Pressing the key briefly confirms your selection.
	• Pressing the key for 2 s confirms your entry.

⊖ + ⊕	**Escape key combination (press keys simultaneously)**
	
	In menu, submenu
	• Pressing the key briefly:
	  • Exits the current menu level and takes you to the next higher level.
	  • If help text is open, closes the help text of the parameter.
	• Pressing the key for 2 s returns you to the operational display ("home position").
	
	In wizards
	Exits the wizard and takes you to the next higher level
	
	In the text and numeric editor
	Exits the Editing view without applying the changes.

⊖ + Ⓔ	**Minus/Enter key combination (press and hold down the keys simultaneously)**
	
	• If keypad lock is active:
	  Pressing the key for 3 s deactivates the keypad lock.
	• If keypad lock is not active:
	  Pressing the key for 3 s opens the context menu including 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 ⮼ keys for longer than 3 seconds.
   ↳ The context menu opens.
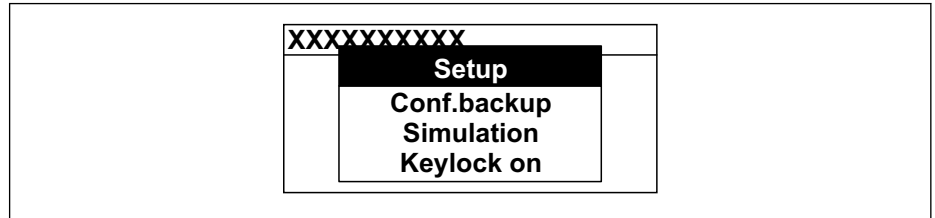
2. Press ⊟ + ⊞ simultaneously.
   ↳ The context menu is closed and the operational display appears.

Calling up the menu via the context menu

1. Open the context menu.

2. Press ⊞ to navigate to the desired menu.

3. Press ⮼ 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 → 🖹 50

Example: Setting the number of displayed measured values to "2 values"
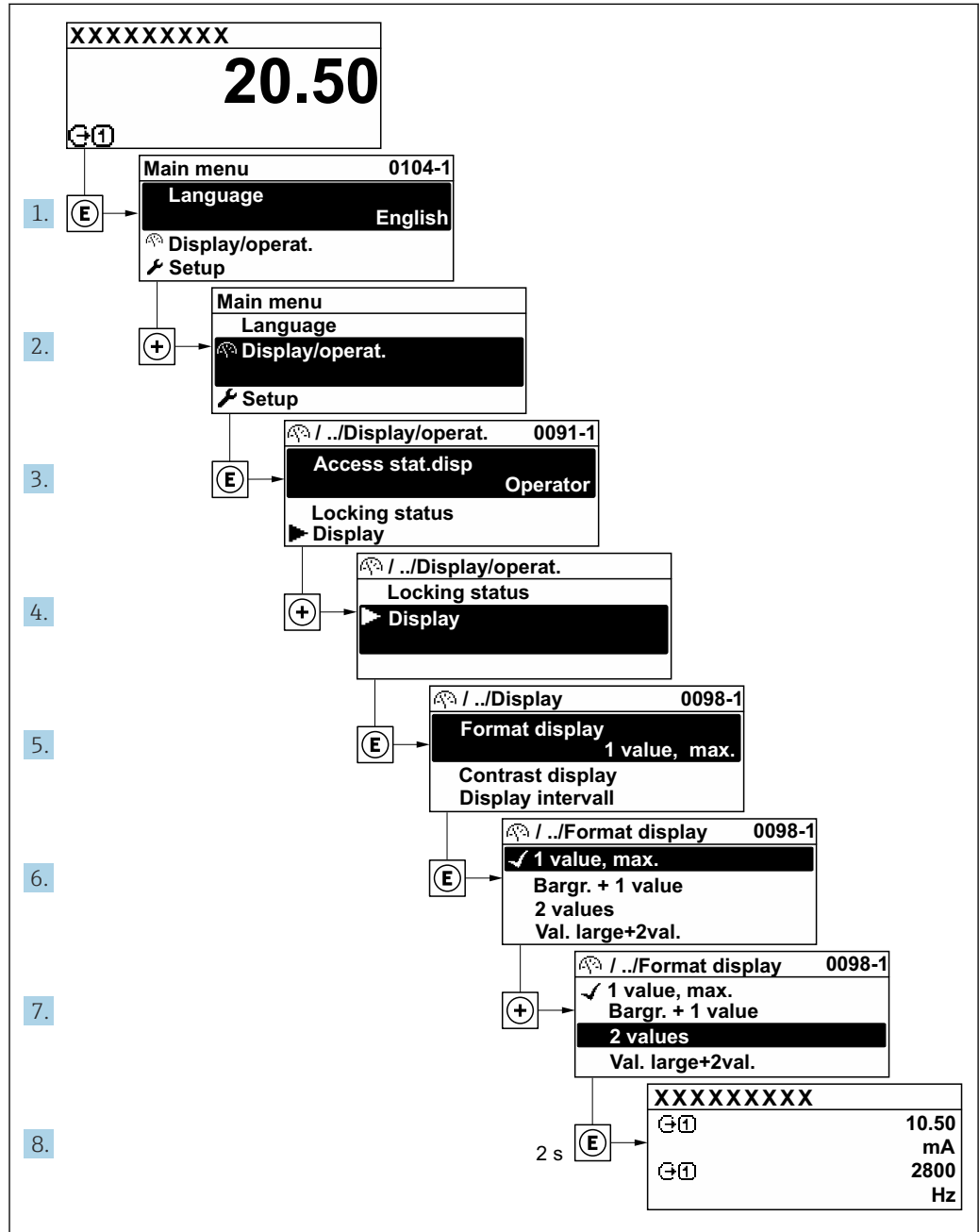
A0029562-EN

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.
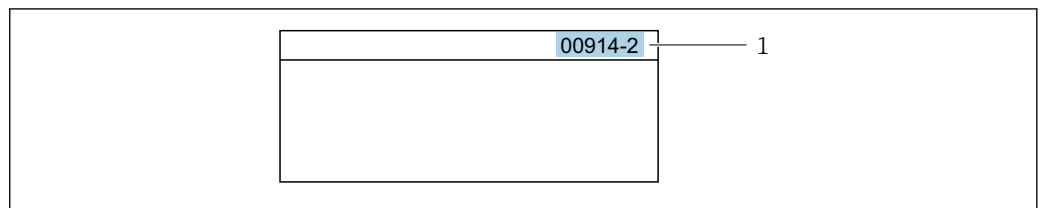
1   Direct access code

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 opened automatically.
  Example: Enter **00914** → **Assign process variable** parameter
- If a different channel is opened: 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.
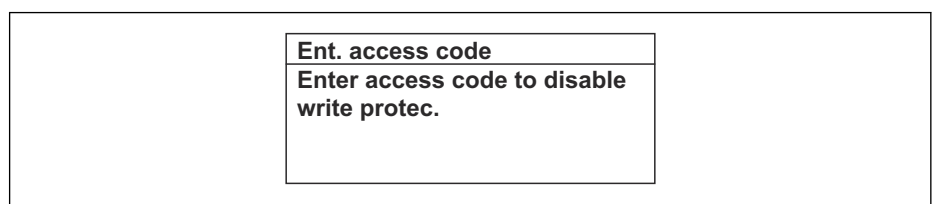
⊠ 20   *Example: Help text for parameter "Enter access code"*

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.

```
┌─────────────────────────────────────────┐
│  Ent. access code                        │
│  Invalid or out of range input           │
│  value                                   │
│  Min:0                                   │
│  Max:9999                                │
└─────────────────────────────────────────┘
```
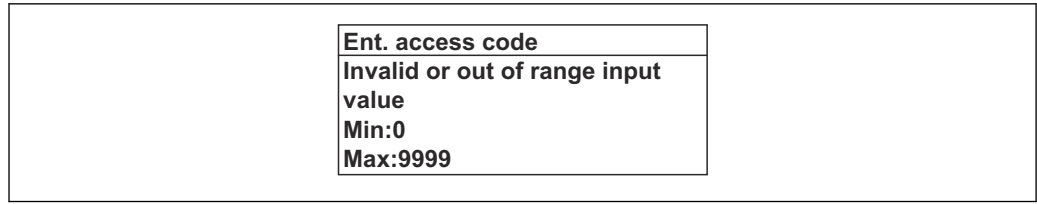
A0014049-EN

ℹ️ For a description of the editing view - consisting of the text editor and numeric editor - with symbols → 🖹 52, for a description of the operating elements → 🖹 54

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 → 🖹 121.

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 excluded from the write protection as they do not affect the measurement: write protection via access code → 🖹 121

ℹ️ 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 → 🖹 121.

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 🖽, 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 operating menu via web browser

8.4.1 Function range

With the integrated web server, the device can be operated and configured via a web browser service interface (CDI-RJ45) or 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 displayed and can be used to monitor device health. 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, see the Special Documentation for the device.

8.4.2   Requirements

Computer hardware

Hardware	Interface	
	CDI-RJ45	**WLAN**
Interface	The computer must have a RJ45 interface. [1]	The operating unit must have a WLAN interface.
Connection	Standard Ethernet cable	Connection via Wireless LAN.
Screen	Recommended size: ≥12" (depends on the screen resolution)	

1)   Recommended cable: CAT5e, CAT6 or CAT7, with shielded plug (e.g. YAMAICHI product; part no. Y-ConProfixPlug63/Prod. ID: 82-006660)

Computer software

Software	Interface	
	CDI-RJ45	**WLAN**

Recommended operating systems	• Microsoft Windows 8 or higher.
	• Mobile operating systems:
	  • iOS
	  • Android
	
	  ℹ Microsoft Windows XP and Windows 7 is supported.	

Web browsers supported	• Microsoft Internet Explorer 8 or higher • Microsoft Edge • Mozilla Firefox • Google Chrome • 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 (e.g. 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 **disabled** .	
JavaScript	JavaScript must be enabled. ℹ If JavaScript cannot be enabled: Enter http://192.168.1.212/servlet/basic.html in the address bar of the web browser. A fully functional but simplified version of the operating menu structure starts in the web browser. ℹ When installing a new firmware version: To enable correct data display, clear the temporary memory (cache) under **Internet options** in the web browser.	JavaScript must be enabled. ℹ The WLAN display requires JavaScript support.
Network connections	Only use the active network connections to the measuring device.	
	Switch off all other network connections such as WLAN for example.	Switch off all other network connections.

ℹ In the event of connection problems: → 🔖 135

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 For information on enabling the Web server → 🖹 65

Measuring device: via WLAN interface

Device	WLAN interface
Measuring device	The measuring device has a WLAN antenna: • Transmitter with integrated WLAN antenna • Transmitter with external WLAN antenna
Web server	Web server and WLAN must be enabled; factory setting: ON For information on enabling the Web server → 🖹 65

8.4.3 Connecting the device

Via service interface (CDI-RJ45)

Preparing the measuring device

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.

3. Connect the computer to the RJ45 plug 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 the computer to the RJ45 plug via the standard Ethernet cable → 🖹 66.

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

Note the following to avoid a network conflict:
▸ Avoid accessing the measuring device simultaneously from the same mobile terminal via the service interface (CDI-RJ45) and the WLAN interface.
▸ Only activate one service interface (CDI-RJ45 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 on the mobile terminal.

Establishing a WLAN 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_Promag_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).
   ↳ The LED on the 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.

Terminating the WLAN connection

▸ After configuring the device:
  Terminate the WLAN connection between the mobile terminal 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.
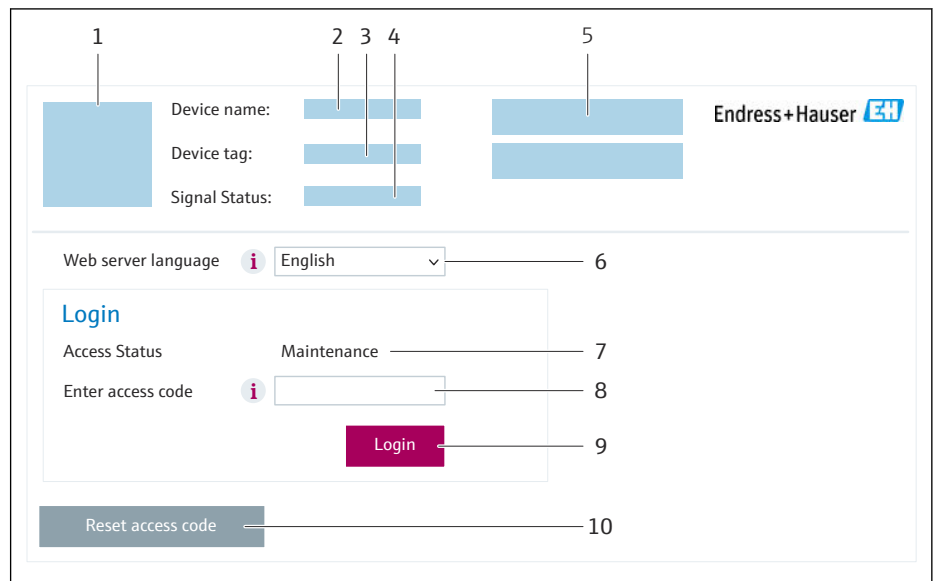
1   Picture of device
2   Device name
3   Device tag
4   Status signal
5   Current measured values
6   Operating language
7   User role
8   Access code
9   Login
10   Reset access code (→ 🖹 118)

If a login page does not appear, or if the page is incomplete → 🖹 135

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
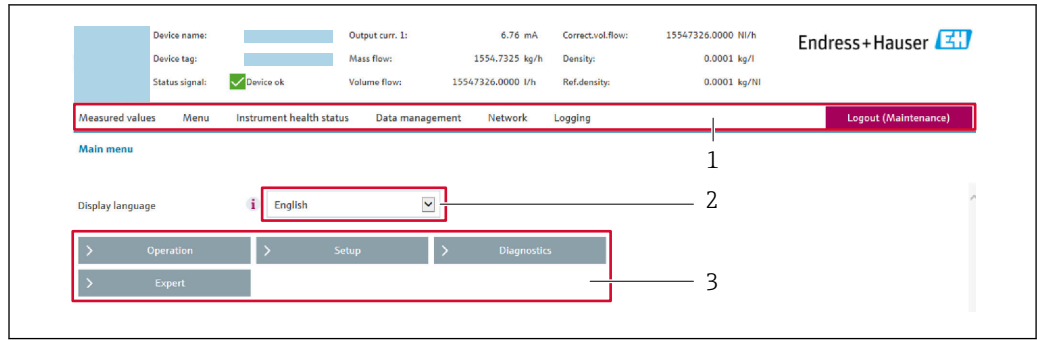
1 Function row
2 Local display language
3 Navigation area

Header

The following information appears in the header:
- Device name
- Device tag
- Device status with status signal → 🔲 141
- Current measured values

Function row

Functions	Meaning
Measured values	Displays the measured values of the device
Menu	• Access to the operating menu from the measuring device • The structure of the operating menu is the same as for the local display 📖 Detailed information on the operating menu structure: Description of Device Parameters
Device status	Displays the diagnostic messages currently pending, listed in order of priority

Data management	Data exchange between computer and measuring device:
	• Device configuration:
	   ▪ Load settings from the device
	      (XML format, save configuration)
	   ▪ Save settings to the device
	      (XML format, restore configuration)
	• Logbook - Export Event logbook (.csv file)
	• Documents - Export documents:
	   ▪ Export backup data record
	      (.csv file, create documentation of the measuring point configuration)
	   ▪ Verification report
	      (PDF file, only available with the "Heartbeat Verification" application package)
	• File for system integration - If using fieldbuses, upload device drivers for system integration from the measuring device:
	   PROFIBUS PA: GSD file
	• Firmware update - Flashing a firmware version

Network	Configuration and checking of all the parameters required for establishing the connection to the measuring device: • Network settings (e.g. IP address, MAC address) • Device information (e.g. serial number, firmware version)
Logout	End the operation and call up the login page

Navigation area

The menus, the associated submenus and parameters can be selected in the navigation area.

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
Web server functionality	Switch the Web server on and off.	• Off • HTML Off • On

Function scope of the "Web server functionality" parameter

Option	Description
Off	• The Web server is completely disabled. • Port 80 is locked.
HTML Off	The HTML version of the Web server is not available.
On	• The complete Web server functionality is available. • JavaScript is used. • The password is transferred in an encrypted state. • 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 the modified properties of the Internet protocol (TCP/IP) → 🖰 61.

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.
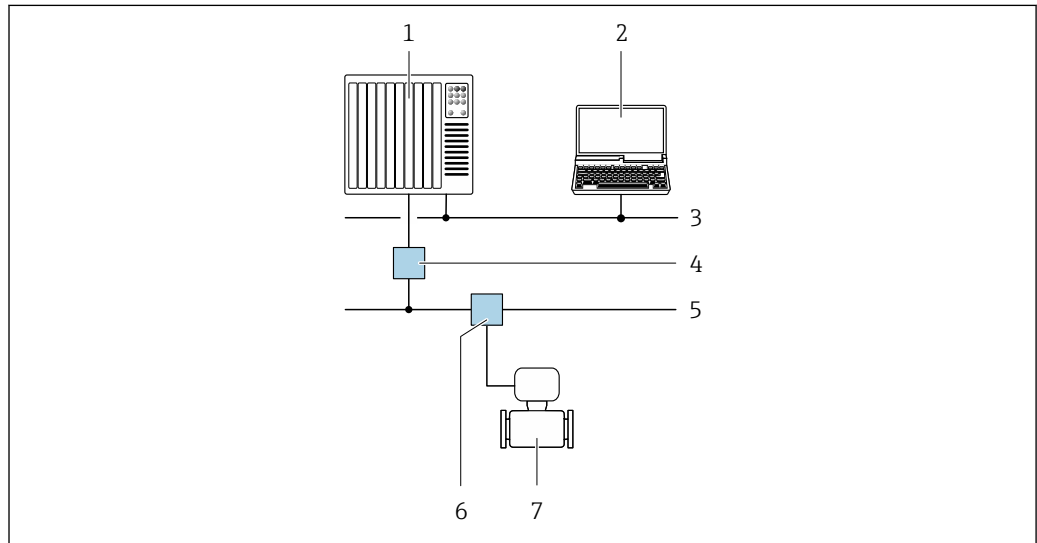
🖾 *21   Options for remote operation via PROFIBUS PA network*

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.

> ℹ An adapter for the RJ45 to the M12 plug is optionally available for the non-hazardous area:
>
> Order code for "Accessories", option **NB**: "Adapter RJ45 M12 (service interface)"
>
> The adapter connects the service interface (CDI-RJ45) to an M12 plug mounted in the cable entry. The connection to the service interface can be established via an M12 plug without opening the device.
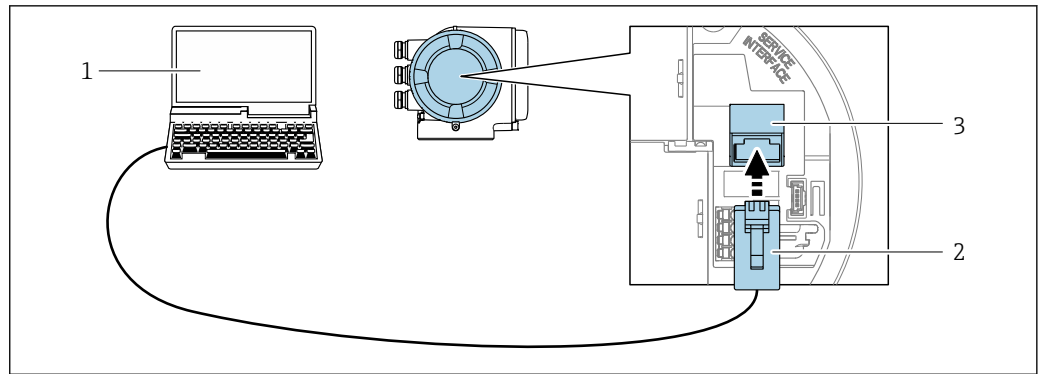
⊡ 22   Connection via service interface (CDI-RJ45)

1   Computer with web browser (e.g. Microsoft Internet Explorer, Microsoft Edge) for accessing the integrated web server or with "FieldCare" operating tool, "DeviceCare" with COM DTM "CDI Communication TCP/IP"
2   Standard Ethernet connecting cable with RJ45 plug
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"
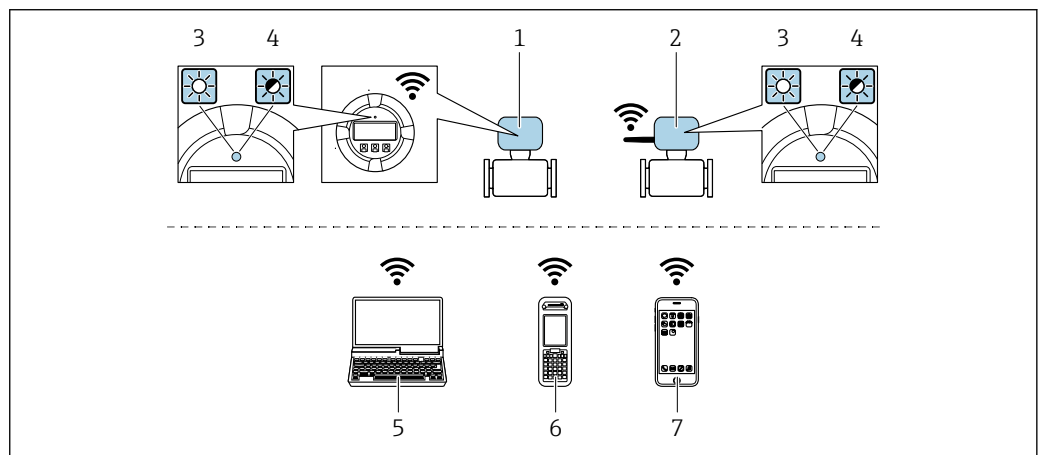
1   Transmitter with integrated WLAN antenna
2   Transmitter with external WLAN antenna
3   LED lit constantly: WLAN reception is enabled on measuring device
4   LED flashing: WLAN connection established between operating unit and measuring device
5   Computer with WLAN interface and web browser (e.g. 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 • External antenna (optional) In the event of poor transmission/reception conditions at the place of installation. ⓘ Only 1 antenna is active at any one time!

Range	• Internal antenna: typically 10 m (32 ft)
	• External antenna: typically 50 m (164 ft)
Materials (external antenna)	• Antenna: ASA plastic (acrylonitrile styrene acrylate) and nickel-plated brass
	• Adapter: Stainless steel and nickel-plated brass
	• Cable: Polyethylene
	• Plug: Nickel-plated brass
	• 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

Note the following to avoid a network conflict:

▶ Avoid accessing the measuring device simultaneously from the same mobile terminal via the service interface (CDI-RJ45) and the WLAN interface.

▶ Only activate one service interface (CDI-RJ45 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 on the mobile terminal.

Establishing a WLAN 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_Promag_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).

   ↳ The LED on the 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.

Terminating the WLAN connection

▶ After configuring the device:

   Terminate the WLAN connection between the mobile terminal and measuring device.

8.5.2   FieldCare

Function range

FDT-based (Field Device Technology) plant asset management tool from Endress+Hauser. It can configure all smart field units 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 → 🖺 66
- CDI-RJ45 service interface → 🖺 66
- WLAN interface → 🖺 67

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

> - Operating Instructions BA00027S
> - Operating Instructions BA00059S

Source for device description files → 🖺 72

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.

> - Operating Instructions BA00027S
> - Operating Instructions BA00059S

User interface
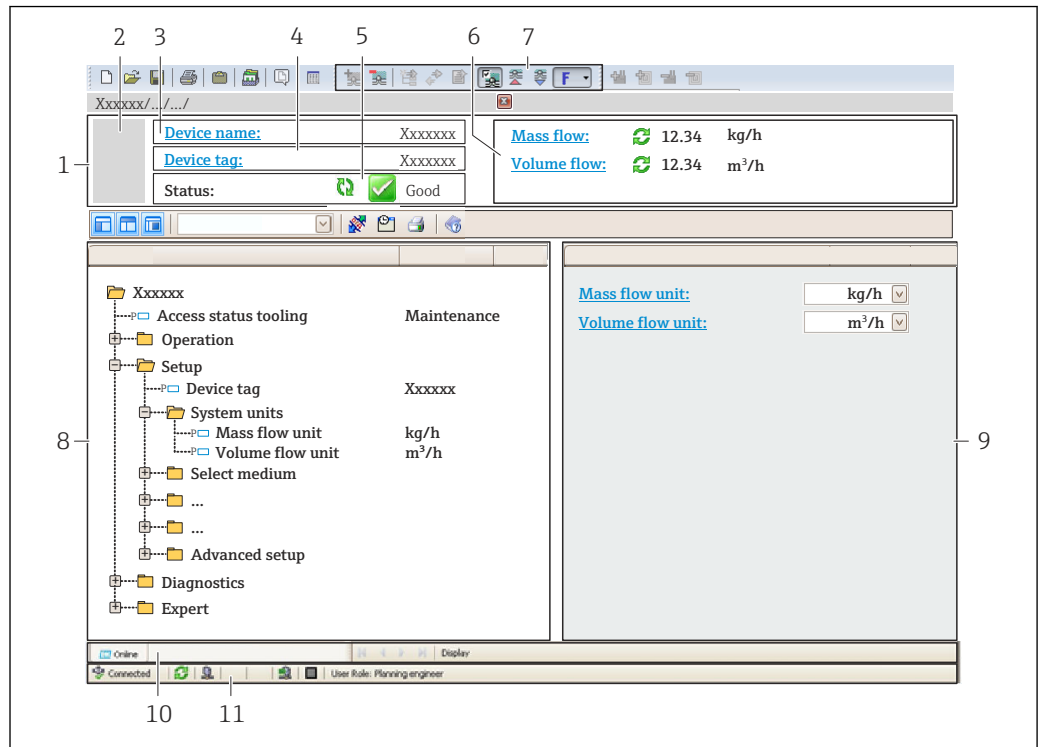
1   Header
2   Picture of device
3   Device name
4   Device tag
5   Status area with status signal → 📄 141
6   Display area for current measured values
7   Editing toolbar with additional functions such as save/load, event list and create documentation
8   Navigation area with operating menu structure
9   Work area
10 Action area
11 Status area

8.5.3   DeviceCare

Function range

Tool for connecting and configuring 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.

