



Level



Pressure



Flow



Temperature



Liquid
Analysis



Registration



Systems
Components



Services



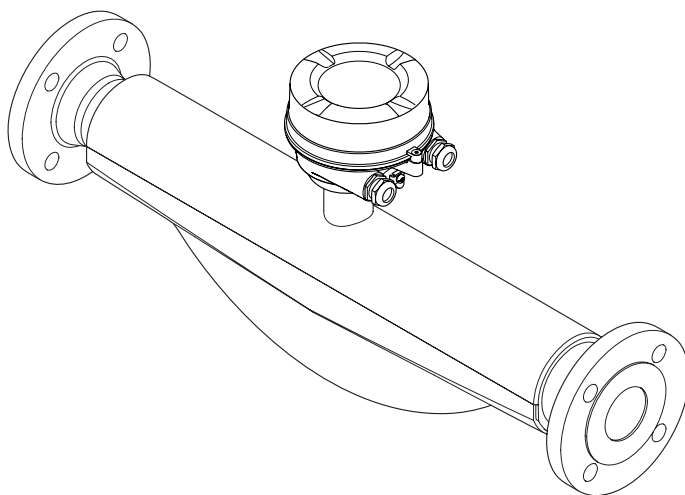
Solutions

Operating Instructions

Proline Promass F 100

EtherNet/IP

Coriolis Mass Flow Measuring System



- 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 in line with technological developments without prior notice. Your Endress+Hauser sales center will supply you with current information and updates to this manual.

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1 Document information

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

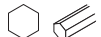
1.2.1 Safety symbols

Symbol	Meaning
 A0011189-EN	DANGER! This symbol alerts you to a dangerous situation. Failure to avoid this situation will result in serious or fatal injury.
 A0011190-EN	WARNING! This symbol alerts you to a dangerous situation. Failure to avoid this situation can result in serious or fatal injury.
 A0011191-EN	CAUTION! This symbol alerts you to a dangerous situation. Failure to avoid this situation can result in minor or medium injury.
 A0011192-EN	NOTICE! This symbol contains information on procedures and other facts which do not result in personal injury.

1.2.2 Electrical symbols

Symbol	Meaning
 A0011197	Direct current A terminal to which DC voltage is applied or through which direct current flows.
 A0011198	Alternating current A terminal to which alternating voltage is applied or through which alternating current flows.
 A0017381	Direct current and alternating current ■ A terminal to which alternating voltage or DC voltage is applied. ■ A terminal through which alternating current or direct current flows.
 A0011200	Ground connection A grounded terminal which, as far as the operator is concerned, is grounded via a grounding system.
 A0011199	Protective ground connection A terminal which must be connected to ground prior to establishing any other connections.
 A0011201	Equipotential connection A connection that has to be connected to the plant grounding system: This may be a potential equalization line or a star grounding system depending on national or company codes of practice.

1.2.3 Tool symbols

Symbol	Meaning
 A0011221	Allen key
 A0011222	Open-ended wrench

1.2.4 Symbols for certain types of information

Symbol	Meaning
 A0011182	Allowed Indicates procedures, processes or actions that are allowed.
 A0011183	Preferred Indicates procedures, processes or actions that are preferred.
 A0011184	Forbidden Indicates procedures, processes or actions that are forbidden.
 A0011193	Tip Indicates additional information.
 A0011194	Reference to documentation Refers to the corresponding device documentation.
 A0011195	Reference to page Refers to the corresponding page number.
 A0011196	Reference to graphic Refers to the corresponding graphic number and page number.
	Series of steps
	Result of a sequence of actions
 A0013502	Help in the event of a problem

1.2.5 Symbols in graphics

Symbol	Meaning
1, 2, 3,...	Item numbers
	Series of steps
A, B, C, ...	Views
A-A, B-B, C-C, ...	Sections
 A0013441	Flow direction
 A0011187	Hazardous area Indicates a hazardous area.
 A0011188	Safe area (non-hazardous area) Indicates a non-hazardous area.

1.3 Documentation

-  The following document types are available:
- On the CD-ROM supplied with the device
 - In the Download Area of the Endress+Hauser Internet site: www.endress.com → Download
-  For a detailed list of the individual documents along with the documentation code (→  90)

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.
Brief Operating Instructions	Guide that takes you quickly to the 1st measured value The Brief Operating Instructions contain all the essential information from incoming acceptance to initial commissioning.

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.

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 beginning work, the specialist staff must have read and understood the instructions in the Operating Instructions and supplementary documentation as well as in the certificates (depending on the application)
- ▶ Following instructions and basic conditions

The operating personnel must fulfill the following requirements:

- ▶ Being instructed and authorized according to the requirements of the task by the facility's owner-operator
- ▶ Following the instructions in these Operating Instructions

2.2 Designated use

Application and media

The measuring device described in these Instructions is intended only for flow measurement of liquids and gases.

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

To ensure that the measuring device remains in proper condition for the operation time:

- ▶ 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 against which the process-wetted materials are adequately resistant.

Incorrect use

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

NOTICE

Danger of breakage of the measuring tube due to corrosive or abrasive fluids.

Housing breakage due to mechanical overload possible!

- ▶ Verify the compatibility of the process fluid with the measuring tube material.
- ▶ Ensure the resistance of all fluid-wetted materials in the process.
- ▶ Observe the specified maximum process pressure.

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

Danger of housing breaking due to measuring tube breakage!

- ▶ In the event of a measuring tube breakage for a device version without rupture disk it is possible for the pressure loading capacity of the sensor housing to be exceeded. This can lead to rupture or failure of the sensor housing.

The external surface temperature of the housing can increase by max. 20 K due to the power consumption of the electronic components. Hot process fluids passing through the measuring device will further increase the surface temperature of the housing. The surface of the sensor, in particular, can reach temperatures which are close to the fluid temperature.

Possible burn hazard due to fluid temperatures!

- For elevated fluid temperature, 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.

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.

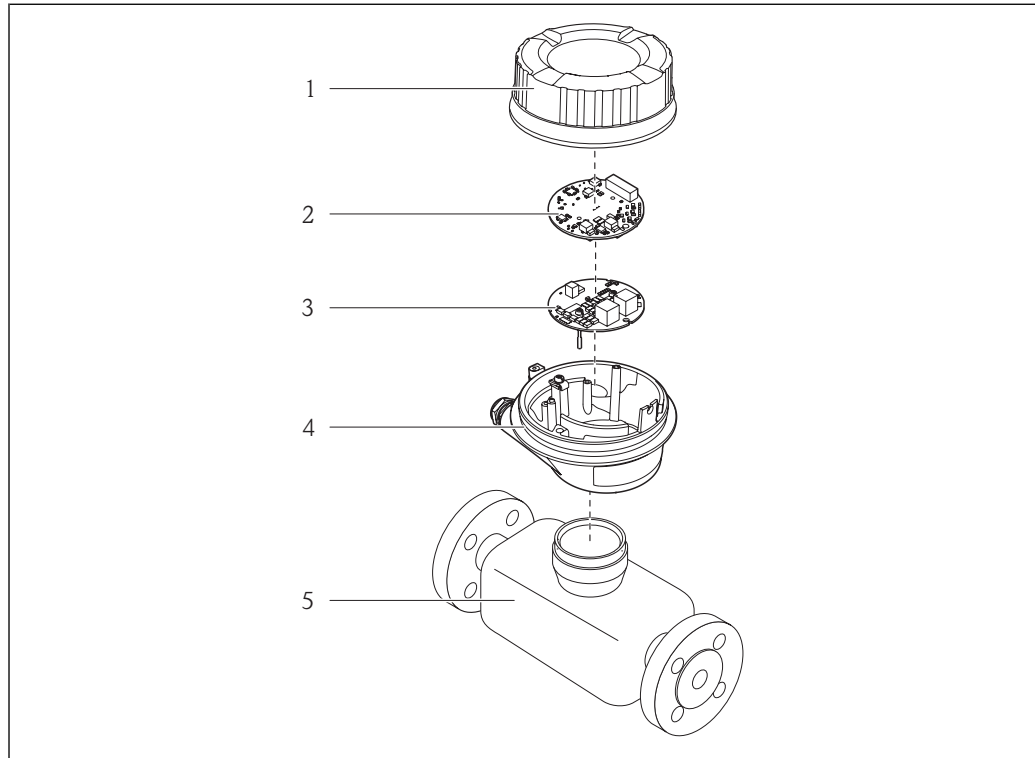
2.5 Product safety

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 they are safe to operate.

