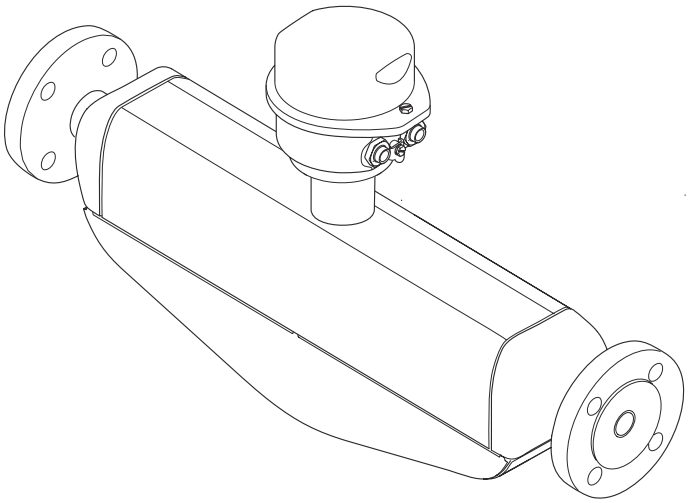
BA01254D/06/EN/03.21
71505951
2021-01-01

Valid as of version
01.00.zz (Device firmware)

Operating Instructions
Proline Promass S 100

Coriolis flowmeter
PROFIBUS DP



Endress+Hauser
People for Process Automation

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

Table of contents

1 About this document

1.1 Document function

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

1.2 Symbols used

1.2.1 Safety symbols

Symbol	Meaning
DANGER	**DANGER!** This symbol alerts you to a dangerous situation. Failure to avoid this situation will result in serious or fatal injury.
WARNING	**WARNING!** This symbol alerts you to a dangerous situation. Failure to avoid this situation can result in serious or fatal injury.
CAUTION	**CAUTION!** This symbol alerts you to a dangerous situation. Failure to avoid this situation can result in minor or medium injury.
NOTICE	**NOTE!** This symbol contains information on procedures and other facts which do not result in personal injury.

1.2.2 Electrical symbols

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

1.2.3 Tool symbols

Symbol	Meaning
	Allen key
	Open-ended wrench

1.2.4 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.

1.2.5 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

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

- The *W@M Device Viewer* : Enter the serial number from the nameplate (www.endress.com/deviceviewer)
- The *Endress+Hauser Operations App*: Enter the serial number from the nameplate or scan the 2-D matrix code (QR code) on the nameplate.

For a detailed list of the individual documents along with the documentation code

1.3.1 Standard documentation

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

1.3.2 Supplementary device-dependent documentation

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

1.4 Registered trademarks

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

Microsoft®
Registered trademark of the Microsoft Corporation, Redmond, Washington, USA

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

2 Basic safety instructions

2.1 Requirements for the personnel

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

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

2.2 Designated use

Application and media
The measuring device described in these Brief Operating Instructions is intended only for flow measurement of liquids.

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

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

To ensure that the measuring device remains in proper condition for the operation time:
- Keep within the specified pressure and temperature range.
- Only use the measuring device in full compliance with the data on the nameplate and the general conditions listed in the Operating Instructions and supplementary documentation.
- Based on the nameplate, check whether the ordered device is permitted for the intended use in the hazardous area (e.g. explosion protection, pressure vessel safety).
- Use the measuring device only for media to which the process-wetted materials are sufficiently resistant.
- If the measuring device is not operated at atmospheric temperature, compliance with the relevant basic conditions specified in the associated device documentation is absolutely essential: "Documentation" section→ 🖹 7.
- Protect the measuring device permanently against corrosion from environmental influences.

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

⚠ WARNING

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

NOTICE

Verification for borderline cases:

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

Residual risks

⚠ WARNING

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

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

2.3 Workplace safety

For work on and with the device:

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

For welding work on the piping:

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

If working on and with the device with wet hands:

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

2.4 Operational safety

Risk of injury.

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

Conversions to the device

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

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

Repair

To ensure continued operational safety and reliability,

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

2.5 Product safety

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

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

2.6 IT security

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

IT security measures in line with operators' security standards and designed to provide additional protection for the device and device data transfer must be implemented by the operators themselves.

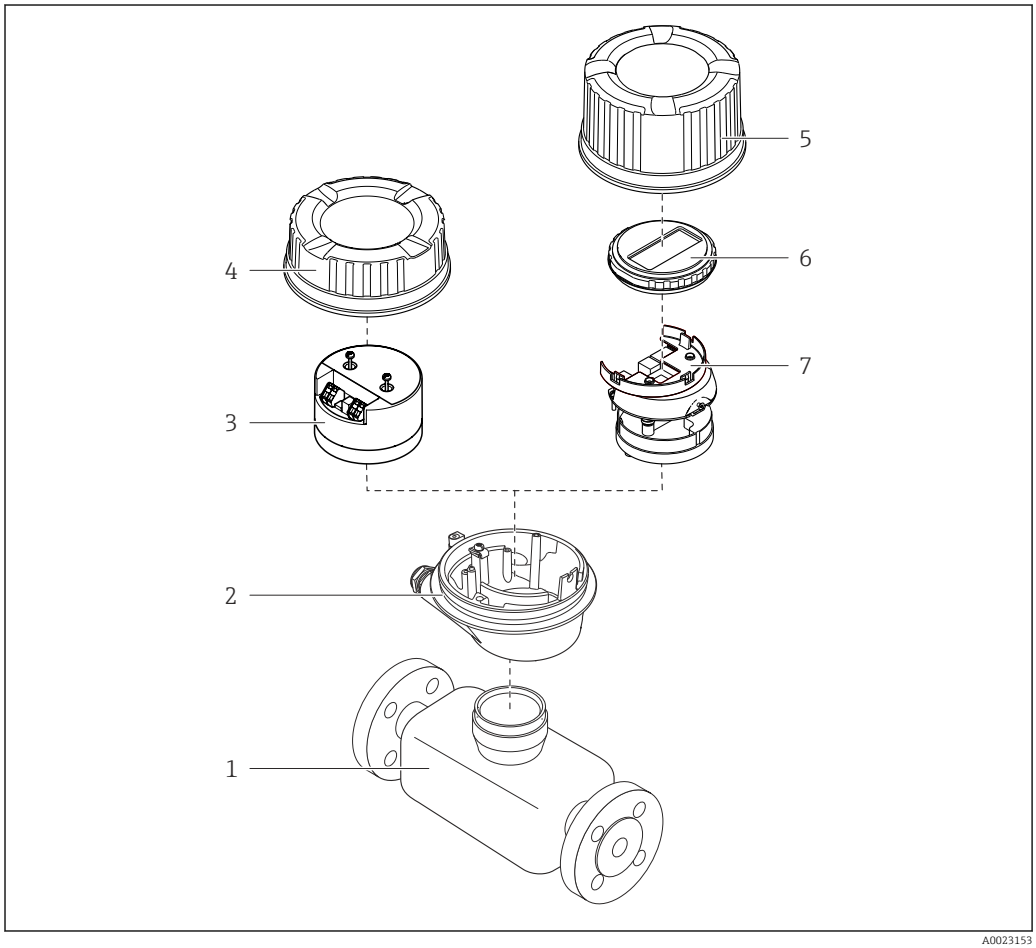
3 Product description

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

3.1.1 Device version with PROFIBUS DP communication type

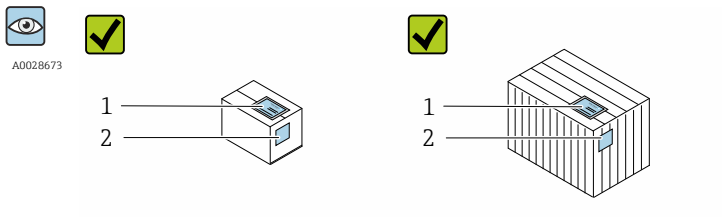


1 *Important components of a measuring device*

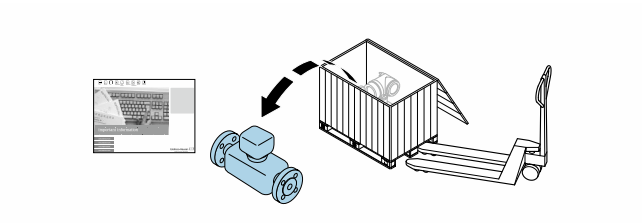
1 *Sensor*
2 *Transmitter housing*
3 *Main electronics module*
4 *Transmitter housing cover*
5 *Transmitter housing cover (version for optional onsite display)*
6 *Onsite display (optional)*
7 *Main electronics module (with bracket for optional onsite display)*

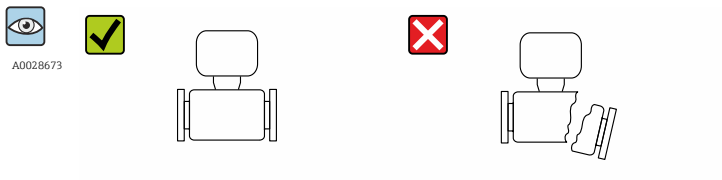
4 Incoming acceptance and product identification

4.1 Incoming acceptance

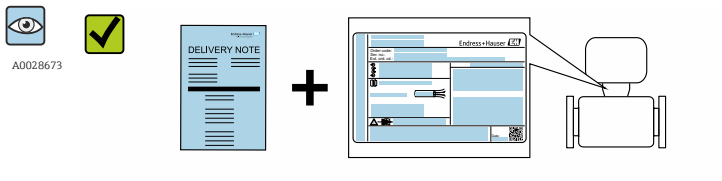


Are the order codes on the delivery note (1) and the product sticker (2) identical?

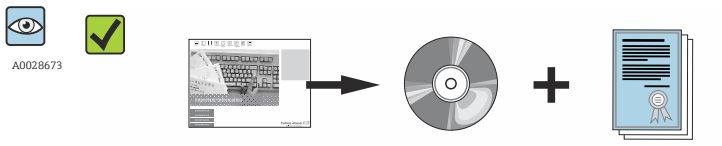




Are the goods undamaged?



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



Is the CD-ROM with the Technical Documentation (depends on device version) and documents present?

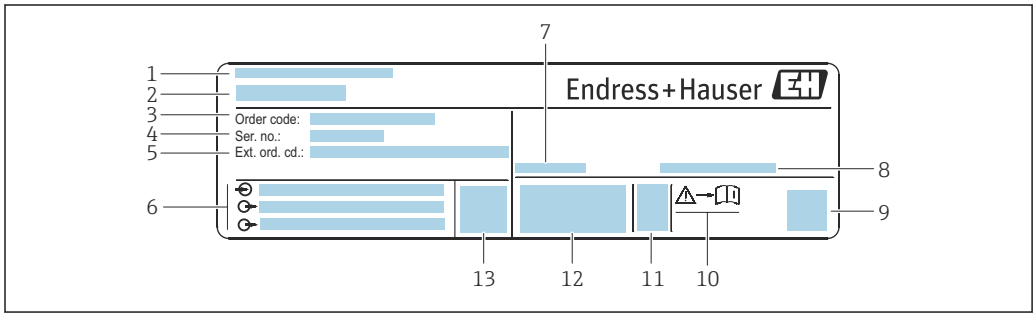
- If one of the conditions is not satisfied, contact your Endress+Hauser Sales Center.
- Depending on the device version, the CD-ROM might not be part of the delivery! The Technical Documentation is available via the Internet or via the *Endress+Hauser Operations App*, see the "Product identification" section → 14.

4.2 Product identification

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

For an overview of the scope of the associated Technical Documentation, refer to the following:
- The chapters "Additional standard documentation on the device" → 8 and "Supplementary device-dependent documentation" → 8
- The *W@M Device Viewer*: Enter the serial number from the nameplate (www.endress.com/deviceviewer)
- The *Endress+Hauser Operations App*: Enter the serial number from the nameplate or scan the 2-D matrix code (QR code) on the nameplate.

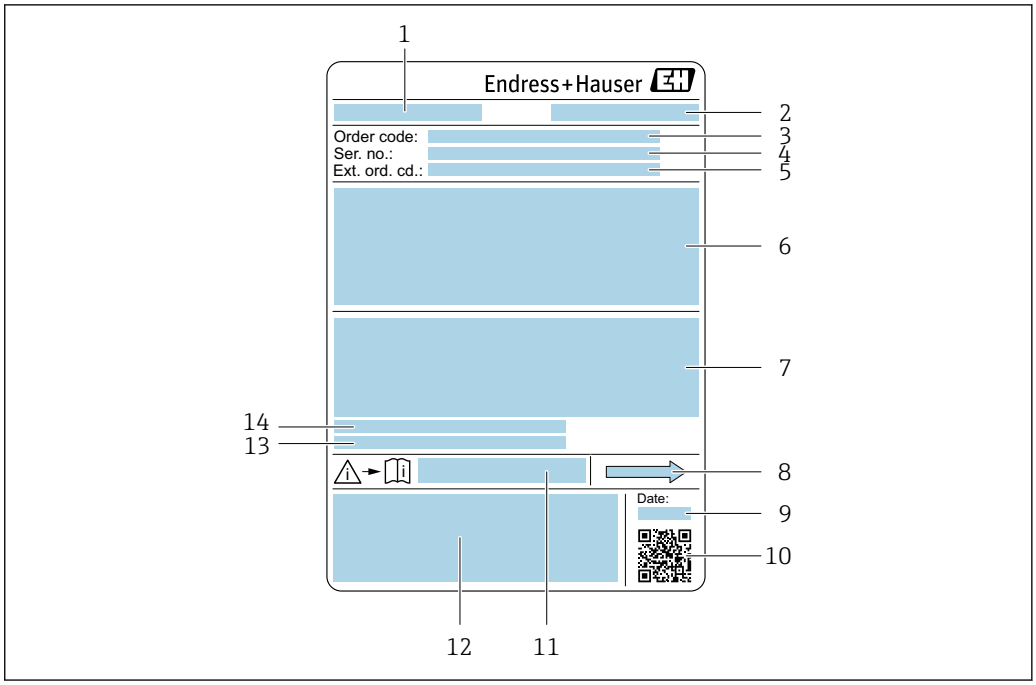
4.2.1 Transmitter nameplate



2 *Example of a transmitter nameplate*

1 *Manufacturing location*
2 *Name of the transmitter*
3 *Order code*
4 *Serial number (ser. no.)*
5 *Extended order code (Ext. ord. cd.)*
6 *Electrical connection data, e.g. available inputs and outputs, supply voltage*
7 *Permitted ambient temperature (T_a)*
8 *Degree of protection*
9 *2-D matrix code*
10 *Document number of safety-related supplementary documentation → 142*
11 *Manufacturing date: year-month*
12 *CE mark, C-Tick*
13 *Firmware version (FW)*

4.2.2 Sensor nameplate



3 *Example of a sensor nameplate*

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

Order code

The measuring device is reordered using the order code.

Extended order code

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

4.2.3 Symbols on measuring device

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

5 Storage and transport

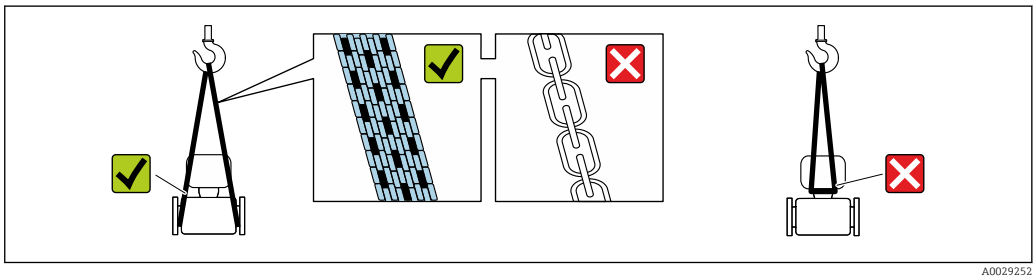
5.1 Storage conditions

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

Storage temperature→ 132

5.2 Transporting the product

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



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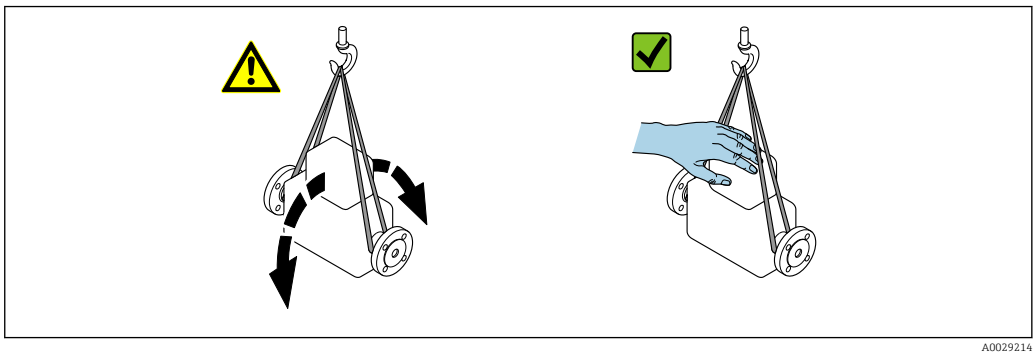
Do not remove protective covers or caps installed on process connections. They prevent mechanical damage to the sealing surfaces and contamination in the measuring tube.

5.2.1 Measuring devices without lifting lugs

WARNING

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

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



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5.2.2 Measuring devices with lifting lugs

⚠ CAUTION

Special transportation instructions for devices with lifting lugs

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

5.2.3 Transporting with a fork lift

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

5.3 Packaging disposal

All packaging materials are environmentally friendly and 100% recyclable:

- Measuring device secondary packaging: polymer stretch film that conforms to EC Directive 2002/95/EC (RoHS).
- Packaging:
  - Wood crate, treated in accordance with ISPM 15 standard, which is confirmed by the affixed IPPC logo.
    or
  - Carton in accordance with European Packaging Directive 94/62EC; recyclability is confirmed by the affixed RESY symbol.
- Seaworthy packaging (optional): Wood crate, treated in accordance with ISPM 15 standard, which is confirmed by the affixed IPPC logo.
- Carrying and mounting hardware:
  - Disposable plastic pallet
  - Plastic straps
  - Plastic adhesive strips
- Dunnage: Paper cushion

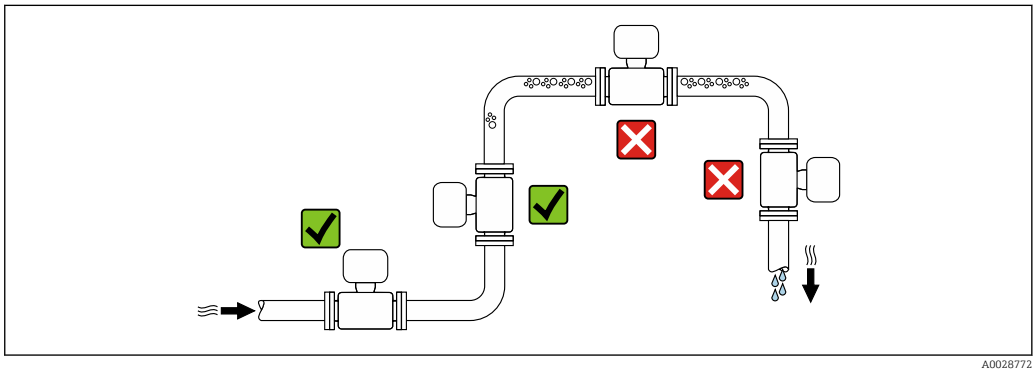
6 Installation

6.1 Installation conditions

No special measures such as supports are necessary. External forces are absorbed by the construction of the device.

6.1.1 Mounting position

Mounting location



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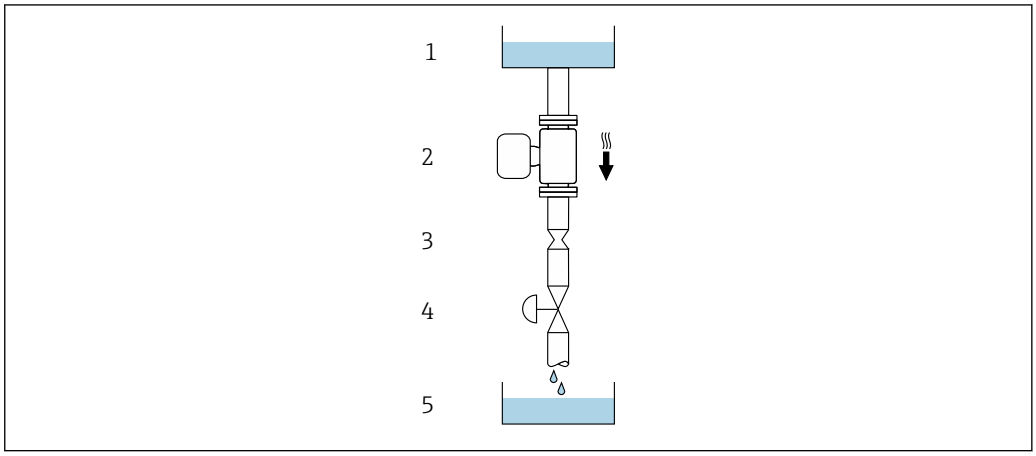
To prevent measuring errors arising from accumulation of gas bubbles in the measuring tube, avoid the following mounting locations in the pipe:
- Highest point of a pipeline.
- Directly upstream of a free pipe outlet in a down pipe.

Installation in down pipes

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



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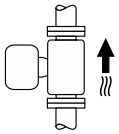
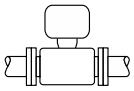
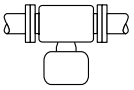
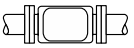
4 *Installation in a down pipe (e.g. for batching applications)*

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

DN		Ø orifice plate, pipe restriction	
[mm]	[in]	[mm]	[in]
8	⅜	6	0.24
15	½	10	0.40
25	1	14	0.55
40	1½	22	0.87
50	2	28	1.10

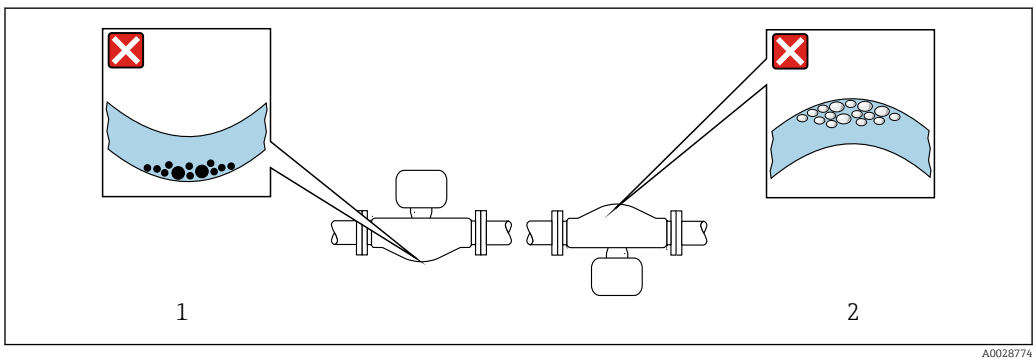
Orientation

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

Orientation			Recommendation
A	Vertical orientation	 A0015591	✓✓
B	Horizontal orientation, transmitter at top	 A0015589	✓✓ [1] Exceptions: → 5, 20
C	Horizontal orientation, transmitter at bottom	 A0015590	✓✓ [2] Exceptions: → 5, 20
D	Horizontal orientation, transmitter at side	 A0015592	✓✓

1) Applications with low process temperatures may decrease the ambient temperature. To maintain the minimum ambient temperature for the transmitter, this orientation 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.

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



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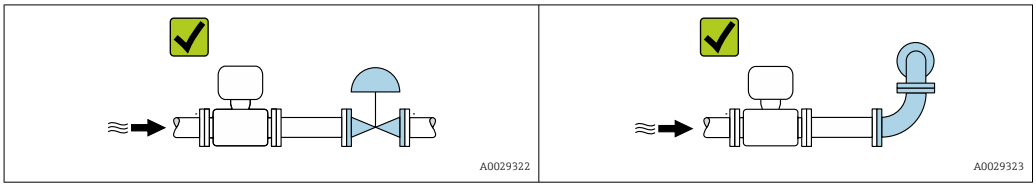
5 Orientation of sensor with curved measuring tube

1 Avoid this orientation for fluids with entrained solids: Risk of solids accumulating.
2 Avoid this orientation for outgassing fluids: Risk of gas accumulating.

Inlet and outlet runs

No special precautions need to be taken for fittings which create turbulence, such as valves, elbows or T-pieces, as long as no cavitation occurs → 21.



Installation dimensions

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

6.1.2 Requirements from environment and process

Ambient temperature range

Measuring device	▪ −40 to +60 °C (−40 to +140 °F) ▪ Order code for "Test, certificate", option **JM**: −50 to +60 °C (−58 to +140 °F)

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

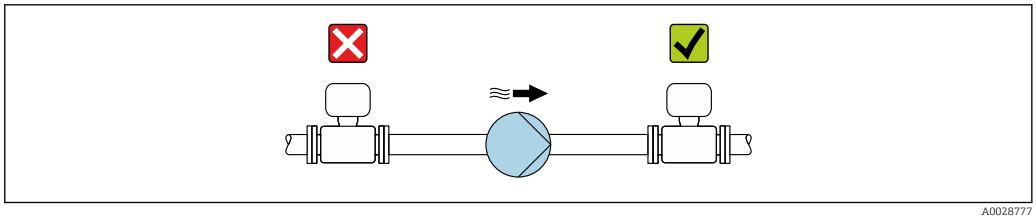
System pressure

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

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

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

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



Thermal insulation

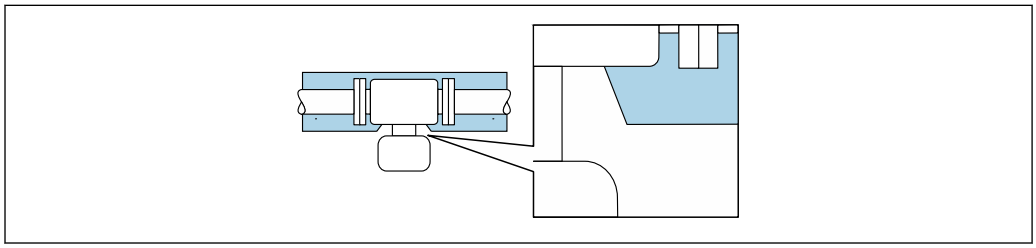
In the case of some fluids, it is important to keep the heat radiated from the sensor to the transmitter to a low level. A wide range of materials can be used for the required insulation.

The following device versions are recommended for versions with thermal insulation:
Version with extended neck for insulation:
Order code for "Sensor option", option **CG** with an extended neck length of 105 mm (4.13 in).

NOTICE

Electronics overheating on account of thermal insulation!

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



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6 *Thermal insulation with extended neck free*

Heating

NOTICE

Electronics can overheat due to elevated ambient temperature!

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

NOTICE

Danger of overheating when heating

- Ensure that the temperature at the lower end of the transmitter housing does not exceed 80 °C (176 °F).
- Ensure that convection takes place on a sufficiently large scale at the transmitter neck.
- Ensure that a sufficiently large area of the housing support remains exposed. The uncovered part serves as a radiator and protects the electronics from overheating and excessive cooling.

Heating options

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

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

Using an electrical trace heating system

If heating is regulated via phase angle control or pulse packages, magnetic fields can affect the measured values (= for values that are greater than the values permitted by the EN standard (sine 30 A/m)).

For this reason, the sensor must be magnetically shielded: the housing can be shielded with tin plates or electric sheets without a privileged direction (e.g. V330-35A).

The sheet must have the following properties:

- Relative magnetic permeability μr ≥ 300
- Plate thickness d ≥ 0.35 mm (d ≥ 0.014 in)

Vibrations

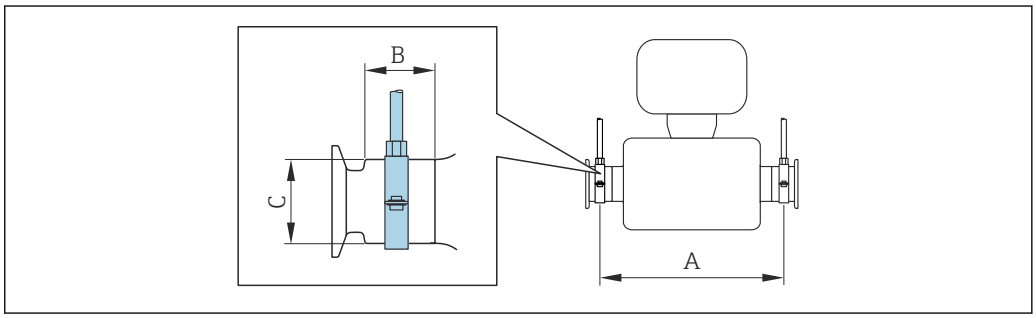
The high oscillation frequency of the measuring tubes ensures that the correct operation of the measuring system is not influenced by plant vibrations.