📖 Innovation brochure IN01047S

ℹ️ Source for device description files → 📄 72

8.5.4 SIMATIC PDM

Function range

Standardized, vendor-independent program from Siemens for the operation, configuration, maintenance and diagnosis of intelligent field devices via the PROFIBUS PA protocol.

🛈 Source for device description files → 🗎 72

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 manual • On the transmitter nameplate • Firmware version Diagnostics → Device information → Firmware version
Release date of firmware version	11.2018	---
Manufacturer ID	0x11	Manufacturer ID Diagnostics → Device information → Manufacturer ID
Device type code	0x156C	Device type Diagnostics → Device information → Device type
Profile version	3.02	---

For an overview of the various firmware versions for the device → 🗎 175

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 → Downloads area • USB stick (contact Endress+Hauser) • DVD (contact Endress+Hauser)
DeviceCare	• www.endress.com → Downloads area • CD–ROM (contact Endress+Hauser) • DVD (contact Endress+Hauser)
SIMATIC PDM (Siemens)	www.endress.com → Downloads 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	0x156C	EH3x156C.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 • 1 Totalizer	• Channel Analog Input: volume flow • Channel totalizer: volume flow
0x9741	• 2 Analog Input • 1 Totalizer	• Channel Analog Input 1: volume flow • Channel Analog Input 2: mass flow • Channel totalizer: volume flow
0x9742	• 3 Analog Input • 1 Totalizer	• Channel Analog Input 1: volume flow • Channel Analog Input 2: mass flow • Channel Analog Input 3: corrected volume flow • 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 Promag 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 Promag 300 GSD file.

Earlier models:
- Promag 50PROFIBUS PA
  - ID No.: 1525 (hex)
  - Extended GSD file: EH3x1525.gsd
  - Standard GSD file: EH3_1525.gsd
- Promag 53PROFIBUS PA
  - ID No.: 1527 (hex)
  - Extended GSD file: EH3x1527.gsd
  - Standard GSD file: EH3_1527.gsd

9.3.1   Automatic identification (factory setting)

The Promag 300 PROFIBUS PA automatically recognizes the measuring device configured in the automation system (Promag 50 PROFIBUS PA oder Promag 53 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 **Promag 50 (0x1525)** option or **Promag 53 (0x1527)** option.

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

- If the Promag 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 (Promag 50 PROFIBUS PA or Promag 53 PROFIBUS PA) (parameter setting no longer corresponds to the original factory setting), these parameters must be changed accordingly in the new replacement Promag 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 Promag 50 PROFIBUS PA currently in operation. This device is now replaced by a Promag 300 PROFIBUS PA.

After replacing the device, the assignment for the low flow cut off must also be changed manually in the Promag 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 Promag 50 PROFIBUS PA or Promag 53 PROFIBUS PA with a Promag 300 PROFIBUS PA.

2. Set the device address: The same device address that was set for the Promag 50 or Promag 53 PROFIBUS PA must be used.

3. Connect the measuring device Promag 300 PROFIBUS PA.

If the factory setting had been changed on the replaced device (Promag 50 PROFIBUS PA or Promag 53 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, Promag 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 Promag 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 Promag 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 Promag 300.

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

Previous model: Promag 50 PROFIBUS PA

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

Previous model: Promag 53 PROFIBUS PA

Control variable	Function	Support
0 → 2	Positive zero return: ON	Yes
0 → 3	Positive zero return: OFF	Yes

Control variable	Function	Support
0 → 5	Electrode cleaning circuit (ECC): OFF	Yes
0 → 6	Electrode cleaning circuit (ECC): ON	Yes
0 → 8	Measuring mode: UNIDIRECTIONAL	No
0 → 9	Measuring mode: BIDIRECTIONAL	**Cause:** The Profile Transducer Block Flow is no longer supported. **To continue to use the functionality:** Use the **Totalizer operation mode** parameter in the Totalizer function block.
0 → 24	UNIT TO BUS	No **Cause:** Functionality is no longer required as the unit is adopted automatically.

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 instrument				Control system
	Analog Input block 1 to 4	→ 📄 78	Output value AI →	
			Output value TOTAL →	
	Totalizer block 1 to 3	→ 📄 78	Controller SETTOT ←	
Flow Block			Configuration MODETOT ←	**PROFIBUS PA**
	Analog Output block 1 to 2	→ 📄 80	Input values AO ←	
	Discrete Input block 1 to 2	→ 📄 81	Output values DI →	
	Discrete Output block 1 to 3	→ 📄 81	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 4	AI	Analog Input block 1 to 4
5	TOTAL or SETTOT_TOTAL or SETOT_MODETOT_TOTAL	Totalizer block 1
6		Totalizer block 2
7		Totalizer block 3
8 to 9	AO	Analog Output block 1 to 2
10 to 11	DI	Discrete Input block 1 to 2
12 to 14	DO	Discrete Output block 1 to 3

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 including its 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.

Four Analog Input blocks are available (slot 1 to 4).

Selection: input variable

Input variable
Volume flow
Mass flow
Corrected volume flow
Flow velocity
Conductivity
Corrected conductivity
Temperature
Electronics temperature
Current input 1
Current input 2
Current input 3

Factory setting

Function block	Factory setting
AI 1	Volume flow
AI 2	Mass flow
AI 3	Corrected volume flow
AI 4	Flow velocity

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 5 to 7).

Selection: totalizer value

Input variable
Volume flow
Mass flow
Corrected volume 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 SET_TOT and TOTAL functions:
- SETTOT: Control the totalizers via the PROFIBUS master.
- TOTAL: Transmit totalizer value incl. status to PROFIBUS master.

Three Totalizer blocks are available (slot 5 to 7).

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 5 to 7).

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, including 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.

Two Analog Output blocks are available (slot 8 to 9).

Assigned compensation values

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

Function block	Compensation value
AO 1	External temperature [1]
AO 2	External density

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 [1]

1)   Status coding

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, including 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 10 to 11).

Selection: device function

Device function	Factory setting: Status (meaning)
Empty pipe detection	• 0 (device function not active)
Low flow cut off	• 1 (device function active)
Verification status [1]	• Bit 0: Verification status - Check not done • Bit 1: Verification status - Failed • Bit 2: Verification status - Busy • Bit 3: Verification status - Ready • Bit 4: Verification overall result - Failed • Bit 5: Verification overall result - Passed • Bit 6: Verification overall result - Check not done • 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, including 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.

Three Discrete Output blocks are available (slot 12 to 14).

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)
DO 2	Start verification [1]	• 1 (enable device function)
DO 3	Relay output or switch output of the pulse/ frequency/switch output	• 0 (non-conductive) • 1 (conductive)

1)   Only available with the Heartbeat Verification application package

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   Post-mounting and post-connection check

Before commissioning the device:

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

- Checklist for "Post-mounting" check→ 🖹 27
- Checklist for "Post-connection check" → 🖹 43

10.2   Switching on the measuring device

‣ Switch on the device upon successful completion of the post-mounting and post-connection check.

 ↪ After a successful startup, the local display switches automatically from the startup display to the operational display.

ℹ️ If nothing appears on the local display or if a diagnostic message is displayed, refer to the section on "Diagnostics and troubleshooting" → 🖹 134.

10.3   Connecting via FieldCare

- For connecting FieldCare → 🖹 66
- For connecting via FieldCare → 🖹 69
- For user interface of FieldCare → 🖹 70

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

ℹ️ - To display the current device address: **Device address** parameter → 🖹 87
- If hardware addressing is active, software addressing is blocked → 🖹 41

10.5   Setting the operating language

Factory setting: English or ordered local language
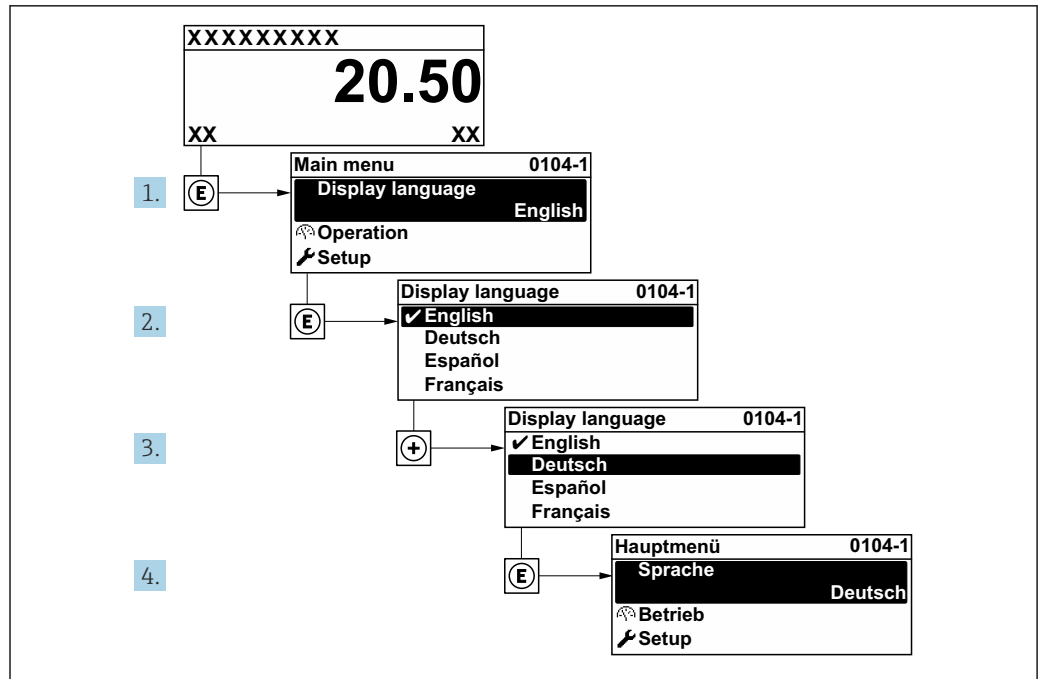
⊠ 23   Taking the example of the local display

10.6   Configuring the measuring instrument

The **Setup** menu with its guided wizards contains all the parameters needed for standard operation.
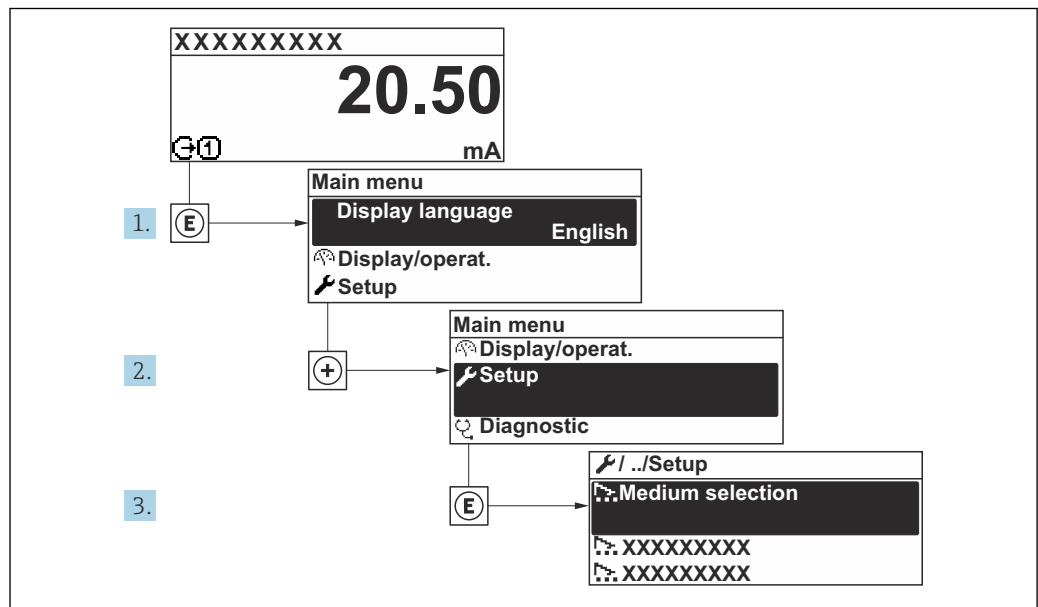
⊠ 24   Navigation to "Setup" menu using the example of the local display

The number of submenus and parameters can vary depending on the device version. Certain submenus and parameters in these submenus are not described in the Operating Instructions. Instead a description is provided in the Special Documentation for the device ("Supplementary documentation").

Navigation
"Setup" menu

```
🔧 Setup
```

Device tag	→ 🖺	86
▸ System units	→ 🖺	86
▸ Communication	→ 🖺	87
▸ Analog inputs	→ 🖺	89
▸ I/O configuration	→ 🖺	89
▸ Current input 1 to n	→ 🖺	90
▸ Status input 1 to n	→ 🖺	91
▸ Current output 1 to n	→ 🖺	92
▸ Pulse/frequency/switch output 1 to n	→ 🖺	95
▸ Relay output 1 to n	→ 🖺	101
▸ Display	→ 🖺	103
▸ Low flow cut off	→ 🖺	104
▸ Empty pipe detection	→ 🖺	106
▸ Advanced setup	→ 🖺	107

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.
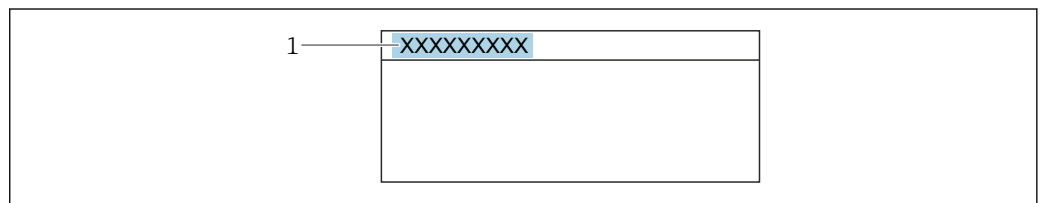
1 Tag name

🖾 25   Header of the operational display with tag name

1   Tag name

ℹ️ Enter the tag name in the "FieldCare" operating tool → 🖺 70

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. @, %, /).	Promag 300 PA

10.6.2 Setting the system units

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

The number of submenus and parameters can vary depending on the device version. Certain submenus and parameters in these submenus are not described in the Operating Instructions. Instead a description is provided in the Special Documentation for the device ("Supplementary documentation").

Navigation

"Setup" menu → System units

▶ System units	
Volume flow unit	→ 🗎 87
Volume unit	→ 🗎 87
Conductivity unit	→ 🗎 87
Temperature unit	→ 🗎 87
Mass flow unit	→ 🗎 87
Mass unit	→ 🗎 87
Density unit	→ 🗎 87
Corrected volume flow unit	→ 🗎 87
Corrected volume unit	→ 🗎 87

Parameter overview with brief description

Parameter	Prerequisite	Description	Selection	Factory setting
Volume flow unit	–	Select volume flow unit. *Result* The selected unit applies to: • Output • Low flow cut off • Simulation process variable	Unit choose list	Country-specific: • l/h • gal/min (us)
Volume unit	–	Select volume unit.	Unit choose list	Country-specific: • m³ • gal (us)
Conductivity unit	The **On** option is selected in the **Conductivity measurement** parameter.	Select conductivity unit. *Result* The selected unit applies to: Simulation process variable	Unit choose list	–
Temperature unit	–	Select temperature unit. *Result* The selected unit applies to: • **Temperature** parameter • **Maximum value** parameter • **Minimum value** parameter • **External temperature** parameter • **Maximum value** parameter • **Minimum value** parameter	Unit choose list	Country-specific: • ℃ • ℉
Mass flow unit	–	Select mass flow unit. *Result* The selected unit applies to: • Output • Low flow cut off • Simulation process variable	Unit choose list	Country-specific: • kg/h • lb/min
Mass unit	–	Select mass unit.	Unit choose list	Country-specific: • kg • lb
Density unit	–	Select density unit. *Result* The selected unit applies to: • Output • Simulation process variable	Unit choose list	Country-specific: • kg/l • lb/ft³
Corrected volume flow unit	–	Select corrected volume flow unit. *Result* The selected unit applies to: **Corrected volume flow** parameter (→ 🖹 125)	Unit choose list	Country-specific: • Nl/h • Sft³/h
Corrected volume unit	–	Select corrected volume unit.	Unit choose list	Country-specific: • Nm³ • Sft³

10.6.3 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

‣ Communication		
Device address		→ 🗎 88

Parameter overview with brief description

Parameter	Description	User entry
Device address	Enter device address.	0 to 126

10.6.4 Configuration of 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

▶ Analog inputs		
	▶ Analog input 1 to n	
	Channel	→ 🖹 89
	PV filter time	→ 🖹 89
	Fail safe type	→ 🖹 89
	Fail-safe value	→ 🖹 89

Parameter overview with brief description

Parameter	Prerequisite	Description	Selection / User entry
Channel	–	Select the process variable.	• Volume flow • Mass flow • Corrected volume flow • Flow velocity • Conductivity[*] • Corrected conductivity[*] • Temperature • Electronic temperature • Current input 1[*] • Current input 2[*] • Current input 3[*]
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
Fail safe type	–	Select the failure mode.	• Fail-safe value • Fallback value • 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

*   Visibility depends on order options or device settings

10.6.5 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.

▶ I/O configuration	
I/O module 1 to n terminal numbers	→ 🖹 90
I/O module 1 to n information	→ 🖹 90
I/O module 1 to n type	→ 🖹 90
Apply I/O configuration	→ 🖹 90
Alteration code	→ 🖹 90

Parameter overview with brief description

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

*   Visibility depends on order options or device settings

10.6.6   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

▶ Current input 1 to n	
Terminal number	→ 🖹 91
Signal mode	→ 🖹 91

0/4 mA value		→ 🗎 91
20 mA value		→ 🗎 91
Current span		→ 🗎 91
Failure mode		→ 🗎 91
Failure value		→ 🗎 91

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 • 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 • Active *	Active
0/4 mA value	–	Enter 4 mA value.	Signed floating-point number	–
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 • 4...20 mA NAMUR • 4...20 mA US • 0...20 mA	Country-specific: • 4...20 mA NAMUR • 4...20 mA US
Failure mode	–	Define input behavior in alarm condition.	• Alarm • Last valid value • Defined value	–
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	–

*   Visibility depends on order options or device settings

10.6.7   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 1 to n

▶ Status input 1 to n		
	Assign status input	→ 🗎 92
	Terminal number	→ 🗎 92

Active level	→ 🗎 92
Terminal number	→ 🗎 92
Response time status input	→ 🗎 92
Terminal number	→ 🗎 92

Parameter overview with brief description

Parameter	Description	Selection / User interface / User entry
Assign status input	Select function for the status input.	• Off • Reset totalizer 1 • Reset totalizer 2 • Reset totalizer 3 • Reset all totalizers • Flow override
Terminal number	Shows the terminal numbers used by the status input module.	• Not used • 24-25 (I/O 2)
Active level	Define input signal level at which the assigned function is triggered.	• High • Low
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

10.6.8   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

▶ Current output 1 to n	
Terminal number	→ 🗎 93
Signal mode	→ 🗎 93
Assign current output 1 to n	→ 🗎 93
Current span	→ 🗎 93
0/4 mA value	→ 🗎 93
20 mA value	→ 🗎 93
Fixed current	→ 🗎 93
Damping output 1 to n	→ 🗎 93

Failure mode	→ 🗎 94

Failure current	→ 🗎 94

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 • 24-25 (I/O 2)	–
Signal mode	–	Select the signal mode for the current output.	• Passive * • Active *	Active
Assign current output 1 to n	–	Select process variable for current output.	• Off • Volume flow • Mass flow • Corrected volume flow • Flow velocity • Conductivity • Corrected conductivity * • Temperature * • Electronic temperature	–
Current span	–	Select current range for process value output and upper/lower level for alarm signal.	• 4...20 mA NAMUR • 4...20 mA US • 4...20 mA • 0...20 mA • Fixed current	Depends on country: • 4...20 mA NAMUR • 4...20 mA US
0/4 mA value	In **Current span** parameter (→ 🗎 93), one of the following options is selected: • 4...20 mA NAMUR • 4...20 mA US • 4...20 mA • 0...20 mA	Enter 4 mA value.	Signed floating-point number	Depends on country: • 0 l/h • 0 gal/min (us)
20 mA value	In **Current span** parameter (→ 🗎 93), one of the following options is selected: • 4...20 mA NAMUR • 4...20 mA US • 4...20 mA • 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 (→ 🗎 93).	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 (→ 🗎 93) and one of the following options is selected in the **Current span** parameter (→ 🗎 93): • 4...20 mA NAMUR • 4...20 mA US • 4...20 mA • 0...20 mA	Set reaction time for output signal to fluctuations in the measured value.	0.0 to 999.9 s	–

Parameter	Prerequisite	Description	User interface / Selection / User entry	Factory setting
Failure mode	A process variable is selected in the **Assign current output** parameter (→ 🖹 93) and one of the following options is selected in the **Current span** parameter (→ 🖹 93): • 4...20 mA NAMUR • 4...20 mA US • 4...20 mA • 0...20 mA	Define output behavior in alarm condition.	• Min. • Max. • Last valid value • Actual value • Defined value	–
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

10.6.9 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

▶ Pulse/frequency/switch output 1 to n		
	Operating mode	→ 🖹 95
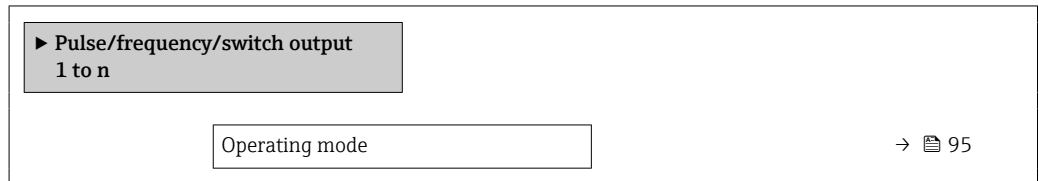
Parameter overview with brief description

Parameter	Description	Selection
Operating mode	Define the output as a pulse, frequency or switch output.	• Pulse • Frequency • Switch

Configuring the pulse output

Navigation

"Setup" menu → Pulse/frequency/switch output

▶ Pulse/frequency/switch output 1 to n		
	Operating mode	→ 🖹 96
	Terminal number	→ 🖹 96
	Signal mode	→ 🖹 96
	Assign pulse output	→ 🖹 96
	Pulse scaling	→ 🖹 96
	Pulse width	→ 🖹 96
	Failure mode	→ 🖹 96
	Invert output signal	→ 🖹 96

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 • Frequency • Switch	–
Terminal number	–	Shows the terminal numbers used by the PFS output module.	• Not used • 24-25 (I/O 2)	–
Signal mode	–	Select the signal mode for the PFS output.	• Passive • Active	–
Assign pulse output 1 to n	The **Pulse** option is selected in **Operating mode** parameter.	Select process variable for pulse output.	• Off • Volume flow • Mass flow • Corrected volume flow	–
Value per pulse	The **Pulse** option is selected in the **Operating mode** parameter (→ 🖹 95) and a process variable is selected in the **Assign pulse output** parameter (→ 🖹 96).	Enter measured value at which a pulse is output.	Positive floating point number	Depends on country and nominal diameter
Pulse width	The **Pulse** option is selected in the **Operating mode** parameter (→ 🖹 95) and a process variable is selected in the **Assign pulse output** parameter (→ 🖹 96).	Define time width of the output pulse.	0.05 to 2 000 ms	–
Failure mode	The **Pulse** option is selected in the **Operating mode** parameter (→ 🖹 95) and a process variable is selected in the **Assign pulse output** parameter (→ 🖹 96).	Define output behavior in alarm condition.	• Actual value • No pulses	–
Invert output signal	–	Invert the output signal.	• No • Yes	–

Configuring the frequency output

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

▶ Pulse/frequency/switch output 1 to n	
Operating mode	→ 🖹 97
Terminal number	→ 🖹 97
Signal mode	→ 🖹 97
Assign frequency output	→ 🖹 97
Minimum frequency value	→ 🖹 97

	Maximum frequency value	→ 🗎 97
	Measuring value at minimum frequency	→ 🗎 98
	Measuring value at maximum frequency	→ 🗎 98
	Failure mode	→ 🗎 98
	Failure frequency	→ 🗎 98
	Invert output signal	→ 🗎 98

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 • Frequency • Switch	–
Terminal number	–	Shows the terminal numbers used by the PFS output module.	• Not used • 24-25 (I/O 2)	–
Signal mode	–	Select the signal mode for the PFS output.	• Passive • Active	–
Assign frequency output	The **Frequency** option is selected in **Operating mode** parameter (→ 🗎 95).	Select process variable for frequency output.	• Off • Volume flow • Mass flow • Corrected volume flow • Flow velocity • Conductivity * • Corrected conductivity * • Temperature * • Electronic temperature	–
Minimum frequency value	The **Frequency** option is selected in the **Operating mode** parameter (→ 🗎 95) and a process variable is selected in the **Assign frequency output** parameter (→ 🗎 97).	Enter minimum frequency.	0.0 to 10 000.0 Hz	–
Maximum frequency value	The **Frequency** option is selected in the **Operating mode** parameter (→ 🗎 95) and a process variable is selected in the **Assign frequency output** parameter (→ 🗎 97).	Enter maximum frequency.	0.0 to 10 000.0 Hz	–