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

3 Product description

3.1 Product design



A0017257

1 Important components of a measuring device

- 1 Transmitter housing cover
- 2 I/O electronics module for EtherNet/IP
- 3 Main electronics module
- 4 Transmitter housing
- 5 Sensor

3.2 Registered trademarks

EtherNet/IP™

Trademark of ODVA, Inc.

Microsoft®

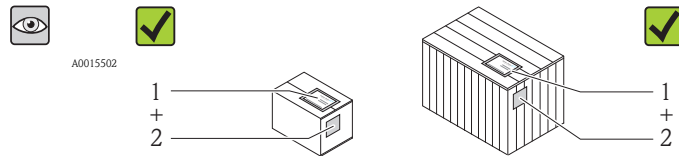
Registered trademark of the Microsoft Corporation, Redmond, Washington, USA

Applicator®, FieldCare®, Field Xpert™, HistoROM®

Registered or registration-pending trademarks of the Endress+Hauser Group

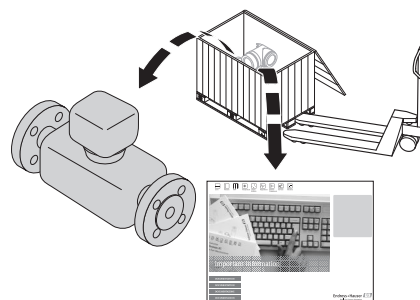
4 Incoming acceptance and product identification

4.1 Incoming acceptance

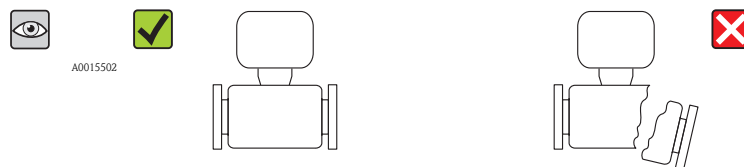


A0013843

Is the order code on the delivery note (1) identical to the order code on the product sticker (2)?

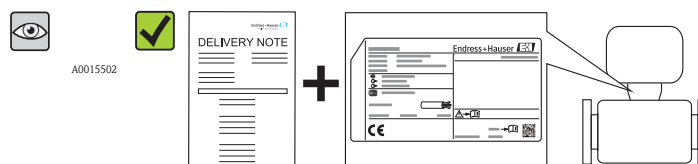


A0013695



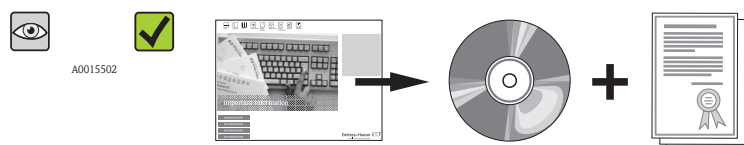
A0013698

Are the goods undamaged?



A0013699

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



A0013697

Is the CD-ROM with the Technical Documentation and documents present?



If one of the conditions is not satisfied, contact your Endress+Hauser Sales Center.

4.2 Product identification

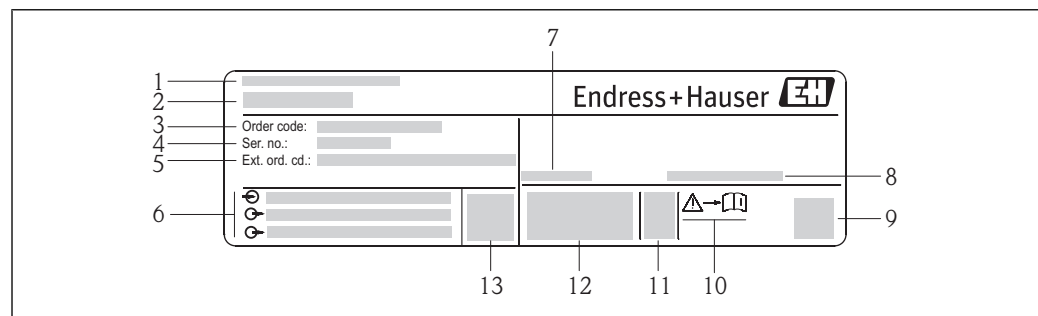
The following options are available for identification of the measuring device:

- 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.

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

- The "Additional standard documentation on the device" (→ 7) and "Supplementary device-dependent documentation" (→ 7) sections
- The *W@M Device Viewer*: Enter the serial number from the nameplate
(www.endress.com/deviceviewer)

4.2.1 Transmitter nameplate

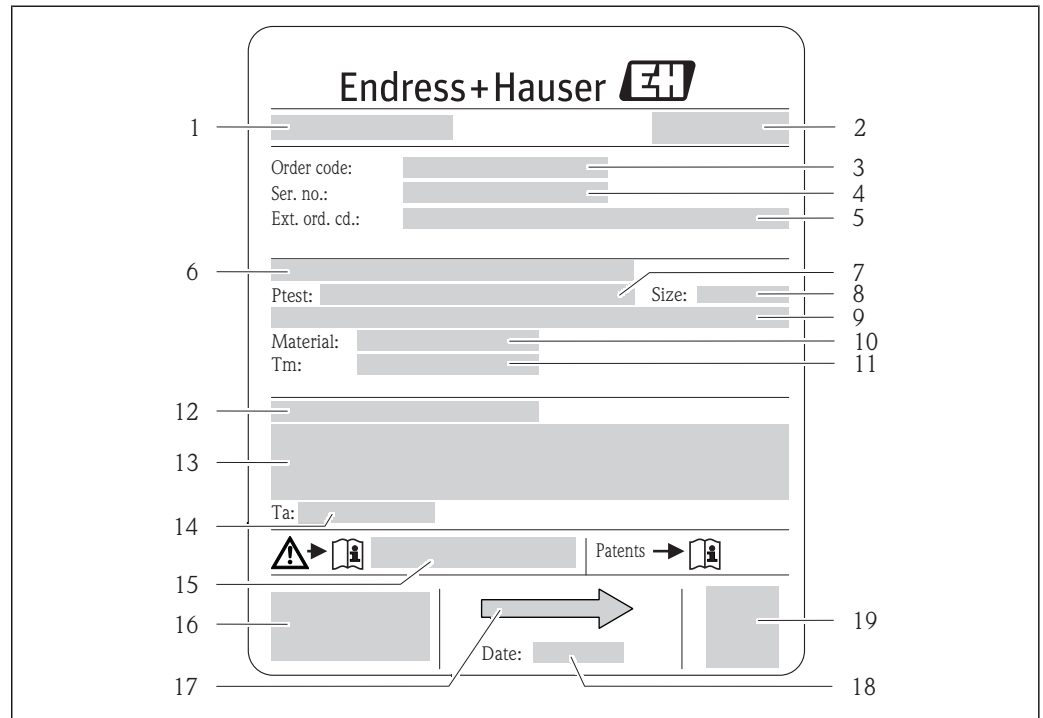


A0017520

2 Example of a transmitter nameplate

- 1 Manufacturing location
- 2 Name of the transmitter
- 3 Order code
- 4 Serial number
- 5 Extended order code
- 6 Electrical connection data, e.g. available inputs and outputs, supply voltage
- 7 Permitted ambient temperature range (T_a)
- 8 Degree of protection
- 9 2-D matrix code
- 10 Document number of safety-related supplementary documentation
- 11 Manufacturing date: year-month
- 12 CE mark, C-Tick
- 13 Firmware version (FW)

4.2.2 Sensor nameplate



A0017923

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.) (→ 13)
- 6 Flange nominal diameter/nominal pressure
- 7 Test pressure of the sensor
- 8 Nominal diameter of the sensor
- 9 Sensor-specific data: e.g. pressure range of secondary containment, wide-range density specification (special density calibration)
- 10 Material of measuring tube and manifold
- 11 Medium temperature range
- 12 Degree of protection
- 13 Approval information for explosion protection and Pressure Equipment Directive
- 14 Permitted ambient temperature (T_a)
- 15 Document number of safety-related supplementary documentation
- 16 CE mark, C-Tick
- 17 Flow direction
- 18 Manufacturing date: year-month
- 19 2-D matrix code



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
 A0011194	WARNING! This symbol alerts you to a dangerous situation. Failure to avoid this situation can result in serious or fatal injury.
 A0011194	Reference to documentation Refers to the corresponding device documentation.
 A0011199	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 fouling in the measuring tube.
- Protect from direct sunlight to avoid unacceptably high surface temperatures.
- Storage temperature: -40 to $+80$ °C (-40 to $+176$ °F), preferable for $+20$ °C ($+68$ °F)
- Store in a dry and dust-free place.
- Do not store outdoors.