6.1.3 Special mounting instructions

Securing with mounting clamp in the case of hygiene connections

It is not necessary to provide additional support for the sensor for operational performance purposes. If, however, additional support is required for installation purposes, the following dimensions must be observed.

Use mounting clamp with lining between clamp and measuring instrument.



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DN		A		B		C	
[mm]	[in]	[mm]	[in]	[mm]	[in]	[mm]	[in]
8	⅜	298	11.73	33	1.3	28	1.1
15	½	402	15.83	33	1.3	28	1.1
25	1	542	21.34	33	1.3	38	1.5
40	1 ½	658	25.91	36.5	1.44	56	2.2
50	2	772	30.39	44.1	1.74	75	2.95

Zero point adjustment

All measuring devices are calibrated in accordance with state-of-the-art technology. Calibration takes place under reference conditions→ 🖹 128. Therefore, a zero point adjustment in the field is generally not required.

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

6.2 Mounting the measuring device

6.2.1 Required tools

For sensor

For flanges and other process connections: Corresponding mounting tools

6.2.2 Preparing the measuring device

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

6.2.3 Mounting the measuring device

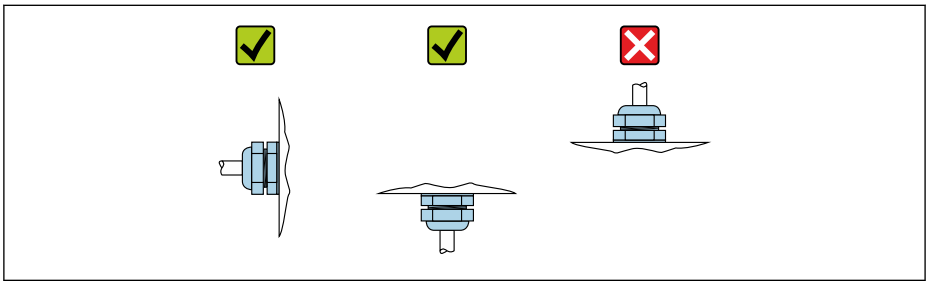
⚠ WARNING

Danger due to improper process sealing!

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

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

↳



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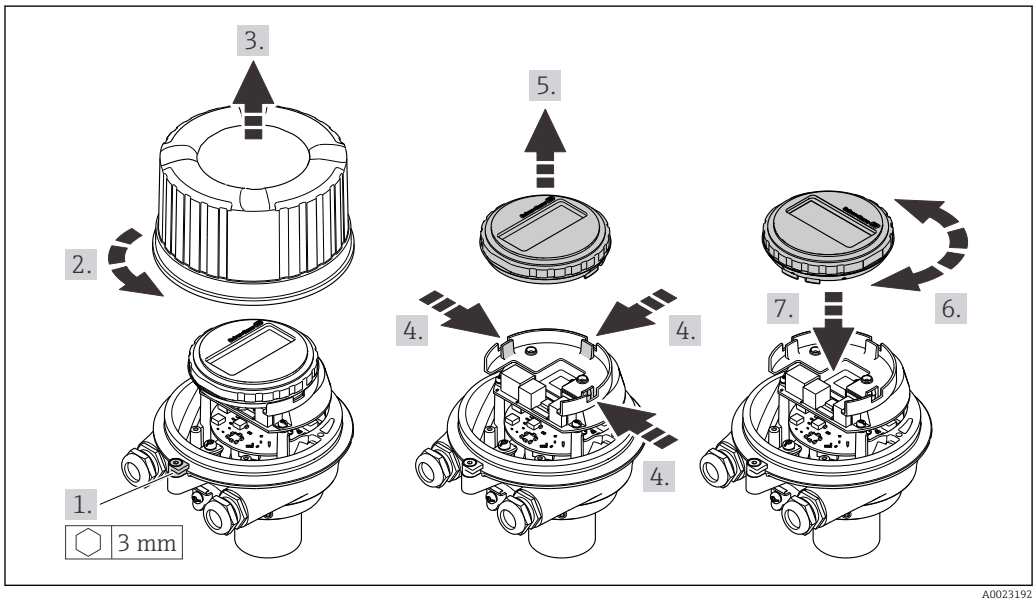
6.2.4 Turning the display module

The local display is only available with the following device version:
Order code for "Display; Operation", option **B**: 4-line; lit, via communication

The display module can be turned to optimize display readability.

Aluminum housing version, AlSi10Mg, coated



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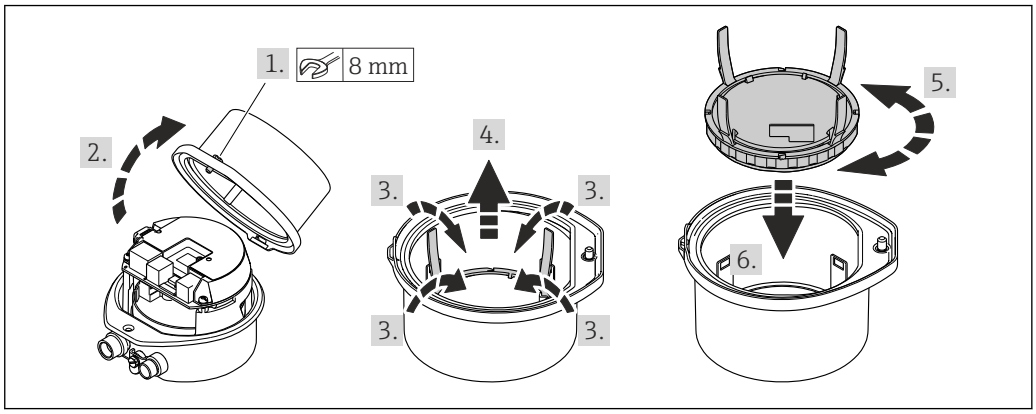
Compact and ultra-compact housing version, hygienic, stainless



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6.3 Post-installation check

Is the device undamaged (visual inspection)?	❑
Does the measuring device conform to the measuring point specifications? For example: ▪ Process temperature → 🖹 133 ▪ Process pressure (refer to the section on "Pressure-temperature ratings" in the "Technical Information" document) ▪ Ambient temperature ▪ Measuring range → 🖹 124	❑
Has the correct orientation for the sensor been selected ? ▪ 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 direction of flow of the fluid through the piping → 🖹 20?	❑
Are the measuring point identification and labeling correct (visual inspection)?	❑
Is the device adequately protected from precipitation and direct sunlight?	❑
Are the securing screw and securing clamp tightened securely?	❑

7 Electrical connection

NOTICE

The measuring device does not have an internal circuit breaker.

- ▶ For this reason, assign the measuring device a switch or power-circuit breaker so that the power supply line can be easily disconnected from the mains.
- ▶ Although the measuring device is equipped with a fuse, additional overcurrent protection (maximum 16 A) should be integrated into the system installation.

7.1 Connection conditions

7.1.1 Required tools

- For cable entries: Use corresponding tools
- For securing clamp (on aluminum housing): Allen screw3 mm
- For securing screw (for stainless steel housing): open-ended wrench 8 mm
- Wire stripper
- When using stranded cables: crimper for wire end ferrule

7.1.2 Requirements for connecting cable

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

Electrical safety

In accordance with applicable federal/national regulations.

Permitted temperature range

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

Power supply cable

Standard installation cable is sufficient.

Signal cable

PROFIBUS DP

The IEC 61158 standard specifies two types of cable (A and B) for the bus line which can be used for every transmission rate. Cable type A is recommended.

Cable type	A
Characteristic impedance	135 to 165 Ω at a measuring frequency of 3 to 20 MHz
Cable capacitance	< 30 pF/m
Wire cross-section	> 0.34 mm^2 (22 AWG)
Cable type	Twisted pairs
Loop resistance	≤110 Ω/km
Signal damping	Max. 9 dB over the entire length of the cable cross-section
Shield	Copper braided shielding or braided shielding with foil shield. When grounding the cable shield, observe the grounding concept of the plant.

Cable diameter

- Cable glands supplied:
  M20 × 1.5 with cable Ø 6 to 12 mm (0.24 to 0.47 in)
- Spring terminals:
  Wire cross-sections 0.5 to 2.5 mm^2 (20 to 14 AWG)

7.1.3 Terminal assignment

Transmitter

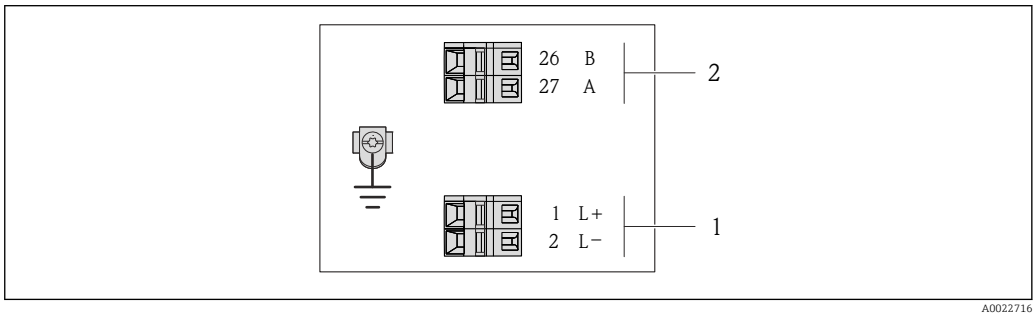
PROFIBUS DP connection version

For use in the non-hazardous area and Zone 2/Div. 2

Order code for "Output", option **L**

Depending on the housing version, the transmitters can be ordered with terminals or device plugs.

Order code "Housing"	Connection methods available		Possible options for order code "Electrical connection"
	Output	Power supply	
Options **A**, **B**	Terminals	Terminals	▪ Option **A**: coupling M20x1 ▪ Option **B**: thread M20x1 ▪ Option **C**: thread G ½" ▪ Option **D**: thread NPT ½"
Options **A**, **B**	Device plugs → 🖹 28	Terminals	▪ Option **L**: plug M12x1 + thread NPT ½" ▪ Option **N**: plug M12x1 + coupling M20 ▪ Option **P**: plug M12x1 + thread G ½" ▪ Option **U**: plug M12x1 + thread M20
Options **A**, **B**, **C**	Device plugs → 🖹 28	Device plugs → 🖹 28	Option **Q**: 2 x plug M12x1
Order code for "Housing": ▪ Option **A**: compact, coated aluminum ▪ Option **B**: compact, hygienic, stainless ▪ Option **C** ultra-compact, hygienic, stainless			



7 *PROFIBUS DP terminal assignment*

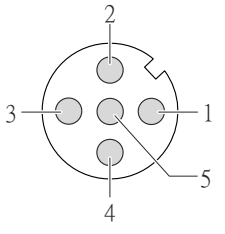
1 *Power supply: DC 24 V*
2 *PROFIBUS DP*

Order code "Output"	Terminal number			
	Power supply		Output	
	2 (L-)	1 (L+)	26 (RxD/TxD-P)	27 (RxD/TxD-N)
Option **L**	DC 24 V		B	A
Order code for "Output": Option **L**: PROFIBUS DP, for use in non-hazardous areas and Zone 2/Div. 2				

7.1.4 Pin assignment, device plug

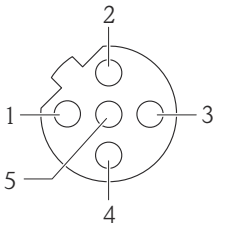
Supply voltage

For use in the non-hazardous area and Zone 2/Div. 2.



Pin		Assignment
1	L+	DC 24 V
2		Not assigned
3		Not assigned
4	L-	DC 24 V
5		Grounding/shielding
Coding		**Plug/socket**
A		Plug

Device plug for signal transmission (device side)



Pin		Assignment
1		Not assigned
2	A	PROFIBUS DP
3		Not assigned
4	B	PROFIBUS DP
5		Grounding/shielding
Coding		**Plug/socket**
B		Socket

7.1.5 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 → 26.

7.2 Connecting the measuring device

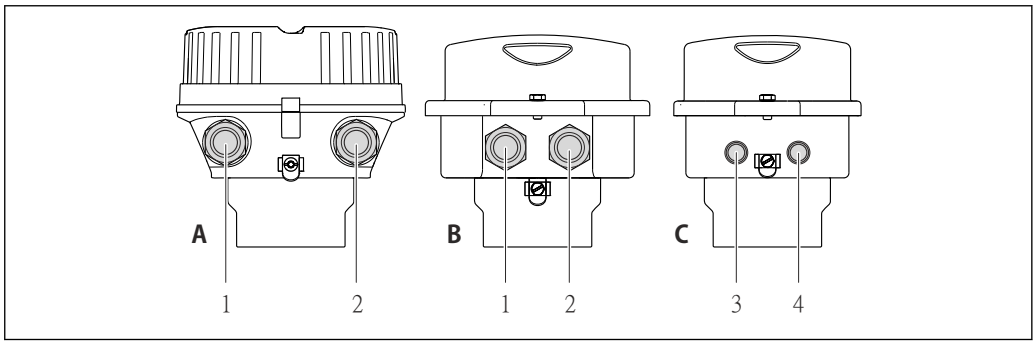
NOTICE

Limitation of electrical safety due to incorrect connection!

- Have electrical connection work carried out by appropriately trained specialists only.
- Observe applicable federal/national installation codes and regulations.
- Comply with local workplace safety regulations.
- Always connect the protective ground cable ⏚ before connecting additional cables.
- For use in potentially explosive atmospheres, observe the information in the device-specific Ex documentation.
- The power unit must be tested to ensure it meets safety requirements (e.g. PELV, SELV).

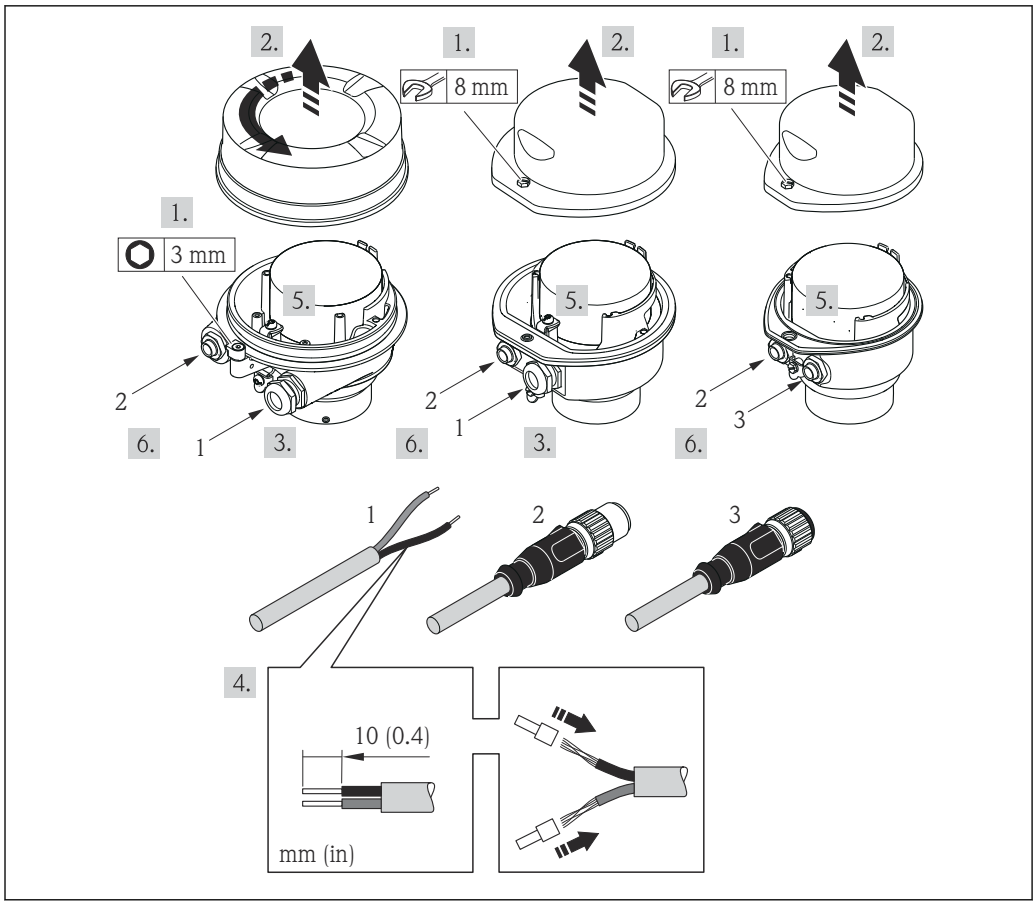
7.2.1 Connecting the transmitter

The connection of the transmitter depends on the following order codes:
- Housing version: compact or ultra-compact
- Connection version: device plug or terminals



8 Housing versions and connection versions

A Compact, coated aluminum
B Compact hygienic, stainless or compact, stainless
1 Cable entry or device plug for signal transmission
2 Cable entry or device plug for supply voltage
C Ultra-compact hygienic, stainless or ultra-compact, stainless
3 Device plug for signal transmission
4 Device plug for supply voltage



9 *Device versions with connection examples*

1 Cable
2 Device plug for signal transmission
3 Device plug for supply voltage

Depending on the housing version disconnect the local display from the main electronics module: Operating Instructions for the device .

▶ Connect the cable in accordance with the terminal assignment or the device plug pin assignment .

7.2.2 Ensure potential equalization

Requirements

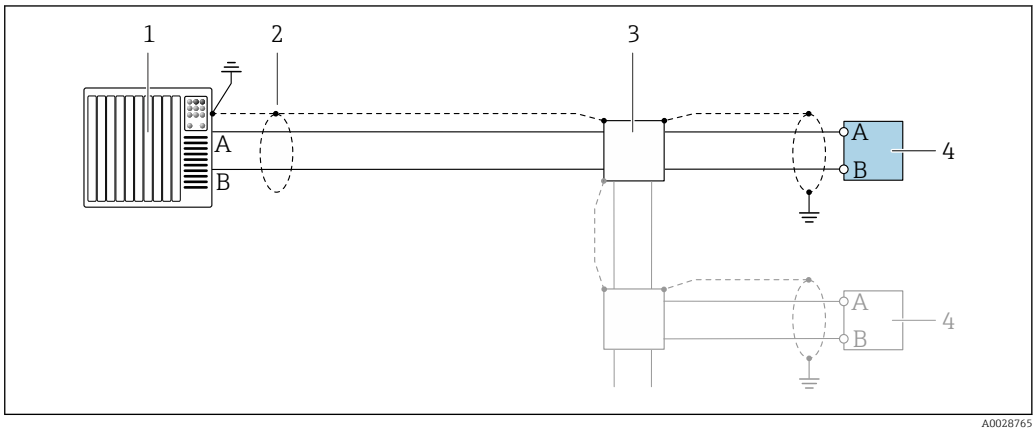
No special measures for potential equalization are required.

For devices intended for use in hazardous locations, please observe the guidelines in the Ex documentation (XA).

7.3 Special connection instructions

7.3.1 Connection examples

PROFIBUS DP



10 *Connection example for PROFIBUS DP, non-hazardous area and Zone 2/Div. 2*

1 *Control system (e.g. PLC)*
2 *Cable shield: the cable shield must be grounded at both ends to comply with EMC requirements; observe cable specifications*
3 *Transmitter*

If baud rates > 1.5 MBaud an EMC cable entry must be used and the cable shield must continue as far as the terminal wherever possible.

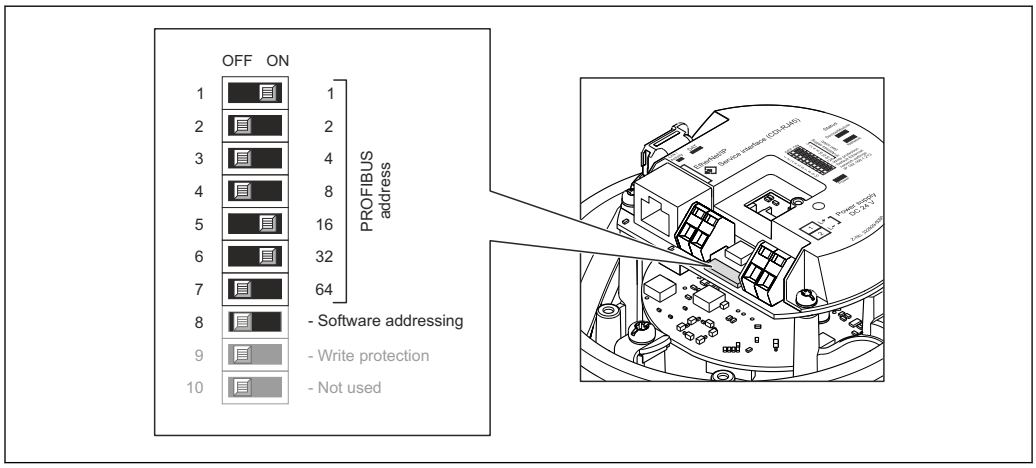
7.4 Hardware settings

7.4.1 Setting the device address

PROFIBUS DP

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.

Setting the address



11 *Addressing using DIP switches on the I/O electronics module*

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 → 138.
3. Disable software addressing via DIP switch 8 (OFF).
4. Set the desired device address via the corresponding DIP switches.
   ↳ Example → 11, 32: 1 + 16 + 32 = device address 49
   The device demands rebooting after 10 s. After rebooting, hardware addressing is enabled with the configured IP address.
5. Reverse the removal procedure to reassemble the transmitter.

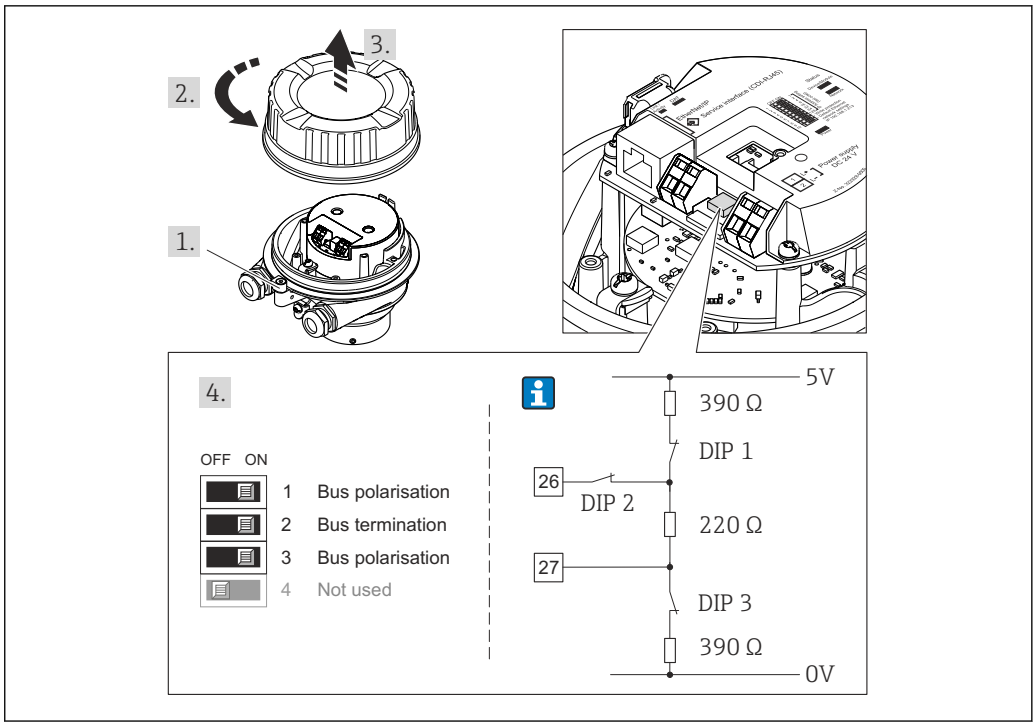
7.4.2 Enabling the terminating resistor

PROFIBUS DP

To avoid incorrect communication transmission caused by impedance mismatch, terminate the PROFIBUS DP cable correctly at the start and end of the bus segment.

- If the device is operated with a baud rate of 1.5 MBaud and under:
  For the last transmitter on the bus, terminate via DIP switch 2 (bus termination) and DIP switch 1 and 3 (bus polarization). Setting: ON – ON – ON → 12, 33.
- For baud rates > 1.5 MBaud:
  Due to the capacitance load of the user and the line reflections generated as a result, ensure that an external bus terminator is used.

It is generally advisable to use an external bus terminator as the entire segment can fail if a device that is terminated internally is defective.