Parameter	Prerequisite	Description	Selection / User interface / User entry	Factory setting
Measuring value at minimum frequency	The **Frequency** option is selected in the **Operating mode** parameter (→ 🖺 95) and a process variable is selected in the **Assign frequency output** parameter (→ 🖺 97).	Enter measured value for minmum frequency.	Signed floating-point number	Depends on country and nominal diameter
Measuring value at maximum frequency	The **Frequency** option is selected in the **Operating mode** parameter (→ 🖺 95) and a process variable is selected in the **Assign frequency output** parameter (→ 🖺 97).	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 (→ 🖺 95) and a process variable is selected in the **Assign frequency output** parameter (→ 🖺 97).	Define output behavior in alarm condition.	• Actual value • Defined value • 0 Hz	–
Failure frequency	In the **Operating mode** parameter (→ 🖺 95), the **Frequency** option is selected, in the **Assign frequency output** parameter (→ 🖺 97) a process variable is selected, and in the **Failure mode** parameter, the **Defined value** option is selected.	Enter frequency output value in alarm condition.	0.0 to 12 500.0 Hz	–
Invert output signal	–	Invert the output signal.	• No • Yes	–

*   Visibility depends on order options or device settings

Configuring the switch output

**Navigation**

"Setup" menu → Pulse/frequency/switch output

| ▶ Pulse/frequency/switch output 1 to n		
	Operating mode	→ 🗎 99
	Terminal number	→ 🗎 99
	Signal mode	→ 🗎 99
	Switch output function	→ 🗎 100
	Assign diagnostic behavior	→ 🗎 100
	Assign limit	→ 🗎 100
	Assign flow direction check	→ 🗎 100
	Assign status	→ 🗎 100
	Switch-on value	→ 🗎 100
	Switch-off value	→ 🗎 100
	Switch-on delay	→ 🗎 100
	Switch-off delay	→ 🗎 101
	Failure mode	→ 🗎 101
	Invert output signal	→ 🗎 101

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 • Frequency • Switch	–
Terminal number	–	Shows the terminal numbers used by the PFS output module.	• Not used • 24-25 (I/O 2)	–
Signal mode	–	Select the signal mode for the PFS output.	• Passive • Active	–

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 • On • Diagnostic behavior • Limit • Flow direction check • Status	–
Assign diagnostic behavior	• In the **Operating mode** parameter, the **Switch** option is selected. • In the **Switch output function** parameter, the **Diagnostic behavior** option is selected.	Select diagnostic behavior for switch output.	• Alarm • Alarm or warning • Warning	–
Assign limit	• The **Switch** option is selected in **Operating mode** parameter. • The **Limit** option is selected in **Switch output function** parameter.	Select process variable for limit function.	• Off • Volume flow • Mass flow • Corrected volume flow • Flow velocity • Conductivity * • Corrected conductivity * • Totalizer 1 • Totalizer 2 • Totalizer 3 • Temperature * • Electronic temperature	–
Assign flow direction check	• The **Switch** option is selected in the **Operating mode** parameter. • The **Flow direction check** option is selected in the **Switch output function** parameter.	Select process variable for flow direction monitoring.		–
Assign status	• The **Switch** option is selected in **Operating mode** parameter. • The **Status** option is selected in **Switch output function** parameter.	Select device status for switch output.	• Partially filled pipe detection • Low flow cut off • Digital output 3 *	–
Switch-on value	• The **Switch** option is selected in the **Operating mode** parameter. • The **Limit** option is selected in the **Switch output function** parameter.	Enter measured value for the switch-on point.	Signed floating-point number	Depends on country: • 0 l/h • 0 gal/min (us)
Switch-off value	• The **Switch** option is selected in the **Operating mode** parameter. • The **Limit** option is selected in the **Switch output function** parameter.	Enter measured value for the switch-off point.	Signed floating-point number	Depends on country: • 0 l/h • 0 gal/min (us)
Switch-on delay	• The **Switch** option is selected in the **Operating mode** parameter. • 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	–

Parameter	Prerequisite	Description	Selection / User interface / User entry	Factory setting
Switch-off delay	• The **Switch** option is selected in the **Operating mode** parameter. • 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	–
Failure mode	–	Define output behavior in alarm condition.	• Actual status • Open • Closed	–
Invert output signal	–	Invert the output signal.	• No • Yes	–

*   Visibility depends on order options or device settings

10.6.10 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

▶ Relay output 1 to n	
Terminal number	→ 🖺 102
Relay output function	→ 🖺 102
Assign flow direction check	→ 🖺 102
Assign limit	→ 🖺 102
Assign diagnostic behavior	→ 🖺 102
Assign status	→ 🖺 102
Switch-off value	→ 🖺 102
Switch-off delay	→ 🖺 102
Switch-on value	→ 🖺 102
Switch-on delay	→ 🖺 102
Failure mode	→ 🖺 102
Switch status	→ 🖺 102
Powerless relay status	→ 🖺 102

Parameter overview with brief description

Parameter	Prerequisite	Description	User interface / Selection / User entry	Factory setting
Terminal number	–	Shows the terminal numbers used by the relay output module.	• Not used • 24-25 (I/O 2)	–
Relay output function	–	Select the function for the relay output.	• Closed • Open • Diagnostic behavior • Limit • Flow direction check • Digital Output	–
Assign flow direction check	The **Flow direction check** option is selected in the **Relay output function** parameter.	Select process variable for flow direction monitoring.		–
Assign limit	The **Limit** option is selected in **Relay output function** parameter.	Select process variable for limit function.	• Off • Volume flow • Mass flow • Corrected volume flow • Flow velocity • Conductivity * • Corrected conductivity * • Totalizer 1 • Totalizer 2 • Totalizer 3 • Temperature * • Electronic temperature	–
Assign diagnostic behavior	In the **Relay output function** parameter, the **Diagnostic behavior** option is selected.	Select diagnostic behavior for switch output.	• Alarm • Alarm or warning • Warning	–
Assign status	In the **Relay output function** parameter, the **Digital Output** option is selected.	Select device status for switch output.	• Partially filled pipe detection • Low flow cut off • Digital output 3 *	–
Switch-off value	The **Limit** option is selected in the **Relay output function** parameter.	Enter measured value for the switch-off point.	Signed floating-point number	Depends on country: • 0 l/h • 0 gal(us)/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	–
Switch-on value	The **Limit** option is selected in the **Relay output function** parameter.	Enter measured value for the switch-on point.	Signed floating-point number	Depends on country: • 0 l/h • 0 gal(us)/min
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	–
Failure mode	–	Define output behavior in alarm condition.	• Actual status • Open • Closed	–
Switch status	–	Shows the current relay switch status.	• Open • Closed	–
Powerless relay status	–		• Open • Closed	–

* Visibility depends on order options or device settings

10.6.11 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 1 bargraph + 1 value 2 values 1 value large + 2 values 4 values	–
Value 1 display	A local display is provided.	Select the measured value that is shown on the local display.	- Volume flow - Mass flow - Corrected volume flow - Flow velocity - Corrected conductivity [*] - Totalizer 1 - Totalizer 2 - Totalizer 3 - Current output 1 [*] - Temperature [*] - Electronic temperature	–
0% bargraph value 1	A local display is provided.	Enter 0% value for bar graph display.	Signed floating-point number	Country-specific: 0 l/h 0 gal/min (us)

Parameter	Prerequisite	Description	Selection / User entry	Factory setting
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 **Value 1 display** parameter (→ 🗎 103)	–
Value 3 display	A local display is provided.	Select the measured value that is shown on the local display.	For the picklist, see **Value 1 display** parameter (→ 🗎 103)	–
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: • 0 l/h • 0 gal/min (us)
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	–
Value 4 display	A local display is provided.	Select the measured value that is shown on the local display.	For the picklist, see **Value 1 display** parameter (→ 🗎 103)	–
Value 5 display	A local display is provided.	Select the measured value that is shown on the local display.	For the picklist, see **Value 1 display** parameter (→ 🗎 103)	–
Value 6 display	A local display is provided.	Select the measured value that is shown on the local display.	For the picklist, see **Value 1 display** parameter (→ 🗎 103)	–
Value 7 display	A local display is provided.	Select the measured value that is shown on the local display.	For the picklist, see **Value 1 display** parameter (→ 🗎 103)	–
Value 8 display	A local display is provided.	Select the measured value that is shown on the local display.	For the picklist, see **Value 1 display** parameter (→ 🗎 103)	–

* Visibility depends on order options or device settings

10.6.12 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

```
▸ Low flow cut off

        Assign process variable                          → 🗎 105

        On value low flow cutoff                         → 🗎 105
```

Off value low flow cutoff	→ 🖹 105
Pressure shock suppression	→ 🖹 105

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 • Volume flow • Mass flow • Corrected volume flow	–
On value low flow cutoff	A process variable is selected in the **Assign process variable** parameter (→ 🖹 105).	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 (→ 🖹 105).	Enter off value for low flow cut off.	0 to 100.0 %	–
Pressure shock suppression	A process variable is selected in the **Assign process variable** parameter (→ 🖹 105).	Enter time frame for signal suppression (= active pressure shock suppression).	0 to 100 s	–

10.6.13 Configuring empty pipe detection

ℹ The measuring instruments are calibrated with water (approx. 500 μS/cm) at the factory. For liquids with a lower conductivity, it is advisable to perform a new full pipe adjustment onsite.

The **Empty pipe detection** submenu contains parameters that must be configured for the configuration of empty pipe detection.

Navigation
"Setup" menu → Empty pipe detection

▶ Empty pipe detection		
Empty pipe detection	→ 🖺 106	
New adjustment	→ 🖺 106	
Progress	→ 🖺 106	
Switch point empty pipe detection	→ 🖺 106	
Response time empty pipe detection	→ 🖺 106	

Parameter overview with brief description

Parameter	Prerequisite	Description	Selection / User interface / User entry	Factory setting
Empty pipe detection	–	Switch empty pipe detection on and off.	• Off • On	–
New adjustment	The **On** option is selected in the **Empty pipe detection** parameter.	Select type of adjustment.	• Cancel • Empty pipe adjust • Full pipe adjust	–
Progress	The **On** option is selected in the **Empty pipe detection** parameter.	Shows the progress.	• Ok • Busy • Not ok	–
Switch point empty pipe detection	The **On** option is selected in the **Empty pipe detection** parameter.	Enter hysteresis in %, below this value the measuring tube will detected as empty.	0 to 100 %	–
Response time empty pipe detection	A process variable is selected in the **Assign process variable** parameter (→ 🖺 106).	Use this function to enter the minimum time (hold time) the signal must be present before diagnostic message S962 "Empty pipe" is triggered in the event of a partially filled or empty measuring pipe.	0 to 100 s	–

10.7   Advanced settings

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

Navigation to the "Advanced setup" submenu
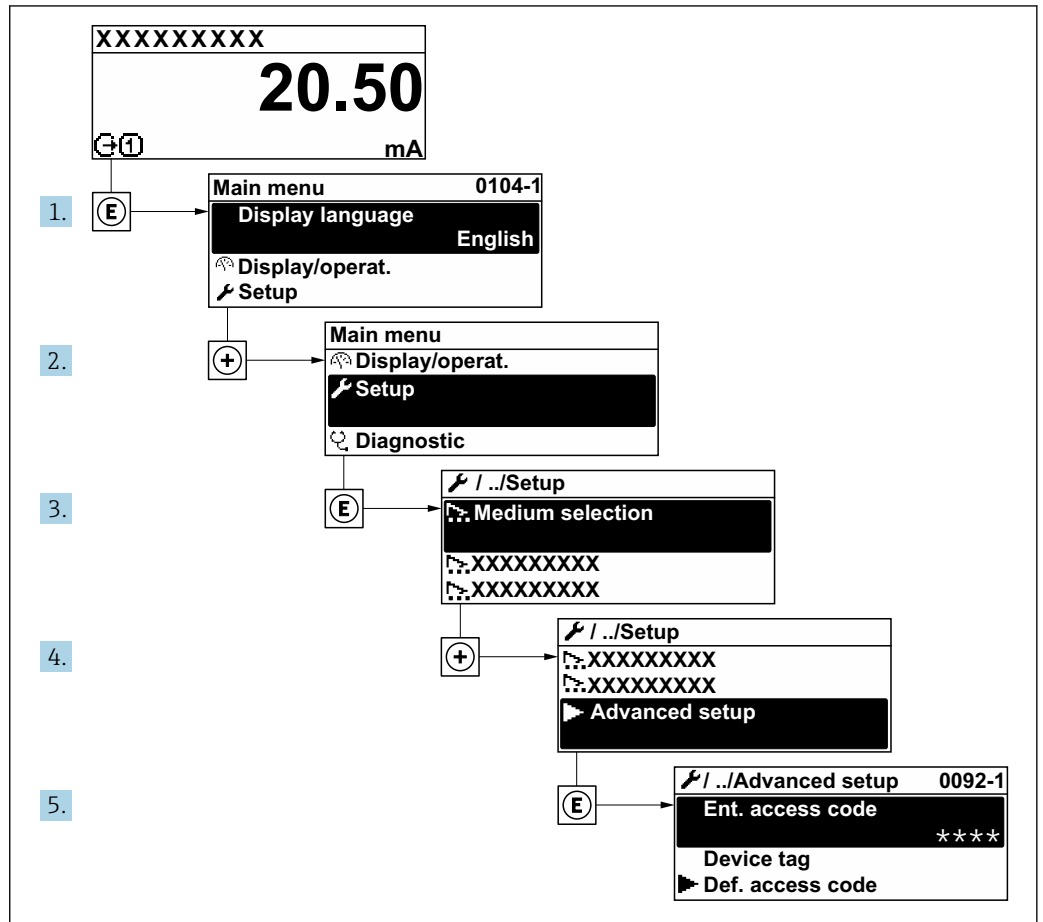
A0032223-EN

ℹ️ The number of submenus and parameters can vary depending on the device version. Certain submenus and parameters in these submenus are not described in the Operating Instructions. Instead a description is provided in the Special Documentation for the device ("Supplementary documentation").

Navigation
"Setup" menu → Advanced setup
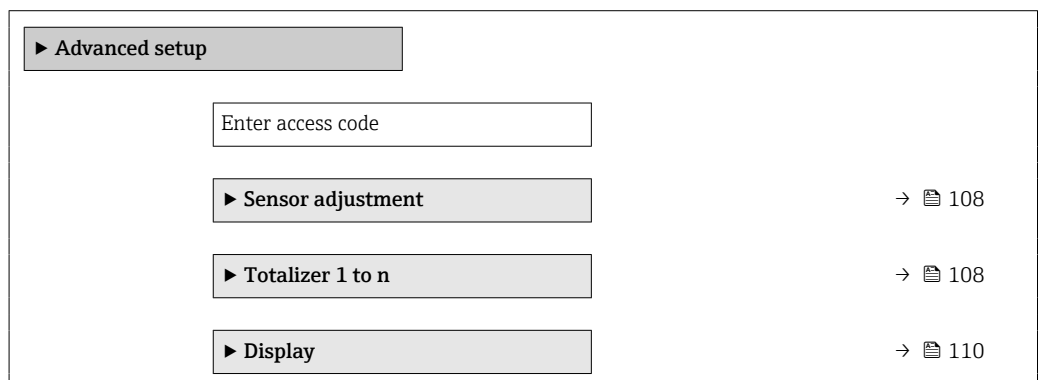
▶ Electrode cleaning circuit	→ 🖺 113	
▶ WLAN settings	→ 🖺 113	
▶ Heartbeat setup		
▶ Configuration backup	→ 🖺 115	
▶ Administration	→ 🖺 117	

10.7.1 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

▶ Sensor adjustment		
	Installation direction	→ 🖺 108

Parameter overview with brief description

Parameter	Description	Selection
Installation direction	Set sign of flow direction to match the direction of the arrow on the sensor.	• Flow in arrow direction • Flow against arrow direction

10.7.2 Configuring the totalizer

In the **"Totalizer 1 to n" submenu**, you can configure the specific totalizer.

Navigation

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

▶ Totalizer 1 to n		
	Assign process variable	→ 🖺 109
	Unit totalizer	→ 🖺 109
	Totalizer operation mode	→ 🖺 109
	Control Totalizer 1 to n	→ 🖺 109
	Failure mode	→ 🖺 109

Parameter overview with brief description

Parameter	Description	Selection	Factory setting
Assign process variable	Select process variable for totalizer.	• Volume flow • Mass flow • Corrected volume flow	–
Unit totalizer	Select the unit for the process variable of the totalizer.	Unit choose list	Country-specific: • m³ • ft³
Control Totalizer 1 to n	Control the totalizer value.	• Totalize • Reset + hold • Preset + hold	–
Totalizer operation mode	Select totalizer calculation mode.	• Net flow total • Forward flow total • Reverse flow total • Last valid value	–
Failure mode	Define the totalizer behavior in the event of a device alarm.	• Stop • Actual value • Last valid value	–

10.7.3 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

▸ Display	
Format display	
Value 1 display	
0% bargraph value 1	
100% bargraph value 1	
Decimal places 1	
Value 2 display	
Decimal places 2	
Value 3 display	
0% bargraph value 3	
100% bargraph value 3	
Decimal places 3	
Value 4 display	
Decimal places 4	
Display language	
Display interval	
Display damping	
Header	
Header text	
Separator	
Backlight	

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 • 1 bargraph + 1 value • 2 values • 1 value large + 2 values • 4 values	–
Value 1 display	A local display is provided.	Select the measured value that is shown on the local display.	• Volume flow • Mass flow • Corrected volume flow • Flow velocity • Corrected conductivity * • Totalizer 1 • Totalizer 2 • Totalizer 3 • Current output 1 * • Temperature * • Electronic temperature	–
0% bargraph value 1	A local display is provided.	Enter 0% value for bar graph display.	Signed floating-point number	Country-specific: • 0 l/h • 0 gal/min (us)
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 • x.x • x.xx • x.xxx • x.xxxx	–
Value 2 display	A local display is provided.	Select the measured value that is shown on the local display.	For the picklist, see **Value 1 display** parameter (→ 🖹 103)	–
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 • x.x • x.xx • x.xxx • x.xxxx	–
Value 3 display	A local display is provided.	Select the measured value that is shown on the local display.	For the picklist, see **Value 1 display** parameter (→ 🖹 103)	–
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: • 0 l/h • 0 gal/min (us)
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	–
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 • x.x • x.xx • x.xxx • x.xxxx	–

Parameter	Prerequisite	Description	Selection / User entry	Factory setting
Value 4 display	A local display is provided.	Select the measured value that is shown on the local display.	For the picklist, see **Value 1 display** parameter (→ 🖺 103)	–
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 ▪ x.x ▪ x.xx ▪ x.xxx ▪ x.xxxx	–
Display language	A local display is provided.	Set display language.	▪ English ▪ Deutsch * ▪ Français * ▪ Español * ▪ Italiano * ▪ Nederlands * ▪ Portuguesa * ▪ Polski * ▪ русский язык (Russian) * ▪ Svenska * ▪ Türkçe * ▪ 中文 (Chinese) * ▪ 日本語 (Japanese) * ▪ 한국어 (Korean) * ▪ tiếng Việt (Vietnamese) * ▪ 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	–
Display damping	A local display is provided.	Set display reaction time to fluctuations in the measured value.	0.0 to 999.9 s	–
Header	A local display is provided.	Select header contents on local display.	▪ Device tag ▪ Free text	–
Header text	The **Free text** option is selected in the **Header** parameter.	Enter display header text.	Max. 12 characters, such as letters, numbers or special characters (e.g. @, %, /)	–
Separator	A local display is provided.	Select decimal separator for displaying numerical values.	▪ . (point) ▪ , (comma)	. (point)
Backlight	One of the following conditions is met: ▪ Order code for "Display; operation", option **F** "4-line, illum.; touch control" ▪ Order code for "Display; operation", option **G** "4-line, illum.; touch control +WLAN" ▪ Order code for "Display; operation", option **O** "Remote display 4-line illuminated; 10m/30ft cable; touch control"	Switch the local display backlight on and off.	▪ Disable ▪ Enable	–

*　Visibility depends on order options or device settings

10.7.4 Performing electrode cleaning

The **Electrode cleaning cycle** submenu contains the parameters that must be set for the configuration of electrode cleaning.

The submenu is only available if the device was ordered with electrode cleaning.

Navigation

"Setup" menu → Advanced setup → Electrode cleaning cycle

▶ Electrode cleaning circuit	
Electrode cleaning circuit	→ 🖺 113
ECC duration	→ 🖺 113
ECC recovery time	→ 🖺 113
ECC cleaning cycle	→ 🖺 113
ECC Polarity	→ 🖺 113

Parameter overview with brief description

Parameter	Prerequisite	Description	Selection / User entry / User interface	Factory setting
Electrode cleaning circuit	For the following order code: "Application package", option **EC** "ECC electrode cleaning"	Enable the cyclic electrode cleaning circuit.	• Off • On	On
ECC duration	For the following order code: "Application package", option **EC** "ECC electrode cleaning"	Enter the duration of electrode cleaning in seconds.	0.01 to 30 s	–
ECC recovery time	For the following order code: "Application package", option **EC** "ECC electrode cleaning"	Define recovery time after electrode cleaning. During this time the current output values will be held at last valid value.	1 to 600 s	–
ECC cleaning cycle	For the following order code: "Application package", option **EC** "ECC electrode cleaning"	Enter the pause duration between electrode cleaning cycles.	0.5 to 168 h	–
ECC Polarity	For the following order code: "Application package", option **EC** "ECC electrode cleaning"	Select the polarity of the electrode cleaning circuit.	• Positive • Negative	Depends on the electrode material: • Tantalum: **Negative** option • Platinum, Alloy C22, stainless steel: **Positive** option

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

▶ WLAN settings		
	WLAN	→ 🗎 114
	WLAN mode	→ 🗎 114
	SSID name	→ 🗎 114
	Network security	→ 🗎 115
	Security identification	→ 🗎 115
	User name	→ 🗎 115
	WLAN password	→ 🗎 115
	WLAN IP address	→ 🗎 115
	WLAN MAC address	→ 🗎 115
	WLAN passphrase	→ 🗎 115
	Assign SSID name	→ 🗎 115
	SSID name	→ 🗎 115
	Connection state	→ 🗎 115
	Received signal strength	→ 🗎 115

Parameter overview with brief description

Parameter	Prerequisite	Description	Selection / User entry / User interface	Factory setting
WLAN	–	Switch WLAN on and off.	• Disable • Enable	–
WLAN mode	–	Select WLAN mode.	• WLAN access point • WLAN Client	–
SSID name	The client is activated.	Enter the user-defined SSID name (max. 32 characters).	–	–

Parameter	Prerequisite	Description	Selection / User entry / User interface	Factory setting
Network security	–	Select the security type of the WLAN network.	• Unsecured • WPA2-PSK • EAP-PEAP with MSCHAPv2 * • EAP-PEAP MSCHAPv2 no server authentic. * • EAP-TLS *	–
Security identification	–	Select security settings and download these settings via menu Data management > Security > WLAN.	• Trusted issuer certificate • Device certificate • Device private key	–
User name	–	Enter user name.	–	–
WLAN password	–	Enter WLAN password.	–	–
WLAN IP address	–	Enter IP address of the device WLAN interface.	4 octet: 0 to 255 (in the particular octet)	–
WLAN MAC address	–		Unique 12-digit character string comprising letters and numbers	Each measuring device is given an individual address.
WLAN passphrase	The **WPA2-PSK** option is selected in the **Security type** parameter.	Enter the network key (8 to 32 characters). 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 (without spaces)	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 • User-defined	–
SSID name	• The **User-defined** option is selected in the **Assign SSID name** parameter. • The **WLAN access point** option is selected in the **WLAN mode** parameter.	Enter the user-defined SSID name (max. 32 characters). 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_Promag_300_A 802000)
Connection state	–	Displays the connection status.	• Connected • Not connected	–
Received signal strength	–	Shows the received signal strength.	• Low • Medium • High	–

*   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. The device configuration is managed via the **Configuration management** parameter.

Navigation

"Setup" menu → Advanced setup → Configuration backup

▶ Configuration backup	
Operating time	→ 🖺 116
Last backup	→ 🖺 116
Configuration management	→ 🖺 116
Backup state	→ 🖺 116
Comparison result	→ 🖺 116

Parameter overview with brief description

Parameter	Description	User interface / Selection
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 • Execute backup • Restore * • Compare * • Clear backup data
Backup state	Shows the current status of data saving or restoring.	• None • Backup in progress • Restoring in progress • Delete in progress • Compare in progress • Restoring failed • Backup failed
Comparison result	Comparison of current device data with HistoROM backup.	• Settings identical • Settings not identical • No backup available • Backup settings corrupt • Check not done • Dataset incompatible

*   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.

Options	Description
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

▶ Administration	
▶ Define access code	→ 🗎 117
▶ Reset access code	→ 🗎 118
Device reset	→ 🗎 118

Using the parameter to define the access code

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

▶ Define access code	
Define access code	→ 🗎 117
Confirm access code	→ 🗎 117

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

```
▶ Reset access code

                          Operating time                        → 🖻 118

                          Reset access code                     → 🖻 118
```

Parameter overview with brief description

Parameter	Description	User interface / User entry
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. ℹ️ For a reset code, contact your Endress+Hauser service organization. The reset code can only be entered via: • Web browser • DeviceCare, FieldCare (via CDI-RJ45 service interface) • Fieldbus	Character string comprising numbers, letters and special characters

Using the parameter to reset the device

Navigation

"Setup" menu → Advanced setup → Administration

Parameter overview with brief description

Parameter	Description	Selection
Device reset	Reset the device configuration - either entirely or in part - to a defined state.	• Cancel • To delivery settings • Restart device • Restore S-DAT backup *

*   Visibility depends on order options or device settings

10.8   Simulation

Via the **Simulation** submenu, it is possible to simulate various process variables in the process and the device alarm mode and verify downstream signal chains (switching valves or closed-control loops). The simulation can be performed without a real measurement (no flow of medium through the device).