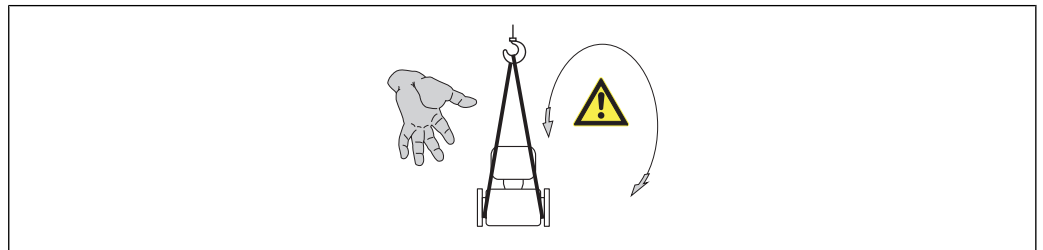
5.2 Transporting the product

⚠ 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 from rotating or slipping.
- ▶ Observe the weight specified on the packaging (stick-on label).
- ▶ Observe the transport instructions on the stick-on label on the electronics compartment cover.



A0015006

Observe the following notes during transport:

- Transport the measuring device to the measuring point in the original packaging.
- Lifting gear
 - Webbing slings: Do not use chains, as they could damage the housing.
 - For wood crates, the floor structure enables these to be loaded lengthwise or broadside using a forklift.
- For measuring device > DN 40 (1 ½ in): lift the measuring device using the webbing slings at the process connections; do not lift at the transmitter housing.
- Do not remove protective covers or protective caps installed on process connections. They prevent mechanical damage to the sealing surfaces and fouling in the measuring tube.

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

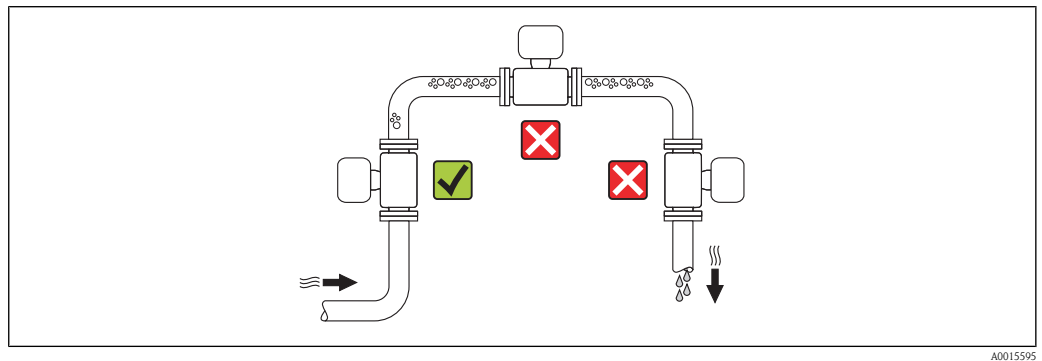
6 Mounting

6.1 Mounting requirements

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

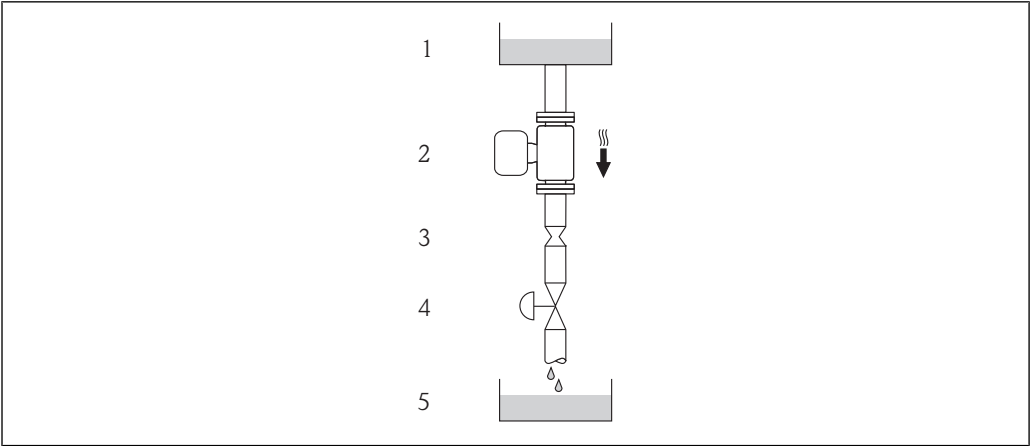


To prevent measuring errors arising from accumulation of gas bubbles in the measuring tube, avoid the following mounting locations in the pipe:

- 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.



A0015596

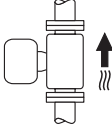
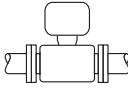
4 Installation in a down pipe (e.g. for batching applications)

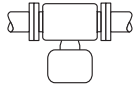
- 1 Supply tank
- 2 Sensor
- 3 Orifice plate, pipe restriction
- 4 Valve
- 5 Batching tank

DN		Ø Orifice plate, pipe restriction	
[mm]	[in]	[mm]	[in]
8	3/8	6	0.24
15	1/2	10	0.40
25	1	14	0.55
40	1 1/2	22	0.87
50	2	28	1.10
80	3	50	2.00
100	4	65	2.60
150	6	90	3.54
250	10	150	5.91

Orientation

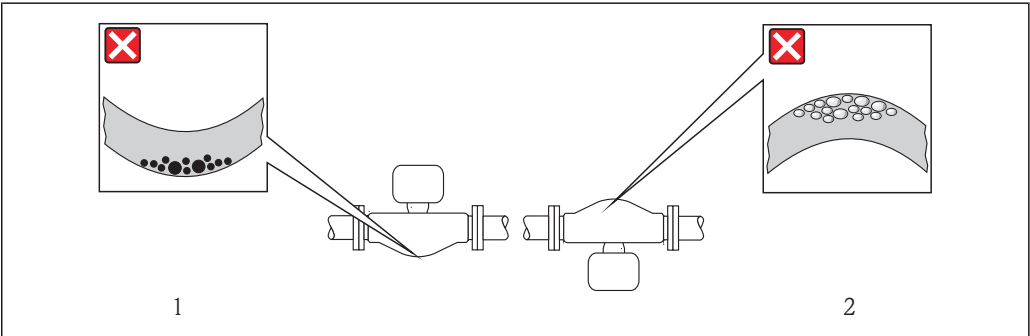
The direction of the arrow on the sensor nameplate helps you to install the sensor according to the flow direction (direction of medium flow through the piping).

Orientation			Recommendation
A	Vertical orientation	 A0015591	✓✓
B	Horizontal orientation, transmitter head up	 A0015589	✓✓ Exception: (→ 5, 19)

Orientation			Recommendation
C	Horizontal orientation, transmitter head down	 A0015590	✓✓ ¹⁾ Exception: (→ 5, 19)
D	Horizontal orientation, transmitter head at side	 A0015592	✗

1) 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.



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 (→ 20).



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)
------------------	--------------------------------

- 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.

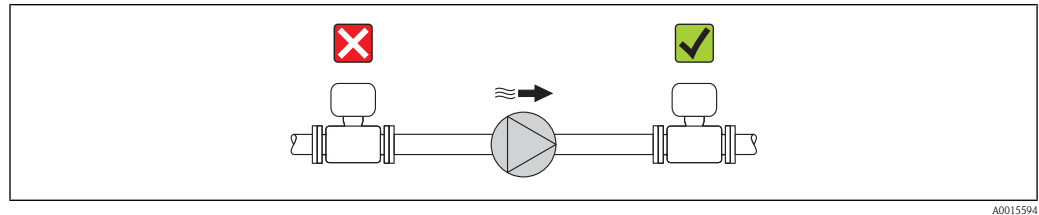
Cavitation is caused if the pressure drops below the vapor pressure:

- 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)



A0015594

Heating

NOTICE

Electronics can overheat due to elevated ambient temperature!