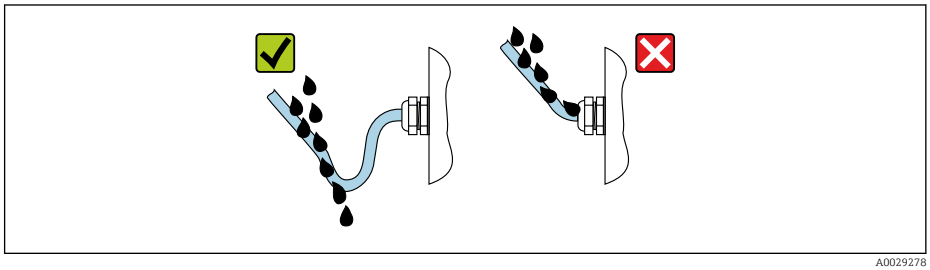
12 *Termination using DIP switches on the I/O electronics module (for baud rates < 1.5 MBaud)*

7.5 Ensuring the degree of protection

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

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

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



6. Insert dummy plugs into unused cable entries.

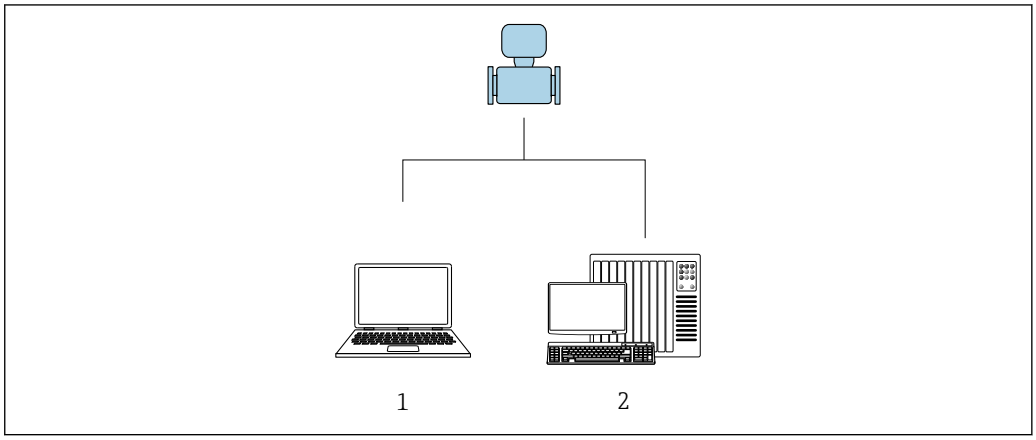
7.6 Post-connection check

Are cables or the device undamaged (visual inspection)?	❑
Do the cables used meet the requirements→ 🖹 26?	❑
Do the cables have adequate strain relief?	❑

Are all the cable glands installed, firmly tightened and leak-tight? Cable run with "water trap" → 🖹 33 ?	❑
Depending on the device version: are all the device plugs firmly tightened ?	❑
Does the supply voltage match the specifications on the transmitter nameplate → 🖹 128?	❑
Is the terminal assignment → 🖹 27 or pin assignment of the connector → 🖹 28 correct?	❑
If supply voltage is present, is the power LED on the electronics module of the transmitter lit green → 🖹 12?	❑
Depending on the device version, is the securing clamp or fixing screw firmly tightened?	❑

8 Operation options

8.1 Overview of operating options

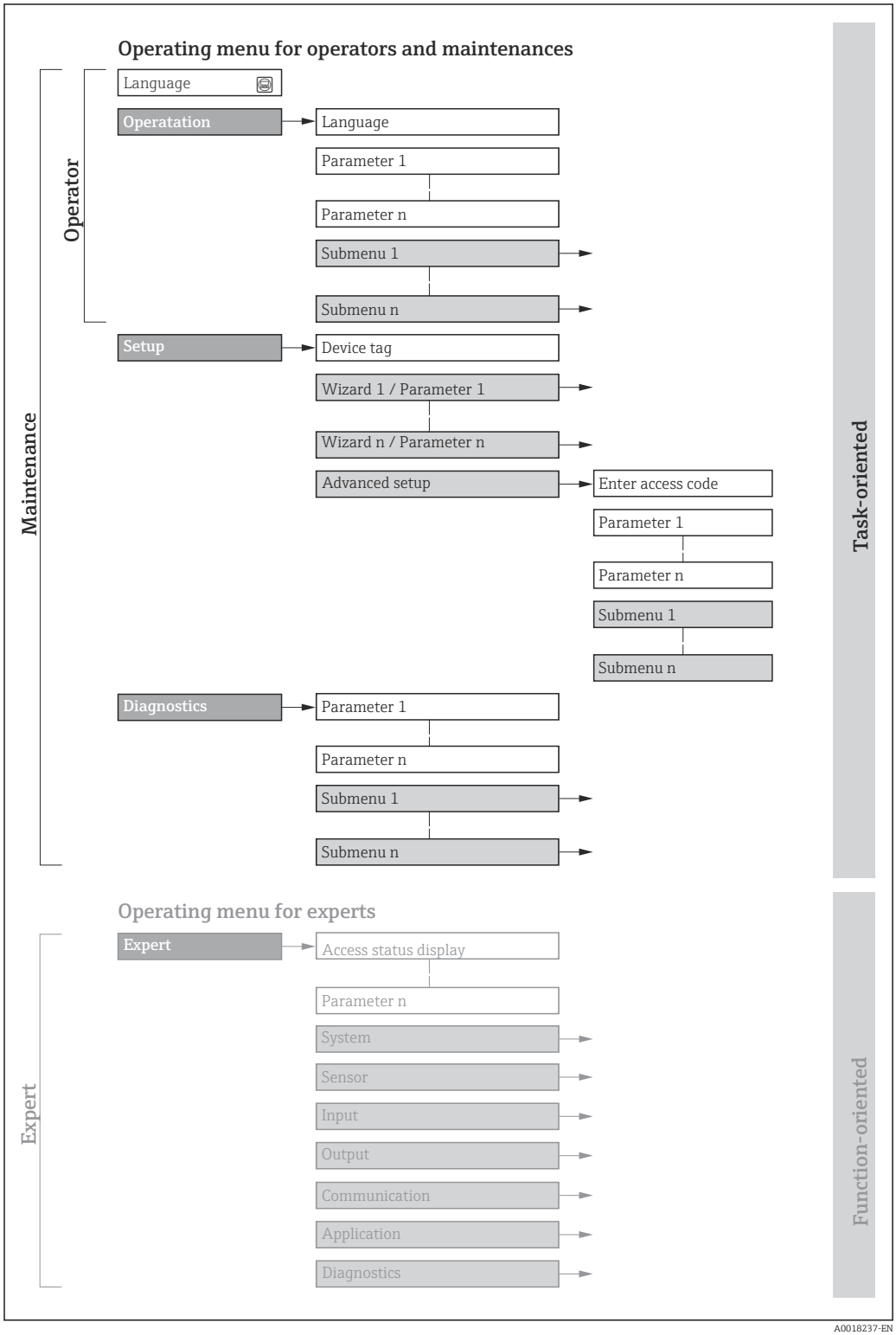


1 Computer with Web browser (e.g. Internet Explorer) or with "FieldCare" operating tool
2 Automation system, e.g. "RSLogix" (Rockwell Automation) and work station for measuring device operation with Add-on Profile Level 3 for "RSLogix 5000" software (Rockwell Automation)

8.2 Structure and function of the operating menu

8.2.1 Structure of the operating menu

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



13 *Schematic structure of the operating menu*

8.2.2 Operating philosophy

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

Menu/parameter		User role and tasks	Content/meaning
Language	task-oriented	**Role "Operator", "Maintenance"** Tasks during operation: ▪ Configuring the operational display ▪ Reading measured values	▪ Defining the operating language ▪ Defining the Web server operating language ▪ Resetting and controlling totalizers
Operation			▪ Configuring the operational display (e.g. display format, display contrast) ▪ Resetting and controlling totalizers
Setup		**"Maintenance" role** Commissioning: Configuration of the measurement	Submenus for fast commissioning: ▪ Set the system units ▪ Define the medium ▪ Configuring the operational display ▪ Set the low flow cut off ▪ Configure partial and empty pipe detection Advanced setup ▪ For more customized configuration of the measurement (adaptation to special measuring conditions) ▪ Configuration of totalizers ▪ Configure the WLAN settings ▪ Administration (define access code, reset measuring device)
Diagnostics		**"Maintenance" role** Fault elimination: ▪ 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. ▪ Heartbeat The functionality of the device is checked on demand and the verification results are documented. ▪ Simulation Is used to simulate measured values or output values.
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 the parameters of the device and makes it possible to access these parameters directly using an access code. The structure of this menu is based on the function blocks of the device: ▪ System Contains all higher-order device parameters which do not concern the measurement or the communication interface. ▪ Sensor Configuration of the measurement. ▪ Communication Configuration of the digital communication interface and the Web server. ▪ Submenus for function blocks (e.g. "Analog Inputs") Configuration of function blocks. ▪ Application Configure 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 the operating menu via the web browser

8.3.1 Function range

Thanks to the integrated Web server, the device can be operated and configured via a Web browser and via a service interface (CDI-RJ45) . In addition to the measured values, status information on the device is also displayed and allows the user to monitor the status of the device. Furthermore the device data can be managed and the network parameters can be configured.

For additional information on the Web server, refer to the Special Documentation for the device → 142

8.3.2 Prerequisites

Computer hardware

Interface	The computer must have an RJ45 interface.
Connection	Standard Ethernet cable with RJ45 connector.
Screen	Recommended size: ≥12" (depends on the screen resolution)

Computer software

Recommended operating systems	Microsoft Windows 7 or higher. Microsoft Windows XP is supported.
Web browsers supported	▪ Microsoft Internet Explorer 8 or higher ▪ Microsoft Edge ▪ Mozilla Firefox ▪ Google Chrome ▪ Safari

Computer settings

User rights	Appropriate user rights (e.g. administrator rights) for TCP/IP and proxy server settings are necessary (for adjusting the IP address, subnet mask etc.).
Proxy server settings of the Web browser	The Web browser setting *Use a Proxy Server for Your LAN* must be **deselected** .
JavaScript	JavaScript must be enabled. If JavaScript cannot be enabled: enter http://XXX.XXX.X.XXX/basic.html in the address line of the Web browser, e.g. http://192.168.1.212/basic.html. A fully functional but simplified version of the operating menu structure starts in the Web browser.
Network connections	Only the active network connections to the measuring device should be used.
	Switch off all other network connections such as WLAN.

In the event of connection problems: → 80

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 → 42

8.3.3 Establishing a connection

Via service interface (CDI-RJ45)

Preparing the measuring device

Configuring the Internet protocol of the computer

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

IP address of the device: 192.168.1.212 (factory setting)

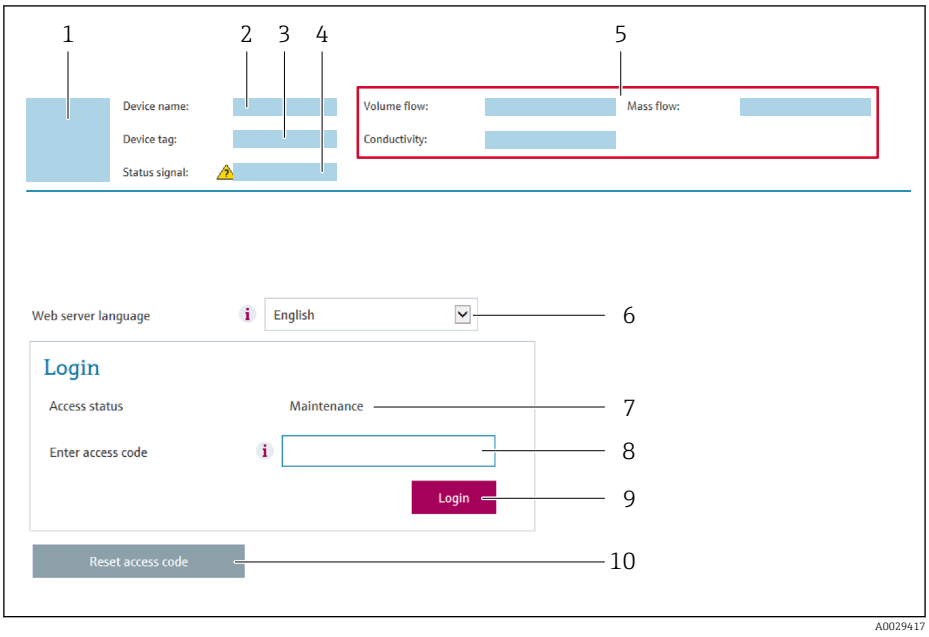
1. Switch on the measuring device.
2. Connect to the computer using a cable → 138.
3. If a 2nd network card is not used, close all the applications on the notebook.
   ↳ Applications requiring Internet or a network, such as e-mail, SAP applications, Internet or Windows Explorer.
4. Close any open Internet 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

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*

If a login page does not appear, or if the page is incomplete → 80

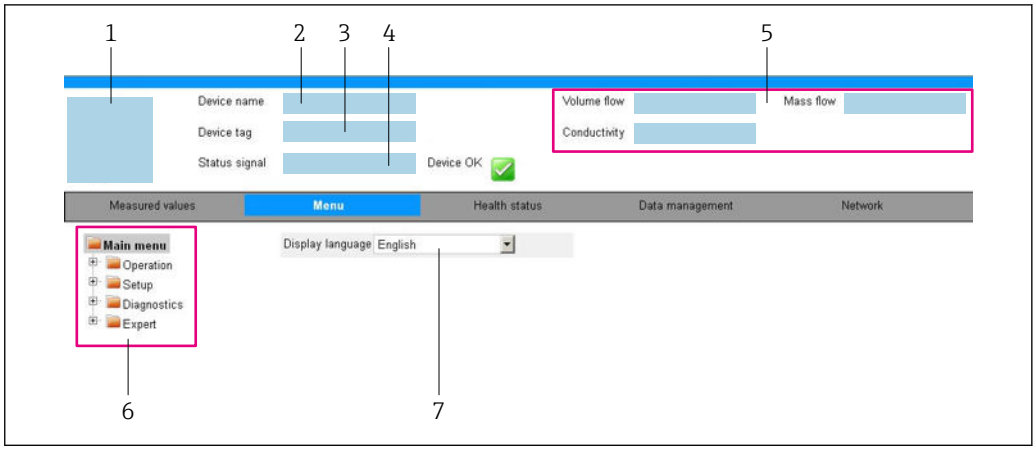
8.3.4 Logging on

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.

8.3.5 User interface



1 *Picture of device*
2 *Device name*
3 *Device tag*
4 *Status signal*
5 *Current measured values*
6 *Navigation area*
7 *Local display language*

Header

The following information appears in the header:
- Device tag
- Device status with status signal → 82
- Current measured values

Function row

Functions	Meaning
Measured values	Displays the measured values of the measuring device
Menu	▪ Access to the operating menu from the measuring device ▪ The structure of the operating menu is the same as for the operating tools For detailed information on the structure of the operating menu, see the Operating Instructions for the measuring device
Device status	Displays the diagnostic messages currently pending, listed in order of priority

Data management	Data exchange between PC and measuring device:
	▪ 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 DP: GSD file

Network configuration	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

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

Working area

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

8.3.6 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 ▪ On

Function scope of the "Web server functionality" parameter

Option	Description
Off	▪ The web server is completely disabled. ▪ Port 80 is locked.
On	▪ The complete functionality of the web server 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 Bedientool "FieldCare"
- Via "DeviceCare" operating tool

8.3.7 Logging out

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

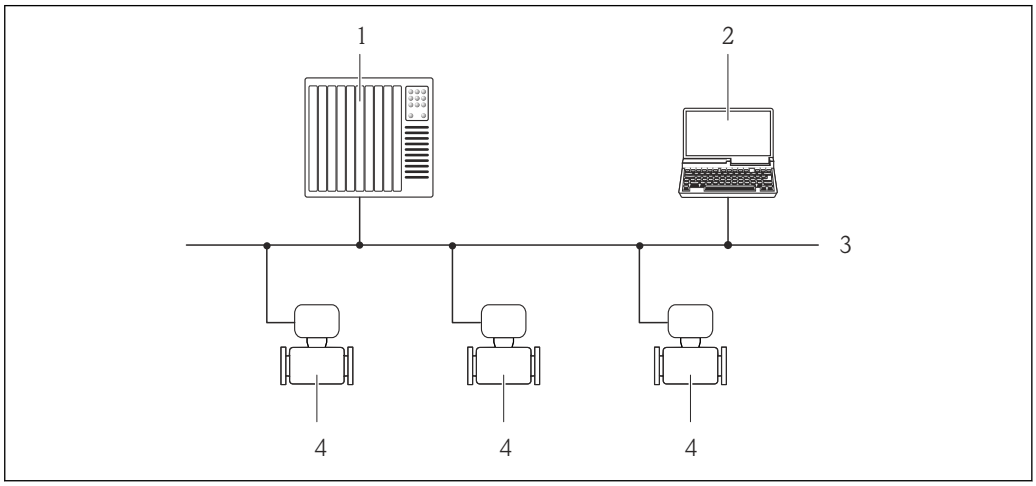
1. Select the **Logout** entry in the function row.
   ↳ The home page with the Login box appears.
2. Close the Web browser.
3. If no longer needed:
   Reset modified properties of the Internet protocol (TCP/IP) → 39.

8.4 Access to the operating menu via the operating tool

8.4.1 Connecting the operating tool

Via PROFIBUS DP network

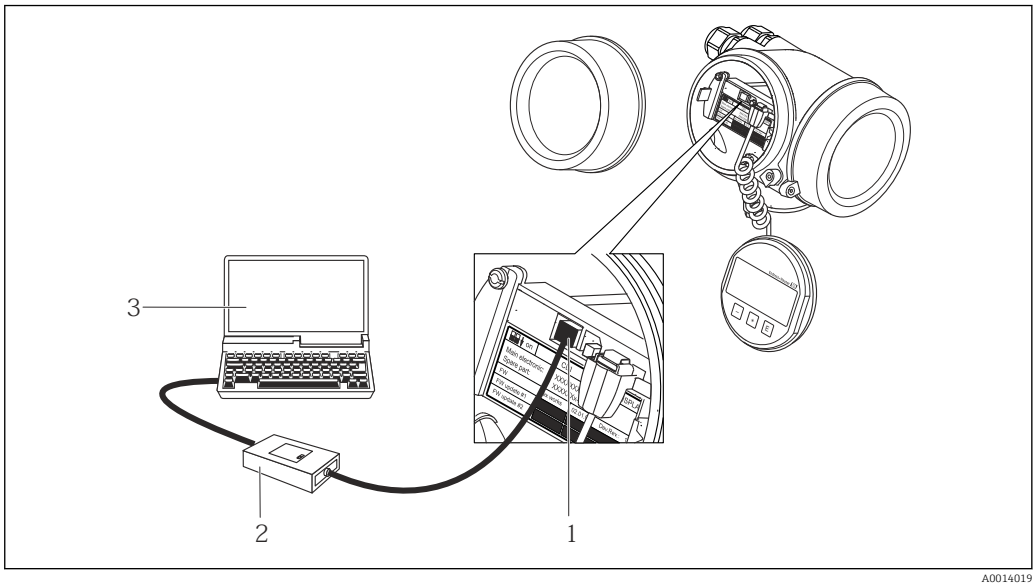
This communication interface is available in device versions with PROFIBUS DP.



14 *Options for remote operation via PROFIBUS DP network*

1 Automation system
2 Computer with PROFIBUS network card
3 PROFIBUS DP network
4 Measuring device

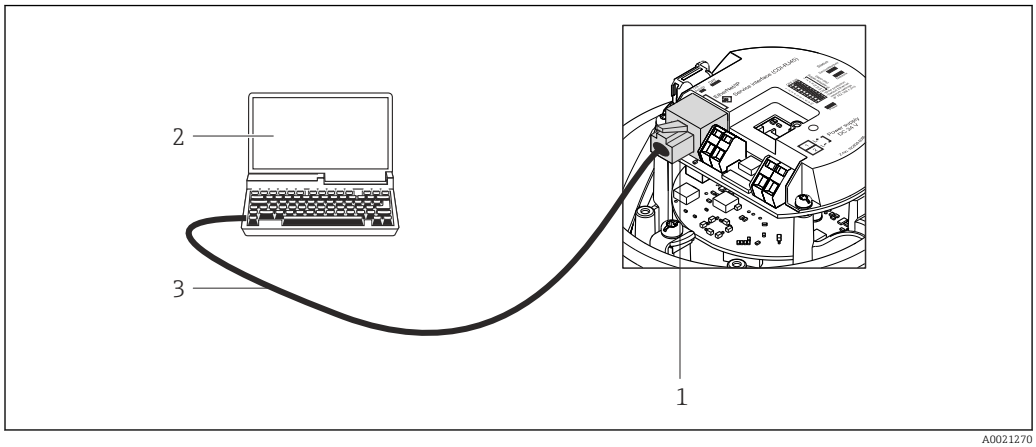
Via service interface (CDI)



1 Service interface (CDI = Endress+Hauser Common Data Interface) of the measuring device
2 Commubox FXA291
3 Computer with FieldCare operating tool with COM DTM CDI Communication FXA291

Via service interface (CDI-RJ45)

PROFIBUS DP



15 Connection for order code for "Output", option L: PROFIBUS DP

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

8.4.2 FieldCare

Function scope

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

Access is via:
CDI-RJ45 service interface

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

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

Source for device description files

See information → 46

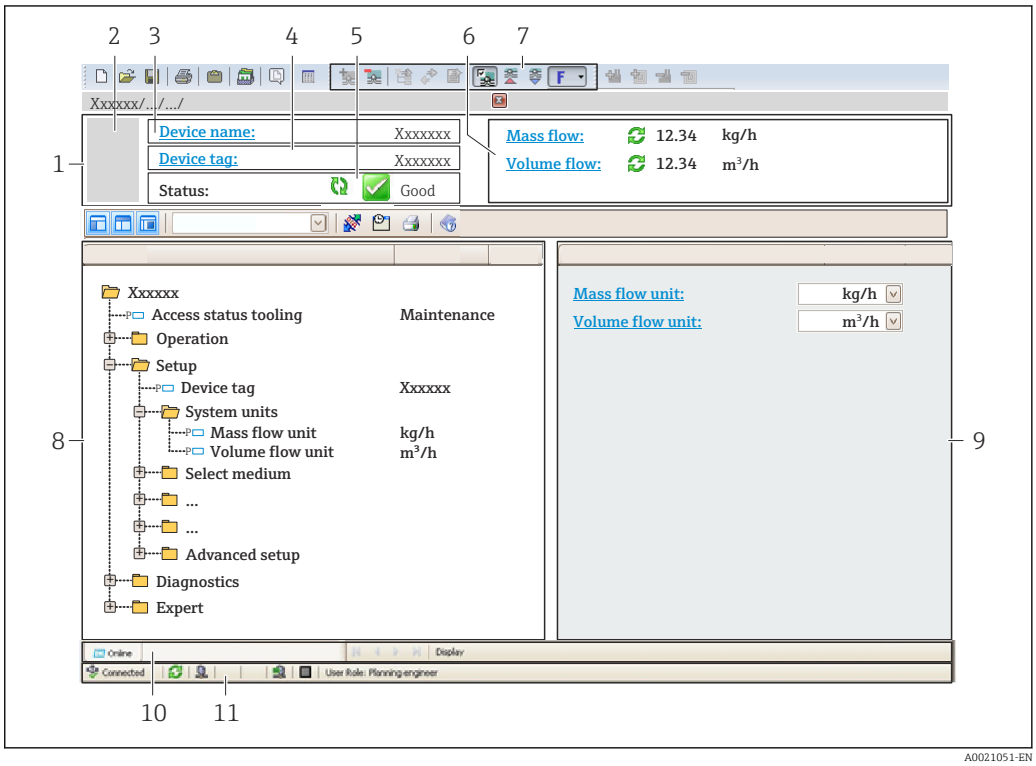
Establishing a connection

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 and press **Enter** to confirm: 192.168.1.212 (factory setting); if the IP address is not known .

7. Establish the online connection to the device.

For additional information, see Operating Instructions BA00027S and BA00059S

User interface



1 *Header*
2 *Picture of device*
3 *Device name*
4 *Tag name*
5 *Status area with status signal→ 82*
6 *Display area for current measured values*
7 *Edit toolbar with additional functions such as save/restore, event list and create documentation*
8 *Navigation area with operating menu structure*
9 *Working area*
10 *Range of action*
11 *Status area*

8.4.3 DeviceCare

Function scope

Tool to connect and configure Endress+Hauser field devices.

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

For details, see Innovation Brochure IN01047S

Source for device description files

See information → 46

9 System integration

9.1 Overview of device description files

9.1.1 Current version data for the device

Firmware version	01.01.zz	▪ On the title page of the Operating Instructions ▪ On the transmitter nameplate ▪ Firmware version Diagnostics → Device information → Firmware version
Release date of firmware version	10.2014	---
Manufacturer ID	0x11	Manufacturer ID Diagnostics → Device information → Manufacturer ID
Device type ID	0x1561	Device type Diagnostics → Device information → Device type
Profile version	3.02	---

For an overview of the different firmware versions for the device

9.1.2 Operating tools

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

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

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

Generally speaking two different GSD versions are possible with Profile 3.0 and higher.

- 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 DP	0x1561	EH3x1561.gsd

The fact that the manufacturer-specific GSD should be used is specified in the **Ident number selector** parameter by selecting the **Manufacturer** option.

Where to acquire the manufacturer-specific GSD:
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

The Profile GSD that is to be used is specified in the **Ident number selector** parameter by selecting the **Profile 0x9740** option, **Profile 0x9741** option or **Profile 0x9742** option.

9.3 Integration into a PROFIBUS network

9.3.1 Block model

- Physical block
- Function blocks
  - Analog Input Block
  - Analog Output Block
  - Discrete Input Block
  - Discrete Output Block
  - Totalizer Block

Technical values for the individual blocks

9.3.2 Assignment of the measured values in the function blocks

The input value of a function block is defined via the CHANNEL parameter.

Analog Input 1 to 8 (AI)

Channel	Measured variable
33122	Volume flow
32961	Mass flow
33093	Corrected volume flow
708	Flow velocity
901	Target mass flow
793	Carrier mass flow
32850	Density
33092	Reference density
794	Concentration
1039	Dynamic viscosity
1032	Kinematic viscosity
904	Temperature compensated dynamic viscosity
905	Temperature compensated kinematic viscosity
33101	Temperature
263	Carrier pipe temperature
1042	Electronic temperature
1066	Oscillation frequency 0
1067	Oscillation frequency 1
1124	Oscillation amplitude 0
876	Oscillation amplitude 1
1062	Frequency fluctuation 0
1063	Frequency fluctuation 1
1117	Oscillation damping 0
1118	Oscillation damping 1
1054	Tube damping fluctuation 0
1055	Tube damping fluctuation 1
1125	Signal asymmetry

Channel	Measured variable
1056	Exciter current 0
1057	Exciter current 1
1440	Sensor integrity

Analog Output 1 to 3 (AO)

Channel	Measured variable
306	External pressure [1]
307	External temperature
488	External reference density

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

The measured variable is accessed via Expert → Sensor → External compensation

Digital Input 1 to 2 (DI)

Channel	Signal
894	Empty pipe detection
895	Low flow cut off
1430	Verification status

Digital Output 1 to 3 (DO)

Channel	Signal
890	Zero point adjustment
891	Flow override
1429	Start verification

Totalizer 1 to 3 (TOT)

Channel	Signal
33122	Volume flow
32961	Mass flow
33093	Corrected volume flow
901	Target mass flow
793	Carrier mass flow

9.3.3 Totalizer control SET_TOT

Value	Behavior
0	Totalize
1	Reset + hold
2	Preset + hold

9.4 Cyclic data transmission

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

9.4.1 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.

<table>
<tr><th colspan="4">Measuring device</th><th>Control system</th></tr>
<tr><td rowspan="6">Transducer Block</td><td>Analog Input block 1 to 8</td><td>→ 🖹 51</td><td>Output value AI →</td><td rowspan="6">PROFIBUS DP</td></tr>
<tr><td rowspan="3">Totalizer block 1 to 3</td><td rowspan="3">→ 🖹 52</td><td>Output value TOTAL →</td></tr>
<tr><td>Controller SETTOT ←</td></tr>
<tr><td>Configuration MODETOT ←</td></tr>
<tr><td>Analog Output block 1 to 3</td><td>→ 🖹 53</td><td>Input values AO ←</td></tr>
<tr><td>Discrete Input block 1 to 2</td><td>→ 🖹 54</td><td>Output values DI →</td></tr>
<tr><td>Discrete Output block 1 to 3</td><td>→ 🖹 55</td><td>Input values DO ←</td></tr>
</table>

Defined order of modules

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

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

Slot	Module	Function block
1 to 8	AI	Analog Input block 1 to 8
9	TOTAL or SETTOT_TOTAL or SETOT_MODETOT_TOTAL	Totalizer block 1
10		Totalizer block 2
11		Totalizer block 3
12-14	AO	Analog Output block 1 to 3
15-16	DI	Discrete Input block 1 to 2
17-19	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.

9.4.2 Description of the modules

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

AI module (Analog Input)

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

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

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

Selection: input variable

The input variable can be specified using the CHANNEL parameter.

CHANNEL	Input variable
32961	Mass flow
33122	Volume flow
33093	Corrected volume flow
708	Flow velocity
32850	Density
33092	Reference density
33101	Temperature
1042	Electronic temperature
901	Target fluid mass flow [1]
793	Carrier mass flow [1]
794	Concentration [1]
263	Carrier tube temperature [2]

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

Factory setting

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

Data structure

Input data of Analog Input

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

TOTAL module

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

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

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

Selection: totalizer value

The totalizer value can be specified using the CHANNEL parameter.

CHANNEL	Input variable
32961	Mass flow
33122	Volume flow
33093	Corrected volume flow
901	Target fluid mass flow [1]
793	Carrier mass flow [1]

1) Only available with the "Concentration" application package

Factory setting

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

Data structure

Input data of TOTAL

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

SETTOT_TOTAL module

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

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

Selection: control totalizer

CHANNEL	Value SETTOT	Control totalizer
33310	0	Totalize
33046	1	Resetting
33308	2	Adopt totalizer initial setting

Factory setting

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

Data structure

Output data of SETTOT

Byte 1
Control variable 1

Input data of TOTAL

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

SETTOT_MODETOT_TOTAL module

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

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

Selection: totalizer configuration

CHANNEL	MODETOT value	Totalizer configuration
33306	0	Balancing
33028	1	Balance the positive flow
32976	2	Balance the negative flow
32928	3	Stop totalizing

Factory setting

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

Data structure

Output data of SETTOT and MODETOT

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

Input data of TOTAL

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

AO module (Analog Output)

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

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

standard. The fifth byte contains standardized status information pertaining to the compensation value.

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

Assigned compensation values

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

CHANNEL	Function block	Compensation value
306	AO 1	External pressure [1]
307	AO 2	External temperature [1]
488	AO 3	External reference 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

DI module (Discrete Input)

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

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

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

Selection: device function

The device function can be specified using the CHANNEL parameter.

CHANNEL	Device function	Factory setting: Status (meaning)
893	Status switch output	▪ 0 (device function not active) ▪ 1 (device function active)
894	Empty pipe detection	
895	Low flow cut off	
1430	Verification status [1]	

1) Only available with the Heartbeat Verification application package

Factory setting

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

Data structure

Input data of Discrete Input

Byte 1	Byte 2
Discrete	Status

DO module (Discrete Output)

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

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

Three Discrete Output blocks are available (slot 17 to 19).