Navigation
"Diagnostics" menu → Simulation

‣ Simulation		
	Assign simulation process variable	→ 🖹 120
	Process variable value	→ 🖹 120
	Status input simulation	→ 🖹 121
	Input signal level	→ 🖹 121
	Current input 1 to n simulation	→ 🖹 120
	Value current input 1 to n	→ 🖹 120
	Current output 1 to n simulation	→ 🖹 120
	Value current output 1 to n	→ 🖹 120
	Frequency output simulation 1 to n	→ 🖹 120
	Frequency value 1 to n	→ 🖹 120
	Pulse output simulation 1 to n	→ 🖹 120
	Pulse value 1 to n	→ 🖹 120
	Switch output simulation 1 to n	→ 🖹 120
	Switch status 1 to n	→ 🖹 120
	Relay output 1 to n simulation	→ 🖹 120
	Switch status 1 to n	→ 🖹 120
	Device alarm simulation	→ 🖹 120
	Diagnostic event category	→ 🖹 120
	Diagnostic event simulation	→ 🖹 120

Parameter overview with brief description

Parameter	Prerequisite	Description	Selection / User entry
Assign simulation process variable	–	Select a process variable for the simulation process that is activated.	• Off • Volume flow • Mass flow • Corrected volume flow • Flow velocity • Conductivity * • Corrected conductivity * • Temperature *
Process variable value	A process variable is selected in the **Assign simulation process variable** parameter (→ 🖹 120).	Enter the simulation value for the selected process variable.	Depends on the process variable selected
Current output 1 to n simulation	–	Switch the simulation of the current output on and off.	• Off • On
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
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 • On
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
Pulse output simulation 1 to n	In the **Operating mode** parameter, the **Pulse** option is selected.	Set and switch off the pulse output simulation. For **Fixed value** option: **Pulse width** parameter (→ 🖹 96) defines the pulse width of the pulses output.	• Off • Fixed value • Down-counting value
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
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 • On
Switch status 1 to n	–	Select the status of the status output for the simulation.	• Open • Closed
Relay output 1 to n simulation	–	Switch simulation of the relay output on and off.	• Off • On
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 • Closed
Device alarm simulation	–	Switch the device alarm on and off.	• Off • On
Diagnostic event category	–	Select a diagnostic event category.	• Sensor • Electronics • Configuration • Process
Diagnostic event simulation	–	Select a diagnostic event to simulate this event.	• Off • Diagnostic event picklist (depends on the category selected)
Current input 1 to n simulation	–	Switch simulation of the current input on and off.	• Off • On
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

Parameter	Prerequisite	Description	Selection / User entry
Status input simulation	–	Switch simulation of the status input on and off.	• Off • On
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 • Low

*   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 → 🖺 121
• Protect access to local operation via key locking → 🖺 59
• Protect access to measuring device via write protection switch → 🖺 122

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 the local display

1. Navigate to the **Define access code** parameter (→ 🖺 117).

2. Maximum of 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 (→ 🖺 117) to confirm.
   ↳ The 🖉 symbol appears in front of all write-protected parameters.

🛈   • Disabling parameter write protection via access code → 🖺 58.
       • If the access code is lost: Resetting the access code → 🖺 122.
       • The user role with which the user is currently logged in is displayed in **Access status** parameter.
          • Navigation path: Operation → Access status
          • User roles and their access rights → 🖺 58

• 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.

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.

Parameters for configuring the language	Parameters for configuring the local display	Parameters for configuring the totalizer
↓	↓	↓
Display language	Format display	Control Totalizer
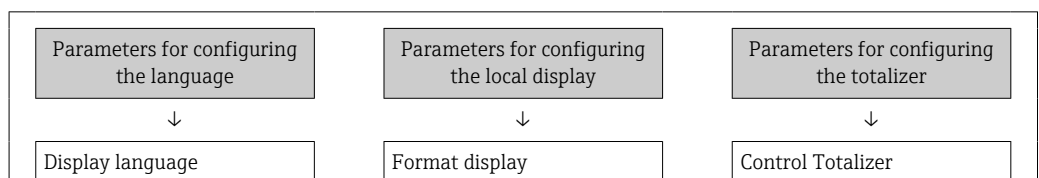
Contrast display	Preset value
Display interval	

Defining the access code via the web browser

1. Navigate to the **Define access code** parameter (→ 🖹 117).

2. Define a 16-digit (max.) numeric code as the access code.

3. Enter the access code again in the **Confirm access code** parameter (→ 🖹 117) to confirm.
   ↳ The web browser switches to the login page.

ℹ️ • Disabling parameter write protection via access code → 🖹 58.
   • If the access code is lost: Resetting the access code → 🖹 122.
   • The **Access status** parameter shows which user role the user is currently logged in with.
      • Navigation path: Operation → Access status
      • User roles and their access rights → 🖹 58

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

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

ℹ️ You can only obtain a reset code from your local Endress+Hauser service organization. The code must be calculated explicitly for every device.

1. Note down the serial number of the device.

2. Read off the **Operating time** parameter.

3. Contact the local Endress+Hauser service organization and tell them the serial number and the operating time.
   ↳ Get the calculated reset code.

4. Enter the reset code in the **Reset access code** parameter (→ 🖹 118).
   ↳ The access code has been reset to the factory setting **0000**. It can be redefined → 🖹 121.

ℹ️ For IT security reasons, the calculated reset code is only valid for 96 hours from the specified operating time and for the specific serial number. If you cannot return to the device within 96 hours, you should either increase the operating time you read out by a few days or switch off the device.

10.9.2 Write protection via write protection switch

Unlike parameter write protection via a user-specific access code, this allows the user to lock write access to the entire operating menu - apart from the **"Contrast display" parameter**.

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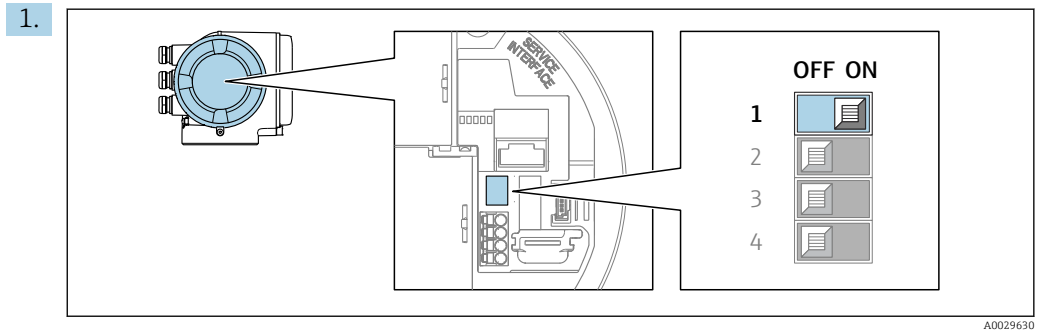
Setting the write protection (WP) switch on the main electronics module to the **ON** position enables hardware write protection.

↳ In the **Locking status** parameter, the **Hardware locked** option is displayed → 🗎 124. 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
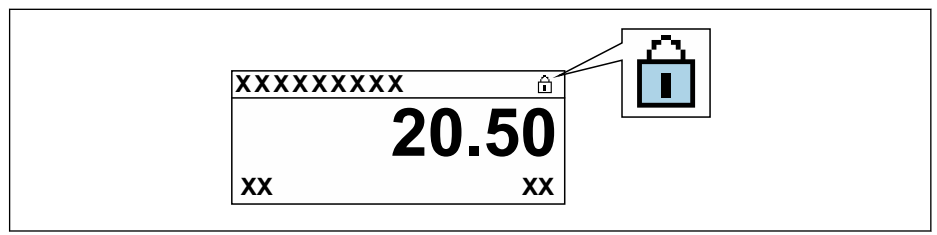
2. Setting the write protection (WP) switch on the main electronics module to the **OFF** position (factory setting) disables hardware write protection.

↳ No option is displayed in the **Locking status** parameter → 🗎 124. 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 off 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 authorization displayed in the **Access status** parameter applies → 🖺 58. 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) → 🖺 122.
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 → 🖺 83
- For information on the operating languages supported by the measuring device → 🖺 201

11.3 Configuring the display

Detailed information:
- On the basic settings for the local display → 🖺 103
- On the advanced settings for the local display → 🖺 110

11.4 Reading off measured values

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

Navigation
"Diagnostics" menu → Measured values

▶ Measured values	
▶ Process variables	→ 🖺 125
▶ Totalizer 1 to n	→ 🖺 108
▶ Input values	→ 🖺 127
▶ Output values	→ 🖺 128

11.4.1   "Process variables" submenu

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

Navigation

"Diagnostics" menu → Measured values → Process variables

Parameter overview with brief description

Parameter	Prerequisite	Description	User interface
Volume flow	–	Displays the volume flow that is currently measured. *Dependency* The unit is taken from: **Volume flow unit** parameter (→ 🖺 87)	Signed floating-point number
Mass flow	–	Displays the mass flow that is currently calculated. *Dependency* The unit is taken from the **Mass flow unit** parameter (→ 🖺 87).	Signed floating-point number
Corrected volume flow	–	Displays the corrected volume flow that is currently calculated. *Dependency* The unit is taken from: **Corrected volume flow unit** parameter (→ 🖺 87)	Signed floating-point number
Flow velocity	–	Displays the flow velocity that is currently calculated.	Signed floating-point number
Conductivity	–	Displays the conductivity that is currently measured. *Dependency* The unit is taken from the **Conductivity unit** parameter (→ 🖺 87).	Signed floating-point number

Parameter	Prerequisite	Description	User interface
Corrected conductivity	One of the following conditions is met: • Order code for "Sensor option", option **CI** "Medium temperature measurement" or • The temperature is read into the flowmeter from an external device.	Displays the conductivity currently corrected. *Dependency* The unit is taken from: **Conductivity unit** parameter (→ 🖺 87)	Positive floating-point number
Temperature	One of the following conditions is met: • Order code for "Sensor option", option **CI** "Medium temperature measurement" or • The temperature is read into the flowmeter from an external device.	Displays the temperature that is currently calculated. *Dependency* The unit is taken from: **Temperature unit** parameter (→ 🖺 87)	Positive floating-point number
Density	–	Displays the current fixed density or density read in from an external device. *Dependency* The unit is taken from: **Density unit** parameter	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

```
▶ Totalizer

        Assign process variable 1 to n

        Totalizer 1 to n value

        Totalizer 1 to n status

        Totalizer 1 to n status (Hex)
```

Parameter overview with brief description

Parameter	Prerequisite	Description	Selection / User entry / User interface
Assign process variable	–	Select process variable for totalizer.	• Volume flow • Mass flow • Corrected volume flow
Totalizer value 1 to n	One of the following options is selected in the **Assign process variable** parameter: • Volume flow • Mass flow • Corrected volume flow	Displays the current totalizer counter value.	Signed floating-point number

Parameter	Prerequisite	Description	Selection / User entry / User interface
Totalizer status 1 to n	–	Displays the current totalizer status.	• Good • Uncertain • 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

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

        ▶ Current input 1 to n                    →  🗎 127

        ▶ Status input 1 to n                     →  🗎 127
```
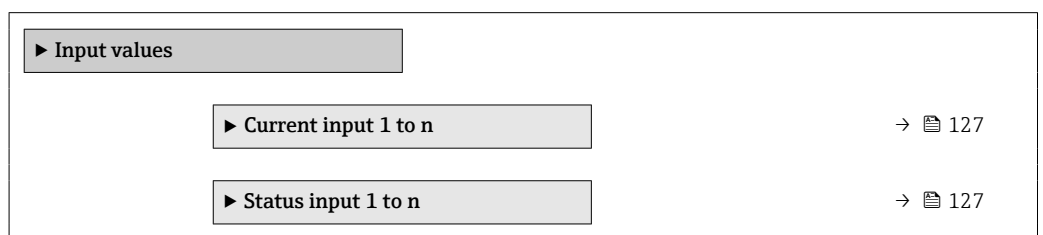
Input values of current input

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