- Observe maximum permitted ambient temperature for the transmitter (→ 19).
- Depending on the fluid temperature, take the device orientation requirements into account (→ 18).

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 approved 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 $\mu_r \geq 300$
- Plate thickness $d \geq 0.35 \text{ mm}$ ($d \geq 0.014 \text{ in}$)

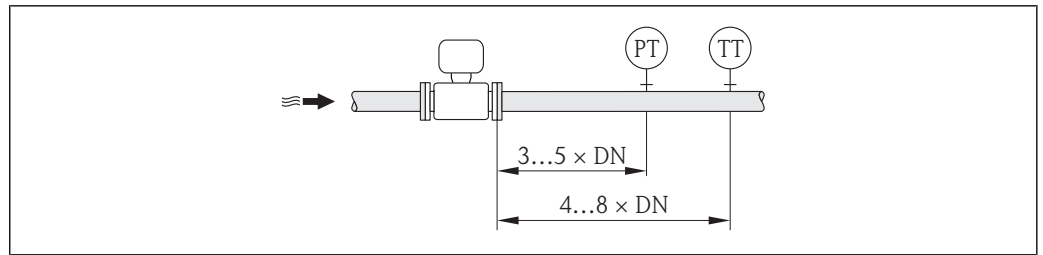
Vibrations

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

Outlet run for peripheral device

If a pressure and temperature measuring device are installed downstream from the measuring device, make sure there is sufficient distance between the two devices.



A0016893

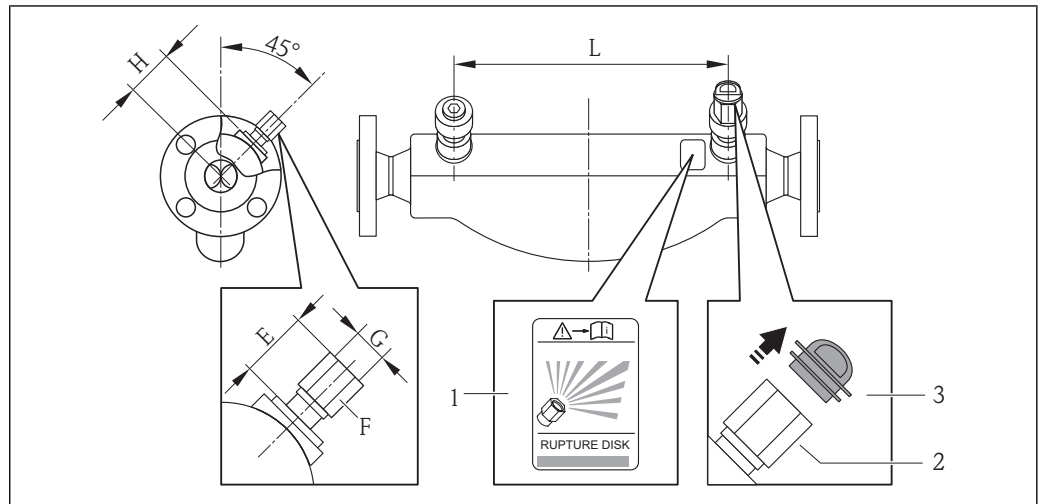
PT Pressure measuring device

TT Temperature measuring device

Rupture disk

Make sure that the function and operation of the rupture disk is not impeded through the installation of the device. The position of the rupture disk is indicated on a sticker beside it.

The existing connecting nozzles are not designed for a rinse or pressure monitoring function.



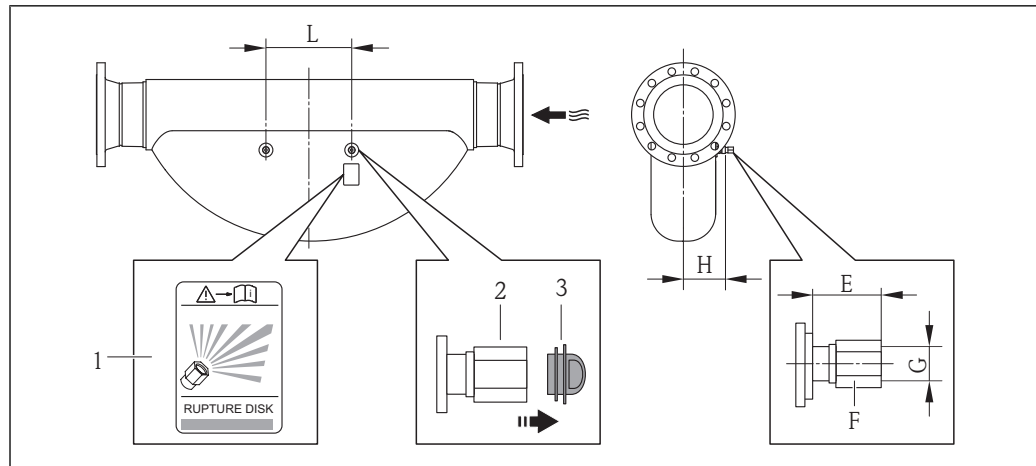
A0008361

1 Indication label for the rupture disk

2 Rupture disk with 1/2" NPT internal thread with 1" width across flat

3 Transport protection

DN		E		F	G	H		L	
[mm]	[in]	[mm]	[in]	[in]	[in]	[mm]	[in]	[mm]	[in]
8	3/8	Approx. 42	Approx. 1.65	AF 1	½ NPT	62	2.44	216	8.50
15	1/2	Approx. 42	Approx. 1.65	AF 1	½ NPT	62	2.44	220	8.66
25	1	Approx. 42	Approx. 1.65	AF 1	½ NPT	62	2.44	260	10.24
40	1½	Approx. 42	Approx. 1.65	AF 1	½ NPT	67	2.64	310	12.20
50	2	Approx. 42	Approx. 1.65	AF 1	½ NPT	79	3.11	452	17.78
80	3	Approx. 42	Approx. 1.65	AF 1	½ NPT	101	3.98	560	22.0
100	4	Approx. 42	Approx. 1.65	AF 1	½ NPT	120	4.72	684	27.0
150	6	Approx. 42	Approx. 1.65	AF 1	½ NPT	141	5.55	880	34.6



A0009733

- 1 Indication label for the rupture disk
 2 Rupture disk with 1/2" NPT internal thread with 1" width across flat
 3 Transport protection

DN		E		F	G	H		L	
[mm]	[in]	[mm]	[in]	[in]	[in]	[mm]	[in]	[mm]	[in]
250	10	Approx. 42	Approx. 1.65	AF 1	½ NPT	182	7.17	380	14.96

WARNING

Limited functional reliability of the rupture disk.

Danger to persons from escaping fluids!

- ▶ Do not remove the rupture disk.
- ▶ When using a rupture disk, do not use a heating jacket.
- ▶ Make sure that the function and operation of the rupture disk is not impeded through the installation of the device.
- ▶ Take precautions to prevent damage and danger to persons if the rupture disk is actuated.
- ▶ Observe information on the rupture disk sticker.

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

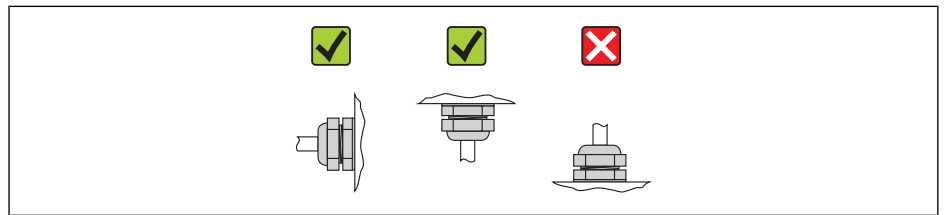
1. Remove all remaining transport packaging.
2. Remove any protective covers or protective caps present from the sensor.
3. Remove stick-on label on the electronics compartment cover.

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.