Assigned device functions

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

CHANNEL	Function block	Device function	Values: control (meaning)
891	DO 1	Flow override	▪ 0 (disable device function) ▪ 1 (enable device function)
890	DO 2	Zero point adjustment	
1429	DO 3	Start verification [1)]	

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 Function check

Before commissioning the measuring device:

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

- "Post-installation check" checklist→ 📄 25
- "Post-connection check" checklist → 📄 33

10.2 Connecting via FieldCare

- For FieldCare connection
- For connecting via FieldCare → 📄 44
- For the FieldCare → 📄 45 user interface

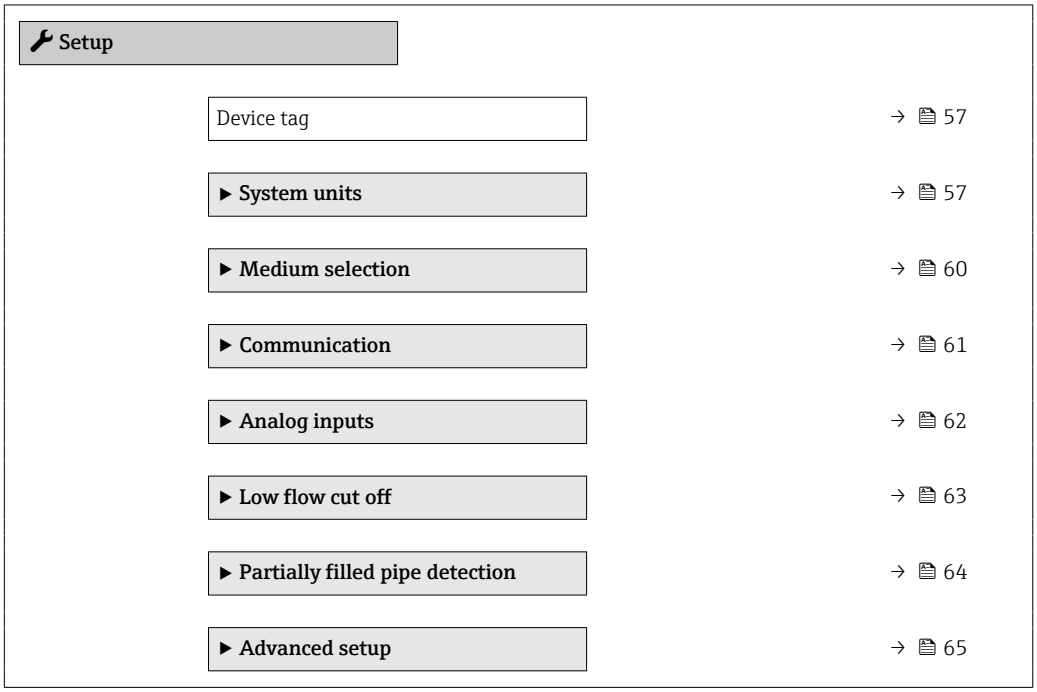
10.3 Setting the operating language

Factory setting: English or ordered local language

The operating language can be set in FieldCare, DeviceCare or via the Web server:
Operation → Display language

10.4 Configuring the measuring device

The **Setup** menu with its submenus contains all the parameters needed for standard operation.



10.4.1 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.

Enter the tag name in the "FieldCare" operating tool → 45

Navigation
"Setup" menu → Device tag

Parameter overview with brief description

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

10.4.2 Setting the system units

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

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

Navigation
"Setup" menu → Advanced setup → System units

Parameter overview with brief description

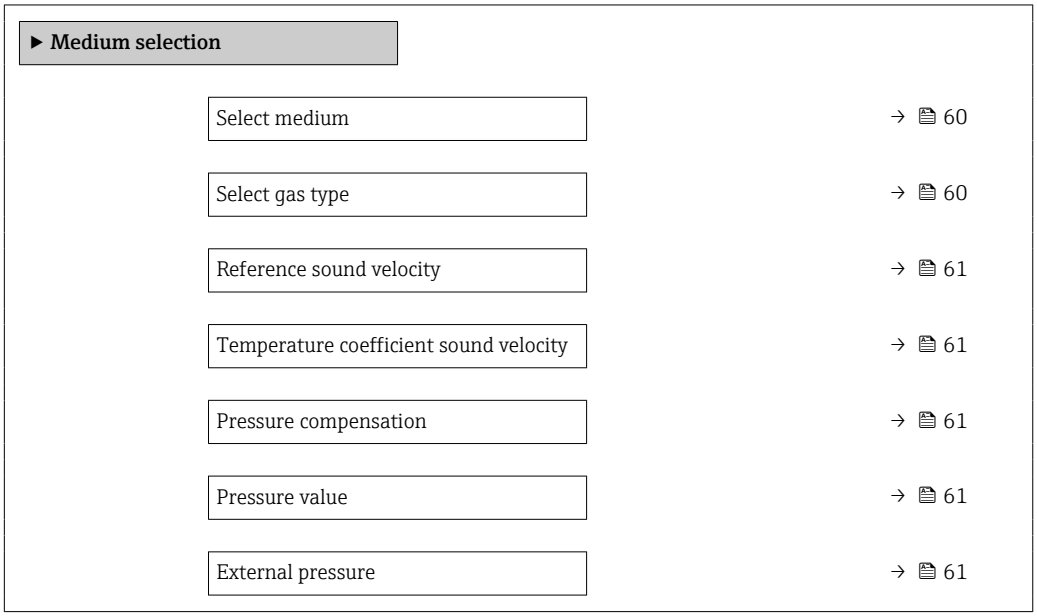
Parameter	Description	Selection	Factory setting
Mass flow unit	Select mass flow unit. *Result* The selected unit applies for: ▪ Output ▪ Low flow cut off ▪ Simulation process variable	Unit choose list	Country-specific: ▪ kg/h ▪ lb/min
Mass unit	Select mass unit.	Unit choose list	Country-specific: ▪ kg ▪ lb
Volume flow unit	Select volume flow unit. *Result* The selected unit applies for: ▪ 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: ▪ l (DN > 150 (6"): **m³** option) ▪ gal (us)
Corrected volume flow unit	Select corrected volume flow unit. *Result* The selected unit applies for: **Corrected volume flow** parameter (→ 🖹 76)	Unit choose list	Country-specific: ▪ Nl/h ▪ Sft³/min
Corrected volume unit	Select corrected volume unit.	Unit choose list	Country-specific: ▪ Nl ▪ Sft³
Density unit	Select density unit. *Result* The selected unit applies for: ▪ Output ▪ Simulation process variable ▪ Density adjustment (**Expert** menu)	Unit choose list	Country-specific: ▪ kg/l ▪ lb/ft³
Reference density unit	Select reference density unit.	Unit choose list	Country-dependent ▪ kg/Nl ▪ lb/Sft³

Parameter	Description	Selection	Factory setting
Temperature unit	Select temperature unit. *Result* The selected unit applies for: ▪ **Electronic temperature** parameter (6053) ▪ **Maximum value** parameter (6051) ▪ **Minimum value** parameter (6052) ▪ **Maximum value** parameter (6108) ▪ **Minimum value** parameter (6109) ▪ **Carrier pipe temperature** parameter (6027) ▪ **Maximum value** parameter (6029) ▪ **Minimum value** parameter (6030) ▪ **Reference temperature** parameter (1816) ▪ **Temperature** parameter	Unit choose list	Country-specific: ▪ °C ▪ °F
Pressure unit	Select process pressure unit. *Result* The unit is taken from: ▪ **Pressure value** parameter (→ 🖹 61) ▪ **External pressure** parameter (→ 🖹 61) ▪ Pressure value	Unit choose list	Country-specific: ▪ bar a ▪ psi a

10.4.3 Selecting and setting the medium

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

Navigation
"Setup" menu → Medium selection



Parameter overview with brief description

Parameter	Prerequisite	Description	Selection / User entry	Factory setting
Select medium	–	Select medium type.	Liquid	–
Select gas type	The **Gas** option is selected in the **Select medium** parameter.	Select measured gas type.	▪ Air ▪ Ammonia NH3 ▪ Argon Ar ▪ Sulfur hexafluoride SF6 ▪ Oxygen O2 ▪ Ozone O3 ▪ Nitrogen oxide NOx ▪ Nitrogen N2 ▪ Nitrous oxide N2O ▪ Methane CH4 ▪ Hydrogen H2 ▪ Helium He ▪ Hydrogen chloride HCl ▪ Hydrogen sulfide H2S ▪ Ethylene C2H4 ▪ Carbon dioxide CO2 ▪ Carbon monoxide CO ▪ Chlorine Cl2 ▪ Butane C4H10 ▪ Propane C3H8 ▪ Propylene C3H6 ▪ Ethane C2H6 ▪ Others	–

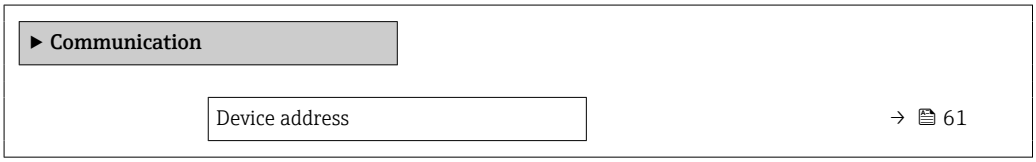
Parameter	Prerequisite	Description	Selection / User entry	Factory setting
Reference sound velocity	In the **Select gas type** parameter, the **Others** option is selected.	Enter sound velocity of gas at 0 °C (32 °F).	1 to 99 999.9999 m/s	–
Temperature coefficient sound velocity	The **Others** option is selected in the **Select gas type** parameter.	Enter temperature coefficient for the gas sound velocity.	Positive floating-point number	0 (m/s)/K
Pressure compensation	–	Select pressure compensation type.	▪ Off ▪ Fixed value ▪ External value	–
Pressure value	The **Fixed value** option is selected in the **Pressure compensation** parameter.	Enter process pressure to be used for pressure correction.	Positive floating-point number	–
External pressure	The **External value** option is selected in the **Pressure compensation** parameter.		Positive floating-point number	–

10.4.4 Configuring communication interface

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

Navigation

"Setup" menu → Communication



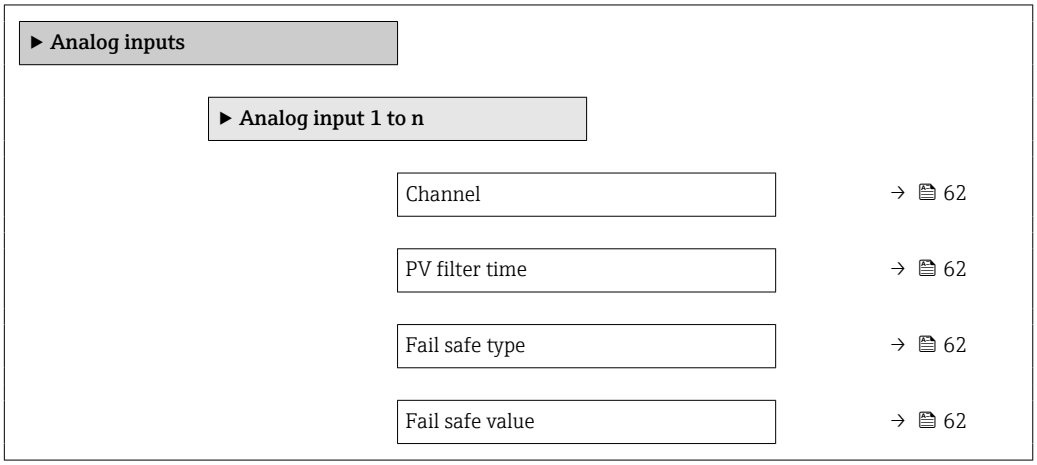
Parameter overview with brief description

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

10.4.5 Configuring the analog inputs

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

Navigation
"Setup" menu → Analog inputs



Parameter overview with brief description

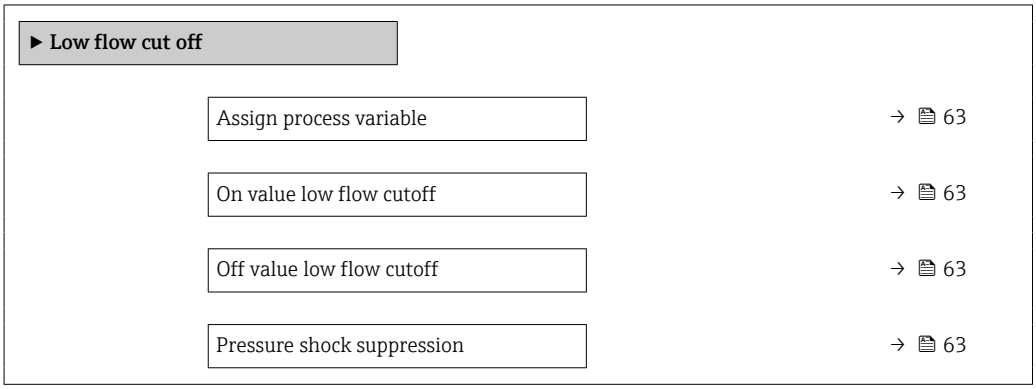
Parameter	Prerequisite	Description	Selection / User entry
Channel	–	Select the process variable.	▪ Mass flow ▪ Volume flow ▪ Corrected volume flow ▪ Target mass flow * ▪ Carrier mass flow * ▪ Density ▪ Reference density ▪ Concentration * ▪ Temperature ▪ Carrier pipe temperature * ▪ Electronic temperature ▪ Oscillation frequency 0 ▪ Oscillation amplitude 0 * ▪ Frequency fluctuation 0 ▪ Oscillation damping 0 ▪ Tube damping fluctuation 0 ▪ Signal asymmetry ▪ Exciter current 0
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

10.4.6 Configuring the low flow cut off

The **Low flow cut off** submenu contains the parameters that must be set in order to configure the low flow cut off.

Navigation
"Setup" menu → Low flow cut off



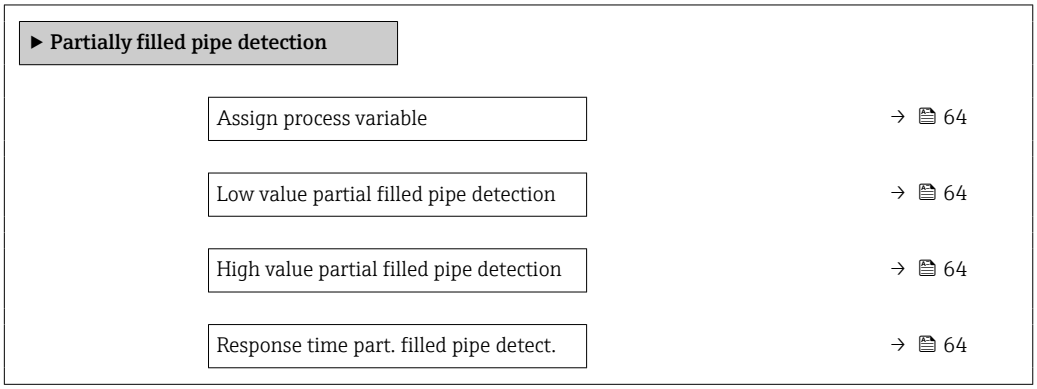
Parameter overview with brief description

Parameter	Prerequisite	Description	Selection / User entry	Factory setting
Assign process variable	–	Select process variable for low flow cut off.	▪ Off ▪ Mass flow ▪ Volume flow ▪ Corrected volume flow	–
On value low flow cutoff	One of the following options is selected in the **Assign process variable** parameter (→ 63): ▪ Mass flow ▪ Volume flow ▪ Corrected volume flow	Enter on value for low flow cut off.	Positive floating-point number	Depends on country and nominal diameter
Off value low flow cutoff	One of the following options is selected in the **Assign process variable** parameter (→ 63): ▪ Mass flow ▪ Volume flow ▪ Corrected volume flow	Enter off value for low flow cut off.	0 to 100.0 %	–
Pressure shock suppression	One of the following options is selected in the **Assign process variable** parameter (→ 63): ▪ Mass flow ▪ Volume flow ▪ Corrected volume flow	Enter time frame for signal suppression (= active pressure shock suppression).	0 to 100 s	–

10.4.7 Configuring the partial filled pipe detection

The **Partially filled pipe detection** submenu contains parameters that have to be set for configuring empty pipe detection.

Navigation
"Setup" menu → Partially filled pipe detection



Parameter overview with brief description

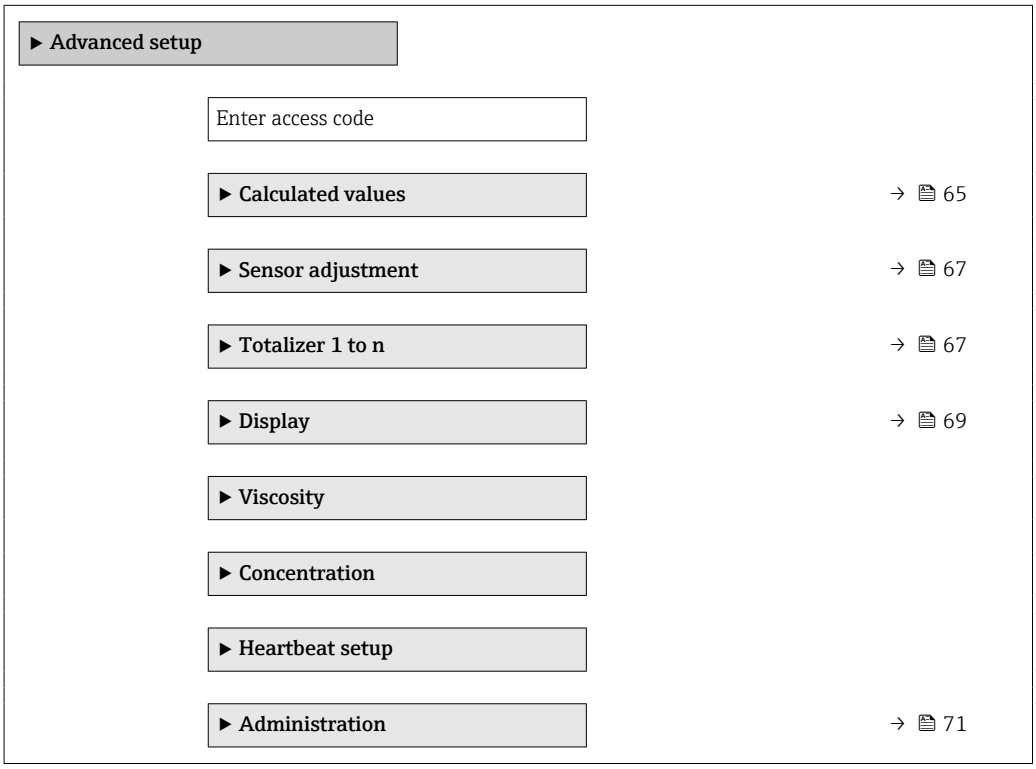
Parameter	Prerequisite	Description	Selection / User entry
Assign process variable	–	Select process variable for partially filled pipe detection.	▪ Off ▪ Density ▪ Reference density
Low value partial filled pipe detection	One of the following options is selected in the **Assign process variable** parameter (→ 64): ▪ Density ▪ Reference density	Enter lower limit value for deactivating partialy filled pipe detection.	Signed floating-point number
High value partial filled pipe detection	One of the following options is selected in the **Assign process variable** parameter (→ 64): ▪ Density ▪ Reference density	Enter upper limit value for deactivating partialy filled pipe detection.	Signed floating-point number
Response time part. filled pipe detect.	One of the following options is selected in the **Assign process variable** parameter (→ 64): ▪ Density ▪ Reference density	Enter time before diagnostic message is displayed for partially filled pipe detection.	0 to 100 s

10.5 Advanced settings

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

The number of submenus can vary depending on the device version, e.g. viscosity is available only with the Promass I.

Navigation
"Setup" menu → Advanced setup



10.5.1 Using the parameter to enter the access code

Navigation
"Setup" menu → Advanced setup

Parameter overview with brief description

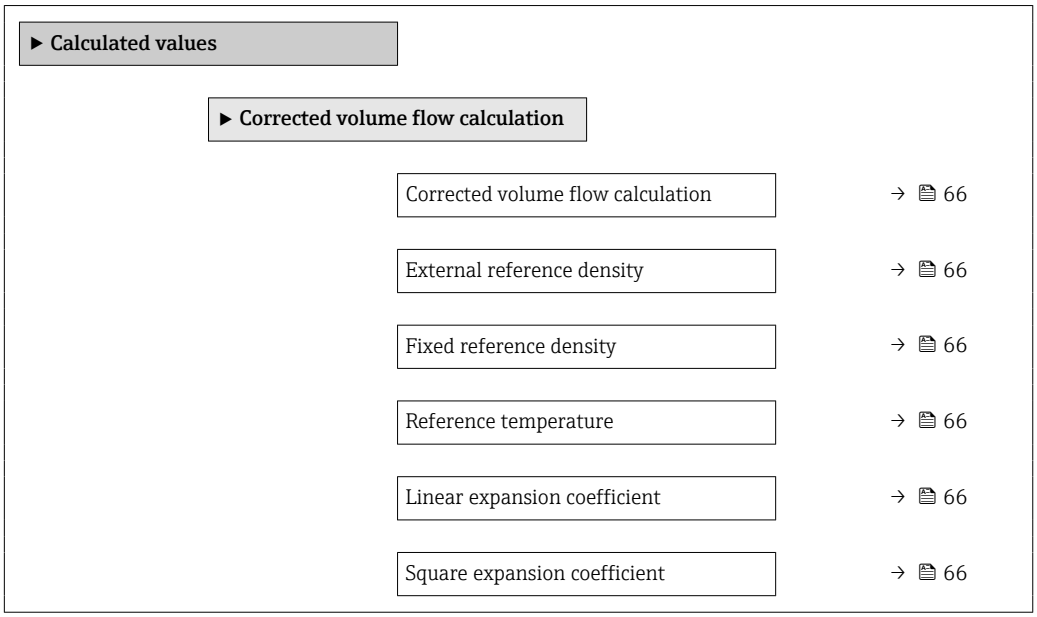
Parameter	Description	User entry
Enter access code	Enter access code to disable write protection of parameters.	0 to 9999

10.5.2 Calculated values

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

Navigation

"Setup" menu → Advanced setup → Calculated values



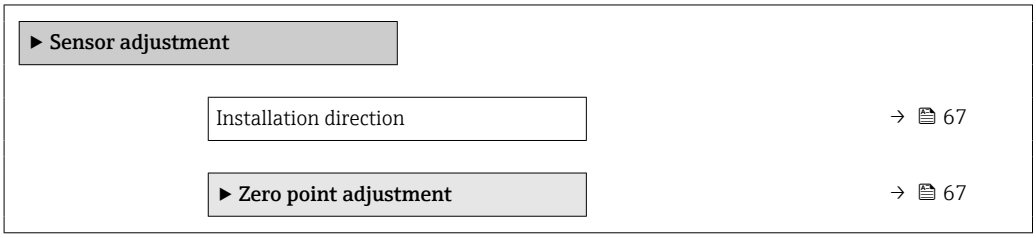
Parameter overview with brief description

Parameter	Prerequisite	Description	Selection / User interface / User entry	Factory setting
Corrected volume flow calculation	–	Select reference density for calculating the corrected volume flow.	▪ Fixed reference density ▪ Calculated reference density ▪ Reference density by API table 53 ▪ External reference density	–
External reference density	In the **Corrected volume flow calculation** parameter, the **External reference density** option is selected.	Shows external reference density.	Floating point number with sign	–
Fixed reference density	The **Fixed reference density** option is selected in the **Corrected volume flow calculation** parameter parameter.	Enter fixed value for reference density.	Positive floating-point number	–
Reference temperature	The **Calculated reference density** option is selected in the **Corrected volume flow calculation** parameter.	Enter reference temperature for calculating the reference density.	−273.15 to 99 999 °C	Country-specific: ▪ +20 °C ▪ +68 °F
Linear expansion coefficient	The **Calculated reference density** option is selected in the **Corrected volume flow calculation** parameter parameter.	Enter linear, medium-specific expansion coefficient for calculating the reference density.	Signed floating-point number	–
Square expansion coefficient	The **Calculated reference density** option is selected in the **Corrected volume flow calculation** parameter parameter.	For media with a non-linear expansion pattern: enter the quadratic, medium-specific expansion coefficient for calculating the reference density.	Signed floating-point number	–

10.5.3 Carrying out a sensor adjustment

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

Navigation
"Setup" menu → Advanced setup → Sensor adjustment



Parameter overview with brief description

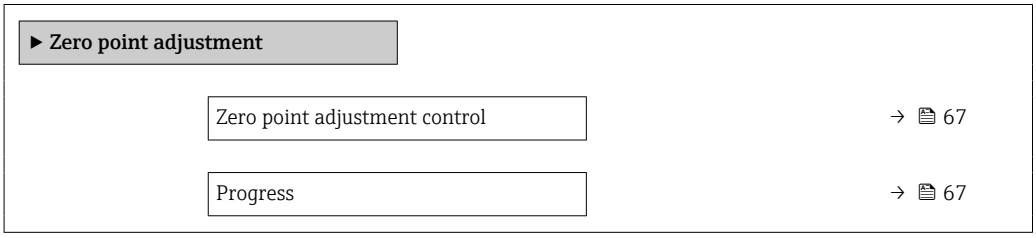
Parameter	Description	Selection
Installation direction	Set sign of flow direction to match the direction of the arrow on the sensor.	▪ Flow in arrow direction ▪ Flow against arrow direction

Zero point adjustment

All measuring devices are calibrated in accordance with state-of-the-art technology. Calibration takes place under reference conditions→ 128. Therefore, a zero point adjustment in the field is generally not required.