```
▶ Current input 1 to n

            Measured values 1 to n                →  🗎 127

            Measured current 1 to n               →  🗎 127
```
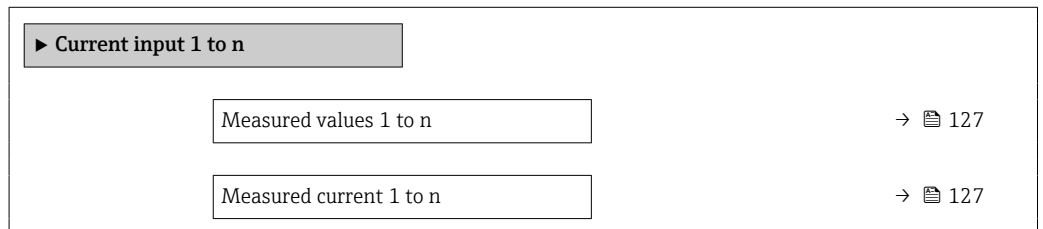
Parameter overview with brief description

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

▶ **Status input 1 to n**	
Value status input	→ 🗎 128
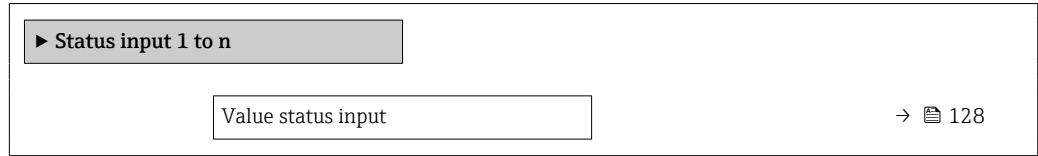
Parameter overview with brief description

Parameter	Description	User interface
Value status input	Shows the current input signal level.	• High • 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**	
▶ **Current output 1 to n**	→ 🗎 128
▶ **Pulse/frequency/switch output 1 to n**	→ 🗎 129
▶ **Relay output 1 to n**	→ 🗎 129
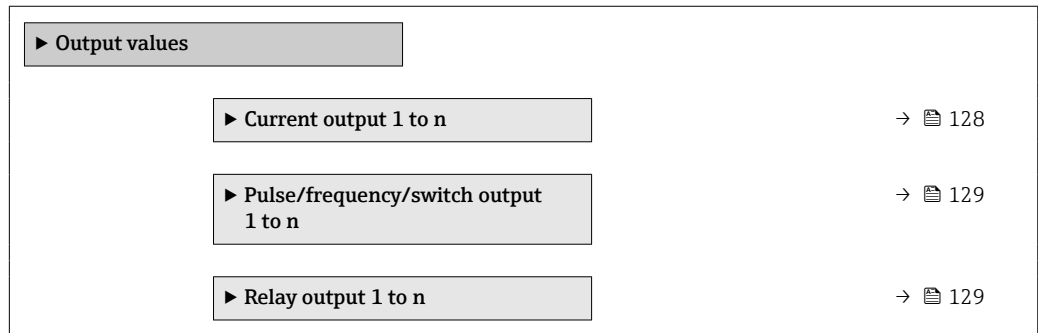
Output values of current output

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
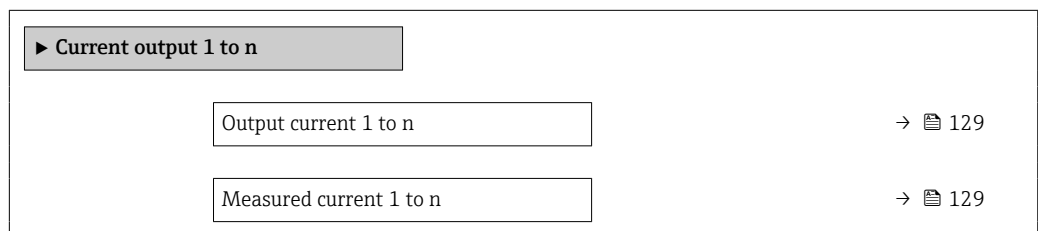
▶ **Current output 1 to n**	
Output current 1 to n	→ 🗎 129
Measured current 1 to n	→ 🗎 129

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

► Pulse/frequency/switch output 1 to n		
	Output frequency 1 to n	→ 🖺 129
	Pulse output 1 to n	→ 🖺 129
	Switch status 1 to n	→ 🖺 129

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 • 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

| ► Relay output 1 to n		
	Switch status	→ 🖺 130
	Switch cycles	→ 🖺 130
	Max. switch cycles number	→ 🖺 130

Parameter overview with brief description

Parameter	Description	User interface
Switch status	Shows the current relay switch status.	• Open • 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 (→ 🗎 84)
- Advanced settings using the **Advanced setup** submenu (→ 🗎 107)

11.6 Performing a totalizer reset

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

Function range of "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

► Totalizer handling		
	Control Totalizer 1 to n	→ 🗎 131
	Preset value 1 to n	→ 🗎 131
	Reset all totalizers	→ 🗎 131

Parameter overview with brief description

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

11.7 Displaying the measured value history

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 → 🖺 68.
- Web browser

Function range
- A total of 1000 measured values can be stored
- 4 logging channels
- Adjustable logging interval for data logging
- Measured value trend for each logging channel displayed in the form of a chart
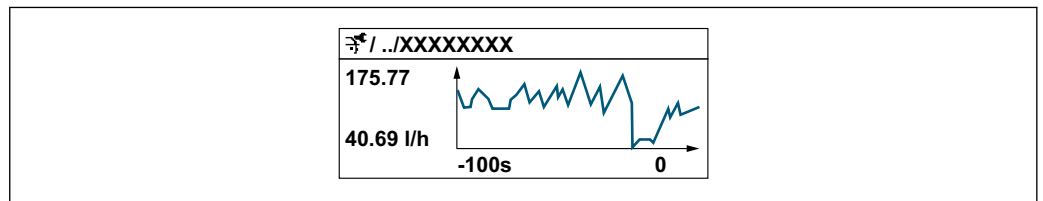
- x-axis: depending on the number of channels selected displays 250 to 1000 measured values of a process variable.
- y-axis: displays the approximate measured value span and constantly adapts this to the ongoing measurement.

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
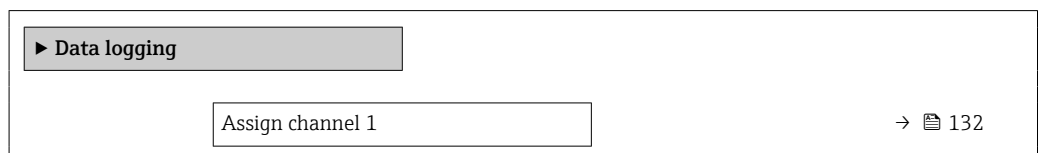
Assign channel 2	→ ▤ 132	
Assign channel 3	→ ▤ 133	
Assign channel 4	→ ▤ 133	
Logging interval	→ ▤ 133	
Clear logging data	→ ▤ 133	
Data logging	→ ▤ 133	
Logging delay	→ ▤ 133	
Data logging control	→ ▤ 133	
Data logging status	→ ▤ 133	
Entire logging duration	→ ▤ 133	
▶ Display channel 1		
▶ Display channel 2		
▶ Display channel 3		
▶ Display channel 4		

Parameter overview with brief description

Parameter	Prerequisite	Description	Selection / User entry / User interface
Assign channel 1	The **Extended HistoROM** application package is available.	Assign process variable to logging channel.	• Off • Volume flow • Mass flow • Corrected volume flow • Flow velocity • Conductivity[*] • Corrected conductivity[*] • Electronic temperature • Current output 1[*] • Temperature[*]
Assign channel 2	The **Extended HistoROM** application package is available. ℹ The software options currently enabled are displayed in the **Software option overview** parameter.	Assign a process variable to logging channel.	For the picklist, see **Assign channel 1** parameter (→ ▤ 132)

Parameter	Prerequisite	Description	Selection / User entry / User interface
Assign channel 3	The **Extended HistoROM** application package is available. ℹ The software options currently enabled are displayed in the **Software option overview** parameter.	Assign a process variable to logging channel.	For the picklist, see **Assign channel 1** parameter (→ 🖺 132)
Assign channel 4	The **Extended HistoROM** application package is available. ℹ The software options currently enabled are displayed in the **Software option overview** parameter.	Assign a process variable to logging channel.	For the picklist, see **Assign channel 1** parameter (→ 🖺 132)
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
Clear logging data	The **Extended HistoROM** application package is available.	Clear the entire logging data.	• Cancel • Clear data
Data logging	–	Select the type of data logging.	• Overwriting • Not 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
Data logging control	In the **Data logging** parameter, the **Not overwriting** option is selected.	Start and stop measured value logging.	• None • Delete + start • Stop
Data logging status	In the **Data logging** parameter, the **Not overwriting** option is selected.	Displays the measured value logging status.	• Done • Delay active • Active • Stopped
Entire logging duration	In the **Data logging** parameter, the **Not overwriting** option is selected.	Displays the total logging duration.	Positive floating-point number

*   Visibility depends on order options or device settings

12 Diagnostics and troubleshooting

12.1 General troubleshooting

For local display

Error	Possible causes	Remedial action
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 dark and no output signals	Supply voltage does not match the voltage specified on the nameplate.	Apply the correct supply voltage → 🖹 33.
Local display dark and no output signals	Supply voltage has incorrect polarity.	Reverse polarity of supply voltage.
Local display dark and no output signals	No contact between connecting cables and terminals.	Ensure electrical contact between the cable and the terminal.
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 → 🖹 177.
Local display cannot be read, but signal output is within the valid range	Display is set too bright or too dark.	• Set the display brighter by simultaneously pressing ⊞ + 🗉. • Set the display darker by simultaneously pressing ⊟ + 🗉.
Local display is dark, but signal output is within the valid range	Display module is defective.	Order spare part → 🖹 177.
Backlighting of local display is red	Diagnostic event with "Alarm" diagnostic behavior has occurred.	Take remedial measures → 🖹 146
Text on local display appears in a language that cannot be understood.	The selected operating language cannot be understood.	1. Press ⊟ + ⊞ for 2 s ("home position"). 2. Press 🗉. 3. Configure the required language in the **Display language** parameter (→ 🖹 112).
Message on local display: "Communication Error" "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. • Order spare part → 🖹 177.

For output signals

Error	Possible causes	Remedial action
Signal output outside the valid range	Main electronics module is defective.	Order spare part → 🖹 177.
Device shows correct value on local display, but signal output is incorrect, though in the valid range.	Parameter configuration error	Check and adjust parameter configuration.
Device measures incorrectly.	Configuration error or device is operated outside the application.	1. Check and correct parameter configuration. 2. Observe limit values specified in the "Technical Data".

For access

Error	Possible causes	Remedial action
Write access to parameter not possible.	Hardware write protection is enabled.	Set the write protection switch on the main electronics module to the **OFF** position → 🖺 122.
Write access to parameter not possible.	Current user role has limited access authorization.	1. Check user role → 🖺 58. 2. Enter correct customer-specific access code → 🖺 58.
Connection via PROFIBUS PA is not possible.	Device plug is connected incorrectly.	Check the pin assignment of the device plugs .
Connection via PROFIBUS PA is not possible.	PROFIBUS PA cable is incorrectly terminated.	Check the terminating resistor .
Connection to the web server is not possible.	Web server is disabled.	Use the "FieldCare" or "DeviceCare" operating tool to check if the web server of the device is enabled and enable if necessary → 🖺 65.
	The Ethernet interface is incorrectly configured on the PC.	▶ Check the properties of the Internet protocol (TCP/IP) → 🖺 61. ▶ Check the network settings with the IT manager.
Connection to the web server is not possible.	The IP address is incorrectly configured on the PC.	Check the IP address: 192.168.1.212 → 🖺 61
Connection to the web server is not possible.	WLAN access data are incorrect.	• Check WLAN network status. • Log on to the device again using WLAN access data. • Check that WLAN is enabled for the device and operating device → 🖺 61.
	WLAN communication is disabled.	–
It is not possible to connect to the web server, FieldCare or DeviceCare.	WLAN network is not available.	• Check whether WLAN reception is available: LED on the display module lights up in blue. • Check if the WLAN connection is enabled: LED on display module flashes blue. • Switch on instrument function.
No network connection or unstable network connection.	WLAN network is weak.	• Operating device outside of receiving range: Check the network status on the operating device. • To improve network performance, use an external WLAN antenna.
	Parallel WLAN and Ethernet communication.	• Check network settings. • Temporarily enable only the WLAN as an interface.
Web browser is frozen and no further operation possible.	Data transfer is active.	Wait until data transfer or current action is finished.
	Connection lost	▶ Check cable connection and power supply. ▶ Refresh web browser and restart if necessary.
The web browser contents are difficult to read or incomplete.	The web browser version used is not the best option.	▶ Use correct web browser version → 🖺 60. ▶ Empty the web browser cache. ▶ Restart the web browser.
	Unsuitable view settings.	Change the font size/display ratio of the Web browser.
No contents displayed in the web browser or contents incomplete.	• JavaScript is not enabled. • JavaScript cannot be enabled.	▶ Enable JavaScript. ▶ Enter http://XXX.XXX.X.X.XX/servlet/basic.html as the IP address.

Error	Possible causes	Remedial action
Operation with FieldCare or DeviceCare not possible via CDI-RJ45 service interface (port 8000).	Firewall of the PC or network prevents communication.	Depending on the settings of the firewall used on the PC or in the network, the firewall must be disabled or adjusted for FieldCare/DeviceCare access.
Flashing of firmware with FieldCare or DeviceCare not possible via CDI-RJ45 service interface (port 8000 or TFTP ports).	Firewall of the PC or network prevents communication.	Depending on the settings of the firewall used on the PC or in the network, the firewall must be disabled or adjusted for 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.
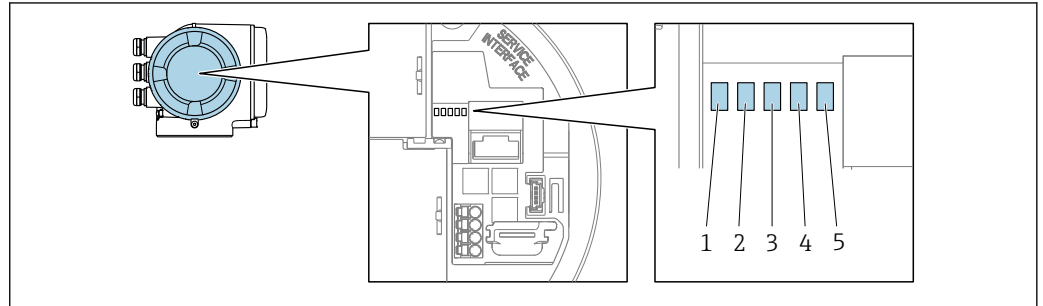
A0029629

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 (normal operation)	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 or green	The device restarts.
2	Device status (during start-up)	Flashes red slowly	If > 30 seconds: problem with the boot loader.
		Flashes red quickly	If > 30 seconds: compatibility problem when reading the firmware.
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
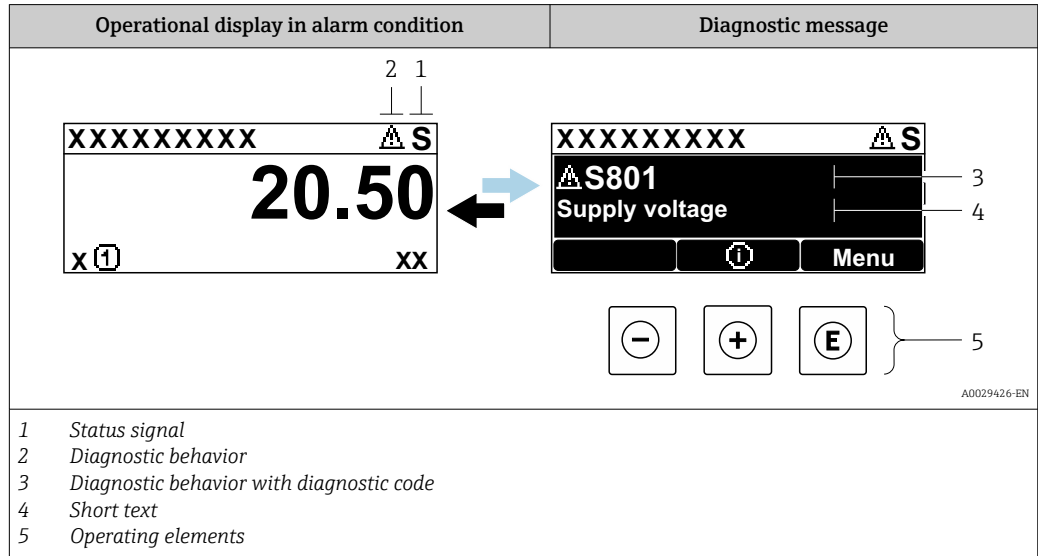
If two or more diagnostic events are pending simultaneously, only the message of the diagnostic event with the highest priority is shown.

Other diagnostic events that have occurred can be displayed in the **Diagnostics** menu:
• Via parameter → 🗎 169
• Via submenus → 🗎 170

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

Diagnostic behavior

Symbol	Meaning
	Alarm
	• Measurement is interrupted.
	• Signal outputs and totalizers assume the defined alarm condition.
	• A diagnostic message is generated.
	Warning
	• 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

Operating key	Meaning
⊕	**Plus key**
	In menu, submenu
	Opens the message about the remedial measures.
Ⓔ	**Enter key**
	In menu, submenu
	Opens the operating menu.

12.3.2   Calling up remedial measures

26   Message for remedial measures

1   Diagnostic information
2   Short text
3   Service ID
4   Diagnostic behavior with diagnostic code
5   Operation time when error occurred
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.
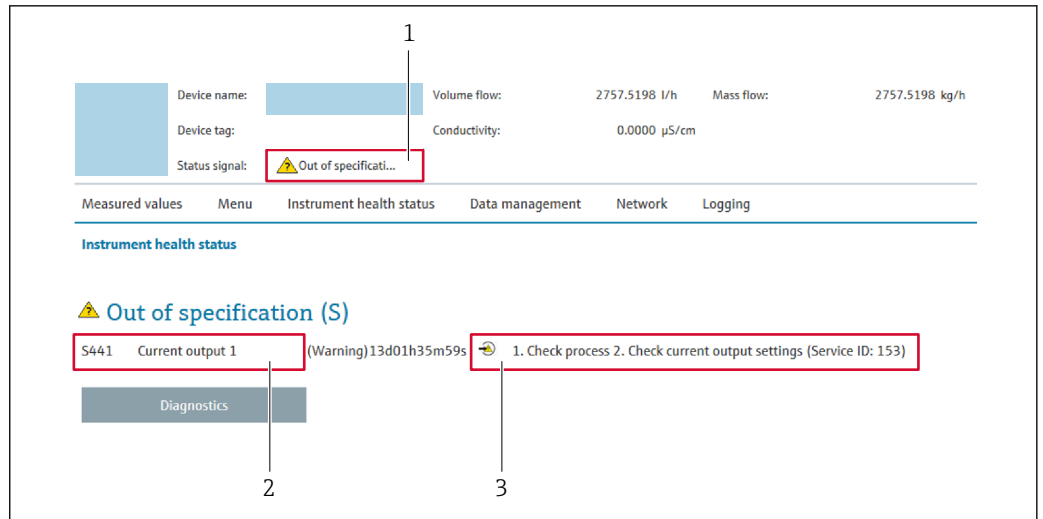
1   Status area with status signal
2   Diagnostic information
3   Remedial measures with service ID

In addition, diagnostic events which have occurred can be shown in the **Diagnostics** menu:
- Via parameter → 🗐 169
- Via submenu → 🗐 170

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).
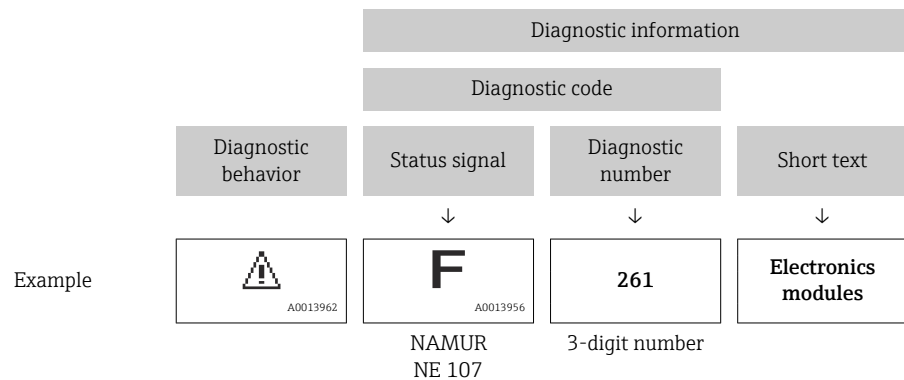
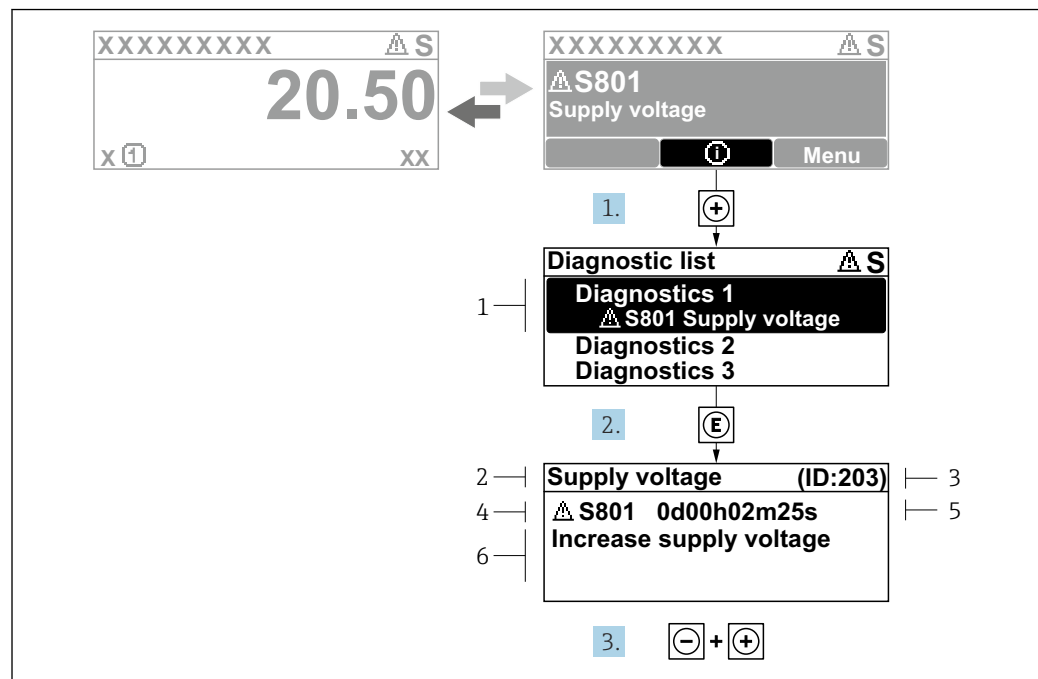| Symbol	Meaning
⊗	**Failure** A device error has occurred. The measured value is no longer valid.
▽	**Function check** The device is in service mode (e.g. during a simulation).
⚠?	**Out of specification** The device is being operated: Outside its technical specification limits (e.g. outside the process temperature range)
◇	**Maintenance required** Maintenance is required. The measured value remains 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 → 🖺 138
2   Diagnostic information → 🖺 139
3   Remedial measures with service ID

In addition, diagnostic events which have occurred can be shown in the **Diagnostics** menu:
• Via parameter → 🖺 169
• Via submenu → 🖺 170

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.
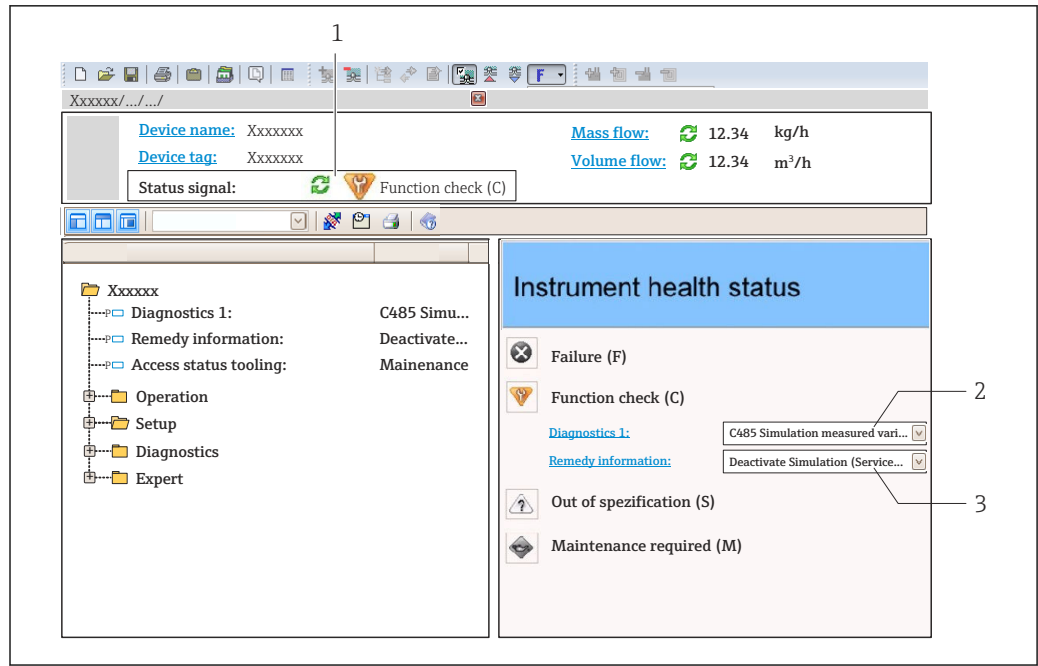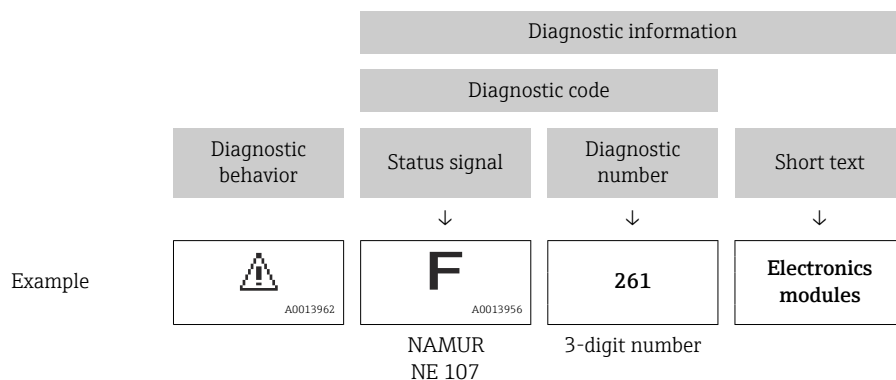

12.5.2   Calling up remedy information

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.

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

Expert → System → Diagnostic handling → Diagnostic behavior
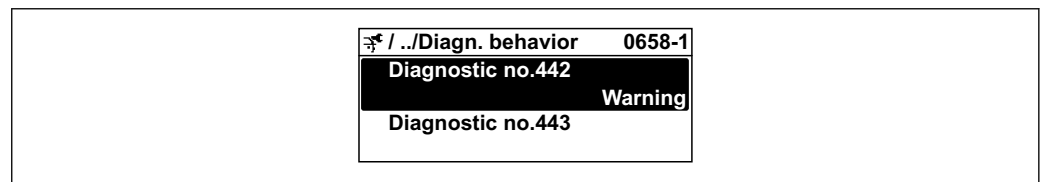
A0019179-EN

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. Measured value output via PROFIBUS and totalizers are not affected. A diagnostic message is generated.
Logbook entry only	The device continues to measure. The diagnostic message is only displayed in the **Event logbook** submenu (**Event list** submenu) and is not displayed in alternating sequence 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.
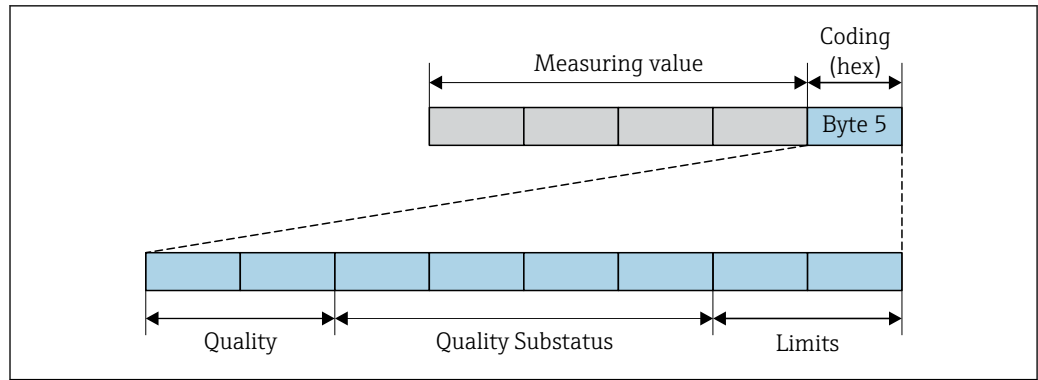
27   Structure of the coding byte

The content of the coding byte depends on the configured failure mode in the individual function block. Depending on which failure mode has been configured, status information in accordance with PROFINET PA Profile Specification 4 is transmitted to the PROFIBUS master (Class 1) via the coding byte status information.

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
  → 🖺 144
• Diagnostic information pertaining to the electronics: diagnostic number 200 to 399
  → 🖺 145
• Diagnostic information pertaining to the configuration: diagnostic number 400 to 599
  → 🖺 145
• Diagnostic information pertaining to the process: diagnostic number 800 to 999
  → 🖺 145

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 diagnostics (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 diagnostics (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	–	–

Data logging continues when Heartbeat Verification is started. The signal outputs and totalizers are not affected.
• Signal status: Function check
• Choice of diagnostic behavior: alarm or warning (factory setting)

When the Heartbeat Verification is started, data logging is interrupted, the last valid measured value is output and the totalizer counter is 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.

ⓘ In the case of some items of diagnostic information, the diagnostic behavior can be changed. Adapting the diagnostic information → 🕮 143

12.7.1 Diagnostic of sensor

Diagnostic information		Remedy instructions	Influenced measured variables
No.	Short text		
043	Sensor short circuit	1. Check sensor cable and sensor 2. Execute Heartbeat Verification 3. Replace sensor cable or sensor	• Conductivity • Corrected conductivity • **Density** option • Electronic temperature • **Empty pipe detection** option • Flow velocity • **Low flow cut off** option • Mass flow • Reference density • Corrected volume flow • Temperature • Status • Volume flow
	Measured variable status [from the factory] [1]		
	Quality	Uncertain		
	Quality substatus	Maintenance demanded		
	Coding (hex)	0x68 to 0x6B		
	Status signal	S		
	Diagnostic behavior	Warning		

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

Diagnostic information		Remedy instructions	Influenced measured variables
No.	Short text		
082	Data storage	1. Check module connections 2. Contact service	• Conductivity • Corrected conductivity • Measured values 1 • Measured values 2 • Measured values 3 • **Density** option • Electronic temperature • **Empty pipe detection** option • Flow velocity • **Low flow cut off** option • Mass flow • Reference density • Corrected volume flow • Temperature • Status • Volume flow
	Measured variable status		
	Quality	Bad		
	Quality substatus	Maintenance alarm		
	Coding (hex)	0x24 to 0x27		
	Status signal	F		
	Diagnostic behavior	Alarm		

Diagnostic information		Remedy instructions	Influenced measured variables
No.	Short text		
083	Memory content	1. Restart device 2. Restore HistoROM S-DAT backup ('Device reset' parameter) 3. Replace HistoROM S-DAT	• Conductivity • Corrected conductivity • Measured values 1 • Measured values 2 • Measured values 3 • **Density** option • Electronic temperature • **Empty pipe detection** option • Flow velocity • **Low flow cut off** option • Mass flow • Reference density • Corrected volume flow • Temperature • Status • Volume flow
	Measured variable status		
	Quality	Bad	
	Quality substatus	Maintenance alarm	
	Coding (hex)	0x24 to 0x27	
	Status signal	F	
	Diagnostic behavior	Alarm	

Diagnostic information		Remedy instructions	Influenced measured variables
No.	Short text		
169	Conductivity measurement failed	1. Check grounding conditions 2. Deactivate conductivity measurement	• Conductivity • Corrected conductivity • Electronic temperature • **Empty pipe detection** option • Flow velocity • **Low flow cut off** option • Mass flow • Corrected volume flow • Temperature • Status • Volume flow
	Measured variable status		
	Quality	Bad	
	Quality substatus	Maintenance alarm	
	Coding (hex)	0x24 to 0x27	
	Status signal	M	
	Diagnostic behavior	Warning	

Diagnostic information		Remedy instructions	Influenced measured variables
No.	Short text		
170	Coil resistance	Check ambient and process temperature	• Conductivity • Corrected conductivity • **Density** option • Electronic temperature • **Empty pipe detection** option • Flow velocity • **Low flow cut off** option • Mass flow • Reference density • Corrected volume flow • Temperature • Status • Volume flow
	Measured variable status		
	Quality	Bad	
	Quality substatus	Maintenance alarm	
	Coding (hex)	0x24 to 0x27	
	Status signal	F	
	Diagnostic behavior	Alarm	

Diagnostic information		Remedy instructions	Influenced measured variables
No.	Short text		
180	Temperature sensor defective	1. Check sensor connections 2. Replace sensor cable or sensor 3. Turn off temperature measurement	• Conductivity • Corrected conductivity • **Density** option • Electronic temperature • **Empty pipe detection** option • Flow velocity • **Low flow cut off** option • Mass flow • Reference density • Corrected volume flow • Temperature • Status • Volume flow
	Measured variable status		
	Quality	Bad	
	Quality substatus	Maintenance alarm	
	Coding (hex)	0x24 to 0x27	
	Status signal	F	
	Diagnostic behavior	Warning	

Diagnostic information		Remedy instructions	Influenced measured variables
No.	Short text		
181	Sensor connection	1. Check sensor cable and sensor 2. Execute Heartbeat Verification 3. Replace sensor cable or sensor	• Conductivity • Corrected conductivity • **Density** option • Electronic temperature • **Empty pipe detection** option • Flow velocity • **Low flow cut off** option • Mass flow • Reference density • Corrected volume flow • Temperature • Status • Volume flow
	Measured variable status		
	Quality	Bad	
	Quality substatus	Maintenance alarm	
	Coding (hex)	0x24 to 0x27	
	Status signal	F	
	Diagnostic behavior	Alarm	

12.7.2   Diagnostic of electronic

Diagnostic information		Remedy instructions	Influenced measured variables
No.	Short text		
201	Device failure	1. Restart device 2. Contact service	• Conductivity • Corrected conductivity • Measured values 1 • Measured values 2 • Measured values 3 • **Density** option • Electronic temperature • **Empty pipe detection** option • Flow velocity • **Low flow cut off** option • Mass flow • Reference density • Corrected volume flow • Temperature • Status • Volume flow
	Measured variable status		
	Quality	Bad	
	Quality substatus	Maintenance alarm	
	Coding (hex)	0x24 to 0x27	
	Status signal	F	
	Diagnostic behavior	Alarm	

Diagnostic information			Remedy instructions	Influenced measured variables
No.	Short text			
242	Software incompatible		1. Check software 2. Flash or change main electronics module	• Conductivity • Corrected conductivity • Measured values 1 • Measured values 2 • Measured values 3 • **Density** option • Electronic temperature • **Empty pipe detection** option • Flow velocity • **Low flow cut off** option • Mass flow • Reference density • Corrected volume flow • Temperature • Status • Volume flow
	Measured variable status			
	Quality	Bad		
	Quality substatus	Maintenance alarm		
	Coding (hex)	0x24 to 0x27		
	Status signal	F		
	Diagnostic behavior	Alarm		

Diagnostic information			Remedy instructions	Influenced measured variables
No.	Short text			
252	Modules incompatible		1. Check electronic modules 2. Check if correct modules are available (e.g. NEx, Ex) 3. Replace electronic modules	• Conductivity • Corrected conductivity • Measured values 1 • Measured values 2 • Measured values 3 • **Density** option • Electronic temperature • **Empty pipe detection** option • Flow velocity • **Low flow cut off** option • Mass flow • Reference density • Corrected volume flow • Temperature • Volume flow
	Measured variable status			
	Quality	Bad		
	Quality substatus	Maintenance alarm		
	Coding (hex)	0x24 to 0x27		
	Status signal	F		
	Diagnostic behavior	Alarm		

Diagnostic information			Remedy instructions	Influenced measured variables
No.	Short text			
252	Modules incompatible		1. Check if correct electronic modul is plugged 2. Replace electronic module	• Conductivity • Corrected conductivity • Measured values 1 • Measured values 2 • Measured values 3 • **Density** option • Electronic temperature • **Empty pipe detection** option • Flow velocity • **Low flow cut off** option • Mass flow • Reference density • Corrected volume flow • Temperature • Status • Volume flow
	Measured variable status			
	Quality	Bad		
	Quality substatus	Maintenance alarm		
	Coding (hex)	0x24 to 0x27		
	Status signal	F		
	Diagnostic behavior	Alarm		

Diagnostic information		Remedy instructions	Influenced measured variables
No.	Short text		
262	Sensor electronic connection faulty	1. Check or replace connection cable between sensor electronic module (ISEM) and main electronics 2. Check or replace ISEM or main electronics	• Conductivity • Corrected conductivity • Measured values 1 • Measured values 2 • Measured values 3 • **Density** option • Electronic temperature • **Empty pipe detection** option • Flow velocity • **Low flow cut off** option • Mass flow • Reference density • Corrected volume flow • Temperature • Status • Volume flow
	Measured variable status		
	Quality	Bad		
	Quality substatus	Maintenance alarm		
	Coding (hex)	0x24 to 0x27		
	Status signal	F		
	Diagnostic behavior	Alarm		

Diagnostic information		Remedy instructions	Influenced measured variables
No.	Short text		
270	Main electronic failure	Change main electronic module	• Conductivity • Corrected conductivity • Measured values 1 • Measured values 2 • Measured values 3 • **Density** option • Electronic temperature • **Empty pipe detection** option • Flow velocity • **Low flow cut off** option • Mass flow • Reference density • Corrected volume flow • Temperature • Status • Volume flow
	Measured variable status		
	Quality	Bad		
	Quality substatus	Maintenance alarm		
	Coding (hex)	0x24 to 0x27		
	Status signal	F		
	Diagnostic behavior	Alarm		

Diagnostic information		Remedy instructions	Influenced measured variables
No.	Short text		
271	Main electronic failure	1. Restart device 2. Change main electronic module	• Conductivity • Corrected conductivity • Measured values 1 • Measured values 2 • Measured values 3 • **Density** option • Electronic temperature • **Empty pipe detection** option • Flow velocity • **Low flow cut off** option • Mass flow • Reference density • Corrected volume flow • Temperature • Status • Volume flow