A0013964

6.3 Post-mounting check

Is the device damaged (visual inspection)?	☐
Does the measuring device conform to the measuring point specifications? For example: ■ Process temperature (→ 85) ■ Process pressure (refer to the chapter on "Material load curves" of the "Technical Information" document) ■ Ambient temperature range (→ 19) ■ Measuring range (→ 76)	☐
Has the correct orientation for the sensor been selected (→ 18)? ■ According to sensor type ■ According to fluid temperature ■ According to fluid properties (outgassing, with entrained solids)	☐
Does the arrow on the sensor nameplate match the direction of flow of the fluid through the piping (→ 18)?	☐
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

7.1 Connection conditions

7.1.1 Required tools

- For cable entries: Use corresponding tools
- For securing clamp (on aluminum housing): Allen screw 3 mm
- For securing screw (for stainless steel housing): open-ended wrench 8 mm
- Wire stripper
- When using stranded cables: Crimping tool 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

- -40 °C (-40 °F)... $\geq 80\text{ °C}$ (176 °F)
- Minimum requirement: cable temperature range $\geq$ ambient temperature + 20 K

Power supply cable

Standard installation cable is sufficient.

Signal cable

EtherNet/IP

The standard ANSI/TIA/EIA-568-B.2 Annex specifies CAT 5 as the minimum category for a cable used for EtherNet/IP. CAT 5e and CAT 6 are recommended.



For more information on planning and installing EtherNet/IP networks, please refer to the "Media Planning and Installation Manual. EtherNet/IP" of the ODVA Organization.

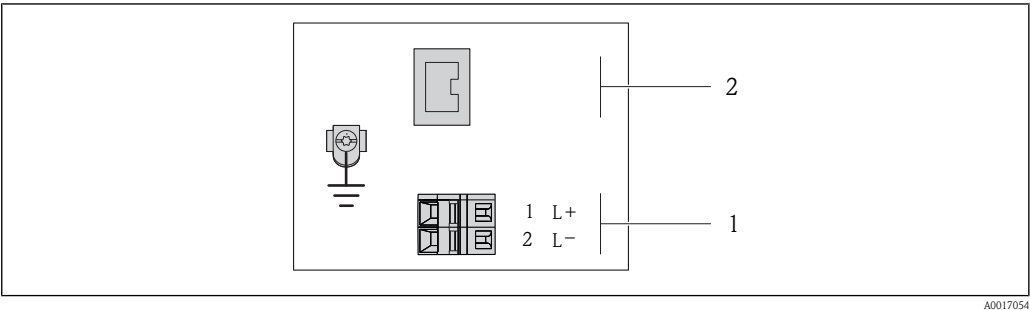
Cable diameter

- Included cable glands: M20 $\times$ 1.5 with cable $\varnothing$ 6 to 12 mm (0.24 to 0.47 in)
- Spring terminals: wire cross-sections 0.5 to 2.5 mm² (20 to 14 AWG)

7.1.3 Terminal assignment

Transmitter

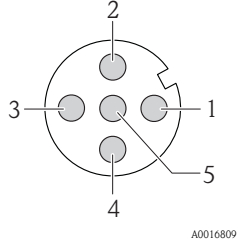
EtherNet/IP connection version



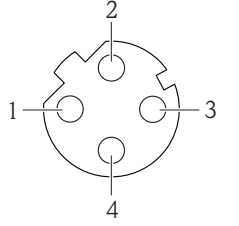
- 1 Order code for "Power supply", option D: DC 24 V
- 2 Order code for "Output", option N: EtherNet/IP

7.1.4 Pin assignment, device plug

Supply voltage for all communication types except Modbus RS485 intrinsically safe (on the device side)

 A0016809	Pin	Assignment		Coding	Connector/ socket
	1	L+	DC 24 V	A	Connector
	2				
	3				
	4	L-	DC 24 V		
	5		Grounding		

EtherNet/IP (on the device side)

 A0016812	Pin	Assignment		Coding	Connector/ socket
	1	+	Tx	D	Socket
	2	+	Rx		
	3	-	Tx		
	4	-	Rx		

7.1.5 Preparing the measuring device

- 1. Remove dummy plug if present.
- 2. **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. If measuring device is delivered without cable glands:
Provide suitable cable gland for corresponding connecting cable (→ 24).
- 3. If measuring device is delivered with cable glands:
Observe cable specification (→ 24).

7.2 Connecting the measuring device

NOTICE

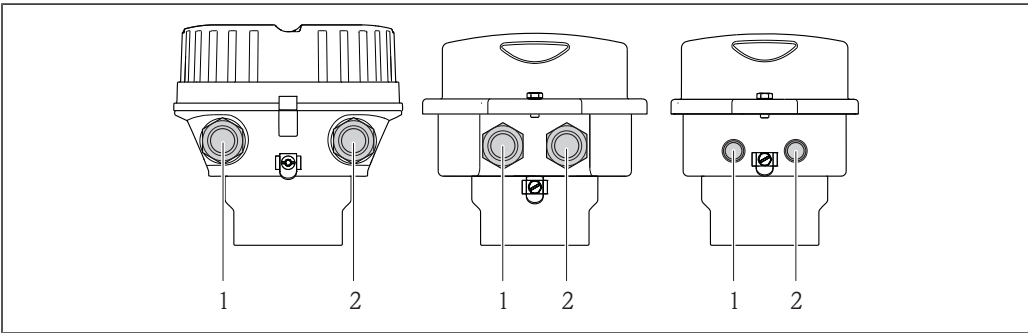
Limitation of electrical safety due to incorrect connection!

- ▶ Have electrical connection work carried out by correspondingly trained specialists only.
- ▶ Observe applicable federal/national installation codes and regulations.
- ▶ Comply with local workplace safety regulations.
- ▶ For use in potentially explosive atmospheres, observe the information in the device-specific Ex documentation.

7.2.1 Connecting the transmitter

The connection of the transmitter depends on the following order characteristics:

- Housing version: compact or ultracompact
- Connection version: connector or terminals



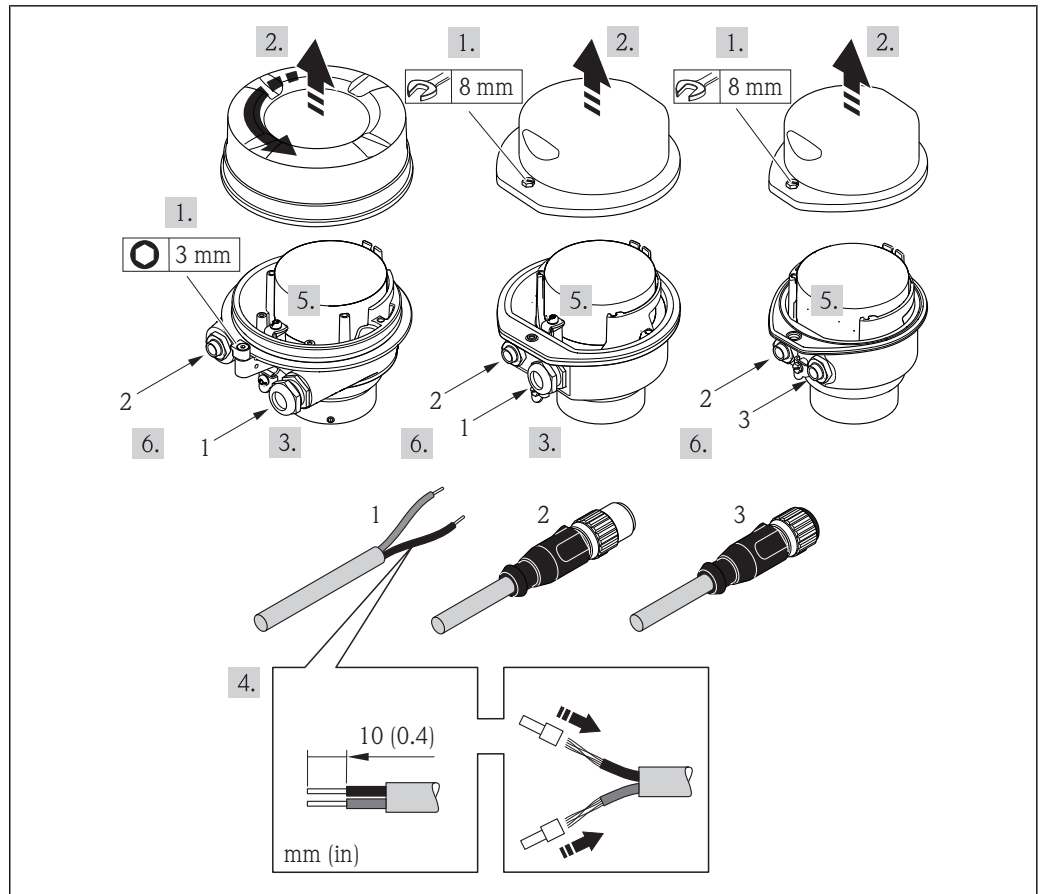
6 Device versions and connection versions

1 Cable entry or connector for signal transmission

2 Cable entry or connector for supply voltage

Depending on the device version, the following connection versions are available:

Connection method	
For supply voltage	For output
Terminals	Device plug
Device plug	Device plug



A0017844

7 Device versions with connection examples

- 1 Cable
- 2 Connector for signal transmission
- 3 Connector for supply voltage

For device version with connector: only pay attention to Step 6.