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

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



Parameter overview with brief description

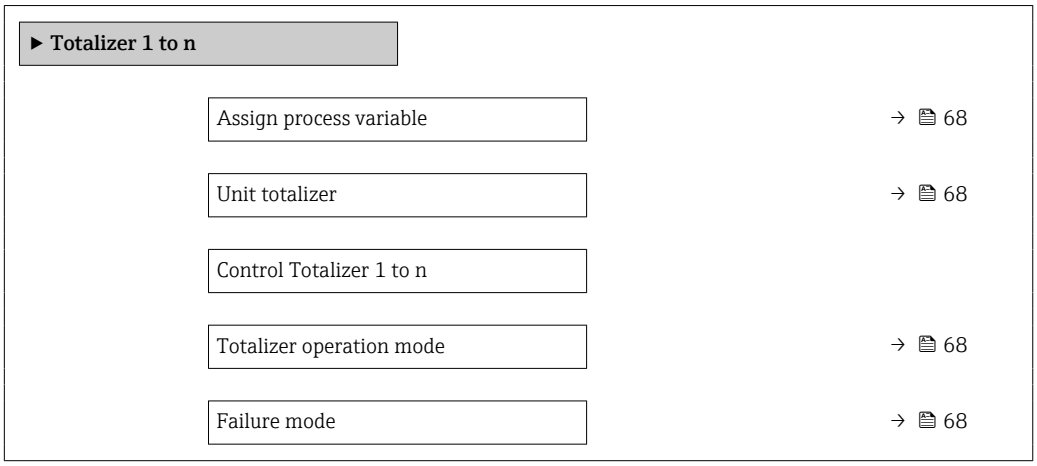
Parameter	Description	Selection / User interface	Factory setting
Zero point adjustment control	Start zero point adjustment.	▪ Cancel ▪ Busy ▪ Zero point adjust failure ▪ Start	–
Progress	Shows the progress of the process.	0 to 100 %	–

10.5.4 Configuring the totalizer

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

Navigation

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



Parameter overview with brief description

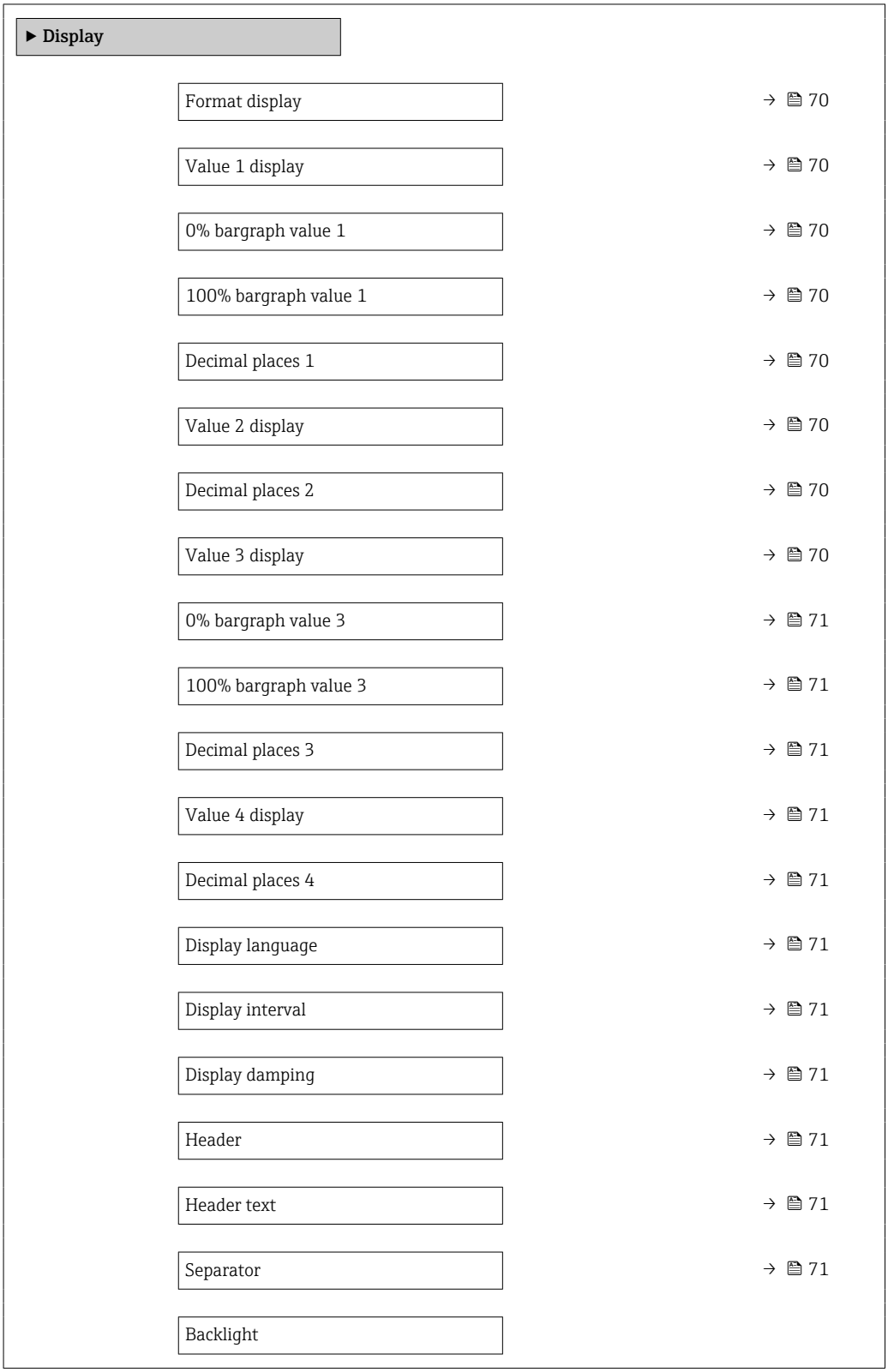
Parameter	Prerequisite	Description	Selection	Factory setting
Assign process variable	–	Select process variable for totalizer.	▪ Mass flow ▪ Volume flow ▪ Corrected volume flow ▪ Target mass flow * ▪ Carrier mass flow *	–
Unit totalizer	One of the following options is selected in the **Assign process variable** parameter: ▪ Mass flow ▪ Volume flow ▪ Corrected volume flow ▪ Target mass flow * ▪ Carrier mass flow *	Select the unit for the process variable of the totalizer.	Unit choose list	Country-specific: ▪ kg ▪ lb
Totalizer operation mode	In the **Assign process variable** parameter, one of the following options is selected: ▪ Mass flow ▪ Volume flow ▪ Corrected volume flow ▪ Target mass flow * ▪ Carrier mass flow *	Select totalizer calculation mode.	▪ Net flow total ▪ Forward flow total ▪ Reverse flow total ▪ Last valid value	–
Failure mode	One of the following options is selected in the **Assign process variable** parameter: ▪ Mass flow ▪ Volume flow ▪ Corrected volume flow ▪ Target mass flow * ▪ Carrier mass flow *	Define the totalizer behavior in the event of a device alarm.	▪ Stop ▪ Actual value ▪ Last valid value	–

* Visibility depends on order options or device settings

10.5.5 Carrying out additional display configurations

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

Navigation
"Setup" menu → Advanced setup → Display



Parameter overview with brief description

Parameter	Prerequisite	Description	Selection / User entry	Factory setting
Format display	A local display is provided.	Select how measured values are shown on the display.	▪ 1 value, max. size ▪ 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.	▪ Mass flow ▪ Volume flow ▪ Corrected volume flow ▪ Target mass flow * ▪ Carrier mass flow * ▪ Density ▪ Reference density ▪ Concentration * ▪ Temperature ▪ Carrier pipe temperature * ▪ Electronic temperature ▪ Oscillation frequency 0 ▪ Oscillation amplitude 0 * ▪ Frequency fluctuation 0 ▪ Oscillation damping 0 ▪ Tube damping fluctuation 0 ▪ Tube damping fluctuation 1 ▪ Signal asymmetry ▪ Exciter current 0 ▪ None ▪ Totalizer 1 ▪ Totalizer 2 ▪ Totalizer 3	–
0% bargraph value 1	A local display is provided.	Enter 0% value for bar graph display.	Signed floating-point number	Country-specific: ▪ 0 kg/h ▪ 0 lb/min
100% bargraph value 1	A local display is provided.	Enter 100% value for bar graph display.	Signed floating-point number	Depends on country and nominal diameter
Decimal places 1	A measured value is specified in the **Value 1 display** parameter.	Select the number of decimal places for the display value.	▪ x ▪ 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 the **Value 1 display** parameter	–
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 the **Value 1 display** parameter (→ 🖹 70)	–

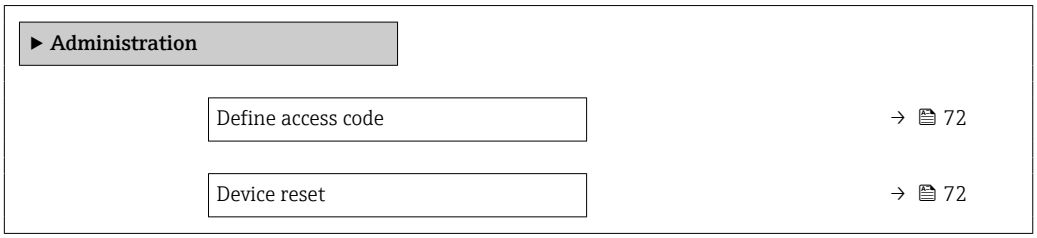
Parameter	Prerequisite	Description	Selection / User entry	Factory setting
0% bargraph value 3	A selection was made in the **Value 3 display** parameter.	Enter 0% value for bar graph display.	Signed floating-point number	Country-specific: ▪ 0 kg/h ▪ 0 lb/min
100% bargraph value 3	A selection was made in the **Value 3 display** parameter.	Enter 100% value for bar graph display.	Signed floating-point number	–
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	–
Value 4 display	A local display is provided.	Select the measured value that is shown on the local display.	For the picklist, see the **Value 1 display** parameter (→ 🖹 70)	–
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) * ▪ Bahasa Indonesia * ▪ 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	In the **Header** parameter, the **Free text** option is selected.	Enter display header text.	Max. 12 characters such as letters, numbers or special characters (e.g. @, %, /)	–
Separator	A local display is provided.	Select decimal separator for displaying numerical values.	▪ . (point) ▪ , (comma)	. (point)

* Visibility depends on order options or device settings

10.5.6 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



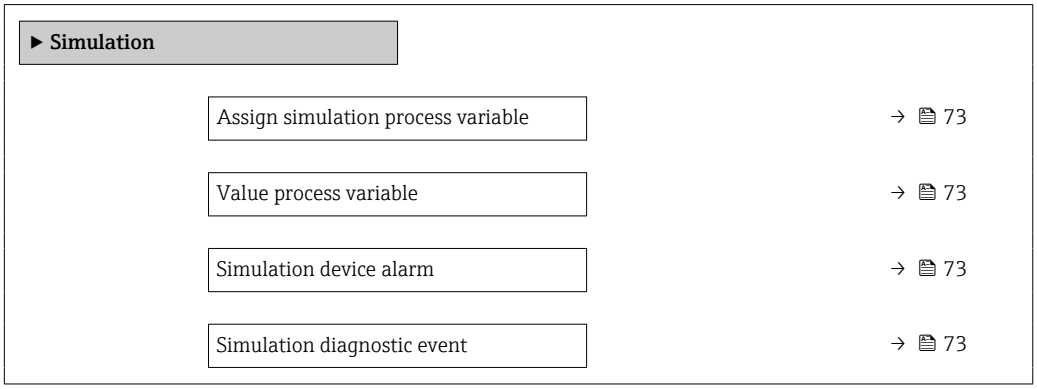
Parameter overview with brief description

Parameter	Description	User entry / Selection
Define access code	Define release code for write access to parameters.	0 to 9 999
Device reset	Reset the device configuration - either entirely or in part - to a defined state.	▪ Cancel ▪ To delivery settings ▪ Restart device

10.6 Simulation

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

Navigation
"Diagnostics" menu → Simulation



Parameter overview with brief description

Parameter	Prerequisite	Description	Selection / User entry
Assign simulation process variable	–	Select a process variable for the simulation process that is activated.	▪ Off ▪ Mass flow ▪ Volume flow ▪ Corrected volume flow ▪ Density ▪ Reference density ▪ Temperature ▪ Concentration * ▪ Target mass flow * ▪ Carrier mass flow *
Value process variable	One of the following options is selected in the **Assign simulation process variable** parameter (→ 🖹 73): ▪ Mass flow ▪ Volume flow ▪ Corrected volume flow ▪ Density ▪ Reference density ▪ Temperature ▪ Concentration * ▪ Target mass flow * ▪ Carrier mass flow *	Enter the simulation value for the selected process variable.	Depends on the process variable selected
Simulation device alarm	–	Switch the device alarm on and off.	▪ Off ▪ On
Diagnostic event category	–	Select a diagnostic event category.	▪ Sensor ▪ Electronics ▪ Configuration ▪ Process
Simulation diagnostic event	–	Select a diagnostic event for the simulation process that is activated.	▪ Off ▪ Diagnostic event picklist (depends on the category selected)

* Visibility depends on order options or device settings

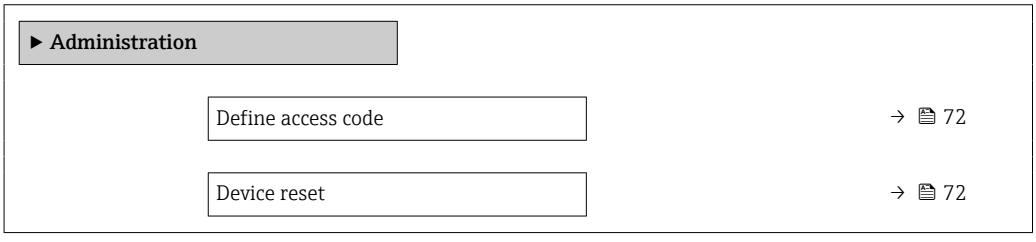
10.7 Protecting settings from unauthorized access

The following options exist for protecting the configuration of the measuring device from unintentional modification after commissioning:
- Write protection via access code for Web browser → 🖹 73
- Write protection via write protection switch → 🖹 74

10.7.1 Write protection via access code

With the customer-specific access code, access to the measuring device via the Web browser is protected, as are the parameters for the measuring device configuration.

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



Defining the access code via the Web browser

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

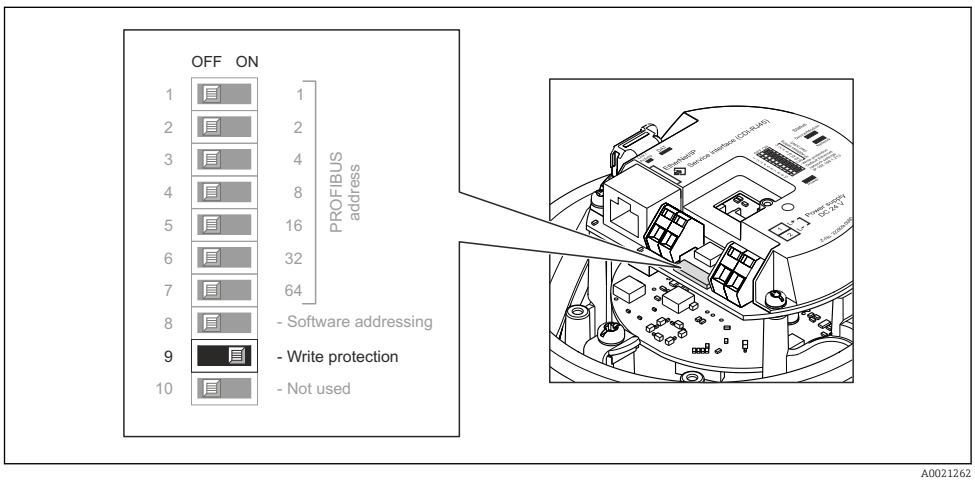
If no action is performed for 10 minutes, the Web browser automatically returns to the login page.

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

10.7.2 Write protection via write protection switch

The write protection switch makes it possible to block write access to the entire operating menu with the exception of the following parameters:
- External pressure
- External temperature
- Reference density
- All parameters for configuring the totalizer

The parameter values are now read only and cannot be edited any more:
- Via service interface (CDI-RJ45)
- Via PROFIBUS DP

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 → 138.
3. 

   Setting the write protection switch on the main electronics module to the **On** position enables hardware write protection. Setting the write protection switch on the main electronics module to the **Off** position (factory setting) disables hardware write protection.
   ↳ If hardware write protection is enabled: the **Locking status** parameter displays the **Hardware locked** option ; if disabled, the **Locking status** parameter does not display any option .
4. Reverse the removal procedure to reassemble the transmitter.

11 Operation

11.1 Reading the device locking status

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

Navigation
"Operation" menu → Locking status

Function scope of "Locking status" parameter

Options	Description
Hardware locked	The write protection switch (DIP switch) for hardware locking is activated on the I/O electronic module. This prevents write access to the parameters .
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 → 56
- For information on the operating languages supported by the measuring device → 139

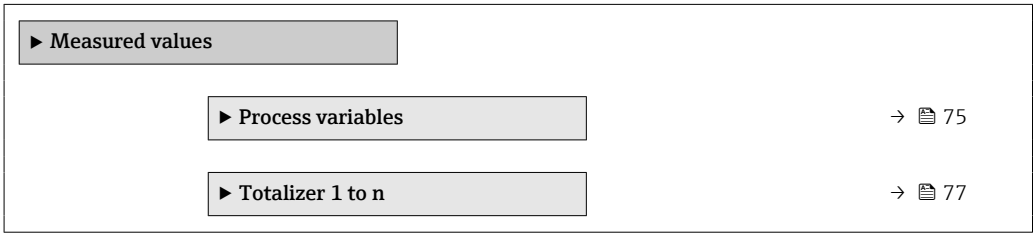
11.3 Configuring the display

Detailed information:
On the advanced settings for the local display → 69

11.4 Reading measured values

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

Navigation
"Diagnostics" menu → Measured values



11.4.1 "Measured variables" submenu

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

Navigation
"Diagnostics" menu → Measured values → Measured variables

Parameter overview with brief description

Parameter	Prerequisite	Description	User interface
Mass flow	–	Displays the mass flow currently measured. *Dependency* The unit is taken from the **Mass flow unit** parameter (→ 58).	Signed floating-point number
Volume flow	–	Displays the volume flow currently calculated. *Dependency* The unit is taken from the **Volume flow unit** parameter (→ 58).	Signed floating-point number
Corrected volume flow	–	Displays the corrected volume flow currently calculated. *Dependency* The unit is taken from the **Corrected volume flow unit** parameter (→ 58).	Signed floating-point number
Density	–	Shows the density currently measured. *Dependency* The unit is taken from the **Density unit** parameter (→ 58).	Signed floating-point number

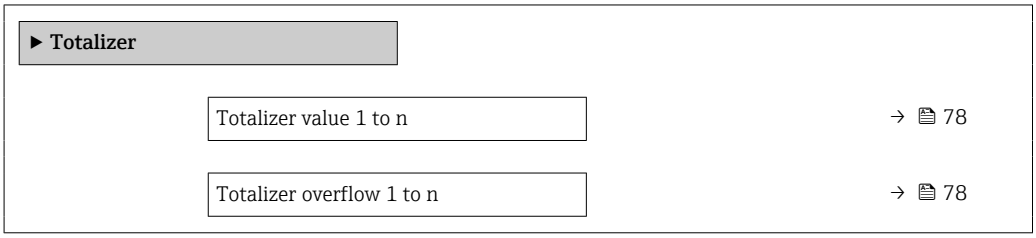
Parameter	Prerequisite	Description	User interface
Reference density	–	Displays the reference density currently calculated. *Dependency* The unit is taken from the **Reference density unit** parameter (→ 58).	Signed floating-point number
Temperature	–	Shows the medium temperature currently measured. *Dependency* The unit is taken from the **Temperature unit** parameter (→ 59).	Signed floating-point number
Pressure value	–	Displays either a fixed or external pressure value. *Dependency* The unit is taken from the **Pressure unit** parameter (→ 59).	Signed floating-point number
Concentration	For the following order code: "Application package", option **ED** "Concentration" The software options currently enabled are displayed in the **Software option overview** parameter.	Displays the concentration currently calculated. *Dependency* The unit is taken from the **Concentration unit** parameter.	Signed floating-point number
Target mass flow	With the following conditions: ▪ Order code for "Application package", option **ED** "Concentration" ▪ The **WT-%** option is selected in the **Concentration unit** parameter parameter. The software options currently enabled are displayed in the **Software option overview** parameter.	Displays the target fluid mass flow currently measured. *Dependency* The unit is taken from the **Mass flow unit** parameter (→ 58).	Signed floating-point number
Carrier mass flow	With the following conditions: ▪ Order code for "Application package", option **ED** "Concentration" ▪ The **WT-%** option is selected in the **Concentration unit** parameter parameter. The software options currently enabled are displayed in the **Software option overview** parameter.	Displays the carrier fluid mass flow currently measured. *Dependency* The unit is taken from the **Mass flow unit** parameter (→ 58).	Signed floating-point number

11.4.2 "Totalizer" submenu

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

Navigation

"Diagnostics" menu → Measured values → Totalizer



Parameter overview with brief description

Parameter	Prerequisite	Description	User interface
Totalizer value 1 to n	One of the following options is selected in the **Assign process variable** parameter**Totalizer 1 to n** submenu: ▪ Volume flow ▪ Mass flow ▪ Corrected volume flow ▪ Target mass flow * ▪ Carrier mass flow *	Displays the current totalizer counter value.	Signed floating-point number
Totalizer overflow 1 to n	One of the following options is selected in the **Assign process variable** parameter**Totalizer 1 to n** submenu: ▪ Volume flow ▪ Mass flow ▪ Corrected volume flow ▪ Target mass flow * ▪ Carrier mass flow *	Displays the current totalizer overflow.	Integer with sign

* Visibility depends on order options or device settings

11.5 Adapting the measuring device to the process conditions

The following are available for this purpose:
- Basic settings using the**Setup** menu (→ 🖹 56)
- Advanced settings using the**Advanced setup** submenu (→ 🖹 65)

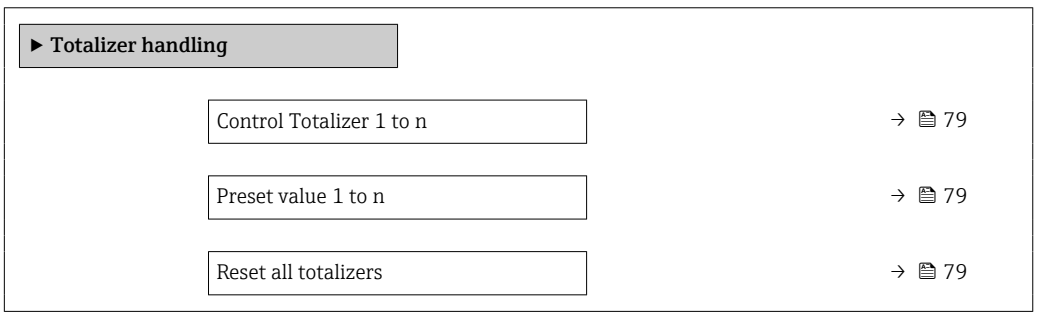
11.6 Performing a totalizer reset

The totalizers are reset in the **Operation** submenu:
Control Totalizer 1 to n

Function scope of the "Control Totalizer " parameter

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

Navigation
"Operation" menu → Totalizer handling



Parameter overview with brief description

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

* Visibility depends on order options or device settings

12 Diagnostics and troubleshooting

12.1 General troubleshooting

For local display

Error	Possible causes	Solution
Local display dark and no output signals	Supply voltage does not match the value indicated on the nameplate.	Apply the correct supply voltage .
Local display dark and no output signals	The polarity of the supply voltage is wrong.	Correct the polarity.
Local display dark and no output signals	No contact between connecting cables and terminals.	Check the connection of the cables and correct if necessary.
Local display dark and no output signals	Terminals are not plugged into the I/O electronics module correctly.	Check terminals.
Local display dark and no output signals	I/O electronics module is defective.	Order spare part → 🖹 120.
Local display is dark, but signal output is within the valid range	Display is set too bright or too dark.	▪ Set the display brighter by simultaneously pressing ⊞ + Ⓔ. ▪ Set the display darker by simultaneously pressing ⊟ + Ⓔ.
Local display is dark, but signal output is within the valid range	The cable of the display module is not plugged in correctly.	Insert the plug correctly into the main electronics module and display module.
Local display is dark, but signal output is within the valid range	Display module is defective.	Order spare part → 🖹 120.
Backlighting of local display is red	Diagnostic event with "Alarm" diagnostic behavior has occurred.	Take remedial measures
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 → 🖹 120.

For output signals

Error	Possible causes	Solution
Green power LED on the main electronics module of the transmitter is dark	Supply voltage does not match the value indicated on the nameplate.	Apply the correct supply voltage .
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	Solution
No write access to parameters	Hardware write protection enabled	Set the write protection switch on main electronics module to the **OFF** position → 🖹 74.
No connection via PROFIBUS DP	PROFIBUS DP bus cable connected incorrectly	Check terminal assignment → 🖹 27.
No connection via PROFIBUS DP	Device plug connected incorrectly	Check the pin assignment of the connector .

Error	Possible causes	Solution
No connection via PROFIBUS DP	PROFIBUS DP cable incorrectly terminated	Check terminating resistor → 🖹 32.
Not connecting to Web server	Web server disabled	Using the "FieldCare" or "DeviceCare" operating tool, check whether the Web server of the measuring device is enabled, and enable it if necessary→ 🖹 42 .
	Incorrect setting for the Ethernet interface of the computer	1. Check the properties of the Internet protocol (TCP/IP) → 🖹 39. 2. Check the network settings with the IT manager.
Not connecting to Web server	Incorrect IP address	Check the IP address: 192.168.1.212 → 🖹 39
Web browser frozen and operation no longer possible	Data transfer active	Wait until data transfer or current action is finished.
	Connection lost	1. Check cable connection and power supply. 2. Refresh the Web browser and restart if necessary.
Content of Web browser incomplete or difficult to read	Not using optimum version of Web server.	1. Use the correct Web browser version → 🖹 38. 2. Clear the Web browser cache and restart the Web browser.
	Unsuitable view settings.	Change the font size/display ratio of the Web browser.
No or incomplete display of contents in the Web browser	▪ JavaScript not enabled ▪ JavaScript cannot be enabled	1. Enable JavaScript. 2. Enter http://XXX.XXX.X.XXX/basic.html as the IP address.
Operation with FieldCare or DeviceCare via CDI-RJ45 service interface (port 8000)	Firewall of computer or network is preventing communication	Depending on the settings of the firewall used on the computer or in the network, the firewall must be adapted or disabled to allow FieldCare/DeviceCare access.
Flashing of firmware with FieldCare or DeviceCare via CDI-RJ45 service interface (via port 8000 or TFTP ports)	Firewall of computer or network is preventing communication	Depending on the settings of the firewall used on the computer or in the network, the firewall must be adapted or disabled to allow FieldCare/DeviceCare access.

12.2 Diagnostic information via light emitting diodes

12.2.1 Transmitter

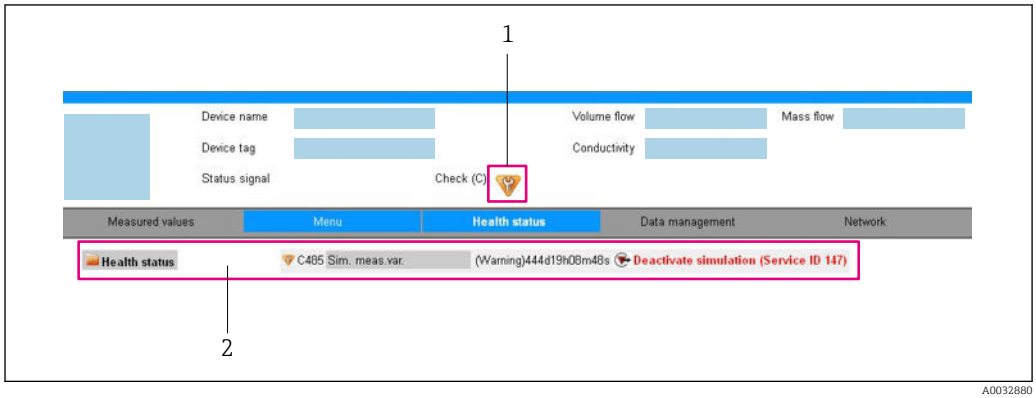
Different LEDs in the transmitter provide information on the device status.

LED	Color	Meaning
Supply voltage	Off	Supply voltage is off or too low
	Green	Supply voltage is ok
Alarm	Off	Device status is ok
	Flashing red	A device error of diagnostic behavior "Warning" has occurred
	Red	▪ A device error of diagnostic behavior "Alarm" has occurred ▪ Boot loader is active
Communication	Flashing white	PROFIBUS DP communication is active

12.3 Diagnostic information in the Web browser

12.3.1 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 → 82 and remedial measures with Service ID*

In addition, diagnostic events which have occurred can be shown in the **Diagnostics** menu:
- Via parameter
- Via submenu → 113

Status signals

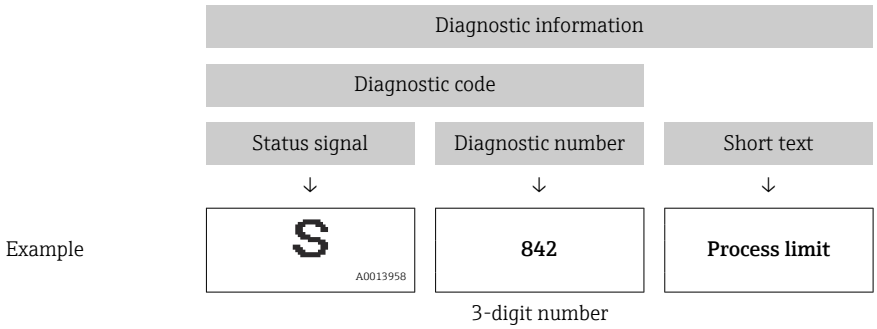
The status signals provide information on the state and reliability of the device by categorizing the cause of the diagnostic information (diagnostic event).

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 operated: Outside its technical specification limits (e.g. outside the process temperature range)
	Maintenance required Maintenance is required. The measured value is still valid.

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

Diagnostic information

The fault can be identified using the diagnostic information. The short text helps you by providing information about the fault.



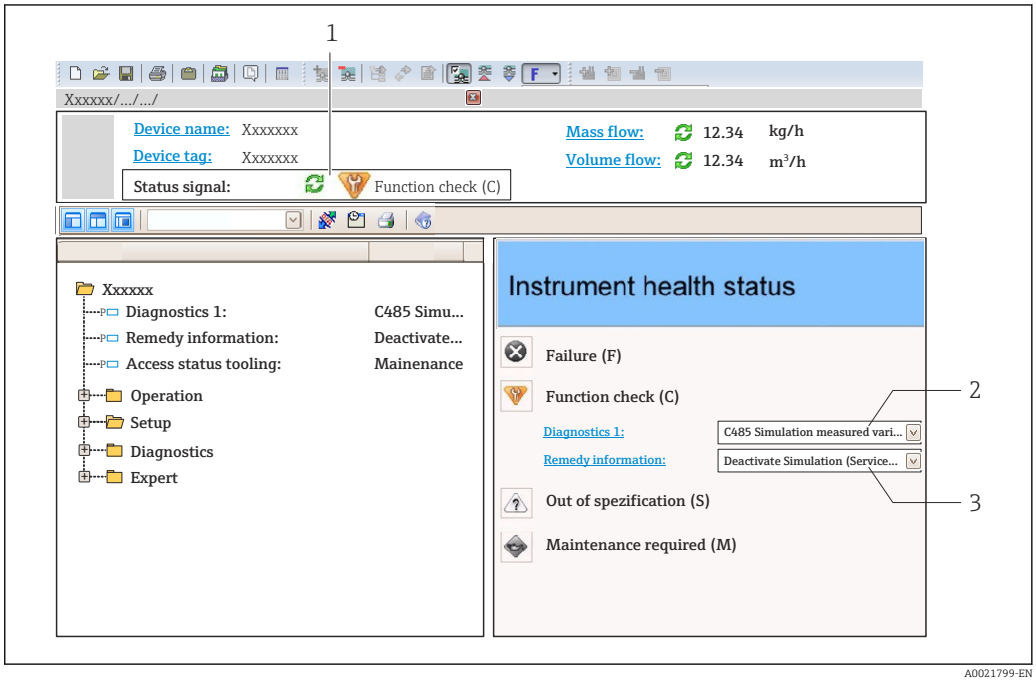
12.3.2 Calling up remedy information

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.