	Measured variable status		
	Quality	Bad		
	Quality substatus	Maintenance alarm		
	Coding (hex)	0x24 to 0x27		
	Status signal	F		
	Diagnostic behavior	Alarm		

Diagnostic information		Remedy instructions	Influenced measured variables
No.	Short text		
272	Main electronic failure	1. Restart device 2. Contact service	• Conductivity • Corrected conductivity • Measured values 1 • Measured values 2 • Measured values 3 • **Density** option • Electronic temperature • **Empty pipe detection** option • Flow velocity • **Low flow cut off** option • Mass flow • Reference density • Corrected volume flow • Temperature • Status • Volume flow
	Measured variable status		
	Quality	Bad	
	Quality substatus	Maintenance alarm	
	Coding (hex)	0x24 to 0x27	
	Status signal	F	
	Diagnostic behavior	Alarm	

Diagnostic information		Remedy instructions	Influenced measured variables
No.	Short text		
273	Main electronic failure	Change electronic	• Conductivity • Corrected conductivity • Measured values 1 • Measured values 2 • Measured values 3 • **Density** option • Electronic temperature • **Empty pipe detection** option • Flow velocity • **Low flow cut off** option • Mass flow • Reference density • Corrected volume flow • Temperature • Status • Volume flow
	Measured variable status		
	Quality	Bad	
	Quality substatus	Maintenance alarm	
	Coding (hex)	0x24 to 0x27	
	Status signal	F	
	Diagnostic behavior	Alarm	

Diagnostic information		Remedy instructions	Influenced measured variables
No.	Short text		
275	I/O module 1 to n defective	Change I/O module	• Conductivity • Corrected conductivity • Measured values 1 • Measured values 2 • Measured values 3 • **Density** option • Electronic temperature • **Empty pipe detection** option • Flow velocity • **Low flow cut off** option • Mass flow • Reference density • Corrected volume flow • Temperature • Status • Volume flow
	Measured variable status		
	Quality	Bad	
	Quality substatus	Maintenance alarm	
	Coding (hex)	0x24 to 0x27	
	Status signal	F	
	Diagnostic behavior	Alarm	

Diagnostic information		Remedy instructions	Influenced measured variables
No.	Short text		
276	I/O module 1 to n faulty	1. Restart device 2. Change I/O module	• Conductivity • Corrected conductivity • Measured values 1 • Measured values 2 • Measured values 3 • **Density** option • Electronic temperature • **Empty pipe detection** option • Flow velocity • **Low flow cut off** option • Mass flow • Reference density • Corrected volume flow • Temperature • Status • Volume flow
	Measured variable status		
	Quality	Bad	
	Quality substatus	Maintenance alarm	
	Coding (hex)	0x24 to 0x27	
	Status signal	F	
	Diagnostic behavior	Alarm	

Diagnostic information		Remedy instructions	Influenced measured variables
No.	Short text		
283	Memory content	1. Reset device 2. Contact service	• Conductivity • Corrected conductivity • Measured values 1 • Measured values 2 • Measured values 3 • **Density** option • Electronic temperature • **Empty pipe detection** option • Flow velocity • **Low flow cut off** option • Mass flow • Reference density • Corrected volume flow • Temperature • Status • Volume flow
	Measured variable status		
	Quality	Bad	
	Quality substatus	Maintenance alarm	
	Coding (hex)	0x24 to 0x27	
	Status signal	F	
	Diagnostic behavior	Alarm	

Diagnostic information		Remedy instructions	Influenced measured variables
No.	Short text		
302	Device verification active	Device verification active, please wait.	• Conductivity • Corrected conductivity • Measured values 1 • Measured values 2 • Measured values 3 • **Density** option • Electronic temperature • **Empty pipe detection** option • Flow velocity • **Low flow cut off** option • Mass flow • Reference density • Corrected volume flow • Temperature • Status • Volume flow
	Measured variable status [from the factory] [1]		
	Quality	Good	
	Quality substatus	Function check	
	Coding (hex)	0xBC to 0xBF	
	Status signal	C	
	Diagnostic behavior	Warning	

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

Diagnostic information		Remedy instructions	Influenced measured variables
No.	**Short text**		
303	I/O 1 to n configuration changed	1. Apply I/O module configuration (parameter 'Apply I/O configuration') 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		

Diagnostic information		Remedy instructions	Influenced measured variables
No.	**Short text**		
311	Electronic failure	1. Do not reset device 2. Contact service	• Conductivity • Corrected conductivity • Measured values 1 • Measured values 2 • Measured values 3 • **Density** option • Electronic temperature • **Empty pipe detection** option • Flow velocity • **Low flow cut off** option • Mass flow • Reference density • Corrected volume flow • Temperature • Status • Volume flow
	Measured variable status		
	Quality	Bad		
	Quality substatus	Maintenance alarm		
	Coding (hex)	0x24 to 0x27		
	Status signal	M		
	Diagnostic behavior	Warning		

Diagnostic information		Remedy instructions	Influenced measured variables
No.	**Short text**		
332	Writing in HistoROM backup failed	Replace user interface board Ex d/XP: replace transmitter	• Conductivity • Corrected conductivity • Measured values 1 • Measured values 2 • Measured values 3 • **Density** option • Electronic temperature • **Empty pipe detection** option • Flow velocity • **Low flow cut off** option • Mass flow • Reference density • Corrected volume flow • Temperature • Status • Volume flow
	Measured variable status		
	Quality	Bad		
	Quality substatus	Maintenance alarm		
	Coding (hex)	0x24 to 0x27		
	Status signal	F		
	Diagnostic behavior	Alarm		

Diagnostic information		Remedy instructions	Influenced measured variables
No.	Short text		
361	I/O module 1 to n faulty	1. Restart device 2. Check electronic modules 3. Change I/O Modul or main electronics	• Conductivity • Corrected conductivity • Measured values 1 • Measured values 2 • Measured values 3 • **Density** option • Electronic temperature • **Empty pipe detection** option • Flow velocity • **Low flow cut off** option • Mass flow • Reference density • Corrected volume flow • Temperature • Status • Volume flow
	Measured variable status		
	Quality	Bad	
	Quality substatus	Maintenance alarm	
	Coding (hex)	0x24 to 0x27	
	Status signal	F	
	Diagnostic behavior	Alarm	

Diagnostic information		Remedy instructions	Influenced measured variables
No.	Short text		
372	Sensor electronic (ISEM) faulty	1. Restart device 2. Check if failure recurs 3. Replace sensor electronic module (ISEM)	• Conductivity • Corrected conductivity • Measured values 1 • Measured values 2 • Measured values 3 • **Density** option • Electronic temperature • **Empty pipe detection** option • Flow velocity • **Low flow cut off** option • Mass flow • Reference density • Corrected volume flow • Temperature • Status • Volume flow
	Measured variable status		
	Quality	Bad	
	Quality substatus	Maintenance alarm	
	Coding (hex)	0x24 to 0x27	
	Status signal	F	
	Diagnostic behavior	Alarm	

Diagnostic information		Remedy instructions	Influenced measured variables
No.	Short text		
373	Sensor electronic (ISEM) faulty	1. Transfer data or reset device 2. Contact service	• Conductivity • Corrected conductivity • Measured values 1 • Measured values 2 • Measured values 3 • **Density** option • Electronic temperature • **Empty pipe detection** option • Flow velocity • **Low flow cut off** option • Mass flow • Reference density • Corrected volume flow • Temperature • Status • Volume flow
	Measured variable status		
	Quality	Bad	
	Quality substatus	Maintenance alarm	
	Coding (hex)	0x24 to 0x27	
	Status signal	F	
	Diagnostic behavior	Alarm	

Diagnostic information		Remedy instructions	Influenced measured variables
No.	Short text		
375	I/O- 1 to n communication failed	1. Restart device 2. Check if failure recurs 3. Replace module rack inclusive electronic modules	• Conductivity • Corrected conductivity • Measured values 1 • Measured values 2 • Measured values 3 • **Density** option • Electronic temperature • **Empty pipe detection** option • Flow velocity • **Low flow cut off** option • Mass flow • Reference density • Corrected volume flow • Temperature • Status • Volume flow
	Measured variable status		
	Quality	Bad	
	Quality substatus	Maintenance alarm	
	Coding (hex)	0x24 to 0x27	
	Status signal	F	
	Diagnostic behavior	Alarm	

Diagnostic information		Remedy instructions	Influenced measured variables
No.	Short text		
376	Sensor electronic (ISEM) faulty	1. Replace sensor electronic module (ISEM) 2. Turn off diagnostic message	• Conductivity • Corrected conductivity • Measured values 1 • Measured values 2 • Measured values 3 • **Density** option • Electronic temperature • **Empty pipe detection** option • Flow velocity • **Low flow cut off** option • Mass flow • Reference density • Corrected volume flow • Temperature • Status • Volume flow
	Measured variable status [from the factory] [1]		
	Quality	Bad	
	Quality substatus	Maintenance alarm	
	Coding (hex)	0x24 to 0x27	
	Status signal	S	
	Diagnostic behavior	Warning	

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

Diagnostic information		Remedy instructions	Influenced measured variables
No.	Short text		
377	Sensor electronic (ISEM) faulty	1. Check sensor cable and sensor 2. Perform Heartbeat Verification 3. Replace sensor cable or sensor	• Conductivity • Corrected conductivity • **Density** option • Electronic temperature • **Empty pipe detection** option • Flow velocity • **Low flow cut off** option • Mass flow • Reference density • Corrected volume flow • Temperature • Status • Volume flow
	Measured variable status [from the factory] [1]		
	Quality	Bad	
	Quality substatus	Maintenance alarm	
	Coding (hex)	0x24 to 0x27	
	Status signal	S	
	Diagnostic behavior	Warning	

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

Diagnostic information		Remedy instructions	Influenced measured variables
No.	Short text		
382	Data storage	1. Insert T-DAT 2. Replace T-DAT	• Conductivity • Corrected conductivity • Measured values 1 • Measured values 2 • Measured values 3 • **Density** option • Electronic temperature • **Empty pipe detection** option • Flow velocity • **Low flow cut off** option • Mass flow • Reference density • Corrected volume flow • Temperature • Status • Volume flow
	Measured variable status		
	Quality	Bad	
	Quality substatus	Maintenance alarm	
	Coding (hex)	0x24 to 0x27	
	Status signal	F	
	Diagnostic behavior	Alarm	

Diagnostic information		Remedy instructions	Influenced measured variables
No.	Short text		
383	Memory content	1. Restart device 2. Delete T-DAT via 'Reset device' parameter 3. Replace T-DAT	• Conductivity • Corrected conductivity • Measured values 1 • Measured values 2 • Measured values 3 • **Density** option • Electronic temperature • **Empty pipe detection** option • Flow velocity • **Low flow cut off** option • Mass flow • Reference density • Corrected volume flow • Temperature • Status • Volume flow
	Measured variable status		
	Quality	Bad	
	Quality substatus	Maintenance alarm	
	Coding (hex)	0x24 to 0x27	
	Status signal	F	
	Diagnostic behavior	Alarm	

Diagnostic information		Remedy instructions	Influenced measured variables
No.	Short text		
387	HistoROM backup failed	Contact service organization	• Conductivity • Corrected conductivity • Measured values 1 • Measured values 2 • Measured values 3 • **Density** option • Electronic temperature • **Empty pipe detection** option • Flow velocity • **Low flow cut off** option • Mass flow • Reference density • Corrected volume flow • Temperature • Status • Volume flow
	Measured variable status		
	Quality	Bad	
	Quality substatus	Maintenance alarm	
	Coding (hex)	0x24 to 0x27	
	Status signal	F	
	Diagnostic behavior	Alarm	

Diagnostic information		Remedy instructions	Influenced measured variables
No.	Short text		
512	Sensor electronic (ISEM) faulty	1. Check ECC recovery time 2. Turn off ECC	• Conductivity • Corrected conductivity • **Density** option • Electronic temperature • **Empty pipe detection** option • Flow velocity • **Low flow cut off** option • Mass flow • Reference density • Corrected volume flow • Temperature • Status • Volume flow
	Measured variable status		
	Quality	Bad	
	Quality substatus	Maintenance alarm	
	Coding (hex)	0x24 to 0x27	
	Status signal	F	
	Diagnostic behavior	Alarm	

12.7.3   Diagnostic of configuration

Diagnostic information		Remedy instructions	Influenced measured variables
No.	Short text		
330	Flash file invalid	1. Update firmware of device 2. Restart device	• Conductivity • Corrected conductivity • Measured values 1 • Measured values 2 • Measured values 3 • **Density** option • Electronic temperature • **Empty pipe detection** option • Flow velocity • **Low flow cut off** option • Mass flow • Reference density • Corrected volume flow • Temperature • Status • Volume flow
	Measured variable status		
	Quality	Bad	
	Quality substatus	Maintenance alarm	
	Coding (hex)	0x24 to 0x27	
	Status signal	M	
	Diagnostic behavior	Warning	

Diagnostic information		Remedy instructions	Influenced measured variables
No.	Short text		
331	Firmware update failed	1. Update firmware of device 2. Restart device	• Conductivity • Corrected conductivity • Measured values 1 • Measured values 2 • Measured values 3 • **Density** option • Electronic temperature • **Empty pipe detection** option • Flow velocity • **Low flow cut off** option • Mass flow • Reference density • Corrected volume flow • Temperature • Volume flow
	Measured variable status		
	Quality	Bad	
	Quality substatus	Maintenance alarm	
	Coding (hex)	0x24 to 0x27	
	Status signal	F	
	Diagnostic behavior	Warning	

Diagnostic information		Remedy instructions	Influenced measured variables
No.	Short text		
410	Data transfer	1. Check connection 2. Retry data transfer	• Conductivity • Corrected conductivity • Measured values 1 • Measured values 2 • Measured values 3 • **Density** option • Electronic temperature • **Empty pipe detection** option • Flow velocity • **Low flow cut off** option • Mass flow • Reference density • Corrected volume flow • Temperature • Status • Volume flow
	Measured variable status		
	Quality	Bad	
	Quality substatus	Maintenance alarm	
	Coding (hex)	0x24 to 0x27	
	Status signal	F	
	Diagnostic behavior	Alarm	

Diagnostic information		Remedy instructions	Influenced measured variables
No.	Short text		
412	Processing download	Download active, please wait	• Conductivity • Corrected conductivity • **Density** option • Electronic temperature • **Empty pipe detection** option • Flow velocity • **Low flow cut off** option • Mass flow • Reference density • Corrected volume flow • Temperature • Status • Volume flow
	Measured variable status		
	Quality	Uncertain	
	Quality substatus	Initial value	
	Coding (hex)	0x4C to 0x4F	
	Status signal	C	
	Diagnostic behavior	Warning	

Diagnostic information		Remedy instructions	Influenced measured variables
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	

Diagnostic information		Remedy instructions	Influenced measured variables
No.	Short text		
437	Configuration incompatible	1. Restart device 2. Contact service	• Conductivity • Corrected conductivity • Measured values 1 • Measured values 2 • Measured values 3 • **Density** option • Electronic temperature • **Empty pipe detection** option • Flow velocity • **Low flow cut off** option • Mass flow • Reference density • Corrected volume flow • Temperature • Status • Volume flow
	Measured variable status		
	Quality	Bad	
	Quality substatus	Maintenance alarm	
	Coding (hex)	0x24 to 0x27	
	Status signal	F	
	Diagnostic behavior	Alarm	

Diagnostic information		Remedy instructions	Influenced measured variables
No.	Short text		
438	Dataset	1. Check data set file 2. Check device configuration 3. Up- and download new configuration	• Conductivity • Corrected conductivity • Measured values 1 • Measured values 2 • Measured values 3 • **Density** option • Electronic temperature • **Empty pipe detection** option • Flow velocity • **Low flow cut off** option • Mass flow • Reference density • Corrected volume flow • Temperature • Status • Volume flow
	Measured variable status		
	Quality	Uncertain	
	Quality substatus	Maintenance demanded	
	Coding (hex)	0x68 to 0x6B	
	Status signal	M	
	Diagnostic behavior	Warning	

Diagnostic information		Remedy instructions	Influenced measured variables
No.	Short text		
441	Current output 1 to n	1. Check process 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	

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

No.	Diagnostic information		Remedy instructions	Influenced measured variables
		Short text		
442	Frequency output 1 to n		1. Check process 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		

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

No.	Diagnostic information		Remedy instructions	Influenced measured variables
		Short text		
443	Pulse output 1 to n		1. Check process 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		

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

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

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

Diagnostic information		Remedy instructions	Influenced measured variables
No.	Short text		
453	Flow override	Deactivate flow override	• Conductivity • Corrected conductivity • **Density** option • Electronic temperature • **Empty pipe detection** option • Flow velocity • **Low flow cut off** option • Mass flow • Reference density • Corrected volume flow • Temperature • Status • Volume flow
	Measured variable status		
	Quality	Good	
	Quality substatus	Function check	
	Coding (hex)	0xBC to 0xBF	
	Status signal	C	
	Diagnostic behavior	Warning	

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

Diagnostic information		Remedy instructions	Influenced measured variables
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	

Diagnostic information		Remedy instructions	Influenced measured variables
No.	Short text		
484	Failure mode simulation	Deactivate simulation	• Conductivity • Corrected conductivity • **Density** option • Electronic temperature • **Empty pipe detection** option • Flow velocity • **Low flow cut off** option • Mass flow • Reference density • Corrected volume flow • Temperature • Status • Volume flow
	Measured variable status		
	Quality	Bad	
	Quality substatus	Function check	
	Coding (hex)	0x3C to 0x3F	
	Status signal	C	
	Diagnostic behavior	Alarm	

Diagnostic information		Remedy instructions	Influenced measured variables
No.	Short text		
485	Measured variable simulation	Deactivate simulation	• Conductivity • Corrected conductivity • **Density** option • Electronic temperature • **Empty pipe detection** option • Flow velocity • **Low flow cut off** option • Mass flow • Reference density • Corrected volume flow • Temperature • Status • Volume flow
	Measured variable status		
	Quality	Good	
	Quality substatus	Function check	
	Coding (hex)	0xBC to 0xBF	
	Status signal	C	
	Diagnostic behavior	Warning	

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

Diagnostic information		Remedy instructions	Influenced measured variables
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	

Diagnostic information		Remedy instructions	Influenced measured variables
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	

Diagnostic information		Remedy instructions	Influenced measured variables
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	

Diagnostic information		Remedy instructions	Influenced measured variables
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	

Diagnostic information		Remedy instructions	Influenced measured variables
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	

Diagnostic information		Remedy instructions	Influenced measured variables
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	

	Diagnostic information		Remedy instructions	Influenced measured variables
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		

	Diagnostic information		Remedy instructions	Influenced measured variables
No.		Short text		
511	ISEM settings faulty		1. Check measuring period and integration time 2. Check sensor properties	• Conductivity • Corrected conductivity • **Density** option • Electronic temperature • **Empty pipe detection** option • Flow velocity • **Low flow cut off** option • Mass flow • Reference density • Corrected volume flow • Temperature • Status • Volume flow
	Measured variable status			
	Quality	Bad		
	Quality substatus	Maintenance alarm		
	Coding (hex)	0x24 to 0x27		
	Status signal	C		
	Diagnostic behavior	Alarm		

	Diagnostic information		Remedy instructions	Influenced measured variables
No.		Short text		
520	I/O 1 to n hardware configuration invalid		1. Check I/O hardware configuration 2. Replace wrong I/O module 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		

	Diagnostic information		Remedy instructions	Influenced measured variables
No.		Short text		
530	Electrode cleaning is running		Turn off ECC	• Conductivity • Corrected conductivity • **Density** option • Electronic temperature • **Empty pipe detection** option • Flow velocity • **Low flow cut off** option • Mass flow • Reference density • Corrected volume flow • Temperature • Status • Volume flow
	Measured variable status			
	Quality	Good		
	Quality substatus	Function check		
	Coding (hex)	0xBC to 0xBF		
	Status signal	C		
	Diagnostic behavior	Warning		

Diagnostic information		Remedy instructions	Influenced measured variables
No.	Short text		
531	Empty pipe adjustment faulty	Execute EPD adjustment	• Conductivity
	Measured variable status [from the factory] [1]		• Corrected conductivity
			• **Empty pipe detection** option
	Quality	Bad	• Flow velocity
	Quality substatus	Maintenance alarm	• **Low flow cut off** option
	Coding (hex)	0x24 to 0x27	• Mass flow
	Status signal	S	• Corrected volume flow
	Diagnostic behavior	Warning	• Status
			• Volume flow

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

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

Diagnostic information		Remedy instructions	Influenced measured variables
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	

12.7.4   Diagnostic of process

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

Diagnostic information		Remedy instructions	Influenced measured variables
No.	Short text		
832	Electronic temperature too high	Reduce ambient temperature	• Conductivity • Corrected conductivity • Measured values 1 • Measured values 2 • Measured values 3 • **Density** option • Electronic temperature • **Empty pipe detection** option • Flow velocity • **Low flow cut off** option • Mass flow • Reference density • Corrected volume flow • Temperature • Status • Volume flow
	Measured variable status [from the factory] [1]		
	Quality	Bad	
	Quality substatus	Process related	
	Coding (hex)	0x28 to 0x2B	
	Status signal	S	
	Diagnostic behavior	Warning	

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

Diagnostic information		Remedy instructions	Influenced measured variables
No.	Short text		
833	Electronic temperature too low	Increase ambient temperature	• Conductivity • Corrected conductivity • Measured values 1 • Measured values 2 • Measured values 3 • **Density** option • Electronic temperature • **Empty pipe detection** option • Flow velocity • **Low flow cut off** option • Mass flow • Reference density • Corrected volume flow • Temperature • Status • Volume flow
	Measured variable status [from the factory] [1]		
	Quality	Bad	
	Quality substatus	Process related	
	Coding (hex)	0x28 to 0x2B	
	Status signal	S	
	Diagnostic behavior	Warning	

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

Diagnostic information		Remedy instructions	Influenced measured variables
No.	Short text		
834	Process temperature too high	Reduce process temperature	• Conductivity • Corrected conductivity • Electronic temperature • **Empty pipe detection** option • Flow velocity • **Low flow cut off** option • Mass flow • Corrected volume flow • Temperature • Status • Volume flow
	Measured variable status [from the factory] [1]		
	Quality	Uncertain	
	Quality substatus	Process related	
	Coding (hex)	0x78 to 0x7B	
	Status signal	S	
	Diagnostic behavior	Warning	

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

Diagnostic information		Remedy instructions	Influenced measured variables
No.	Short text		
835	Process temperature too low	Increase process temperature	• Conductivity • Corrected conductivity • Electronic temperature • **Empty pipe detection** option • Flow velocity • **Low flow cut off** option • Mass flow • Corrected volume flow • Temperature • Status • Volume flow
	Measured variable status [from the factory] [1]		
	Quality	Uncertain		
	Quality substatus	Process related		
	Coding (hex)	0x78 to 0x7B		
	Status signal	S		
	Diagnostic behavior	Warning		

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