1. Depending on the housing version, loosen the securing clamp or fixing screw of the housing cover.
2. Depending on the housing version, unscrew or open the housing cover.
3. Push the cable through the cable entry. To ensure tight sealing, do not remove the sealing ring from the cable entry.
4. Strip the cable and cable ends. In the case of stranded cables, also fit ferrules.
5. Connect the cable in accordance with the terminal assignment (→ 25) or the connector pin assignment (→ 25).
6. Depending on the device version: tighten the cable glands or plug in the connector and tighten (→ 25).
7. **NOTICE!** Housing degree of protection voided due to insufficient sealing of the housing. Screw in the screw without using any lubricant. The threads on the cover are coated with a dry lubricant.
Reverse the removal procedure to reassemble the transmitter.

7.3 Hardware settings

7.3.1 Setting the device address

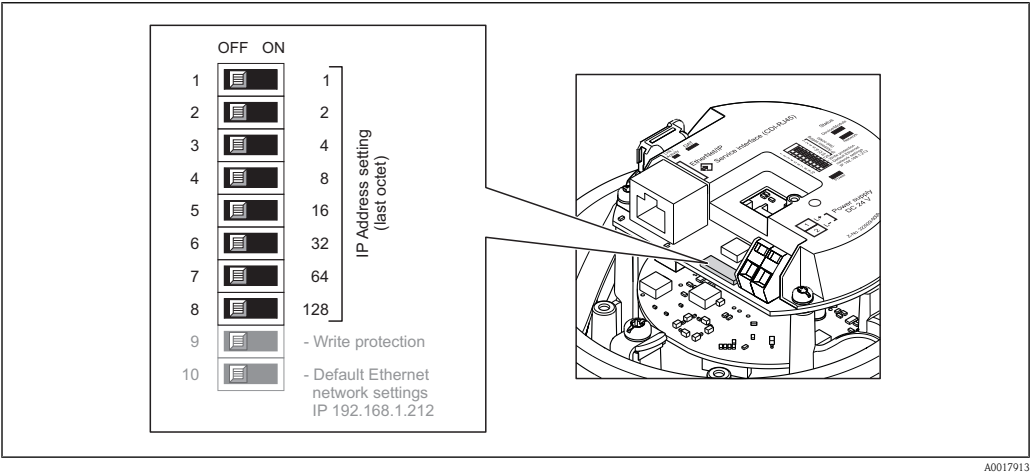
The IP address of the measuring device can be configured for the network via DIP switches.

Addressing data

IP address and configuration options			
1st octet	2nd octet	3rd octet	4th octet
192.	168.	1.	XXX
↓		↓	
Can only be configured via software addressing		Can be configured via software addressing and hardware addressing	
IP address range	1 to 254 (4th octet)		
IP address broadcast	255		
Addressing mode ex works	Software addressing; all DIP switches for hardware addressing are set to OFF.		
IP address ex works	192.168.1.212 (= software addressing)		

 For device addressing via software (→  40)

Setting the address



1. Depending on the housing version, loosen the securing clamp or fixing screw of the housing cover.
2. Depending on the housing version, unscrew or open the housing cover.
3. Set the desired IP address using the corresponding DIP switches on the I/O electronics module.
✓ Hardware addressing with the configured IP address is enabled after 10 s.
4. Reverse the removal procedure to reassemble the transmitter.

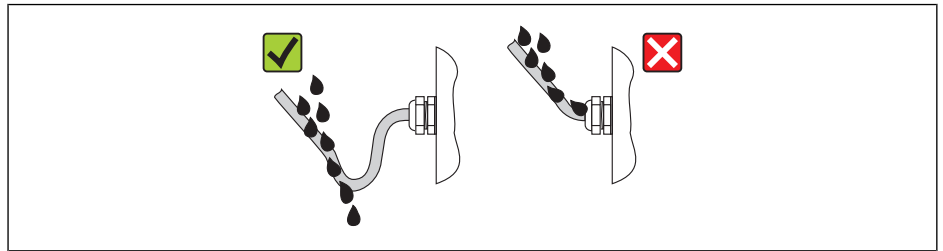
7.4 Ensuring the degree of protection

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. Dry, clean or replace the seals if necessary.
2. Tighten all housing screws and screw covers.
3. Firmly tighten the cable glands.

4. To ensure that moisture does not enter the cable entry, route the cable so that it loops down before the cable entry ("water trap").



A0013960

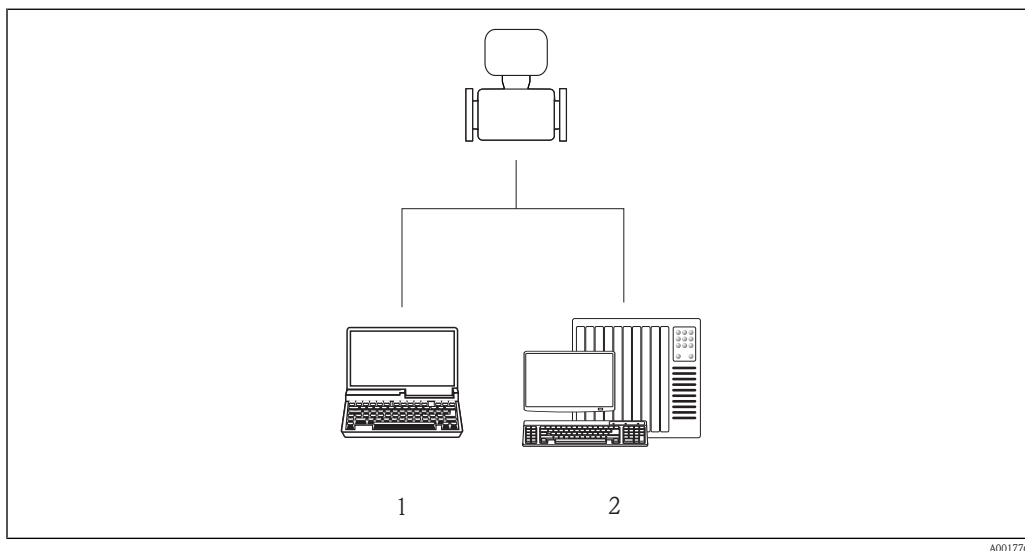
5. Insert dummy plugs into unused cable entries.