12.4 Diagnostic information in DeviceCare or FieldCare

12.4.1 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.

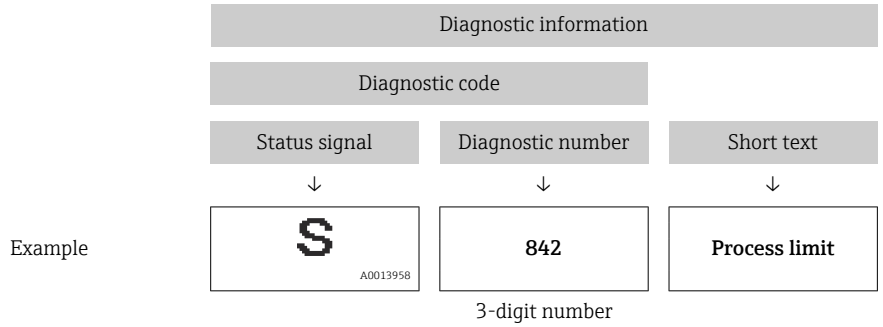


1 Status area with status signal
2 Diagnostic information→ 82
3 Remedy information with Service ID

In addition, diagnostic events which have occurred can be shown in the **Diagnostics** menu:
- Via parameter
- Via submenu → 113

Diagnostic information

The fault can be identified using the diagnostic information. The short text helps you by providing information about the fault.



12.4.2 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.

12.5 Adapting the diagnostic information

12.5.1 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.

Expert → System → Diagnostic handling → Diagnostic behavior

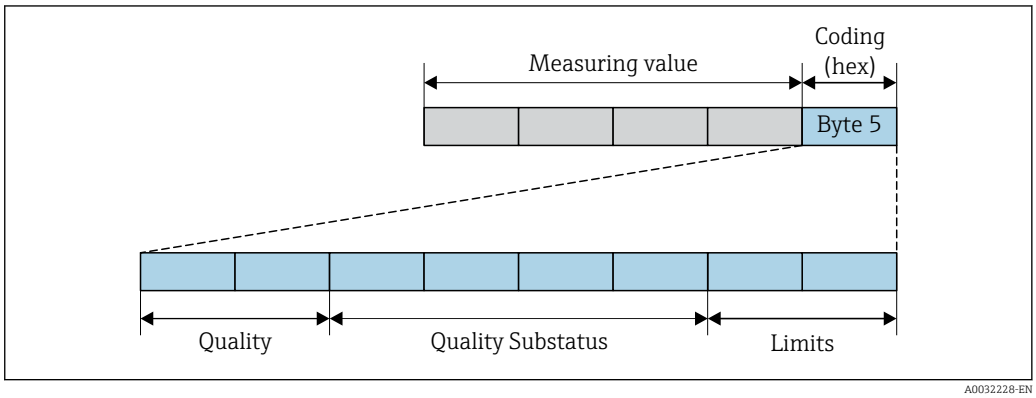
Available diagnostic behaviors

The following diagnostic behaviors can be assigned:

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

Displaying the measured value status

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



16 *Structure of the coding byte*

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

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

When the diagnostic behavior is assigned, this also changes the measured value status and device status for the diagnostic information. The measured value status and device status depend on the choice of diagnostic behavior and on the group in which the diagnostic information is located. The measured value status and device status are firmly assigned to the particular diagnostic behavior and cannot be changed individually.

The diagnostic information is grouped as follows:
- Diagnostic information pertaining to the sensor: diagnostic number 000 to 199 → 85
- Diagnostic information pertaining to the electronics: diagnostic number 200 to 399 → 86
- Diagnostic information pertaining to the configuration: diagnostic number 400 to 599 → 86
- Diagnostic information pertaining to the process: diagnostic number 800 to 999 → 86

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

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					

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

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

Diagnostic information 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
Logbook entry only	GOOD	ok	0x80 to 0x8E	–	–
Off					

12.6 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. Change the diagnostic information → 84

12.6.1 Diagnostic of sensor

Diagnostic information			Remedy instructions	Influenced measured variables
No.	Short text			
022	Sensor temperature		1. Change main electronic module 2. Change sensor	▪ Carrier mass flow ▪ Concentration ▪ Density ▪ Dynamic viscosity ▪ **Empty pipe detection** option ▪ Kinematic viscosity ▪ **Low flow cut off** option ▪ Mass flow ▪ Sensor integrity ▪ Reference density ▪ Corrected volume flow ▪ Target mass flow ▪ Temp. compensated dynamic viscosity ▪ Temp. compensated kinematic viscosity ▪ Temperature ▪ Status ▪ Volume flow
	Status signal	F		
	Diagnostic behavior	Alarm		

Diagnostic information			Remedy instructions	Influenced measured variables
No.	Short text			
046	Sensor limit exceeded		1. Inspect sensor 2. Check process condition	▪ Carrier mass flow ▪ Concentration ▪ Density ▪ Dynamic viscosity ▪ Kinematic viscosity ▪ Mass flow ▪ Sensor integrity ▪ Reference density ▪ Corrected volume flow ▪ Target mass flow ▪ Temp. compensated dynamic viscosity ▪ Temp. compensated kinematic viscosity ▪ Volume flow
	Status signal	S		
	Diagnostic behavior	Warning		

Diagnostic information			Remedy instructions	Influenced measured variables
No.	Short text			
062	Sensor connection		1. Change main electronic module 2. Change sensor	▪ Carrier mass flow ▪ Concentration ▪ Density ▪ Dynamic viscosity ▪ **Empty pipe detection** option ▪ Kinematic viscosity ▪ **Low flow cut off** option ▪ Mass flow ▪ Sensor integrity ▪ Reference density ▪ Corrected volume flow ▪ Target mass flow ▪ Temp. compensated dynamic viscosity ▪ Temp. compensated kinematic viscosity ▪ Temperature ▪ Status ▪ Volume flow
	Status signal	F		
	Diagnostic behavior	Alarm		

Diagnostic information			Remedy instructions	Influenced measured variables
No.	Short text			
082	Data storage		1. Check module connections 2. Contact service	▪ Carrier mass flow ▪ Concentration ▪ Density ▪ Dynamic viscosity ▪ **Empty pipe detection** option ▪ Kinematic viscosity ▪ **Low flow cut off** option ▪ Mass flow ▪ Sensor integrity ▪ Reference density ▪ Corrected volume flow ▪ Target mass flow ▪ Temp. compensated dynamic viscosity ▪ Temp. compensated kinematic viscosity ▪ Temperature ▪ Volume flow
	Status signal	F		
	Diagnostic behavior	Alarm		

Diagnostic information			Remedy instructions	Influenced measured variables
No.	Short text			
083	Memory content		1. Restart device 2. Contact service	▪ Carrier mass flow ▪ Concentration ▪ Density ▪ Dynamic viscosity ▪ **Empty pipe detection** option ▪ Kinematic viscosity ▪ **Low flow cut off** option ▪ Mass flow ▪ Sensor integrity ▪ Reference density ▪ Corrected volume flow ▪ Target mass flow ▪ Temp. compensated dynamic viscosity ▪ Temp. compensated kinematic viscosity ▪ Temperature ▪ Status ▪ Volume flow
	Status signal	F		
	Diagnostic behavior	Alarm		

Diagnostic information			Remedy instructions	Influenced measured variables
No.	Short text			
140	Sensor signal		1. Check or change main electronics 2. Change sensor	▪ Carrier mass flow ▪ Concentration ▪ Density ▪ Dynamic viscosity ▪ Kinematic viscosity ▪ Mass flow ▪ Sensor integrity ▪ Reference density ▪ Corrected volume flow ▪ Target mass flow ▪ Temp. compensated dynamic viscosity ▪ Temp. compensated kinematic viscosity ▪ Temperature
	Status signal	S		
	Diagnostic behavior	Alarm		

Diagnostic information			Remedy instructions	Influenced measured variables
No.	Short text			
144	Measuring error too high		1. Check or change sensor 2. Check process conditions	▪ Carrier mass flow ▪ Concentration ▪ Density ▪ Dynamic viscosity ▪ Kinematic viscosity ▪ Mass flow ▪ Sensor integrity ▪ Reference density ▪ Corrected volume flow ▪ Target mass flow ▪ Temp. compensated dynamic viscosity ▪ Temp. compensated kinematic viscosity ▪ Temperature
	Status signal	F		
	Diagnostic behavior	Alarm		

Diagnostic information			Remedy instructions	Influenced measured variables
No.	Short text			
190	Special event 1		Contact service	▪ Carrier mass flow ▪ Concentration ▪ Density ▪ Dynamic viscosity ▪ **Empty pipe detection** option ▪ Kinematic viscosity ▪ **Low flow cut off** option ▪ Mass flow ▪ Sensor integrity ▪ Reference density ▪ Corrected volume flow ▪ Target mass flow ▪ Temp. compensated dynamic viscosity ▪ Temp. compensated kinematic viscosity ▪ Temperature ▪ Status ▪ Volume flow
	Status signal	F		
	Diagnostic behavior	Alarm		

Diagnostic information			Remedy instructions	Influenced measured variables
No.	Short text			
191	Special event 5		Contact service	▪ Carrier mass flow ▪ Concentration ▪ Density ▪ Dynamic viscosity ▪ **Empty pipe detection** option ▪ Kinematic viscosity ▪ **Low flow cut off** option ▪ Mass flow ▪ Sensor integrity ▪ Reference density ▪ Corrected volume flow ▪ Target mass flow ▪ Temp. compensated dynamic viscosity ▪ Temp. compensated kinematic viscosity ▪ Temperature ▪ Status ▪ Volume flow
	Status signal	F		
	Diagnostic behavior	Alarm		

Diagnostic information			Remedy instructions	Influenced measured variables
No.	Short text			
192	Special event 9		Contact service	▪ Carrier mass flow ▪ Concentration ▪ Density ▪ Dynamic viscosity ▪ Kinematic viscosity ▪ Mass flow ▪ Sensor integrity ▪ Reference density ▪ Corrected volume flow ▪ Target mass flow ▪ Temp. compensated dynamic viscosity ▪ Temp. compensated kinematic viscosity ▪ Temperature ▪ Volume flow
	Status signal	F		
	Diagnostic behavior	Alarm		

12.6.2 Diagnostic of electronic

Diagnostic information			Remedy instructions	Influenced measured variables
No.	Short text			
201	Device failure		1. Restart device 2. Contact service	▪ Carrier mass flow ▪ Concentration ▪ Density ▪ Dynamic viscosity ▪ **Empty pipe detection** option ▪ Kinematic viscosity ▪ **Low flow cut off** option ▪ Mass flow ▪ Sensor integrity ▪ Reference density ▪ Corrected volume flow ▪ Target mass flow ▪ Temp. compensated dynamic viscosity ▪ Temp. compensated kinematic viscosity ▪ Temperature ▪ Status ▪ Volume flow
	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	▪ Carrier mass flow ▪ Concentration ▪ Density ▪ Dynamic viscosity ▪ **Empty pipe detection** option ▪ Kinematic viscosity ▪ **Low flow cut off** option ▪ Mass flow ▪ Sensor integrity ▪ Reference density ▪ Corrected volume flow ▪ Target mass flow ▪ Temp. compensated dynamic viscosity ▪ Temp. compensated kinematic viscosity ▪ Temperature ▪ Status ▪ Volume flow
	Status signal	F		
	Diagnostic behavior	Alarm		

Diagnostic information			Remedy instructions	Influenced measured variables
No.	Short text			
252	Modules incompatible		1. Check electronic modules 2. Change electronic modules	▪ Carrier mass flow ▪ Concentration ▪ Density ▪ Dynamic viscosity ▪ **Empty pipe detection** option ▪ Kinematic viscosity ▪ **Low flow cut off** option ▪ Mass flow ▪ Reference density ▪ Corrected volume flow ▪ Target mass flow ▪ Temp. compensated dynamic viscosity ▪ Temp. compensated kinematic viscosity ▪ Temperature ▪ Status ▪ Volume flow
	Status signal	F		
	Diagnostic behavior	Alarm		

Diagnostic information			Remedy instructions	Influenced measured variables
No.	Short text			
262	Module connection		1. Check module connections 2. Change main electronics	▪ Carrier mass flow ▪ Concentration ▪ Density ▪ Dynamic viscosity ▪ **Empty pipe detection** option ▪ Kinematic viscosity ▪ **Low flow cut off** option ▪ Mass flow ▪ Sensor integrity ▪ Reference density ▪ Corrected volume flow ▪ Target mass flow ▪ Temp. compensated dynamic viscosity ▪ Temp. compensated kinematic viscosity ▪ Temperature ▪ Status ▪ Volume flow
	Status signal	F		
	Diagnostic behavior	Alarm		

Diagnostic information			Remedy instructions	Influenced measured variables
No.	Short text			
270	Main electronic failure		Change main electronic module	▪ Carrier mass flow ▪ Concentration ▪ Density ▪ Dynamic viscosity ▪ **Empty pipe detection** option ▪ Kinematic viscosity ▪ **Low flow cut off** option ▪ Mass flow ▪ Sensor integrity ▪ Reference density ▪ Corrected volume flow ▪ Target mass flow ▪ Temp. compensated dynamic viscosity ▪ Temp. compensated kinematic viscosity ▪ Temperature ▪ Status ▪ Volume flow
	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	▪ Carrier mass flow ▪ Concentration ▪ Density ▪ Dynamic viscosity ▪ **Empty pipe detection** option ▪ Kinematic viscosity ▪ **Low flow cut off** option ▪ Mass flow ▪ Sensor integrity ▪ Reference density ▪ Corrected volume flow ▪ Target mass flow ▪ Temp. compensated dynamic viscosity ▪ Temp. compensated kinematic viscosity ▪ Temperature ▪ Status ▪ Volume flow
	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	▪ Carrier mass flow ▪ Concentration ▪ Density ▪ Dynamic viscosity ▪ **Empty pipe detection** option ▪ Kinematic viscosity ▪ **Low flow cut off** option ▪ Mass flow ▪ Sensor integrity ▪ Reference density ▪ Corrected volume flow ▪ Target mass flow ▪ Temp. compensated dynamic viscosity ▪ Temp. compensated kinematic viscosity ▪ Temperature ▪ Status ▪ Volume flow
	Status signal	F		
	Diagnostic behavior	Alarm		

Diagnostic information			Remedy instructions	Influenced measured variables
No.	Short text			
273	Main electronic failure		Change electronic	▪ Carrier mass flow ▪ Concentration ▪ Density ▪ Dynamic viscosity ▪ **Empty pipe detection** option ▪ Kinematic viscosity ▪ **Low flow cut off** option ▪ Mass flow ▪ Sensor integrity ▪ Reference density ▪ Corrected volume flow ▪ Target mass flow ▪ Temp. compensated dynamic viscosity ▪ Temp. compensated kinematic viscosity ▪ Temperature ▪ Status ▪ Volume flow
	Status signal	F		
	Diagnostic behavior	Alarm		

Diagnostic information			Remedy instructions	Influenced measured variables
No.	Short text			
274	Main electronic failure		Change electronic	▪ Mass flow ▪ Sensor integrity ▪ Corrected volume flow ▪ Volume flow
	Status signal	S		
	Diagnostic behavior	Warning		

Diagnostic information			Remedy instructions	Influenced measured variables
No.	Short text			
283	Memory content		1. Reset device 2. Contact service	▪ Carrier mass flow ▪ Concentration ▪ Density ▪ Dynamic viscosity ▪ **Empty pipe detection** option ▪ Kinematic viscosity ▪ **Low flow cut off** option ▪ Mass flow ▪ Reference density ▪ Corrected volume flow ▪ Target mass flow ▪ Temp. compensated dynamic viscosity ▪ Temp. compensated kinematic viscosity ▪ Temperature ▪ Status ▪ Volume flow
	Status signal	F		
	Diagnostic behavior	Alarm		

Diagnostic information			Remedy instructions	Influenced measured variables
No.	Short text			
311	Electronic failure		1. Reset device 2. Contact service	▪ Carrier mass flow ▪ Concentration ▪ Density ▪ Dynamic viscosity ▪ **Empty pipe detection** option ▪ Kinematic viscosity ▪ **Low flow cut off** option ▪ Mass flow ▪ Sensor integrity ▪ Reference density ▪ Corrected volume flow ▪ Target mass flow ▪ Temp. compensated dynamic viscosity ▪ Temp. compensated kinematic viscosity ▪ Temperature ▪ Status ▪ Volume flow
	Status signal	F		
	Diagnostic behavior	Alarm		

Diagnostic information			Remedy instructions	Influenced measured variables
No.	Short text			
311	Electronic failure		1. Do not reset device 2. Contact service	▪ Carrier mass flow ▪ Concentration ▪ Density ▪ Dynamic viscosity ▪ **Empty pipe detection** option ▪ Kinematic viscosity ▪ **Low flow cut off** option ▪ Mass flow ▪ Sensor integrity ▪ Reference density ▪ Corrected volume flow ▪ Target mass flow ▪ Temp. compensated dynamic viscosity ▪ Temp. compensated kinematic viscosity ▪ Temperature ▪ Volume flow
	Status signal	M		
	Diagnostic behavior	Warning		

Diagnostic information			Remedy instructions	Influenced measured variables
No.	Short text			
382	Data storage		1. Insert DAT module 2. Change DAT module	▪ Carrier mass flow ▪ Concentration ▪ Density ▪ Dynamic viscosity ▪ **Empty pipe detection** option ▪ Kinematic viscosity ▪ **Low flow cut off** option ▪ Mass flow ▪ Reference density ▪ Corrected volume flow ▪ Target mass flow ▪ Temp. compensated dynamic viscosity ▪ Temp. compensated kinematic viscosity ▪ Temperature ▪ Status ▪ Volume flow
	Status signal	F		
	Diagnostic behavior	Alarm		

Diagnostic information			Remedy instructions	Influenced measured variables
No.	Short text			
383	Memory content		1. Restart device 2. Check or change DAT module 3. Contact service	▪ Carrier mass flow ▪ Concentration ▪ Density ▪ Dynamic viscosity ▪ **Empty pipe detection** option ▪ Kinematic viscosity ▪ **Low flow cut off** option ▪ Mass flow ▪ Reference density ▪ Corrected volume flow ▪ Target mass flow ▪ Temp. compensated dynamic viscosity ▪ Temp. compensated kinematic viscosity ▪ Temperature ▪ Status ▪ Volume flow
	Status signal	F		
	Diagnostic behavior	Alarm		

Diagnostic information			Remedy instructions	Influenced measured variables
No.	Short text			
390	Special event 2		Contact service	▪ Carrier mass flow ▪ Concentration ▪ Density ▪ Dynamic viscosity ▪ **Empty pipe detection** option ▪ Kinematic viscosity ▪ **Low flow cut off** option ▪ Mass flow ▪ Sensor integrity ▪ Reference density ▪ Corrected volume flow ▪ Target mass flow ▪ Temp. compensated dynamic viscosity ▪ Temp. compensated kinematic viscosity ▪ Temperature ▪ Status ▪ Volume flow
	Status signal	F		
	Diagnostic behavior	Alarm		

Diagnostic information			Remedy instructions	Influenced measured variables
No.	Short text			
391	Special event 6		Contact service	▪ Carrier mass flow ▪ Concentration ▪ Density ▪ Dynamic viscosity ▪ **Empty pipe detection** option ▪ Kinematic viscosity ▪ **Low flow cut off** option ▪ Mass flow ▪ Sensor integrity ▪ Reference density ▪ Corrected volume flow ▪ Target mass flow ▪ Temp. compensated dynamic viscosity ▪ Temp. compensated kinematic viscosity ▪ Temperature ▪ Status ▪ Volume flow
	Status signal	F		
	Diagnostic behavior	Alarm		

Diagnostic information			Remedy instructions	Influenced measured variables
No.	Short text			
392	Special event 10		Contact service	▪ Carrier mass flow ▪ Concentration ▪ Density ▪ Dynamic viscosity ▪ Kinematic viscosity ▪ Mass flow ▪ Sensor integrity ▪ Reference density ▪ Corrected volume flow ▪ Target mass flow ▪ Temp. compensated dynamic viscosity ▪ Temp. compensated kinematic viscosity ▪ Temperature ▪ Volume flow
	Status signal	F		
	Diagnostic behavior	Alarm		

12.6.3 Diagnostic of configuration

Diagnostic information			Remedy instructions	Influenced measured variables
No.	Short text			
410	Data transfer		1. Check connection 2. Retry data transfer	▪ Carrier mass flow ▪ Concentration ▪ Density ▪ Dynamic viscosity ▪ **Empty pipe detection** option ▪ Kinematic viscosity ▪ **Low flow cut off** option ▪ Mass flow ▪ Sensor integrity ▪ Reference density ▪ Corrected volume flow ▪ Target mass flow ▪ Temp. compensated dynamic viscosity ▪ Temp. compensated kinematic viscosity ▪ Temperature ▪ Volume flow
	Status signal	F		
	Diagnostic behavior	Alarm		

Diagnostic information			Remedy instructions	Influenced measured variables
No.	Short text			
411	Up-/download active		Up-/download active, please wait	▪ Carrier mass flow ▪ Concentration ▪ Density ▪ Dynamic viscosity ▪ **Empty pipe detection** option ▪ Kinematic viscosity ▪ **Low flow cut off** option ▪ Mass flow ▪ Sensor integrity ▪ Reference density ▪ Corrected volume flow ▪ Target mass flow ▪ Temp. compensated dynamic viscosity ▪ Temp. compensated kinematic viscosity ▪ Temperature ▪ Volume flow
	Status signal	C		
	Diagnostic behavior	Warning		

Diagnostic information			Remedy instructions	Influenced measured variables
No.	Short text			
411	Up-/download active		Up-/download active, please wait	▪ Carrier mass flow ▪ Concentration ▪ Density ▪ Dynamic viscosity ▪ **Empty pipe detection** option ▪ Kinematic viscosity ▪ **Low flow cut off** option ▪ Mass flow ▪ Sensor integrity ▪ Reference density ▪ Corrected volume flow ▪ Target mass flow ▪ Temp. compensated dynamic viscosity ▪ Temp. compensated kinematic viscosity ▪ Temperature ▪ Volume flow
	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	▪ Carrier mass flow ▪ Concentration ▪ Density ▪ Dynamic viscosity ▪ **Empty pipe detection** option ▪ Kinematic viscosity ▪ **Low flow cut off** option ▪ Mass flow ▪ Reference density ▪ Corrected volume flow ▪ Target mass flow ▪ Temp. compensated dynamic viscosity ▪ Temp. compensated kinematic viscosity ▪ Temperature ▪ Status ▪ Volume flow
	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	▪ Carrier mass flow ▪ Concentration ▪ Density ▪ Dynamic viscosity ▪ **Empty pipe detection** option ▪ Kinematic viscosity ▪ **Low flow cut off** option ▪ Mass flow ▪ Sensor integrity ▪ Reference density ▪ Corrected volume flow ▪ Target mass flow ▪ Temp. compensated dynamic viscosity ▪ Temp. compensated kinematic viscosity ▪ Temperature ▪ Volume flow
	Status signal	M		
	Diagnostic behavior	Warning		

Diagnostic information			Remedy instructions	Influenced measured variables
No.	Short text			
453	Flow override		Deactivate flow override	▪ Carrier mass flow ▪ Concentration ▪ Density ▪ Dynamic viscosity ▪ **Empty pipe detection** option ▪ Kinematic viscosity ▪ **Low flow cut off** option ▪ Mass flow ▪ Sensor integrity ▪ Reference density ▪ Corrected volume flow ▪ Target mass flow ▪ Temp. compensated dynamic viscosity ▪ Temp. compensated kinematic viscosity ▪ Temperature ▪ Volume flow
	Status signal	C		
	Diagnostic behavior	Warning		

Diagnostic information			Remedy instructions	Influenced measured variables
No.	Short text			
482	FB not Auto/Cas		Set Block in AUTO mode	–
	Status signal	F		
	Diagnostic behavior	Alarm		

Diagnostic information			Remedy instructions	Influenced measured variables
No.	Short text			
484	Simulation failure mode		Deactivate simulation	▪ Carrier mass flow ▪ Concentration ▪ Density ▪ Dynamic viscosity ▪ **Empty pipe detection** option ▪ Kinematic viscosity ▪ **Low flow cut off** option ▪ Mass flow ▪ Sensor integrity ▪ Reference density ▪ Corrected volume flow ▪ Target mass flow ▪ Temp. compensated dynamic viscosity ▪ Temp. compensated kinematic viscosity ▪ Temperature ▪ Volume flow
	Status signal	C		
	Diagnostic behavior	Alarm		

Diagnostic information			Remedy instructions	Influenced measured variables
No.	Short text			
485	Simulation measured variable		Deactivate simulation	▪ Carrier mass flow ▪ Concentration ▪ Density ▪ Dynamic viscosity ▪ **Empty pipe detection** option ▪ Kinematic viscosity ▪ **Low flow cut off** option ▪ Mass flow ▪ Sensor integrity ▪ Reference density ▪ Corrected volume flow ▪ Target mass flow ▪ Temp. compensated dynamic viscosity ▪ Temp. compensated kinematic viscosity ▪ Temperature ▪ Volume flow
	Status signal	C		
	Diagnostic behavior	Warning		

Diagnostic information			Remedy instructions	Influenced measured variables
No.	Short text			
495	Simulation diagnostic event		Deactivate simulation	–
	Status signal	C		
	Diagnostic behavior	Warning		

Diagnostic information			Remedy instructions	Influenced measured variables
No.	Short text			
497	Simulation block output		Deactivate simulation	–
	Status signal	C		
	Diagnostic behavior	Warning		

Diagnostic information			Remedy instructions	Influenced measured variables
No.	Short text			
537	Configuration		1. Check IP addresses in network 2. Change IP address	–
	Status signal	F		
	Diagnostic behavior	Warning		

Diagnostic information			Remedy instructions	Influenced measured variables
No.	Short text			
590	Special event 3		Contact service	▪ Carrier mass flow ▪ Concentration ▪ Density ▪ Dynamic viscosity ▪ **Empty pipe detection** option ▪ Kinematic viscosity ▪ **Low flow cut off** option ▪ Mass flow ▪ Sensor integrity ▪ Reference density ▪ Corrected volume flow ▪ Target mass flow ▪ Temp. compensated dynamic viscosity ▪ Temp. compensated kinematic viscosity ▪ Temperature ▪ Status ▪ Volume flow
	Status signal	F		
	Diagnostic behavior	Alarm		

Diagnostic information			Remedy instructions	Influenced measured variables
No.	Short text			
591	Special event 7		Contact service	▪ Carrier mass flow ▪ Concentration ▪ Density ▪ Dynamic viscosity ▪ **Empty pipe detection** option ▪ Kinematic viscosity ▪ **Low flow cut off** option ▪ Mass flow ▪ Sensor integrity ▪ Reference density ▪ Corrected volume flow ▪ Target mass flow ▪ Temp. compensated dynamic viscosity ▪ Temp. compensated kinematic viscosity ▪ Temperature ▪ Status ▪ Volume flow
	Status signal	F		
	Diagnostic behavior	Alarm		

Diagnostic information			Remedy instructions	Influenced measured variables
No.	Short text			
592	Special event 11		Contact service	▪ Carrier mass flow ▪ Concentration ▪ Density ▪ Dynamic viscosity ▪ Kinematic viscosity ▪ Mass flow ▪ Sensor integrity ▪ Reference density ▪ Corrected volume flow ▪ Target mass flow ▪ Temp. compensated dynamic viscosity ▪ Temp. compensated kinematic viscosity ▪ Temperature ▪ Volume flow
	Status signal	F		
	Diagnostic behavior	Alarm		

12.6.4 Diagnostic of process

Diagnostic information			Remedy instructions	Influenced measured variables
No.	Short text			
825	Operating temperature		1. Check ambient temperature 2. Check process temperature	Volume flow
	Status signal	S		
	Diagnostic behavior	Warning		

Diagnostic information			Remedy instructions	Influenced measured variables
No.	Short text			
825	Operating temperature		1. Check ambient temperature 2. Check process temperature	▪ Carrier mass flow ▪ Concentration ▪ Density ▪ Dynamic viscosity ▪ **Empty pipe detection** option ▪ Kinematic viscosity ▪ **Low flow cut off** option ▪ Mass flow ▪ Sensor integrity ▪ Reference density ▪ Corrected volume flow ▪ Target mass flow ▪ Temp. compensated dynamic viscosity ▪ Temp. compensated kinematic viscosity ▪ Temperature ▪ Status ▪ Volume flow
	Status signal	S		
	Diagnostic behavior	Warning		