Diagnostic information		Remedy instructions	Influenced measured variables
No.	Short text		
842	Process limit	Low flow cut off active! 1. Check low flow cut off configuration	• Flow velocity • Mass flow • Corrected volume flow • Status • Volume flow
	Measured variable status [from the factory] [1]		
	Quality	Uncertain		
	Quality substatus	Process related		
	Coding (hex)	0x78 to 0x7B		
	Status signal	S		
	Diagnostic behavior	Warning		

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

Diagnostic information		Remedy instructions	Influenced measured variables
No.	Short text		
882	Input signal	1. Check input configuration 2. Check external device or process conditions	• Corrected conductivity • Measured values 1 • Measured values 2 • Measured values 3 • **Density** option • **Empty pipe detection** option • Flow velocity • **Low flow cut off** option • Mass flow • Reference density • Corrected volume flow • Temperature • Status • Volume flow
	Measured variable status		
	Quality	Bad		
	Quality substatus	Maintenance alarm		
	Coding (hex)	0x24 to 0x27		
	Status signal	F		
	Diagnostic behavior	Alarm		

Diagnostic information		Remedy instructions	Influenced measured variables
No.	Short text		
937	Sensor symmetry	1. Eliminate external magnetic field near sensor 2. Turn off diagnostic message	• Conductivity • Corrected conductivity • **Density** option • Electronic temperature • **Empty pipe detection** option • Flow velocity • **Low flow cut off** option • Mass flow • Reference density • Corrected volume flow • Temperature • Status • Volume flow
	Measured variable status [from the factory] [1]		
	Quality	Bad	
	Quality substatus	Maintenance alarm	
	Coding (hex)	0x24 to 0x27	
	Status signal	S	
	Diagnostic behavior	Warning	

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

Diagnostic information		Remedy instructions	Influenced measured variables
No.	Short text		
938	EMC interference	1. Check ambient conditions regarding EMC influence 2. Turn off diagnostic message	• Conductivity • Corrected conductivity • **Density** option • Electronic temperature • **Empty pipe detection** option • Flow velocity • **Low flow cut off** option • Mass flow • Reference density • Corrected volume flow • Temperature • Status • Volume flow
	Measured variable status [from the factory] [1]		
	Quality	Bad	
	Quality substatus	Maintenance alarm	
	Coding (hex)	0x24 to 0x27	
	Status signal	F	
	Diagnostic behavior	Alarm	

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

Diagnostic information		Remedy instructions	Influenced measured variables
No.	Short text		
961	Electrode potential out of specification	1. Check process conditions 2. Check ambient conditions	• **Empty pipe detection** option • **Low flow cut off** option • Mass flow • Status • Volume flow
	Measured variable status [from the factory] [1]		
	Quality	Bad	
	Quality substatus	Maintenance alarm	
	Coding (hex)	0x24 to 0x27	
	Status signal	S	
	Diagnostic behavior	Warning	

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

Diagnostic information		Remedy instructions	Influenced measured variables
No.	Short text		
962	Pipe empty	1. Perform full pipe adjustment 2. Perform empty pipe adjustment 3. Turn off empty pipe detection	• Conductivity • Corrected conductivity • Flow velocity • **Low flow cut off** option • Mass flow • Corrected volume flow • Status • Volume flow
	Measured variable status [from the factory] [1]		
	Quality	Bad		
	Quality substatus	Process related		
	Coding (hex)	0x28 to 0x2B		
	Status signal	S		
	Diagnostic behavior	Warning		

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 → 🖺 140
- Via web browser → 🖺 141
- Via "FieldCare" operating tool → 🖺 142
- Via "DeviceCare" operating tool → 🖺 142

Other pending diagnostic events can be displayed in the **Diagnostic list** submenu → 🖺 170.

Navigation
"Diagnostics" menu

⟲ Diagnostics	
Actual diagnostics	→ 🖺 169
Previous diagnostics	→ 🖺 169
Operating time from restart	→ 🖺 170
Operating time	→ 🖺 170

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. ℹ️ 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.

Parameter	Prerequisite	Description	User interface
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   Diagnostics 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
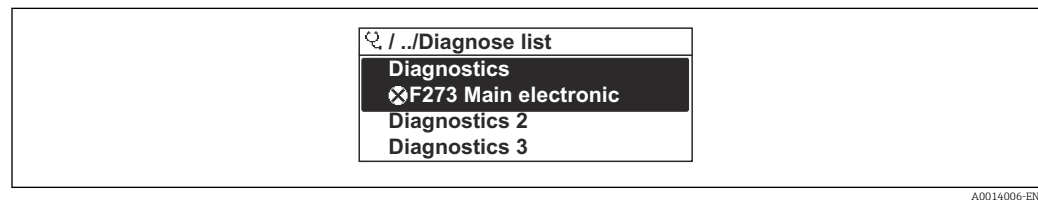
❐ *28   Using the example of the local display*

To call up the measures to rectify a diagnostic event:
- Via local display → 🖿 140
- Via web browser → 🖿 141
- Via "FieldCare" operating tool → 🖿 142
- Via "DeviceCare" operating tool → 🖿 142

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 → Events list
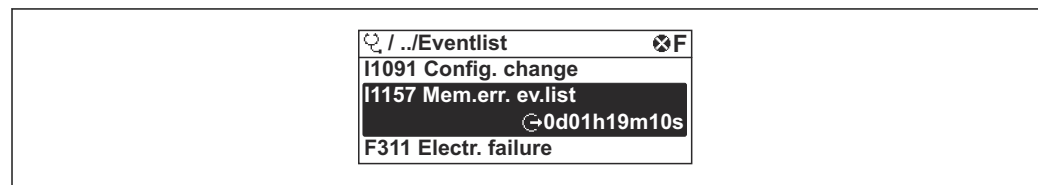
❐ *29   Using the example of the local display*

- 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 → 🖿 146
- Information events → 🖿 171

In addition to the operating time when the event occurred, each event is also assigned a symbol that indicates whether the event has occurred or is finished:
• Diagnostics 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 → 🗎 140
• Via web browser → 🗎 141
• Via "FieldCare" operating tool → 🗎 142
• Via "DeviceCare" operating tool → 🗎 142

For filtering the displayed event messages → 🗎 171

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
I1137	Electronic changed
I1151	History reset
I1155	Reset electronic temperature
I1156	Memory error trend
I1157	Memory error event list
I1184	Display connected
I1256	Display: access status changed
I1278	I/O module reset detected
I1335	Firmware changed
I1351	Empty pipe detection adjustment failure

Info number	Info name
I1353	Empty pipe detection adjustment ok
I1361	Web server: login failed
I1397	Fieldbus: access status changed
I1398	CDI: access status changed
I1443	Coating thickness not determined
I1444	Device verification passed
I1445	Device verification failed
I1457	Measured error verification failed
I1459	I/O module 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

The entire device configuration or some of the configuration can be reset to a defined state with the **Device reset** parameter (→ 🖺 118).

12.11.1 Function range of "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 the customer-specific value. All other parameters are reset to the factory setting.
Restart device	The restart resets every parameter with data stored in volatile memory (RAM) to the factory setting (e.g. measured value data). The device configuration remains unchanged.
Restore S-DAT backup	Restores the data that is saved on the S-DAT. Additional information: This function can be used to resolve the memory issue "083 Memory content inconsistent" or to restore the S-DAT data when a new S-DAT has been installed.
	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

▸ Device information	
Device tag	→ 🖪 174
Serial number	→ 🖪 174
Firmware version	→ 🖪 174
Device name	→ 🖪 174
Order code	→ 🖪 174
Extended order code 1	→ 🖪 174
Extended order code 2	→ 🖪 174
Extended order code 3	→ 🖪 174
ENP version	→ 🖪 174
PROFIBUS ident number	→ 🖪 174
Status PROFIBUS Master Config	→ 🖪 174

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. @, %, /).	Promag 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. ℹ The name can be found on the nameplate of the transmitter.	Promag 300/500	–
Order code	Shows the device order code. ℹ 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. ℹ 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. ℹ 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. ℹ 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	–
PROFIBUS ident number	Displays the PROFIBUS identification number.	0 to FFFF	0x156C
Status PROFIBUS Master Config	Displays the status of the PROFIBUS Master configuration.	• 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 **70**	Original firmware	Operating Instructions	BA01396D/06/EN/01.16

11.2018	01.01.zz	Option **66**	• Local display - enhanced performance and data entry via text editor
			• Optimized keypad lock for local display
			• Web server feature update
			  • Support for trend data function
			  • Heartbeat function enhanced to include detailed results (page 3/4 of the report)
			  • Device configuration as PDF (parameter log, similar to FDT print)
			• Network capability of Ethernet (service) interface
			• Comprehensive Heartbeat feature update
			• Local display - support for WLAN infrastructure mode
			• Implementation of reset code
				Operating Instructions	BA01396D/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. 5H3B
      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 work

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 gaskets.

13.1.2   Interior cleaning

Cleaning with pigs

It is essential to take the internal diameters of the measuring tube and process connection into account when cleaning with pigs. All the dimensions and lengths of the sensor and transmitter are provided in the separate "Technical Information" document.

13.1.3   Replacing seals

The sensor's seals (particularly aseptic molded seals) must be replaced periodically.

The interval between changes depends on the frequency of the cleaning cycles, the cleaning temperature and the medium temperature.

Replacement seals (accessory part) → 🖹 210

13.2   Measuring and test equipment

Endress+Hauser offers a variety of measuring and testing equipment, such as Netilion or device tests.

ℹ️ Your Endress+Hauser Sales Center can provide detailed information on the services.

List of some of the measuring and testing equipment: → 🖹 180

13.3   Endress+Hauser services

Endress+Hauser offers a wide variety of services for maintenance such as recalibration, maintenance service or device tests.

ℹ️ Your Endress+Hauser Sales Center can provide detailed information on the services.

14 Repair

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 conversion 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 all repairs and conversions and enter the details in Netilion Analytics.

14.2 Spare parts

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.

ℹ Measuring device serial number:
- Is located on the nameplate of the device.
- Can be read out via the **Serial number** parameter (→ 🕮 174) in the **Device information** submenu.

14.3 Endress+Hauser services

Endress+Hauser offers a wide range of services.

ℹ Your Endress+Hauser Sales Center can provide detailed information on the services.

14.4 Return

The requirements for safe device return can vary depending on the device type and national legislation.

1. Refer to the web page for information:
   https://www.endress.com/support/return-material
   ↳ Select the region.

2. If returning the device, pack the device in such a way that it is reliably protected against impact and external influences. The original packaging offers the best protection.

14.5   Disposal

If required by the Directive 2012/19/EU on waste electrical and electronic equipment (WEEE), the product is marked with the depicted symbol in order to minimize the disposal of WEEE as unsorted municipal waste. Do not dispose of products bearing this marking as unsorted municipal waste. Instead, return them to the manufacturer for disposal under the applicable conditions.

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 media.

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: • Approvals • Output • Input • Display/operation • Housing • Software ⓘ Order code: 5X3BXX ▣ Installation Instructions EA01199D

Remote display and operating module DKX001	• If ordered directly with the measuring device:
	Order code for "Display; operation", option O "Remote display 4-line, illuminated; 10 m (30 ft) cable; touch control"
	• If ordered separately:
	  • Measuring device: order code for "Display; operation", option M "W/o, prepared for remote display"
	  • DKX001: Via the separate product structure DKX001
	• If ordered subsequently:
	DKX001: Via the separate product structure DKX001
	
	Mounting bracket for DKX001
	• If ordered directly: order code for "Accessory enclosed", option RA "Mounting bracket, pipe 1/2'"
	• If ordered subsequently: order number: 71340960
	
	Connecting cable (replacement cable)
	Via the separate product structure: DKX002
	
	ⓘ Further information on display and operating module DKX001→ ▤ 202.
	
	▣ 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". ⓘ • The external WLAN antenna is not suitable for use in hygienic applications. • Additional information regarding the WLAN interface → ▤ 67. ⓘ Order number: 71351317 ▣ Installation Instructions EA01238D
Weather protection cover	Is used to protect the measuring device from the effects of the weather: e.g. rainwater, excess heating from direct sunlight. ⓘ Order number: 71343505 ▣ Installation Instructions EA01160D

15.1.2   For the sensor

Accessories	Description
Adapter set	Adapter connections for installing a Promag H instead of a Promag 30/33 A or Promag 30/33 H (DN 25). Consists of: • 2 process connections • Screws • Seals
Seal set	For the regular replacement of seals for the sensor.
Spacer	If replacing a DN 80/100 sensor in an existing installation, a spacer is needed if the new sensor is shorter.
Welding jig	Welding socket as process connection: welding jig for installation in pipe.
Grounding rings	Are used to ground the medium in lined measuring tubes to ensure proper measurement. ⊞ Grounding rings can be ordered via the device order structure or configured and ordered as an accessory via the DK5HR order structure.
Mounting kit	Consists of: • 2 process connections • Screws • Seals
Wall mounting kit	Wall mounting kit for measuring device (only DN 2 to 25 (1/12 to 1"))

15.2   Service-specific accessories

Accessories	Description
Applicator	Software for selecting and sizing Endress+Hauser measuring devices: • Choice of measuring devices for industrial requirements • Calculation of all the necessary data for identifying the optimum flowmeter: e.g. nominal diameter, pressure loss, flow velocity and accuracy. • Graphic illustration of the calculation results • 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. Applicator is available: • Via the Internet: https://portal.endress.com/webapp/applicator • As a downloadable DVD for local PC installation.
Netilion	IIoT ecosystem: Unlock knowledge Endress+Hauser 's Netilion IIoT ecosystem enables you to optimize your plant performance, digitize workflows, share knowledge and improve collaboration. Based on decades of experience in process automation, Endress+Hauser offers the process industry an IIoT ecosystem that enables you to gain useful insights from data. This knowledge can be used to optimize processes, leading to higher plant availability, efficiency and reliability, and ultimately to a more profitable plant. www.netilion.endress.com
FieldCare	FDT-based plant asset management tool from Endress+Hauser. 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. ▤ Operating Instructions BA00027S and BA00059S
DeviceCare	Tool to connect and configure Endress+Hauser field devices. ▤ 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. 📖 • Technical Information TI00133R 　　• Operating Instructions BA00247R
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. 📖 "Fields of Activity" document FA00006T

16 Technical data

16.1 Application

The measuring device is intended only for the flow measurement of liquids with a minimum conductivity of 5 µS/cm.

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	Electromagnetic flow measurement on the basis of *Faraday's law of magnetic induction*.

Measuring system	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.
	For information on the structure of the measuring instrument → 🕮 13

16.3 Input

Measured variable	**Direct measured variables**

- Volume flow (proportional to induced voltage)
- Temperature [2]
- Electrical conductivity

Calculated measured variables

- Mass flow
- Corrected volume flow
- Corrected electrical conductivity [2]

Measuring range	Typically v = 0.01 to 10 m/s (0.03 to 33 ft/s) with the specified accuracy

Flow characteristic values in SI units: DN 2 to 125 ($^1/_{12}$ to 5")

Nominal diameter		Recommended flow	Factory settings		
		min./max. full scale value (v ~ 0.3/10 m/s)	Full scale value current output (v ~ 2.5 m/s)	Pulse value (~ 2 pulse/s)	Low flow cut off (v ~ 0.04 m/s)
[mm]	[in]	[dm³/min]	[dm³/min]	[dm³]	[dm³/min]
2	$^1/_{12}$	0.06 to 1.8	0.5	0.005	0.01
4	$^5/_{32}$	0.25 to 7	2	0.025	0.05

---

2) Available only for nominal diameters DN 15 to 150 (½ to 6") and with the order code for "Sensor option", option CI "Medium temperature measurement".

Nominal diameter		Recommended flow	Factory settings		
		min./max. full scale value (v ~ 0.3/10 m/s)	Full scale value current output (v ~ 2.5 m/s)	Pulse value (~ 2 pulse/s)	Low flow cut off (v ~ 0.04 m/s)
[mm]	[in]	[dm³/min]	[dm³/min]	[dm³]	[dm³/min]
8	⁵⁄₁₆	1 to 30	8	0.1	0.1
15	½	4 to 100	25	0.2	0.5
25 ¹⁾	1	9 to 300	75	0.5	1
40	1 ½	25 to 700	200	1.5	3
50	2	35 to 1 100	300	2.5	5
65	–	60 to 2 000	500	5	8
80	3	90 to 3 000	750	5	12
100	4	145 to 4 700	1200	10	20
125	5	220 to 7 500	1850	15	30

1)   The values apply for the product version: 5HxB26

Flow characteristic values in SI units: DN 150 (6")

Nominal diameter		Recommended flow	Factory settings		
		min./max. full scale value (v ~ 0.3/10 m/s)	Full scale value current output (v ~ 2.5 m/s)	Pulse value (~ 2 pulse/s)	Low flow cut off (v ~ 0.04 m/s)
[mm]	[in]	[m³/h]	[m³/h]	[m³]	[m³/h]
150	6	20 to 600	150	0.03	2.5

Flow characteristic values in US units: ¹⁄₁₂ - 6" (DN 2 - 150)

Nominal diameter		Recommended flow	Factory settings		
		min./max. full scale value (v ~ 0.3/10 m/s)	Full scale value current output (v ~ 2.5 m/s)	Pulse value (~ 2 pulse/s)	Low flow cut off (v ~ 0.04 m/s)
[in]	[mm]	[gal/min]	[gal/min]	[gal]	[gal/min]
¹⁄₁₂	2	0.015 to 0.5	0.1	0.001	0.002
¹⁄₃₂	4	0.07 to 2	0.5	0.005	0.008
⁵⁄₁₆	8	0.25 to 8	2	0.02	0.025
½	15	1 to 27	6	0.05	0.1
1 ¹⁾	25	2.5 to 80	18	0.2	0.25
1 ½	40	7 to 190	50	0.5	0.75
2	50	10 to 300	75	0.5	1.25
3	80	24 to 800	200	2	2.5
4	100	40 to 1 250	300	2	4

Nominal diameter		Recommended flow	Factory settings		
		min./max. full scale value (v ~ 0.3/10 m/s)	Full scale value current output (v ~ 2.5 m/s)	Pulse value (~ 2 pulse/s)	Low flow cut off (v ~ 0.04 m/s)
[in]	[mm]	[gal/min]	[gal/min]	[gal]	[gal/min]
5	125	60 to 1 950	450	5	7
6	150	90 to 2 650	600	5	12

1) The values apply for the product version: 5HxB26

Recommended measuring range

Flow limit → 🔢 197

For custody transfer, the applicable approval determines the permitted measuring range, the pulse value and the low flow cut off.

| Operable flow range | Over 1000 : 1 |

For custody transfer, the operable flow range is 100 : 1 to 630 : 1, depending on the nominal diameter. Further details are specified by the applicable approval.

| Input signal | **External measured values** |

To increase the measurement accuracy of certain measured variables or to calculate the mass flow, the automation system can continuously write different measured values to the measuring instrument:
• Medium temperature enables temperature-compensated conductivity measurement (e.g. iTEMP)
• Reference density for calculating the mass flow

Various pressure and temperature measuring devices can be ordered from Endress +Hauser: see "Accessories" section → 🔢 181

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 → 🔢 184.

Digital communication

The measured values are written by the automation system 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) • 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	• Temperature • Density

Status input

Maximum input values	• DC –3 to 30 V • 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 • High signal: DC 12 to 30 V
Assignable functions	• Off • Reset the individual totalizers separately • Reset all totalizers • 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: • Active • Passive
Current range	Can be set to: • 4 to 20 mA NAMUR • 4 to 20 mA US • 4 to 20 mA • 0 to 20 mA (only if the signal mode is active) • 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	• Volume flow • Mass flow • Corrected volume flow • Flow velocity • Conductivity • Corrected conductivity • Temperature • Electronics temperature

Current output 4 to 20 mA Ex i passive

Order code	"Output; input 2" (21), "Output; input 3" (022): Option C: current output 4 to 20 mA Ex i passive
Signal mode	Passive
Current range	Can be set to: • 4 to 20 mA NAMUR • 4 to 20 mA US • 4 to 20 mA • 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	• Volume flow • Mass flow • Corrected volume flow • Flow velocity • Conductivity • Corrected conductivity • Temperature • Electronics temperature

Pulse/frequency/switch output

Function	Can be configured as pulse, frequency or switch output
Version	Open collector Can be set to: • Active • Passive • Passive NAMUR ⓘ 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	Configurable
Assignable measured variables	• Volume flow • Mass flow • 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	Configurable: 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	• Volume flow • Mass flow • Corrected volume flow • Flow velocity • Conductivity • Corrected conductivity • Temperature • Electronics temperature
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	• Disable
	• On
	• Diagnostic behavior
	• Limit value:
	  • Disable
	  • Volume flow
	  • Mass flow
	  • Corrected volume flow
	  • Flow velocity
	  • Conductivity
	  • Corrected conductivity
	  • Totalizer 1-3
	  • Temperature
	  • Electronics temperature
	• Flow direction monitoring
	• Status
	  • Empty pipe detection
	  • Buildup index
	  • HBSI limit value exceeded
	  • Low flow cut off

Relay output

Function	Switch output
Version	Relay output, galvanically isolated
Switching behavior	Can be set to: • NO (normally open), factory setting • NC (normally closed)
Maximum switching capacity (passive)	• DC 30 V, 0.1 A • AC 30 V, 0.5 A

Assignable functions	• Disable
	• On
	• Diagnostic behavior
	• Limit value:
	  • Disable
	  • Volume flow
	  • Mass flow
	  • Corrected volume flow
	  • Flow velocity
	  • Conductivity
	  • Corrected conductivity
	  • Totalizer 1-3
	  • Temperature
	  • Electronics temperature
	• Flow direction monitoring
	• Status
	  • Empty pipe detection
	  • Buildup index
	  • HBSI limit value exceeded
	  • Low flow cut off

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:
	• 4 to 20 mA in accordance with NAMUR recommendation NE 43
	• 4 to 20 mA in accordance with US
	• Min. value: 3.59 mA
	• Max. value: 22.5 mA
	• Definable value between: 3.59 to 22.5 mA
	• Actual value
	• Last valid value

0 to 20 mA

Failure mode	Choose from:
	• Maximum alarm: 22 mA
	• Definable value between: 0 to 20.5 mA

Pulse/frequency/switch output

Pulse output	
Fault mode	Choose from: • Actual value • No pulses
Frequency output	
Fault mode	Choose from: • Actual value • 0 Hz • Definable value between: 2 to 12 500 Hz
Switch output	
Fault mode	Choose from: • Current status • Open • Closed

Relay output

Failure mode	Choose from:
	• Current status
	• Open
	• Closed

Local display

Plain text display	With information on cause and remedial measures
Backlight	Red lighting indicates a device error.

ℹ️ 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
	The following information is displayed depending on the device version:
	• Supply voltage active
	• Data transmission active
	• Device alarm/error has occurred
	ℹ️ Diagnostic information via light emitting diodes → 🕮 137

Low flow cut off	The switch points for low flow cut off are user-selectable.

Galvanic isolation	The outputs are galvanically isolated:
	• from the power supply
	• from one another
	• from the potential equalization (PE) terminal

protocol-specific data	**Manufacturer ID**	0x11
	Ident number	0x156C
	Profile version	3.02
	Device description files (GSD, DTM, DD)	Information and files under:
		• https://www.endress.com/download
		On the device product page: PRODUCTS → Product Finder → Links
		• https://www.profibus.com

Supported functions	• Identification & Maintenance Simplest device identification on the part of the control system and nameplate • PROFIBUS upload/download Reading and writing parameters is up to ten times faster with PROFIBUS upload/download • Condensed status 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 • Local display • Via operating tools (e.g. FieldCare)

Compatibility with earlier model	If the device is replaced, the measuring device Promag 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 Promag 300 GSD file.
	
	Earlier models:
	• Promag 50 PROFIBUS PA
	  • ID No.: 1525 (hex)
	  • Extended GSD file: EH3x1525.gsd
	  • Standard GSD file: EH3_1525.gsd
	• Promag 53 PROFIBUS PA
	  • ID No.: 1527 (hex)
	  • Extended GSD file: EH3x1527.gsd
	  • Standard GSD file: EH3_1527.gsd

System integration	Information regarding system integration → 🖹 77. • Cyclic data transmission • Block model • Description of the modules