7.5 Post-connection check

Are cables or the device undamaged (visual inspection)?	☐
Do the cables comply with the requirements (→ 24)?	☐
Do the cables have adequate strain relief?	☐
Are all the cable glands installed, firmly tightened and leak-tight? Cable run with "water trap" (→ 28) ?	☐
Depending on the device version: are all the connectors firmly tightened (→ 26)?	☐
Does the supply voltage match the specifications on the transmitter nameplate (→ 80)?	☐
Is the terminal assignment (→ 25) or the pin assignment of the connector (→ 25) correct?	☐
If supply voltage is present, is the power LED on the electronics module of the transmitter lit green (→ 10)?	☐
Depending on the device version, is the securing clamp or fixing screw firmly tightened?	☐

8 Operation options

8.1 Overview of operation options



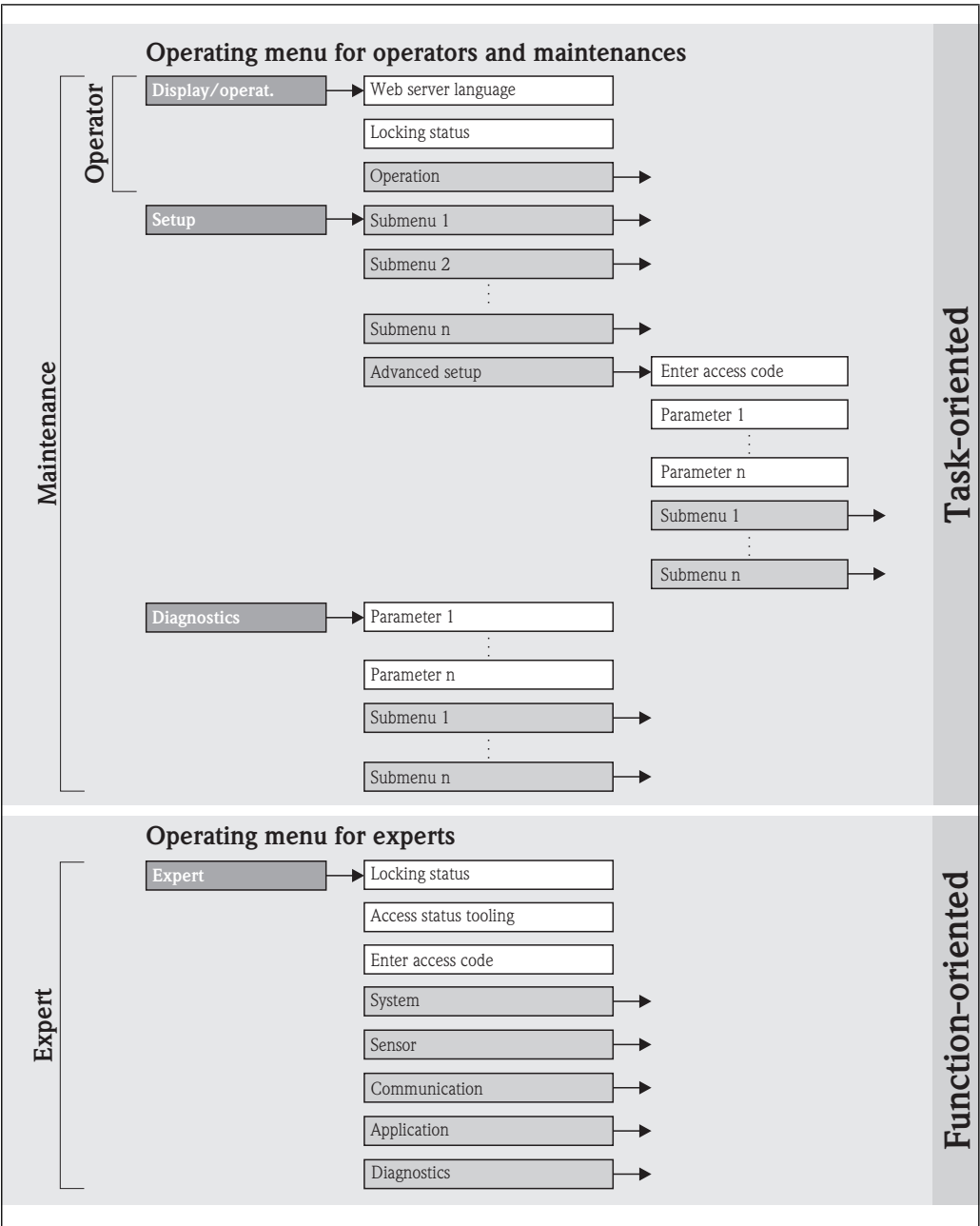
1 Computer with Web browser (e.g. Internet Explorer) or with "FieldCare" operating tool

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 with menus and parameters (→  92)



 8 Taking the example of the Web browser

A0016727-EN

8.2.2 Operating philosophy

The individual parts of the operating menu are assigned to certain user roles. Each user role corresponds to typical tasks within the device lifecycle.

Menu		User role and tasks	Content/meaning
Display/operat.	task-oriented	Role "Operator", "Maintenance" Tasks during operation: Reading measured values	- Defining the Web server operating language - Resetting and controlling totalizers
Setup		"Maintenance" role Commissioning: - Configuration of the measurement - Configuration of the communication interface	Submenus for quick commissioning: - Setting the individual system units - Defining the medium - Configuration of the digital communication interface - Configuring the low flow cut off - Configuring the monitoring of partial and empty pipe detection "Advanced setup" submenu: - For more customized configuration of the measurement (adaptation to special measuring conditions) - Configuration of totalizers
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" submenu Contains up to 5 currently pending diagnostic messages. "Event logbook" submenu Contains 20 event messages that have occurred. "Device information" submenu Contains information for identifying the device. "Measured values" submenu Contains all current measured values. "Simulation" submenu Is used to simulate measured values or output values. "Device reset" submenu Resets the device configuration to certain settings
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" submenu Contains all higher-order device parameters that do not pertain either to measurement or the measured value communication. "Sensor" submenu Contains all parameters for configuring the measurement. "Communication" submenu Contains all parameters for configuring the digital communication interface and the Web server. "Application" submenu Contains all parameters for configuring the functions that go beyond the actual measurement (e.g. totalizer). "Diagnostics" submenu Contains all parameters for error detection and analyzing process and device errors and for device simulation.

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. 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.

8.3.2 Prerequisites

Hardware

Connecting cable	Standard Ethernet cable with RJ45 connector
Computer	RJ45 interface
Measuring device	Web server must be enabled; factory setting: ON  For information on enabling the Web server (→ 35)

Software of the computer

Web browsers supported	■ Microsoft Internet Explorer 7.x, 8.x, 9.x ■ Mozilla Firefox 4.x, 5.x, 8.x ■ Google chrome 15.x
Recommended operating systems	■ Windows XP ■ Windows 7
User rights for TCP/IP settings	Admin rights required (e.g. for changing the IP address, subnet mask)
Computer configuration	■ JavaScript is 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.

 When installing a new firmware version:
To enable correct data display, clear the temporary memory (cache) of the Web browser under **Internet options**.

8.3.3 Establishing a connection

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)

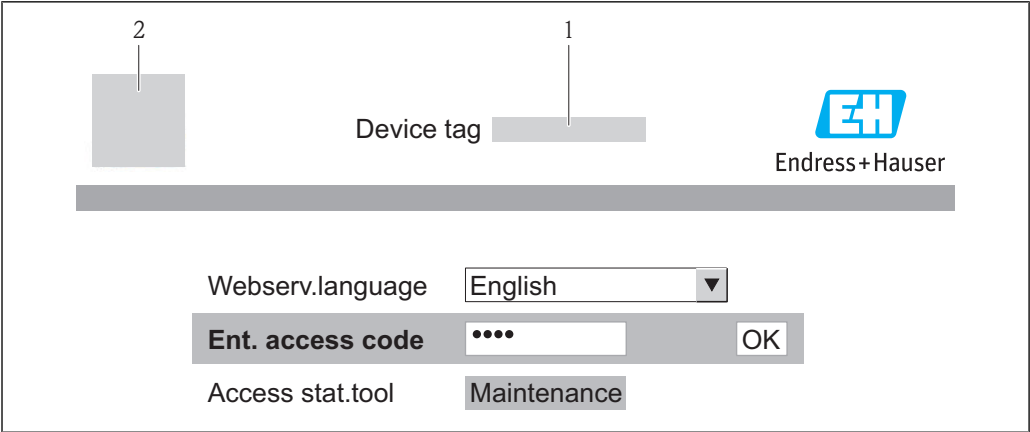
IP address	192.168.1.XXX; for XXX all numerical values except: 0, 212 and 255 → e.g. 192.168.1.213
Subnet mask	255.255.255.0
Default gateway	192.168.1.212 or 0.0.0.0

1. Switch on the measuring device and connect to the computer via the cable (→ 36).
2. Configure the properties of the Internet protocol (TCP/IP) as defined in the table above.

Starting the Web browser

1. Start the Web browser on the computer.
2. If the IP address of the measuring device is known, enter the defined device address in the address line of the Web browser. If it is unknown (→ 54).

The login page appears.