Diagnostic information			Remedy instructions	Influenced measured variables
No.	Short text			
825	Operating temperature		1. Check ambient temperature 2. Check process temperature	▪ Carrier mass flow ▪ Concentration ▪ Density ▪ Dynamic viscosity ▪ **Empty pipe detection** option ▪ Kinematic viscosity ▪ **Low flow cut off** option ▪ Mass flow ▪ Reference density ▪ Corrected volume flow ▪ Target mass flow ▪ Temp. compensated dynamic viscosity ▪ Temp. compensated kinematic viscosity ▪ Temperature ▪ Status ▪ Volume flow
	Status signal	F		
	Diagnostic behavior	Alarm		

Diagnostic information			Remedy instructions	Influenced measured variables
No.	Short text			
830	Sensor temperature too high		Reduce ambient temp. around the sensor housing	▪ Carrier mass flow ▪ Concentration ▪ Density ▪ Dynamic viscosity ▪ Kinematic viscosity ▪ Mass flow ▪ Sensor integrity ▪ Reference density ▪ Corrected volume flow ▪ Target mass flow ▪ Temp. compensated dynamic viscosity ▪ Temp. compensated kinematic viscosity ▪ Temperature ▪ Volume flow
	Status signal	S		
	Diagnostic behavior	Warning		

Diagnostic information			Remedy instructions	Influenced measured variables
No.	Short text			
831	Sensor temperature too low		Increase ambient temp. around the sensor housing	▪ Carrier mass flow ▪ Concentration ▪ Density ▪ Dynamic viscosity ▪ Kinematic viscosity ▪ Mass flow ▪ Sensor integrity ▪ Reference density ▪ Corrected volume flow ▪ Target mass flow ▪ Temp. compensated dynamic viscosity ▪ Temp. compensated kinematic viscosity ▪ Temperature ▪ Volume flow
	Status signal	S		
	Diagnostic behavior	Warning		

Diagnostic information			Remedy instructions	Influenced measured variables
No.	Short text			
832	Electronic temperature too high		Reduce ambient temperature	▪ Carrier mass flow ▪ Concentration ▪ Density ▪ **Empty pipe detection** option ▪ **Low flow cut off** option ▪ Mass flow ▪ Sensor integrity ▪ Reference density ▪ Corrected volume flow ▪ Target mass flow ▪ Temperature ▪ Volume flow
	Status signal	S		
	Diagnostic behavior	Warning		

Diagnostic information			Remedy instructions	Influenced measured variables
No.	Short text			
833	Electronic temperature too low		Increase ambient temperature	▪ Carrier mass flow ▪ Concentration ▪ Density ▪ Dynamic viscosity ▪ **Empty pipe detection** option ▪ Kinematic viscosity ▪ **Low flow cut off** option ▪ Mass flow ▪ Sensor integrity ▪ Reference density ▪ Corrected volume flow ▪ Target mass flow ▪ Temp. compensated dynamic viscosity ▪ Temp. compensated kinematic viscosity ▪ Volume flow
	Status signal	S		
	Diagnostic behavior	Warning		

Diagnostic information			Remedy instructions	Influenced measured variables
No.	Short text			
834	Process temperature too high		Reduce process temperature	▪ Carrier mass flow ▪ Concentration ▪ Density ▪ Dynamic viscosity ▪ Kinematic viscosity ▪ Mass flow ▪ Sensor integrity ▪ Reference density ▪ Corrected volume flow ▪ Target mass flow ▪ Temp. compensated dynamic viscosity ▪ Temp. compensated kinematic viscosity ▪ Temperature ▪ Volume flow
	Status signal	S		
	Diagnostic behavior	Warning		

Diagnostic information			Remedy instructions	Influenced measured variables
No.	Short text			
835	Process temperature too low		Increase process temperature	▪ Carrier mass flow ▪ Concentration ▪ Density ▪ Dynamic viscosity ▪ Kinematic viscosity ▪ Mass flow ▪ Sensor integrity ▪ Reference density ▪ Corrected volume flow ▪ Target mass flow ▪ Temp. compensated dynamic viscosity ▪ Temp. compensated kinematic viscosity ▪ Temperature ▪ Volume flow
	Status signal	S		
	Diagnostic behavior	Warning		

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	▪ Carrier mass flow ▪ Concentration ▪ Density ▪ Dynamic viscosity ▪ **Empty pipe detection** option ▪ Kinematic viscosity ▪ **Low flow cut off** option ▪ Mass flow ▪ Reference density ▪ Corrected volume flow ▪ Target mass flow ▪ Temp. compensated dynamic viscosity ▪ Temp. compensated kinematic viscosity ▪ Temperature ▪ Volume flow
	Status signal	S		
	Diagnostic behavior	Warning		

Diagnostic information			Remedy instructions	Influenced measured variables
No.	Short text			
843	Process limit		Check process conditions	▪ Carrier mass flow ▪ Concentration ▪ Density ▪ Dynamic viscosity ▪ **Empty pipe detection** option ▪ Kinematic viscosity ▪ **Low flow cut off** option ▪ Mass flow ▪ Sensor integrity ▪ Reference density ▪ Corrected volume flow ▪ Target mass flow ▪ Temp. compensated dynamic viscosity ▪ Temp. compensated kinematic viscosity ▪ Temperature ▪ Volume flow
	Status signal	S		
	Diagnostic behavior	Warning		

Diagnostic information			Remedy instructions	Influenced measured variables
No.	Short text			
862	Partly filled pipe		1. Check for gas in process 2. Adjust detection limits	▪ Carrier mass flow ▪ Concentration ▪ Density ▪ Dynamic viscosity ▪ Kinematic viscosity ▪ Mass flow ▪ Sensor integrity ▪ Reference density ▪ Corrected volume flow ▪ Target mass flow ▪ Temp. compensated dynamic viscosity ▪ Temp. compensated kinematic viscosity ▪ Temperature ▪ Volume flow
	Status signal	S		
	Diagnostic behavior	Warning		

Diagnostic information			Remedy instructions	Influenced measured variables
No.	Short text			
882	Input signal		1. Check input configuration 2. Check external device or process conditions	▪ Density ▪ Mass flow ▪ Reference density ▪ Corrected volume flow ▪ Volume flow
	Status signal	F		
	Diagnostic behavior	Alarm		

Diagnostic information			Remedy instructions	Influenced measured variables
No.	Short text			
910	Tubes not oscillating		1. Check electronic 2. Inspect sensor	▪ Carrier mass flow ▪ Concentration ▪ Density ▪ **Empty pipe detection** option ▪ **Low flow cut off** option ▪ Mass flow ▪ Sensor integrity ▪ Reference density ▪ Corrected volume flow ▪ Target mass flow ▪ Temperature ▪ Volume flow
	Status signal	F		
	Diagnostic behavior	Alarm		

Diagnostic information			Remedy instructions	Influenced measured variables
No.	Short text			
912	Medium inhomogeneous		1. Check process cond. 2. Increase system pressure	▪ Carrier mass flow ▪ Concentration ▪ Density ▪ Dynamic viscosity ▪ **Empty pipe detection** option ▪ Kinematic viscosity ▪ **Low flow cut off** option ▪ Mass flow ▪ Sensor integrity ▪ Reference density ▪ Corrected volume flow ▪ Target mass flow ▪ Temp. compensated dynamic viscosity ▪ Temp. compensated kinematic viscosity ▪ Temperature ▪ Volume flow
	Status signal	S		
	Diagnostic behavior	Warning		

Diagnostic information			Remedy instructions	Influenced measured variables
No.	Short text			
912	Inhomogeneous		1. Check process cond. 2. Increase system pressure	▪ Carrier mass flow ▪ Concentration ▪ Density ▪ Dynamic viscosity ▪ **Empty pipe detection** option ▪ Kinematic viscosity ▪ **Low flow cut off** option ▪ Mass flow ▪ Sensor integrity ▪ Reference density ▪ Corrected volume flow ▪ Target mass flow ▪ Temp. compensated dynamic viscosity ▪ Temp. compensated kinematic viscosity ▪ Temperature ▪ Volume flow
	Status signal	S		
	Diagnostic behavior	Warning		

Diagnostic information			Remedy instructions	Influenced measured variables
No.	Short text			
913	Medium unsuitable		1. Check process conditions 2. Check electronic modules or sensor	▪ Carrier mass flow ▪ Concentration ▪ Density ▪ Dynamic viscosity ▪ Kinematic viscosity ▪ Mass flow ▪ Sensor integrity ▪ Reference density ▪ Corrected volume flow ▪ Target mass flow ▪ Temp. compensated dynamic viscosity ▪ Temp. compensated kinematic viscosity ▪ Temperature ▪ Volume flow
	Status signal	S		
	Diagnostic behavior	Warning		

Diagnostic information			Remedy instructions	Influenced measured variables
No.	Short text			
944	Monitoring failed		Check process conditions for Heartbeat Monitoring	▪ Carrier mass flow ▪ Concentration ▪ Density ▪ Mass flow ▪ Sensor integrity ▪ Reference density ▪ Corrected volume flow ▪ Target mass flow ▪ Temperature
	Status signal	S		
	Diagnostic behavior	Warning		

Diagnostic information			Remedy instructions	Influenced measured variables
No.	Short text			
948	Tube damping too high		Check process conditions	–
	Status signal	S		
	Diagnostic behavior	Warning		

Diagnostic information			Remedy instructions	Influenced measured variables
No.	Short text			
990	Special event 4		Contact service	▪ Carrier mass flow ▪ Concentration ▪ Density ▪ Dynamic viscosity ▪ **Empty pipe detection** option ▪ Kinematic viscosity ▪ **Low flow cut off** option ▪ Mass flow ▪ Sensor integrity ▪ Reference density ▪ Corrected volume flow ▪ Target mass flow ▪ Temp. compensated dynamic viscosity ▪ Temp. compensated kinematic viscosity ▪ Temperature ▪ Status ▪ Volume flow
	Status signal	F		
	Diagnostic behavior	Alarm		

Diagnostic information			Remedy instructions	Influenced measured variables
No.	Short text			
991	Special event 8		Contact service	▪ Carrier mass flow ▪ Concentration ▪ Density ▪ Dynamic viscosity ▪ **Empty pipe detection** option ▪ Kinematic viscosity ▪ **Low flow cut off** option ▪ Mass flow ▪ Sensor integrity ▪ Reference density ▪ Corrected volume flow ▪ Target mass flow ▪ Temp. compensated dynamic viscosity ▪ Temp. compensated kinematic viscosity ▪ Temperature ▪ Status ▪ Volume flow
	Status signal	F		
	Diagnostic behavior	Alarm		

Diagnostic information			Remedy instructions	Influenced measured variables
No.	Short text			
992	Special event 12		Contact service	▪ Carrier mass flow ▪ Concentration ▪ Density ▪ Dynamic viscosity ▪ Kinematic viscosity ▪ Mass flow ▪ Sensor integrity ▪ Reference density ▪ Corrected volume flow ▪ Target mass flow ▪ Temp. compensated dynamic viscosity ▪ Temp. compensated kinematic viscosity ▪ Temperature ▪ Volume flow
	Status signal	F		
	Diagnostic behavior	Alarm		

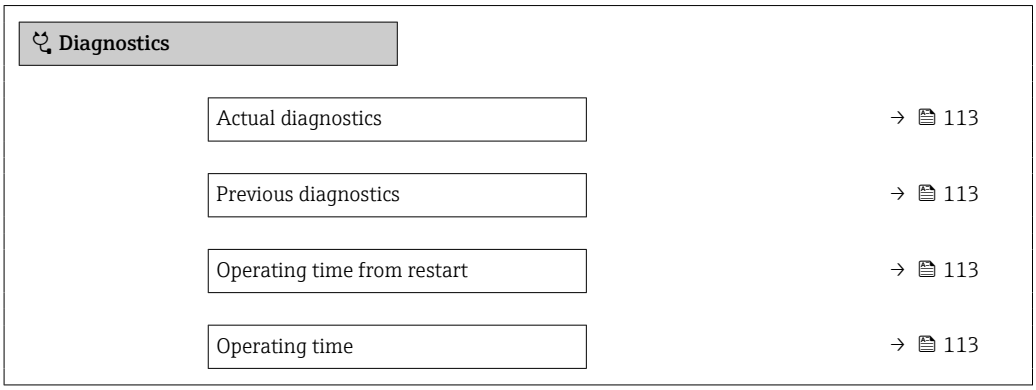
12.7 Pending diagnostic events

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 Web browser → 🖹 83
- Via "FieldCare" operating tool → 🖹 84
- Via "DeviceCare" operating tool → 🖹 84

Other pending diagnostic events can be displayed in the **Diagnostic list** submenu → 🖹 113

Navigation
"Diagnostics" menu



Parameter overview with brief description

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

12.8 Diagnostic list

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

Navigation path
Diagnostics → Diagnostic list

To call up the measures to rectify a diagnostic event:
- Via Web browser → 83
- Via "FieldCare" operating tool → 84
- Via "DeviceCare" operating tool → 84

12.9 Event logbook

12.9.1 Reading out the event logbook

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

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

A maximum of 20 event messages can be displayed in chronological order.

The event history includes entries for:
- Diagnostic events → 86
- Information events → 114

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

To call up the measures to rectify a diagnostic event:
- Via Web browser → 83
- Via "FieldCare" operating tool → 84
- Via "DeviceCare" operating tool → 84

For filtering the displayed event messages → 114

12.9.2 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)

12.9.3 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)
I1089	Power on
I1090	Configuration reset
I1091	Configuration changed
I1110	Write protection switch changed
I1111	Density adjust failure
I1137	Electronic changed
I1151	History reset
I1155	Reset electronic temperature
I1157	Memory error event list
I1185	Display backup done
I1186	Restore via display done

Info number	Info name
I1187	Settings downloaded with display
I1188	Display data cleared
I1189	Backup compared
I1209	Density adjustment ok
I1221	Zero point adjust failure
I1222	Zero point adjustment ok
I1256	Display: access status changed
I1264	Safety sequence aborted
I1335	Firmware changed
I1361	Wrong web server login
I1397	Fieldbus: access status changed
I1398	CDI: access status changed
I1444	Device verification passed
I1445	Device verification failed
I1446	Device verification active
I1447	Record application reference data
I1448	Application reference data recorded
I1449	Recording application ref. data failed
I1450	Monitoring off
I1451	Monitoring on
I1457	Failed:Measured error verification
I1459	Failed: I/O module verification
I1460	Failed: Sensor integrity verification
I1461	Failed: Sensor verification
I1462	Failed:Sensor electronic module verific.

12.10 Resetting the measuring device

Using the**Device reset** parameter (→ 72) it is possible to reset the entire device configuration or some of the configuration to a defined state.

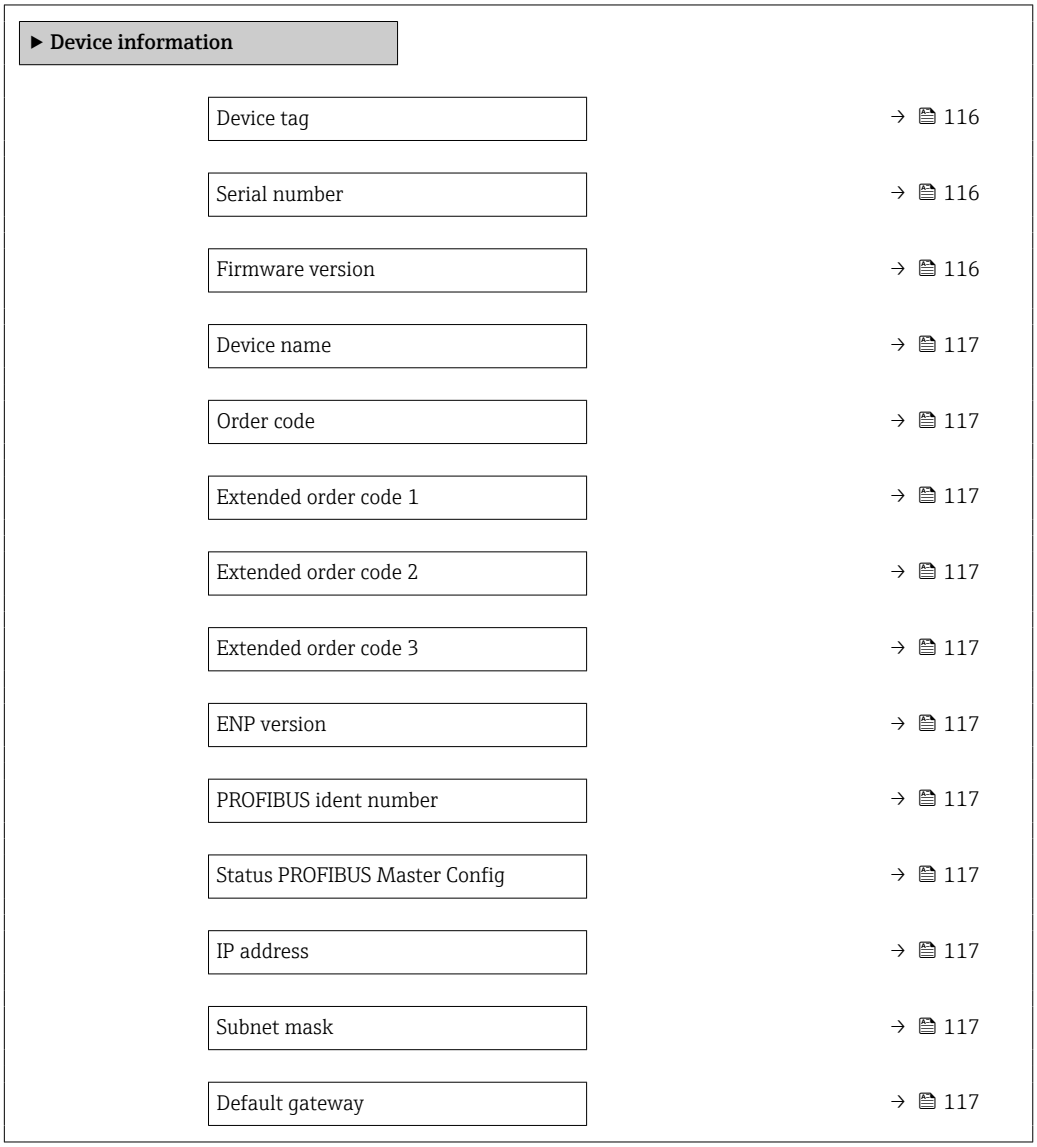
12.10.1 Function scope of the "Device reset" parameter

Options	Description
Cancel	No action is executed and the user exits the parameter.
To delivery settings	Every parameter for which a customer-specific default setting was ordered is reset to this customer-specific value. All other parameters are reset to the factory setting. This option is not visible if no customer-specific settings have been ordered.
Restart device	The restart resets every parameter whose data are in the volatile memory (RAM) to the factory setting (e.g. measured value data). The device configuration remains unchanged.

12.11 Device information

The **Device information** submenu contains all parameters that display different information for device identification.

Navigation
"Diagnostics" menu → Device information



Parameter overview with brief description

Parameter	Description	User interface	Factory setting
Device tag	Shows name of measuring point.	Max. 32 characters, such as letters, numbers or special characters (e.g. @, %, /).	–
Serial number	Shows the serial number of the measuring device.	A maximum of 11-digit character string comprising letters and numbers.	–
Firmware version	Shows the device firmware version installed.	Character string in the format xx.yy.zz	–

Parameter	Description	User interface	Factory setting
Device name	Shows the name of the transmitter. The name can be found on the nameplate of the transmitter.	Max. 32 characters such as letters or numbers.	–
Order code	Shows the device order code. 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. 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. 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. 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	0x1561
Status PROFIBUS Master Config	Displays the status of the PROFIBUS Master configuration.	▪ Active ▪ Not active	–
IP address	Displays the IP address of the Web server of the measuring device.	4 octet: 0 to 255 (in the particular octet)	–
Subnet mask	Displays the subnet mask.	4 octet: 0 to 255 (in the particular octet)	–
Default gateway	Displays the default gateway.	4 octet: 0 to 255 (in the particular octet)	–

12.12 Firmware history

Release date	Firmware version	Order code for "Firmware version"	Firmware changes	Documentation type	Documentation
09.2013	01.00.00	Option **78**	Original firmware	Operating Instructions	BA01254D/06/EN/01.13
10.2014	01.01.zz	Option **69**	▪ Integration of optional local display ▪ New unit "Beer Barrel (BBL)" ▪ Simulation of diagnostic events	Operating Instructions	BA01254D/06/EN/02.14

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. 8E1B
    The product root is the first part of the order code: see the nameplate on the device.
  - Text search: Manufacturer's information
  - Media type: Documentation – Technical Documentation

13 Maintenance

13.1 Maintenance tasks

No special maintenance work is required.

13.1.1 Exterior cleaning

When cleaning the exterior of measuring devices, always use cleaning agents that do not attack the surface of the housing or the seals.

13.1.2 Interior cleaning

Observe the following points for CIP and SIP cleaning:
- Use only cleaning agents to which the process-wetted materials are adequately resistant.
- Observe the maximum permitted medium temperature for the measuring device → 133.

Observe the following point for cleaning with pigs:
Observe the inside diameter of the measuring tube and process connection.

13.2 Measuring and test equipment

Endress+Hauser offers a wide variety of measuring and test equipment, such as W@M or device tests.

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

List of some of the measuring and testing equipment: → 122

13.3 Endress+Hauser services

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

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

14 Repairs

14.1 General notes

14.1.1 Repair and conversion concept

The Endress+Hauser repair and conversion concept provides for the following:
- The measuring devices have a modular design.
- Spare parts are grouped into logical kits with the associated Installation Instructions.
- Repairs are carried out by Endress+Hauser Service or by appropriately trained customers.
- Certified devices can only be converted to other certified devices by Endress+Hauser Service or at the factory.

14.1.2 Notes for repair and conversion

For repair and modification of a measuring device, observe the following notes:
- ▶ Use only original Endress+Hauser spare parts.
- ▶ Carry out the repair according to the Installation Instructions.
- ▶ Observe the applicable standards, federal/national regulations, Ex documentation (XA) and certificates.
- ▶ Document every repair and each conversion and enter them into the *W@M* life cycle management database.

14.2 Spare parts

W@M Device Viewer (www.endress.com/deviceviewer):
All the spare parts for the measuring device, along with the order code, are listed here and can be ordered. If available, users can also download the associated Installation Instructions.

Measuring device serial number:
- Is located on the nameplate of the device.
- Can be read out via the **Serial number** parameter (→ 116) in the **Device information** submenu.

14.3 Endress+Hauser services

Endress+Hauser offers a wide range of services.

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

14.4 Return

The measuring device must be returned if it is need of repair or a factory calibration, or if the wrong measuring device has been delivered or ordered. Legal specifications require Endress+Hauser, as an ISO-certified company, to follow certain procedures when handling products that are in contact with the medium.

To ensure safe, swift and professional device returns, please refer to the procedure and conditions for returning devices provided on the Endress+Hauser website at http://www.endress.com/support/return-material

14.5 Disposal

14.5.1 Removing the measuring device

1. Switch off the device.

⚠ WARNING

Danger to persons from process conditions.

- Beware of hazardous process conditions such as pressure in the measuring device, high temperatures or aggressive fluids.

2. Carry out the mounting and connection steps from the "Mounting the measuring device" and "Connecting the measuring device" sections in reverse order. Observe the safety instructions.

14.5.2 Disposing of the measuring device

⚠ WARNING

Danger to personnel and environment from fluids that are hazardous to health.

- Ensure that the measuring device and all cavities are free of fluid residues that are hazardous to health or the environment, e.g. substances that have permeated into crevices or diffused through plastic.

Observe the following notes during disposal:

- Observe valid federal/national regulations.
- Ensure proper separation and reuse of the device components.

15 Accessories

Various accessories, which can be ordered with the device or subsequently from Endress +Hauser, are available for the device. Detailed information on the order code in question is available from your local Endress+Hauser sales center or on the product page of the Endress+Hauser website: www.endress.com.

15.1 Device-specific accessories

15.1.1 For the sensor

Accessories	Description
Heating jacket	Is used to stabilize the temperature of the fluids in the sensor. Water, water vapor and other non-corrosive liquids are permitted for use as fluids. If using oil as a heating medium, please consult with Endress+Hauser. For details, see Operating Instructions BA00099D

15.2 Communication-specific accessories

Accessories	Description
Commubox FXA291	Connects Endress+Hauser field devices with a CDI interface (= Endress+Hauser Common Data Interface) and the USB port of a computer or laptop. For details, see the "Technical Information" document TI405C/07

15.3 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://wapps.endress.com/applicator ▪ As a downloadable DVD for local PC installation.
W@M	W@M Life Cycle Management Improved productivity with information at your fingertips. Data relevant to a plant and its components is generated from the first stages of planning and during the asset's complete life cycle. W@M Life Cycle Management is an open and flexible information platform with online and on-site tools. Instant access for your staff to current, in-depth data shortens your plant's engineering time, speeds up procurement processes and increases plant uptime. Combined with the right services, W@M Life Cycle Management boosts productivity in every phase. For more information, visit www.endress.com/lifecyclemanagement

FieldCare	FDT-based plant asset management tool from Endress+Hauser. 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. For details, see Operating Instructions BA00027S and BA00059S
DeviceCare	Tool for connecting and configuring Endress+Hauser field devices. For details, see Innovation brochure IN01047S

15.4 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. For details, see "Technical Information" TI00133R and 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. For details, see "Fields of Activity", FA00006T

16 Technical data

16.1 Application

The measuring device is suitable for flow measurement of liquids and gases only.

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 adequately resistant.

16.2 Function and system design

Measuring principle

Mass flow measurement based on the Coriolis measuring principle

Measuring system

The device consists of a transmitter and a sensor.

One device version is available: compact version - transmitter and sensor form a mechanical unit.

For information on the structure of the device

16.3 Input

Measured variable

Direct measured variables

- Mass flow
- Density
- Temperature

Calculated measured variables

- Volume flow
- Corrected volume flow
- Reference density

Measuring range

Measuring ranges for liquids

DN		Measuring range full scale values $\dot{m}_{min(F)}$ to $\dot{m}_{max(F)}$	
[mm]	[in]	[kg/h]	[lb/min]
8	⅜	0 to 2 000	0 to 73.50
15	½	0 to 6 500	0 to 238.9
25	1	0 to 18 000	0 to 661.5
40	1½	0 to 45 000	0 to 1 654
50	2	0 to 70 000	0 to 2 573

Measuring ranges for gases

The full scale values depend on the density of the gas and can be calculated with the formula below:
$\dot{m}_{max(G)} = \dot{m}_{max(F)} \cdot \rho_G : x$

$\dot{m}_{max(G)}$	Maximum full scale value for gas [kg/h]
$\dot{m}_{max(F)}$	Maximum full scale value for liquid [kg/h]
$\dot{m}_{max(G)} < \dot{m}_{max(F)}$	$\dot{m}_{max(G)}$ can never be greater than $\dot{m}_{max(F)}$
ρ_G	Gas density in [kg/m³] at operating conditions

DN		x
[mm]	[in]	[kg/m³]
8	⅜	60
15	½	80
25	1	90
40	1½	90
50	2	90

Calculation example for gas

- Sensor: Promass S, DN 50
- Gas: Air with a density of 60.3 kg/m³ (at 20 °C and 50 bar)
- Measuring range (liquid):70 000 kg/h
- x = 90 kg/m³ (for Promass S, DN 50)

Maximum possible full scale value:
$\dot{m}_{max(G)} = \dot{m}_{max(F)} \cdot \rho_G : x = 70\,000 \text{ kg/h} \cdot 60.3 \text{ kg/m}^3 : 90 \text{ kg/m}^3 = 46\,900 \text{ kg/h}$

Recommended measuring range

"Flow limit" section → 134

Operable flow range

Over 1000 : 1.

Flow rates above the preset full scale value are not overridden by the electronics unit, with the result that the totalizer values are registered correctly.