16.5 Power supply

Terminal assignment	→ 🖹 31

Available device plugs	→ 🖹 31

Available device plugs	→ 🖹 31

Supply voltage

Order code "Power supply"	Terminal voltage		Frequency range
Option **D**	DC 24 V	±20%	–
Option **E**	AC 100 to 240 V	−15...+10%	50/60 Hz, ±4 Hz
Option **I**	DC 24 V	±20%	–
	AC 100 to 240 V	−15...+10%	50/60 Hz, ±4 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 memory or in the pluggable data memory (HistoROM DAT). • Error messages (incl. total operated hours) are stored.
Overcurrent protection element	The device must be operated with a dedicated circuit breaker, as it does not have an ON/OFF switch of its own. • The circuit breaker must be easy to reach and labeled accordingly. • Permitted nominal current of the circuit breaker: 2 A up to maximum 10 A.
Electrical connection	→ 🗎 33
Potential equalization	
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 ∅ 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	→ 🗎 28

Overvoltage protection	Mains voltage fluctuations	→ 🗎 191
	Overvoltage category	Overvoltage category II
	Short-term, temporary overvoltage	Between cable and ground up to 1200 V, for max. 5 s
	Long-term, temporary overvoltage	Between cable and ground up to 500 V

16.6   Performance characteristics

Reference operating conditions	• Error limits following DIN EN 29104, in future ISO 20456 • Water, typically: +15 to +45 °C (+59 to +113 °F); 0.5 to 7 bar (73 to 101 psi) • Data as indicated in the calibration protocol • Accuracy based on accredited calibration rigs according to ISO 17025 • Reference temperature for conductivity measurement: 25 °C (77 °F)
Maximum measurement error	o.r. = of reading

Maximum permissible error under reference operating conditions

Volume flow

- ±0.5 % o.r. ± 1 mm/s (0.04 in/s)
- Optional: ±0.2 % o.r. ± 2 mm/s (0.08 in/s)

Fluctuations in the supply voltage do not have any effect within the specified range.
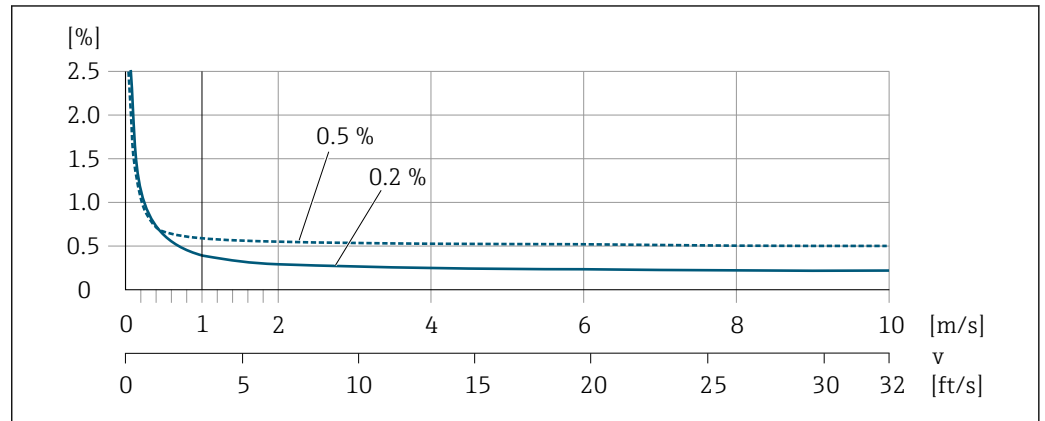
☒ *30   Maximum measured error in % o.r.*

Temperature

±3 ℃ (±5.4 ℉)

Electrical conductivity

The values apply for:
- Devices with stainless steel process connections
- Measurements at a reference temperature of 25 ℃ (77 ℉). At different temperatures, attention must be paid to the temperature coefficient of the medium (typically 2.1 %/K)

Conductivity [µS/cm]	Nominal diameter		Measurement error [%] of reading
	[mm]	[in]	
5 to 20	15…150	½…6	± 20%
> 20 to 50	15…150	½…6	± 10%
> 50 to 10 000	2…8	$\frac{1}{12}$ to $\frac{5}{16}$	± 10%
	15…150	½…6	• Standard: ± 10% • Optional [1]: ± 5%
> 10 000 to 20 000	2…150	$\frac{1}{12}$ to 6	± 10%
> 20 000 to 100 000	2…150	$\frac{1}{12}$ to 6	± 20%

1)   Order code for "Calibrated conductivity measurement", option CW
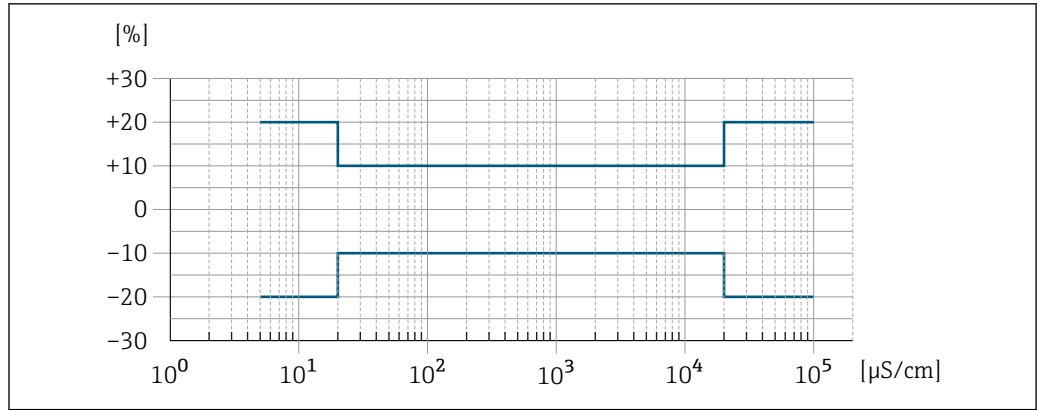
⊞ 31   Measurement error (standard)
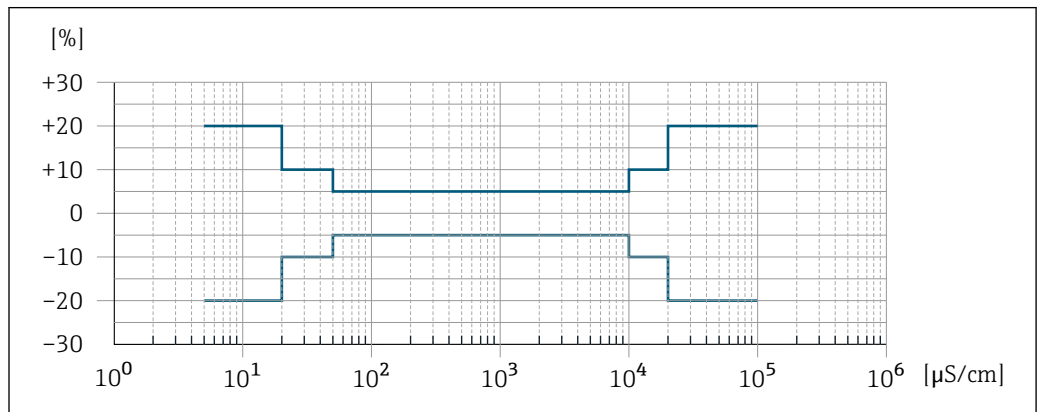
⊞ 32   Measurement error (optional: order code for "Calibrated conductivity measurement", option CW)

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

Volume flow
Max. ±0.1 % o.r. ± 0.5 mm/s (0.02 in/s)

Temperature
±0.5 ℃ (±0.9 ℉)

Electrical conductivity
- Max. ±5 % o.r.
- Max. ±1 % o.r. for DN 15 to 150 in conjunction with process connections made of stainless steel 1.4404 (F316L)

Temperature measurement response time	T_{90} < 15 s

Influence of ambient temperature	**Current output**

Temperature coefficient	Max. 1 µA/°C

Pulse/frequency output

Temperature coefficient	No additional effect. Included in accuracy.

16.7   Mounting

Mounting requirements	→ 🖹 19

16.8   Environment

Ambient temperature range	→ 🖹 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	The storage temperature corresponds to the operating temperature range of the transmitter and the sensor → 🖹 24.

- Protect the measuring device against direct sunlight during storage in order to avoid unacceptably high surface temperatures.
- Select a storage location where moisture cannot collect in the measuring device as fungus or bacteria infestation can damage the liner.
- If protection caps or protective covers are mounted these should never be removed before installing the measuring device.

Atmosphere	Additional protection against condensation and moisture: the sensor housing is potted with a gel.

Order code for "Sensor option", option CF "Harsh environment".

Relative humidity	The device is suitable for use outdoors and indoors with a relative humidity of 4 to 95 %.

Operating height	According to EN 61010-1

- ≤ 2 000 m (6 562 ft)
- > 2 000 m (6 562 ft) with additional overvoltage protection (e.g. Endress+Hauser HAW Series)

Degree of protection	**Transmitter** • IP66/67, Type 4X enclosure, suitable for pollution degree 4 • When the housing is open: IP20, Type 1 enclosure, suitable for pollution degree 2 • Display module: IP20, Type 1 enclosure, suitable for pollution degree 2 **Optional** **External WLAN antenna** IP67
Vibration-resistance and shock-resistance	**Vibration sinusoidal, in accordance with IEC 60068-2-6** • 2 to 8.4 Hz, 3.5 mm peak • 8.4 to 2 000 Hz, 1 g peak **Vibration broad-band random, according to IEC 60068-2-64** • 10 to 200 Hz, 0.003 g^2/Hz • 200 to 2 000 Hz, 0.001 g^2/Hz • Total: 1.54 g rms **Shock half-sine, according to IEC 60068-2-27** 6 ms 30 g **Rough handling shocks according to IEC 60068-2-31**
Internal cleaning	• CIP cleaning • SIP cleaning
Mechanical load	Transmitter housing: • Protect against mechanical effects, such as shock or impact • Do not use as a ladder or climbing aid
Electromagnetic compatibility (EMC)	• As per IEC/EN 61326 and NAMUR Recommendation 21 (NE 21) • As per IEC/EN 61000-6-2 and IEC/EN 61000-6-4 📖 Details are provided in the Declaration of Conformity. ℹ️ This unit is not intended for use in residential environments and cannot guarantee adequate protection of the radio reception in such environments.

16.9 Process

Medium temperature range	−20 to +150 °C (−4 to +302 °F)

A0027450
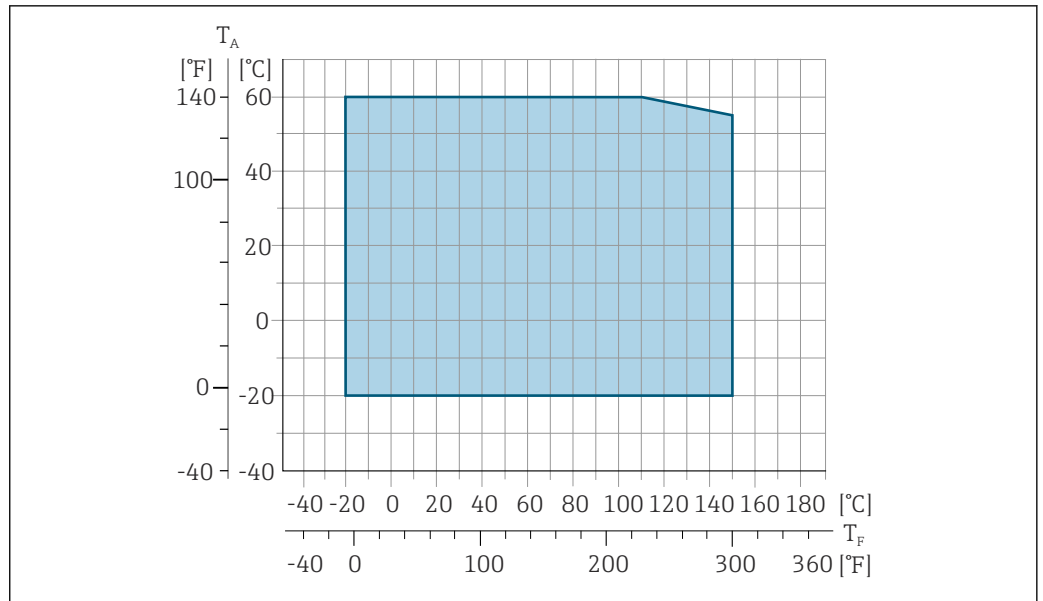
T_A   *Ambient temperature range*
T_F   *Fluid temperature*

The permitted fluid temperature in custody transfer is 0 to +50 °C (+32 to +122 °F).

Conductivity	≥5 µS/cm for liquids in general.

Pressure-temperature ratings	For an overview of the pressure-temperature ratings for the process connections, see the Technical Information

Pressure tightness

Liner: PFA

Nominal diameter		Limit values for absolute pressure in [mbar] ([psi]) for medium temperatures:				
[mm]	[in]	+25 °C (+77 °F)	+80 °C (+176 °F)	+100 °C (+212 °F)	+130 °C (+266 °F)	+150 °C (+302 °F)
2 to 150	¹⁄₁₂ to 6	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)

Flow limit

The diameter of the pipe and the flow rate determine the nominal diameter of the sensor. The optimum velocity of flow is between 2 to 3 m/s (6.56 to 9.84 ft/s). Also match the velocity of flow (v) to the physical properties of the medium:
• v < 2 m/s (6.56 ft/s): for low conductivity values
• v > 2 m/s (6.56 ft/s): for media producing buildup (e.g. milk with a high fat content)

• A necessary increase in the flow velocity can be achieved by reducing the sensor nominal diameter.
• In the case of media with a high solids content, a sensor with a nominal diameter > DN 8 (3/8") can improve the signal stability and cleanability due to the larger electrodes.

Pressure loss

• No pressure loss occurs as of nominal diameter DN 8 (5/16") if the sensor is installed in a pipe with the same nominal diameter.
• Pressure losses for configurations incorporating adapters according to DIN EN 545 → 🖿 24

System pressure	→ 🖹 24

Vibrations	→ 🖹 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 flanges of the standard pressure rating.
The weight may be lower than indicated depending on the pressure rating and design. 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)

Nominal diameter		Weight	
[mm]	[in]	[kg]	[lbs]
2	1/12	4.7	10.4
4	5/32	4.7	10.4
8	5/16	4.7	10.4
15	½	4.6	10.1
25	1	5.5	12.1
40	1 ½	6.8	15.0
50	2	7.3	16.1
65	–	8.1	17.9
80	3	8.7	19.2
100	4	10.0	22.1
125	5	15.4	34.0
150	6	17.8	39.3

Measuring tube specification

Nominal diameter		Pressure rating [1]	Process connection internal diameter	
		EN (DIN)	PFA	
[mm]	[in]	[bar]	[mm]	[in]
2	1/12	PN 16/40	2.25	0.09
4	5/32	PN 16/40	4.5	0.18
8	5/16	PN 16/40	9.0	0.35
15	½	PN 16/40	16.0	0.63
–	1	PN 16/40	22.6 [2]	0.89 [2]
25	–	PN 16/40	26.0 [3]	1.02 [3]
40	1 ½	PN 16/25/40	35.3	1.39

Nominal diameter		Pressure rating [1]	Process connection internal diameter	
		EN (DIN)	PFA	
[mm]	[in]	[bar]	[mm]	[in]
50	2	PN 16/25	48.1	1.89
65	–	PN 16/25	59.9	2.36
80	3	PN 16/25	72.6	2.86
100	4	PN 16/25	97.5	3.84
125	5	PN 10/16	120.0	4.72
150	6	PN 10/16	146.5	5.77

1) Depending on process connection and seals used
2) Order code 5H**22
3) Order code 5H**26

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
Compression fitting 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) • Contact housing: Polyamide • Contacts: Gold-plated brass

Sensor housing

Stainless steel 1.4301 (304)

Measuring tubes

Stainless steel 1.4301 (304)

Liner

PFA (USP Class VI, FDA 21 CFR 177.2600)

Process connections

• Stainless steel, 1.4404 (F316L)
• PVDF
• PVC adhesive sleeve

Electrodes

Standard: 1.4435 (316L)

Seals

• O-ring seal, DN 2 to 25 (1/12 to 1"): EPDM, FKM [3], Kalrez
• Aseptic [4] gasket seal, DN 2 to 150 (1/12 to 6"): EPDM, FKM [3], VMQ (silicone)

Accessories

Protective cover

Stainless steel, 1.4404 (316L)

External WLAN antenna

• Antenna: ASA plastic (acrylonitrile styrene acrylate) and nickel-plated brass
• Adapter: Stainless steel and nickel-plated brass
• Cable: Polyethylene
• Plug: Nickel-plated brass
• Angle bracket: Stainless steel

Grounding rings

• Standard: 1.4435 (316L)
• Optional: Alloy C22, tantalum

Wall mounting kit

Stainless steel, 1.4301 (304) [5]

Centering star

1.4435 (F316L)

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3)   USP Class VI, FDA 21 CFR 177.2600, 3A

4)   In this context, aseptic means hygienic design

5)   Does not meet the hygienic design installation guidelines.

Fitted electrodes	• 2 measuring electrodes for signal detection • 1 empty pipe detection electrode for empty pipe detection/temperature measurement (only DN 15 to 150 (½ to 6"))

Process connections	With O-ring seal: • Welding nipple (DIN EN ISO 1127, ODT/SMS, ISO 2037) • Flange (EN (DIN), ASME, JIS) • Flange from PVDF (EN (DIN), ASME, JIS) • Male thread • Female thread • Hose connection • PVC adhesive sleeve With aseptic gasket seal: • Coupling (DIN 11851, DIN 11864-1, ISO 2853, SMS 1145) • Flange DIN 11864-2 For information on the different materials used in the process connections → 🖺 200

Surface roughness	Electrodes: • Stainless steel, 1.4435 (316L) electropolished ≤ 0.5 µm (19.7 µin) • Alloy C22, 2.4602 (UNSN06022); tantalum ≤ 0.5 µm (19.7 µin) (All data refer to parts in contact with the medium) Liner with PFA: ≤ 0.4 µm (15.7 µin) (All data refer to parts in contact with the medium) Stainless steel process connections: • With O-ring seal: ≤ 1.6 µm (63 µin) • With aseptic seal: Ra_{max} = 0.76 µm (31.5 µin) Optional: Ra_{max} = 0.38 µm (15 µin) electropolished (All data refer to parts in contact with the medium)

16.11 Operability

Languages	Can be operated in the following languages:
	• Via local operation
	  English, German, French, Spanish, Italian, Dutch, Portuguese, Polish, Russian, Turkish, Chinese, Japanese, Korean, Vietnamese, Czech, Swedish
	• Via web browser
	  English, German, French, Spanish, Italian, Dutch, Portuguese, Polish, Russian, Turkish, Chinese, Japanese, Vietnamese, Czech, Swedish
	• Via "FieldCare", "DeviceCare" operating tool: English, German, French, Spanish, Italian, Chinese, Japanese

Onsite operation

Via display module

Features:
- 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"

ℹ️ Information about WLAN interface → 🖹 67
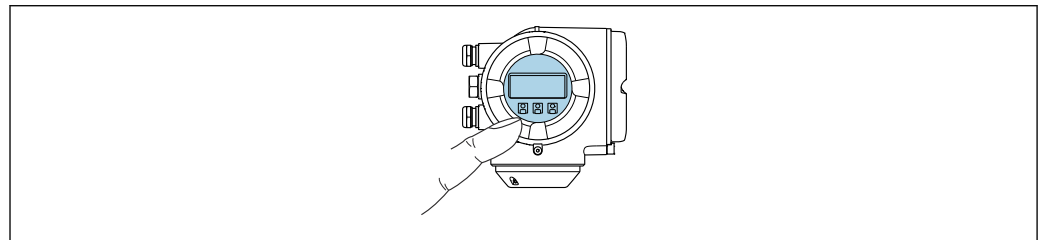
33   Operation with touch control

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

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

ℹ️ The remote display and operating module DKX001 is available as an optional extra → 🖹 179..

- 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 instrument is always supplied with a dummy cover when the remote display and operating module DKX001 is ordered directly with the measuring instrument. 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 instrument display module. Only one display or operation unit may be connected to the transmitter at any one time.

34   Operation via remote display and operating module DKX001

Display and operating elements

The display and operating elements correspond to those of the display module → 🖹 202.

Housing material

The housing material of the display and operating module DKX001 corresponds to the selected material of the transmitter housing.

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

→ 🖹 29

Dimensions

📖 Information on the dimensions:

"Mechanical construction" section of the "Technical Information" document.

Remote operation	→ 🖹 66

Service interface	→ 🖹 66

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 • WLAN interface	Special Documentation for device
DeviceCare SFE100	Notebook, PC or tablet with Microsoft Windows system	• CDI-RJ45 service interface • WLAN interface • Fieldbus protocol	→ 🖹 180
FieldCare SFE500	Notebook, PC or tablet with Microsoft Windows system	• CDI-RJ45 service interface • WLAN interface • Fieldbus protocol	→ 🖹 180

Supported operating tools	Operating unit	Interface	Additional information
Field Xpert	SMT70/77/50	• All fieldbus protocols • WLAN interface • Bluetooth • CDI-RJ45 service interface	Operating Instructions BA01202S Device description files: Use update function of handheld terminal
SmartBlue app	Smartphone or tablet with iOs or Android	WLAN	→ 🕮 180

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) from Rockwell Automation → www.rockwellautomation.com
- Process Device Manager (PDM) from Siemens → www.siemens.com
- Field Device Manager (FDM) from Honeywell → www.process.honeywell.com
- FieldMate from Yokogawa → www.yokogawa.com
- PACTWare → www.pactware.com

The related device description files are available: www.endress.com → Download Area

Web server

With the integrated web server, the device can be operated and configured via a web browser service interface (CDI-RJ45) or 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 displayed and can be used to monitor device health. 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 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 report (PDF file, only available with the **Heartbeat Verification** → 🕮 209 application package)
- Flash firmware version for device firmware upgrade, for example
- Download driver for system integration
- Visualize up to 1000 saved measured values (only available with the **Extended HistoROM** application package→ 🕮 209)

| | HistoROM | | |

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.

ℹ️ 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:

	HistoROM backup	T-DAT	S-DAT
Available data	• Event logbook, e.g. diagnostic events • Parameter data record backup • Device firmware package • Driver for system integration for exporting via web server, e.g.: GSD for PROFIBUS PA	• Measured value logging ("Extended HistoROM" order option) • Current parameter data record (used by firmware at run time) • Indicator (minimum/maximum values) • Totalizer value	• Sensor data: e.g. nominal diameter • Serial number • Calibration data • Device configuration (e.g. SW options, fixed I/O or multi I/O)
Storage location	Fixed on the user interface PC board in the connection compartment	Can be plugged into the user interface PC 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 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 transmission

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:
- Recording of 1 to 4 channels of up to 1000 measured values (up to 250 measured values per channel)
- User configurable recording interval
- 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

Current certificates and approvals for the product are available at www.endress.com on the relevant product page:

1. Select the product using the filters and search field.

2. Open the product page.

3. Select **Downloads**.

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. Endress+Hauser confirms successful testing of the device by affixing to it the CE mark.
UKCA marking	The device meets the legal requirements of the applicable UK regulations (Statutory Instruments). These are listed in the UKCA Declaration of Conformity along with the designated standards. By selecting the order option for UKCA marking, Endress+Hauser confirms a successful evaluation and testing of the device by affixing the UKCA mark. Contact address Endress+Hauser UK: Endress+Hauser Ltd. Floats Road Manchester M23 9NF United Kingdom www.uk.endress.com
RCM marking	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 SSI 28-06 or more recent
	  • Confirmation by affixing the 3-A logo for measuring devices with the order code for "Additional approval", option LP "3-A".
	  • The 3-A approval refers to the measuring device.
	  • When installing the measuring device, ensure that no liquid can accumulate on the outside of the measuring device.
	    Remote transmitters must be installed in accordance with the 3-A Standard.
	  • Accessories (e.g. weather protection cover, wall holder unit) must be installed in accordance with the 3-A Standard.
	    Each accessory can be cleaned. Disassembly may be necessary under certain circumstances.
	• EHEDG Type EL Class I
	  • Confirmation by affixing the EHEDG symbol for measuring devices with the order code for "Additional approval", option LT "EHEDG".
	  • EPDM is not a suitable seal material for fluids with a fat content > 8 %.
	  • To meet the requirements for EHEDG certification, the device must be used with process connections in accordance with the EHEDG position paper entitled "Easy Cleanable Pipe Couplings and Process Connections" (www.ehedg.org).
	• FDA 21 CFR 177
	• Food Contact Materials Regulation (EC) 1935/2004
	• Food Contact Materials Regulation China GB 4806
	• Pasteurized Milk Ordinance (PMO)

Pharmaceutical compatibility	• FDA 21 CFR 177
	• USP <87>
	• USP <88> Class VI 121 °C
	• TSE/BSE Certificate of Suitability
	• cGMP
	  Devices with the order code for "Test, certificate", option JG "Conformity with cGMP-derived requirements, declaration" comply with the requirements of cGMP with regard to the surfaces of parts in contact with the medium, design, FDA 21 CFR material conformity, USP Class VI tests and TSE/BSE conformity.
	  A serial number-specific declaration is generated.

Certification PROFIBUS	**PROFIBUS interface** The measuring device is certified and registered by the PNO (PROFIBUS Nutzerorganisation e.V./PROFIBUS User Organization). The measuring system meets all the requirements of the following specifications: • Certified according to PA Profile 3.02 • The device can also be operated with certified devices of other manufacturers (interoperability)
Radio approval	The measuring device has radio approval. For detailed information on the radio approval, see the Special Documentation

Pressure Equipment Directive	• With the marking a) PED/G1/x (x = category) or b) PESR/G1/x (x = category) on the sensor nameplate, Endress+Hauser confirms compliance with the "Essential Safety Requirements" a) specified in Annex I of the Pressure Equipment Directive 2014/68/EU or b) Schedule 2 of Statutory Instruments 2016 No. 1105. • Devices not bearing this marking (without PED or PESR) are designed and manufactured according to sound engineering practice. They meet the requirements of a) Art. 4 Para. 3 of the Pressure Equipment Directive 2014/68/EU or b) Part 1, Para. 8 of Statutory Instruments 2016 No. 1105. The scope of application is indicated a) in diagrams 6 to 9 in Annex II of the Pressure Equipment Directive 2014/68/EU or b) Schedule 3, Para. 2 of Statutory Instruments 2016 No. 1105.
Additional certification	**PWIS-free** PWIS = paint-wetting impairment substances Order code for "Service": • Option **HC**: PWIS-free (version A) • Option **HD**: PWIS-free (version B) • Option **HE**: PWIS-free (version C) For more information on PWIS-free certification, see "Test specification" document TS01028D
External standards and guidelines	• EN 60529 Degrees of protection provided by enclosures (IP code) • EN 61010-1 Safety requirements for electrical equipment for measurement, control and laboratory use - general requirements • EN 61326-1/-2-3 EMC requirements for electrical equipment for measurement, control and laboratory use • 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 • 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.

Diagnostic functionality	Order code for "Application package", option EA "Extended HistoROM" Comprises extended functions concerning the event log and the activation of the measured value memory. Event log: Memory volume is extended from 20 message entries (standard version) to up to 100 entries. Data logging (line recorder): • Memory capacity for up to 1000 measured values is activated. • 250 measured values can be output via each of the 4 memory channels. The recording interval can be defined and configured by the user. • Measured value logs can be accessed via the local display or operating tool e.g. FieldCare, DeviceCare or Web server. For detailed information, see the Operating Instructions for the device.
Heartbeat Technology	Order code for "Application package", option EB "Heartbeat Verification + Monitoring" **Heartbeat Verification** Meets the requirement for traceable verification to DIN ISO 9001:2008 Chapter 7.6 a) "Control of monitoring and measuring equipment". • Functional testing in the installed state without interrupting the process. • Traceable verification results on request, including a report. • Simple testing process via local operation or other operating interfaces. • Clear measuring point assessment (pass/fail) with high test coverage within the framework of manufacturer specifications. • Extension of calibration intervals according to operator's risk assessment. **Heartbeat Monitoring** 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: • Draw conclusions - using these data and other information - about the impact process influences (e.g. buildup, interference from the magnetic field) have on the measuring performance over time. • Schedule servicing in time. • Monitor the process or product quality . For detailed information, see the Special Documentation for the device.
Cleaning	Order code for "Application package", option EC "ECC electrode cleaning " The electrode cleaning circuit (ECC) function has been developed to have a solution for applications where magnetite (Fe_3O_4) deposits frequently occur (e.g. hot water). Since magnetite is highly conductive this build up leads to measuring errors and ultimately to

the loss of signal. The application package is designed to avoid build-up of very conductive matter and thin layers (typical of magnetite).

For detailed information, see the Operating Instructions for the device.

16.14   Accessories

Overview of accessories available to order → 🖹 179

16.15   Supplementary documentation

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

Standard documentation   **Brief Operating Instructions**

Brief Operating Instructions for the sensor

Measuring device	Documentation code
Proline Promag H	KA01289D

Brief Operating Instructions for transmitter

Measuring device	Documentation code
Proline 300	KA01405D

Technical Information

Measuring device	Documentation code
Promag H 300	TI01223D

Description of Device Parameters

Measuring device	Documentation code
Promag 300	GP01052D

Supplementary device-dependent documentation   **Safety instructions**

Safety instructions for electrical equipment for hazardous areas.

Contents	Documentation code
ATEX/IECEx Ex d/Ex de	XA01414D
ATEX/IECEx Ex ec	XA01514D
cCSAus XP	XA01515D
cCSAus Ex d/ Ex de	XA01516D
cCSAus Ex nA	XA01517D

Contents	Documentation code
INMETRO Ex d/Ex de	XA01518D
INMETRO Ex ec	XA01519D
NEPSI Ex d/Ex de	XA01520D
NEPSI Ex nA	XA01521D
EAC Ex d/Ex de	XA01656D
EAC Ex nA	XA01657D
JPN Ex d	XA01775D

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
Radio approvals for WLAN interface for A309/A310 display module	SD01793D
Web server	SD01660D
Remote display and operating module DKX001	SD01763D

Contents	Documentation code
Heartbeat Technology	SD01744D
Web server	SD01656D

Installation instructions

Contents	Note
Installation instructions for spare part sets and accessories	• Access the overview of all the available spare part sets via *Device Viewer* → 🖹 177 • Accessories available for order with Installation Instructions → 🖹 179

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