16.4 Output

Output signal

PROFIBUS DP

Signal encoding	NRZ code
Data transfer	9.6 kBaud...12 MBaud

Signal on alarm

Depending on the interface, failure information is displayed as follows:

PROFIBUS DP

Status and alarm messages	Diagnostics in accordance with PROFIBUS PA Profile 3.02

Local display

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

Status signal as per NAMUR recommendation NE 107

Operating tool

- Via digital communication:
  PROFIBUS DP
- Via service interface

Plain text display	With information on cause and remedial measures

Web browser

Plain text display	With information on cause and remedial measures

Low flow cut off

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

Galvanic isolation

The following connections are galvanically isolated from each other:
- Outputs
- Power supply

Protocol-specific data

PROFIBUS DP

Manufacturer ID	0x11
Ident number	0x1561
Profile version	3.02
Device description files (GSD, DTM, DD)	Information and files under: ▪ www.endress.com On the product page for the device: Documents/Software → Device drivers ▪ www.profibus.org

Output values (from measuring device to automation system)	**Analog input 1 to 8** ▪ Mass flow ▪ Volume flow ▪ Corrected volume flow ▪ Target mass flow ▪ Carrier mass flow ▪ Density ▪ Reference density ▪ Concentration ▪ Temperature ▪ Carrier pipe temperature ▪ Electronic temperature ▪ Oscillation frequency ▪ Oscillation amplitude ▪ Frequency fluctuation ▪ Oscillation damping ▪ Tube damping fluctuation ▪ Signal asymmetry ▪ Exciter current **Digital input 1 to 2** ▪ Partially filled pipe detection ▪ Low flow cut off **Totalizer 1 to 3** ▪ Mass flow ▪ Volume flow ▪ Corrected volume flow

Input values
(from automation system to measuring device)
	Analog output 1 to 3 (fixed assignment)
	▪ Pressure
	▪ Temperature
	▪ Reference density
	Digital output 1 to 3 (fixed assignment)
	▪ Digital output 1: switch positive zero return on/off
	▪ Digital output 2: perform zero point adjustment
	▪ Digital output 3: switch switch output on/off
	Totalizer 1 to 3
	▪ Totalize
	▪ Reset and hold
	▪ Preset and hold
	▪ Stop
	▪ Operating mode configuration:
	  ▪ Net flow total
	  ▪ Forward flow total
	  ▪ Reverse flow total

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 ▪ Via operating tools (e.g. FieldCare)

16.5 Power supply

Terminal assignment → 27

Pin assignment, device plug

Supply voltage

The power unit must be tested to ensure it meets safety requirements (e.g. PELV, SELV).

Transmitter

DC 20 to 30 V

Power consumption

Transmitter

Order code for "Output"	Maximum Power consumption
Option **L**: PROFIBUS DP	3.5 W

Current consumption

Transmitter

Order code for "Output"	Maximum Current consumption	Maximum switch-on current
Option **L**: PROFIBUS DP	145 mA	18 A (< 0.125 ms)

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 plug-in memory (HistoROM DAT).
- Error messages (incl. total operated hours) are stored.

Electrical connection

Potential equalization

Terminals

Transmitter
Spring terminals for wire cross-sections0.5 to 2.5 mm² (20 to 14 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

Cable specification

16.6 Performance characteristics

Reference operating conditions

- Error limits based on ISO 11631
- Water with +15 to +45 °C (+59 to +113 °F) at2 to 6 bar (29 to 87 psi)
- Specifications as per calibration protocol
- Accuracy based on accredited calibration rigs that are traced to ISO 17025.

To obtain measured errors, use the *Applicator* sizing tool → 122→ 141

Maximum measured error

o.r. = of reading; 1 g/cm³ = 1 kg/l; T = medium temperature

Base accuracy

Mass flow and volume flow (liquids)
±0.10 %

Mass flow (gases)
±0.50 % o.r.

Design fundamentals → 131

Density (liquids)
- Reference conditions:±0.0005 g/cm³
- Standard density calibration:±0.01 g/cm³
  (valid over the entire temperature range and density range)
- Wide-range density specification (order code for "Application package", option EF "Special density and concentration ") : ±0.002 g/cm³ (valid range for special density calibration: 0 to 2 g/cm³, +5 to +80 °C (+41 to +176 °F))

Temperature
±0.5 °C ± 0.005 · T °C (±0.9 °F ± 0.003 · (T − 32) °F)

Zero point stability

DN		Zero point stability	
[mm]	[in]	[kg/h]	[lb/min]
8	⅜	0.20	0.007
15	½	0.65	0.024
25	1	1.80	0.066
40	1½	4.50	0.165
50	2	7.0	0.257

Flow values

Flow values as turndown parameter depending on nominal diameter.

SI units

DN	1:1	1:10	1:20	1:50	1:100	1:500
[mm]	[kg/h]	[kg/h]	[kg/h]	[kg/h]	[kg/h]	[kg/h]
8	2 000	200	100	40	20	4
15	6 500	650	325	130	65	13
25	18 000	1 800	900	360	180	36
40	45 000	4 500	2 250	900	450	90
50	70 000	7 000	3 500	1 400	700	140

US units

DN	1:1	1:10	1:20	1:50	1:100	1:500
[inch]	[lb/min]	[lb/min]	[lb/min]	[lb/min]	[lb/min]	[lb/min]
⅜	73.50	7.350	3.675	1.470	0.735	0.147
½	238.9	23.89	11.95	4.778	2.389	0.478
1	661.5	66.15	33.08	13.23	6.615	1.323

DN	1:1	1:10	1:20	1:50	1:100	1:500
[inch]	[lb/min]	[lb/min]	[lb/min]	[lb/min]	[lb/min]	[lb/min]
1½	1654	165.4	82.70	33.08	16.54	3.308
2	2573	257.3	128.7	51.46	25.73	5.146

Repeatability

o.r. = of reading; 1 g/cm³ = 1 kg/l; T = medium temperature

Base repeatability

Mass flow and volume flow (liquids)
±0.05 % o.r.

Mass flow (gases)
±0.25 % o.r.

Design fundamentals → 131

Density (liquids)
±0.00025 g/cm³

Temperature
±0.25 °C ± 0.0025 · T °C (±0.45 °F ± 0.0015 · (T–32) °F)

Response time

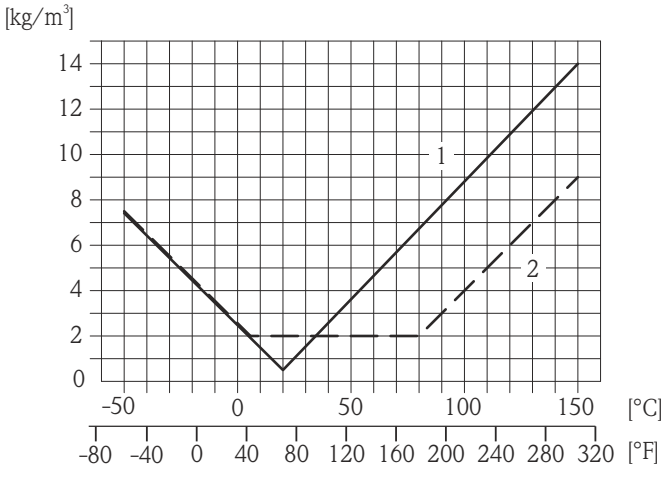
The response time depends on the configuration (damping).

Influence of medium temperature

Mass flow and volume flow
When there is a difference between the temperature for zero point adjustment and the process temperature, the typical measured error of the sensor is ±0.0002 % of the full scale value/°C (±0.0001 % of the full scale value/°F).

Density
When there is a difference between the density calibration temperature and the process temperature, the typical measured error of the sensor is ±0.0001 g/cm³ /°C (±0.00005 g/cm³ /°F). Field density calibration is possible.

Wide-range density specification (special density calibration)
If the process temperature is outside the valid range → 129 the measured error is ±0.0001 g/cm³ /°C (±0.00005 g/cm³ /°F)



A0016611

1 *Field density calibration, for example at +20 °C (+68 °F)*
2 *Special density calibration*

Temperature
±0.005 · T °C (± 0.005 · (T − 32) °F)

Influence of medium pressure

The table below shows the effect on accuracy of mass flow due to a difference between calibration pressure and process pressure.

o.r. = of reading

DN		[% o.r./bar]	[% o.r./psi]
[mm]	[in]		
8	⅜	−0.002	−0.0001
15	½	−0.006	−0.0004
25	1	−0.005	−0.0003
40	1½	−0.005	−0.0003
50	2	−0.005	−0.0003

Design fundamentals

o.r. = of reading, o.f.s. = of full scale value

BaseAccu = base accuracy in % o.r., BaseRepeat = base repeatability in % o.r.

MeasValue = measured value; ZeroPoint = zero point stability

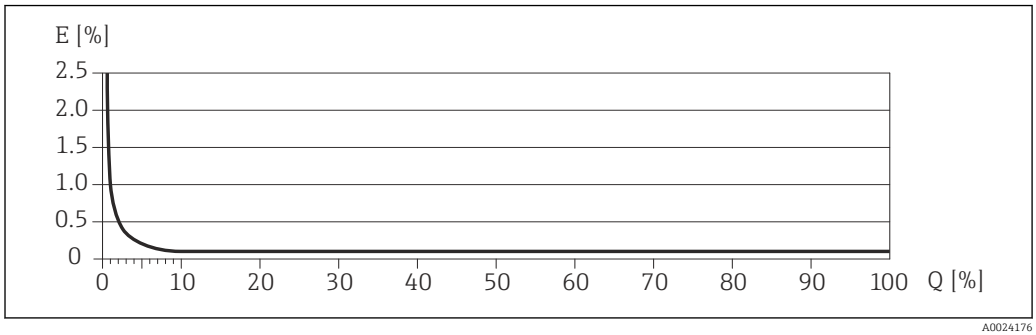
Calculation of the maximum measured error as a function of the flow rate

Flow rate	Maximum measured error in % o.r.
$\geq \frac{\text{ZeroPoint}}{\text{BaseAccu}} \cdot 100$ A0021332	$\pm$ BaseAccu A0021339
$< \frac{\text{ZeroPoint}}{\text{BaseAccu}} \cdot 100$ A0021333	$\pm \frac{\text{ZeroPoint}}{\text{MeasValue}} \cdot 100$ A0021334

Calculation of the maximum repeatability as a function of the flow rate

Flow rate	Maximum repeatability in % o.r.
$\geq \frac{½ \cdot \text{ZeroPoint}}{\text{BaseRepeat}} \cdot 100$ A0021335	$\pm$ BaseRepeat A0021340
$< \frac{½ \cdot \text{ZeroPoint}}{\text{BaseRepeat}} \cdot 100$ A0021336	$\pm ½ \cdot \frac{\text{ZeroPoint}}{\text{MeasValue}} \cdot 100$ A0021337

Example for max. measured error



E Error: Maximum measured error as % o.r. (example)
Q Flow rate as %

Design fundamentals → 131

16.7 Installation

"Mounting requirements"

16.8 Environment

Ambient temperature range	**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	All components apart from the display modules: ▪ −40 to +80 °C (−40 to +176 °F), preferably at +20 °C (+68 °F) (standard version) ▪ −50 to +80 °C (−58 to +176 °F) (Order code for *"Test, certificate"*, option JM) **Display modules** −40 to +80 °C (−40 to +176 °F)
Climate class	DIN EN 60068-2-38 (test Z/AD)
Degree of protection	**Transmitter and sensor** ▪ As standard: IP66/67, type 4X enclosure ▪ With the order code for "Sensor options", option **CM**: IP69K can also be ordered ▪ When housing is open: IP20, type 1 enclosure ▪ Display module: IP20, type 1 enclosure
Shock resistance	As per IEC/EN 60068-2-31
Vibration resistance	Acceleration up to 1 g, 10 to 150 Hz, based on IEC/EN 60068-2-6

Interior cleaning	▪ Sterilization in place (SIP) ▪ Cleaning in place (CIP) ▪ Cleaning with pigs
Electromagnetic compatibility (EMC)	▪ As per IEC/EN 61326 and NAMUR Recommendation 21 (NE 21) ▪ Complies with emission limits for industry as per EN 55011 (Class A) ▪ Device version with PROFIBUS DP: Complies with emission limits for industry as per EN 50170 Volume 2, IEC 61784 The following applies for PROFIBUS DP: If baud rates > 1.5 MBaud an EMC cable entry must be used and the cable shield must continue as far as the terminal wherever possible. For details refer to the Declaration of Conformity.

16.9 Process

Medium temperature range	**Sensor** −50 to +150 °C (−58 to +302 °F) **Seals** No internal seals
Medium density	0 to 5 000 kg/m³ (0 to 312 lb/cf)
Pressure-temperature ratings	An overview of the material load diagrams (pressure/temperature diagrams) for the process connections is provided in the "Technical Information" document.
Sensor housing	The sensor housing is filled with dry nitrogen gas and protects the electronics and mechanics inside. If a measuring tube fails (e.g. due to process characteristics like corrosive or abrasive fluids), the fluid will initially be contained by the sensor housing. If the sensor is to be purged with gas (gas detection), it should be equipped with purge connections. Do not open the purge connections unless the containment can be filled immediately with a dry, inert gas. Use only low pressure to purge. Maximum pressure: 5 bar (72.5 psi) **Burst pressure of the sensor housing** The following sensor housing burst pressures are only valid for standard devices and/or devices equipped with closed purge connections (not opened/as delivered). If a device fitted with purge connections (order code for "Sensor option", option CH "Purge connection") is connected to the purge system, the maximum pressure is determined by the purge system itself or by the device, depending on which component has the lower pressure classification. The sensor housing burst pressure refers to a typical internal pressure which is reached prior to mechanical failure of the sensor housing and which was determined during type

testing. The corresponding type test declaration can be ordered with the device (order code for "Additional approval", option LN "Sensor housing burst pressure, type test").

DN		Sensor housing burst pressure	
[mm]	[in]	[bar]	[psi]
8	3/8	190	2755
15	½	175	2538
25	1	165	2392
40	1½	152	2204
50	2	103	1494

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

Flow limit

Select the nominal diameter by optimizing between the required flow range and permissible pressure loss.

For an overview of the measuring range full scale values, see the "Measuring range" section → 124

- The minimum recommended full scale value is approx. 1/20 of the maximum full scale value
- In most applications, 20 to 50 % of the maximum full scale value can be considered ideal
- Select a lower full scale value for abrasive substances (such as liquids with entrained solids): flow velocity <1 m/s (<3 ft/s).
- For gas measurement the following rules apply:
  - The flow velocity in the measuring tubes should not exceed half the sonic velocity (0.5 Mach).
  - The maximum mass flow depends on the density of the gas: formula → 125

Pressure loss

To calculate the pressure loss, use the *Applicator* sizing tool → 141

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 EN/DIN PN 40 flanges. Weight specifications including transmitter: order code for "Housing", option A "Compact, aluminum coated".

Weight in SI units

DN [mm]	Weight [kg]
8	11
15	13
25	19
40	35
50	58

Weight in US units

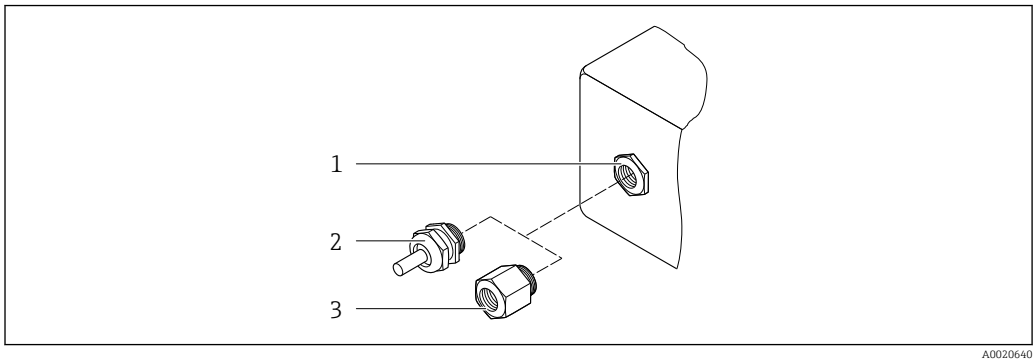
DN [in]	Weight [lbs]
3/8	24
½	29
1	42
1½	77
2	128

Materials

Transmitter housing

- Order code for "Housing", option **A** "Compact, aluminum coated": Aluminum, AlSi10Mg, coated
- Order code for "Housing", option **B** "Compact, hygienic, stainless": Hygienic version, stainless steel 1.4301 (304)
- Order code for "Housing", option **C** "Ultra-compact, hygienic, stainless": Hygienic version, stainless steel 1.4301 (304)
- Window material for optional local display (→ 137):
  - For order code for "Housing", option **A**: glass
  - For order code for "Housing", option **B** and **C**: plastic

Cable entries/cable glands



17 *Possible cable entries/cable glands*

1 *Female thread M20 × 1.5*
2 *Cable gland M20 × 1.5*
3 *Adapter for cable entry with female thread G ½" or NPT ½"*

Order code for "Housing", option A "Compact, aluminum, coated"

The various cable entries are suitable for hazardous and non-hazardous areas.

Cable entry/cable gland	Material
Cable gland M20 × 1.5	Nickel-plated brass
Adapter for cable entry with female thread G ½"	
Adapter for cable entry with female thread NPT ½"	

Order code for "Housing", option B "Compact, hygienic, stainless"

The various cable entries are suitable for hazardous and non-hazardous areas.

Cable entry/cable gland	Material
Cable gland M20 × 1.5	Stainless steel, 1.4404 (316L)
Adapter for cable entry with female thread G ½"	
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

- Acid and alkali-resistant outer surface
- Stainless steel 1.4301 (304)

Measuring tubes

- Stainless steel, 1.4539 (904L)
- Stainless steel, 1.4435 (316L)

Process connections

Flange according to EN 1092-1 (DIN 2501)/ASME B16.5/JIS B2220:	Stainless steel, 1.4404 (316/316L)
All other process connections:	Stainless steel, 1.4435 (316L)

Available process connections→ 137

Seals

Welded process connections without internal seals

Accessories

Protective cover

Stainless steel, 1.4404 (316L)

Safety Barrier Promass 100

Housing: Polyamide

Process connections

- Fixed flange connections:
  - EN 1092-1 (DIN 2501) flange
  - EN 1092-1 (DIN 2512N) flange
  - ASME B16.5 flange
  - JIS B2220 flange
  - DIN 11864-2 Form A flange, DIN 11866 series A, flange with notch
- Clamp connections:
  - Tri-Clamp (OD tubes), DIN 11866 series C
  - DIN 11864-3 Form A clamp, DIN 11866 series A, with notch
  - DIN 32676 clamp, DIN 11866 series A
  - ISO 2852 clamp, ISO 2037
- Thread:
  - DIN 11851 thread, DIN 11866 series A
  - SMS 1145 thread
  - ISO 2853 thread, ISO 2037
  - DIN 11864-1 Form A thread, DIN 11866 series A

Process connection materials

Surface roughness

All data relate to parts in contact with fluid. The following surface roughness quality can be ordered.

- Ra_{max} = 0.76 µm (30 µin)
- Ra_{max} = 0.38 µm (15 µin)

16.11 Operability

Local display

The local display is only available with the following device order code:
Order code for "Display; Operation", option **B**: 4-line; lit, via communication

Display element
- 4-line liquid crystal display with 16 characters per line.
- White background lighting; switches to red in event of device errors.
- Format for displaying measured variables and status variables can be individually configured.
- Permitted ambient temperature for the display: –20 to +60 °C (–4 to +140 °F). The readability of the display may be impaired at temperatures outside the temperature range.

Disconnecting the local display from the main electronics module

In the case of the "Compact, aluminum coated" housing version, the local display must only be disconnected manually from the main electronics module. In the case of the "Compact, hygienic, stainless" and "Ultra-compact, hygienic, stainless" housing versions, the local display is integrated in the housing cover and is disconnected from the main electronics module when the housing cover is opened.

"Compact, aluminum coated" housing version

The local display is plugged onto the main electronics module. The electronic connection between the local display and main electronics module is established via a connecting cable.

For some work performed on the measuring device (e.g. electrical connection), it is advisable to disconnect the local display from the main electronics module:

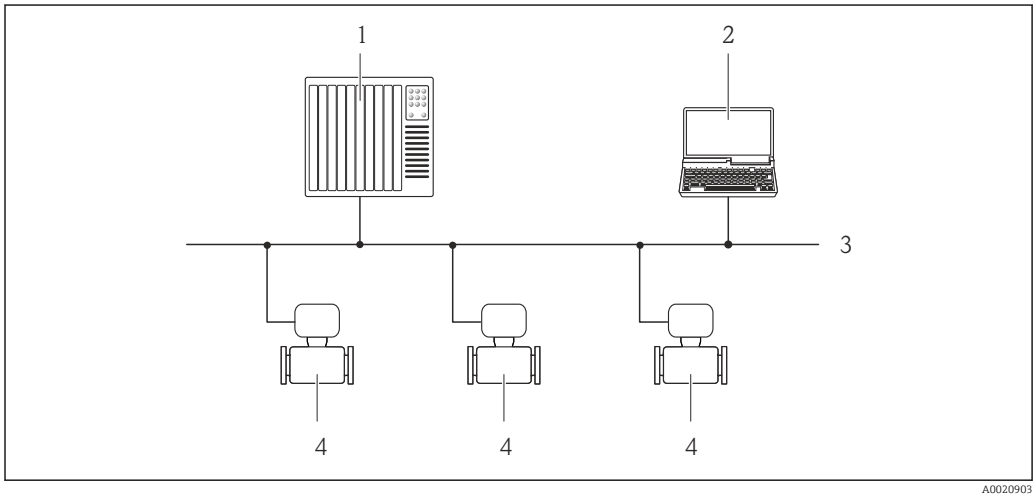
1. Press in the side latches of the local display.
2. Remove the local display from the main electronics module. Pay attention to the length of the connecting cable when doing so.

Once the work is completed, plug the local display back on.

Remote operation

Via PROFIBUS DP network

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



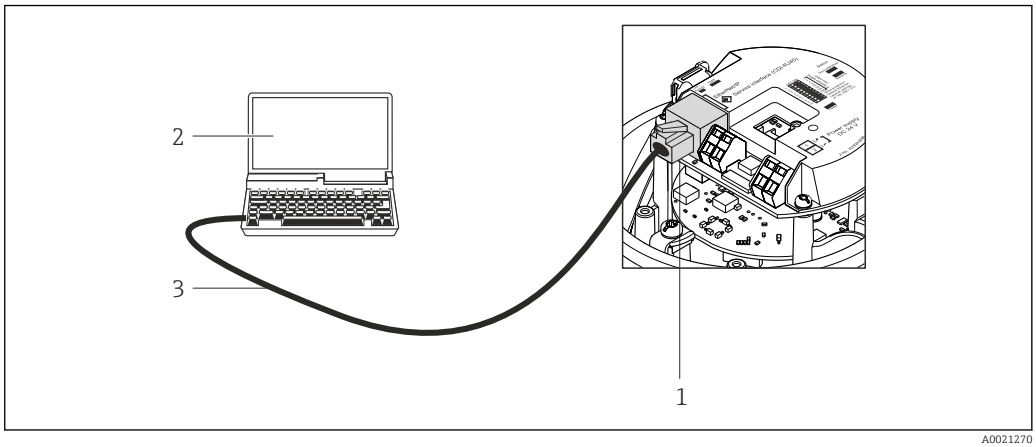
18 *Options for remote operation via PROFIBUS DP network*

1 *Automation system*
2 *Computer with PROFIBUS network card*
3 *PROFIBUS DP network*
4 *Measuring device*

Service interface

Via service interface (CDI-RJ45)

PROFIBUS DP



19 Connection for order code for "Output", option L: PROFIBUS DP

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

Languages

Can be operated in the following languages:
- Via "FieldCare" operating tool: English, German, French, Spanish, Italian, Chinese, Japanese
- Via Web browser
  English, German, French, Spanish, Italian, Dutch, Portuguese, Polish, Russian, Turkish, Chinese, Japanese, Bahasa (Indonesian), Vietnamese, Czech

16.12 Certificates and approvals

CE mark

The measuring system is in conformity with the statutory requirements of the applicable EC Directives. These are listed in the corresponding EC Declaration of Conformity along with the standards applied.

Endress+Hauser confirms successful testing of the device by affixing to it the CE mark.

C-Tick symbol

The measuring system meets the EMC requirements of the "Australian Communications and Media Authority (ACMA)".

Ex approval

The devices are certified for use in hazardous areas and the relevant safety instructions are provided in the separate "Safety Instructions" (XA) document. Reference is made to this document on the nameplate.

Hygienic compatibility

- 3A approval
- EHEDG-tested

Certification PROFIBUS

PROFIBUS interface

The measuring device is certified and registered by the PROFIBUS User Organization (PNO). The measuring system meets all the requirements of the following specifications:
- Certified in accordance with PROFIBUS PA Profile 3.02
- The device can also be operated with certified devices of other manufacturers (interoperability)

Pressure Equipment Directive	▪ With the PED/G1/x (x = category) marking on the sensor nameplate, Endress+Hauser confirms compliance with the "Essential Safety Requirements" specified in Annex I of the Pressure Equipment Directive 97/23/EC. ▪ Devices not bearing this marking (PED) are designed and manufactured according to good engineering practice. They meet the requirements of Art.3 Section 3 of the Pressure Equipment Directive 97/23/EC. The range of application is indicated in tables 6 to 9 in Annex II of the Pressure Equipment Directive.
Other standards and guidelines	▪ EN 60529 Degrees of protection provided by enclosures (IP code) ▪ IEC/EN 60068-2-6 Environmental influences: Test procedure - Test Fc: vibrate (sinusoidal). ▪ IEC/EN 60068-2-31 Environmental influences: Test procedure - Test Ec: shocks due to rough handling, primarily for devices. ▪ EN 61010-1 Safety requirements for electrical equipment for measurement, control and laboratory use ▪ IEC/EN 61326 Emission in accordance with Class A requirements. Electromagnetic compatibility (EMC requirements). ▪ NAMUR NE 21 Electromagnetic compatibility (EMC) of industrial process and laboratory control equipment ▪ NAMUR NE 32 Data retention in the event of a power failure in field and control instruments with microprocessors ▪ NAMUR NE 43 Standardization of the signal level for the breakdown information of digital transmitters with analog output signal. ▪ NAMUR NE 53 Software of field devices and signal-processing devices with digital electronics ▪ NAMUR NE 80 The application of the pressure equipment directive to process control devices ▪ NAMUR NE 105 Specifications for integrating fieldbus devices in engineering tools for field devices ▪ NAMUR NE 107 Self-monitoring and diagnosis of field devices ▪ NAMUR NE 131 Requirements for field devices for standard applications ▪ NAMUR NE 132 Coriolis mass meter

16.13 Application packages

Many different application packages are available to enhance the functionality of the device. Such packages might be needed to address safety aspects or specific application requirements.

The application packages can be ordered with the device or subsequently from Endress+Hauser. Detailed information on the order code in question is available from your local Endress+Hauser sales center or on the product page of the Endress+Hauser website: www.endress.com.

Detailed information on the application packages:
Special Documentation on the device

Heartbeat Technology

Package	Description
Heartbeat Verification +Monitoring	**Heartbeat Monitoring:** Continuously supplies monitoring data, which are characteristic of the measuring principle, for an external condition monitoring system. This makes it possible to: ▪ Draw conclusions - using these data and other information - about the impact the measuring application has on the measuring performance over time. ▪ Schedule servicing in time. ▪ Monitor the product quality, e.g. gas pockets. **Heartbeat Verification:** Makes it possible to check the device functionality on demand when the device is installed, without having to interrupt the process. ▪ Access via onsite operation or other operating interfaces, such as FieldCare for instance. ▪ Documentation of device functionality within the framework of manufacturer specifications, for proof testing for instance. ▪ End-to-end, traceable documentation of the verification results, including report. ▪ Makes it possible to extend calibration intervals in accordance with operator's risk assessment.

Concentration

Package	Description
Concentration measurement and special density	**Calculation and outputting of fluid concentrations** Many applications use density as a key measured value for monitoring quality or controlling processes. The device measures the density of the fluid as standard and makes this value available to the control system. The "Special Density" application package offers high-precision density measurement over a wide density and temperature range particularly for applications subject to varying process conditions. With the help of the "Concentration Measurement" application package, the measured density is used to calculate other process parameters: ▪ Temperature-compensated density (reference density). ▪ Percentage mass of the individual substances in a two-phase fluid. (Concentration in %). ▪ Fluid concentration is output with special units (°Brix, °Baumé, °API, etc.) for standard applications. The measured values are output via the digital and analog outputs of the device.

16.14 Accessories

Overview of accessories available for order → 122

16.15 Documentation

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

Standard documentation

Brief Operating Instructions

Measuring device	Documentation code
Promass S 100	KA01119D

Technical Information

Measuring device	Documentation code
Promass S 100	TI01037D

Supplementary device-dependent documentation

Safety Instructions

Contents	Documentation code
ATEX/IECEx Ex i	XA00159D
ATEX/IECEx Ex nA	XA01029D
cCSAus IS	XA00160D
INMETRO Ex i	XA01219D
INMETRO Ex nA	XA01220D
NEPSI Ex i	XA01249D
NEPSI Ex nA	XA01262D

Special Documentation

Contents	Documentation code
Information on the Pressure Equipment Directive	SD00142D
Concentration Measurement	SD01152D
Heartbeat Technology	SD01153D

Installation instructions

Contents	Documentation code
Installation Instructions for spare part sets	Specified for each individual accessory → 122 Overview of accessories available for order → 122

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