A0017362

- 1 Device tag (→ 48)
- 2 Picture of device

i If a login page does not appear, or if the page is incomplete (→ 59)

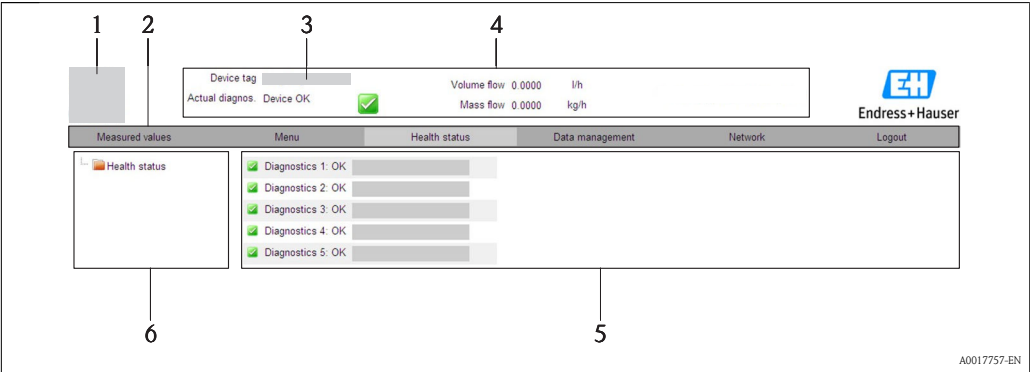
8.3.4 Logging on

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

Access code	0000 (factory setting); can be changed by customer (→ 52)
-------------	---

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

8.3.5 User interface



A0017757-EN

- 1 Picture of device
- 2 Function row with 6 functions
- 3 Device tag
- 4 Header
- 5 Working area
- 6 Navigation area

Header

The following information appears in the header:

- Device tag (→ 48)
- Device status with status signal (→ 61)
- Current measured values

Function row

Functions	Meaning
Measured values	The measured values of the device are displayed
Menu	Access to the operating menu structure of the device, same as for the operating tool
Device status	Displays the diagnostic messages currently pending, listed in order of priority
Data management	■ Data exchange between PC and measuring device in XML format: – Upload the configuration from the device – Save the configuration to the device ■ Upload the EDS system file from the device
Network configuration	Configuration and checking of all the parameters required for establishing the connection to the 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 path

"Expert" menu → Communication → Web server → Web server functionality

Parameter	Description	Options	Factory setting
Web server functionality	Switch the Web server on and off.	■ Off ■ On	On

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:

"FieldCare" operating tool

8.3.7 Logging out

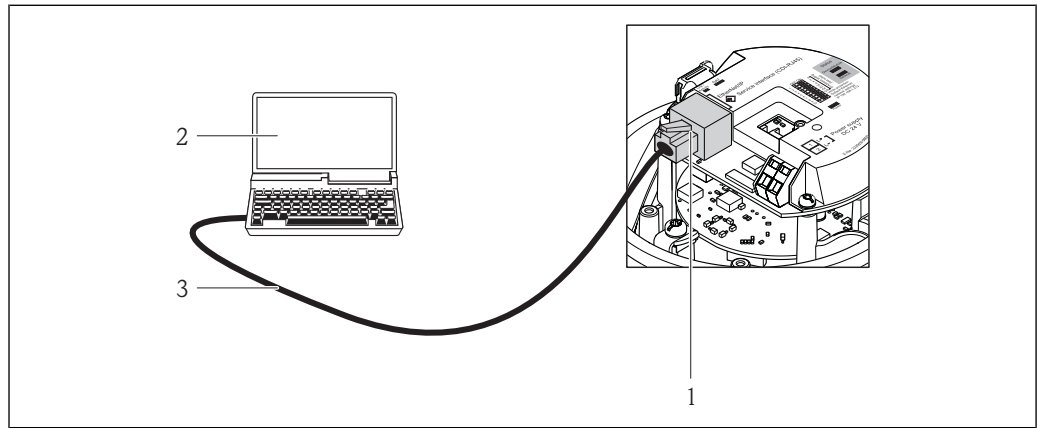
 Before logging out, perform a data backup via the **Data management** function (upload configuration from device) if necessary.

1. Click on **Logout**.
 - ✓ The home page with the Login box appears.
2. Close the Web browser.
3. Reset the modified properties of the Internet protocol (TCP/IP) if they are no longer needed (→  33).

8.4 Access to the operating menu via the operating tool

8.4.1 Connecting the operating tool

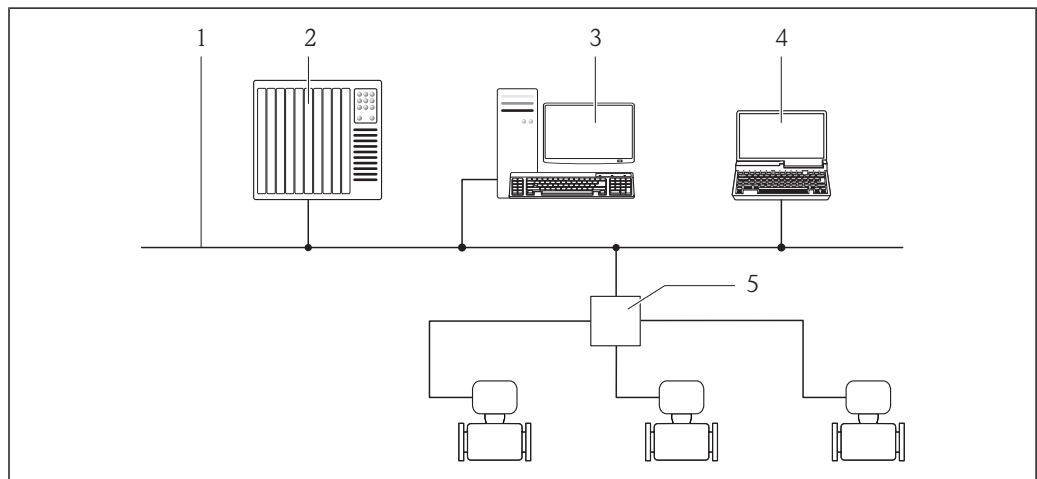
Via service interface (CDI-RJ45)



A0016940

- 1 Service interface (CDI -RJ45) and EtherNet/IP interface 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 connector

Via Ethernet network



A0016961

- 1 Ethernet network
- 2 Automation system, e.g. "RSLogix" (Rockwell Automation)
- 3 Workstation for measuring device operation: with Add-on Profile Level 3 for "RSLogix 5000" (Rockwell Automation) or with Electronic Data Sheet (EDS)
- 4 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"
- 5 Ethernet switch

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 takes place via:

Service interface CDI-RJ45 (→  36)

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 details, see Operating Instructions BA00027S and BA00059S

Source for device description files

See data (→  39)

Establishing a connection

Via service interface (CDI-RJ45)

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 (→  54).
7. Establish the online connection to the device.

 For details, see Operating Instructions BA00027S and BA00059S

User interface

1 Header

2 Picture of device

3 Device tag (→ 55)

4 Status area with status signal (→ 61)

5 Display area for current measured values (→ 55)

6 Event list with additional functions such as save/load, events list and document creation

7 Navigation area with operating menu structure

8 Working area

A0017402-EN

9 System integration

9.1 Overview of device description files

9.1.1 Current version data for the device

Firmware version	01.00.zz	■ On the title page of the Operating instructions ■ On transmitter nameplate ■ Parameter firmware version Diagnostics → Device info → Firmware version
Release date of firmware version	06.2012	—

9.1.2 Operating tools

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

Operating tool via service interface (CDI)	Sources for obtaining device descriptions
FieldCare	■ www.endress.com → Download Area ■ CD-ROM (contact Endress+Hauser) ■ DVD (contact Endress+Hauser)

9.2 Overview of system files

System files	Version	Description	How to acquire
Electronic Data Sheet (EDS system file)	1.00	Certified in accordance with the following ODVA guidelines: ■ Conformance test ■ Performance test ■ PlugFest Embedded EDS Support (File Object 0x37)	■ www.endress.com → Download Area ■ EDS system file integrated in the device; can be downloaded via the Web browser (→ 35)
Add-on Profile Level 3	■ Major revision 1 ■ Minor revision 1	System file for "RSLogix 5000" software (Rockwell Automation)	www.endress.com → Download Area

9.3 Integrating the measuring device in the system

 A detailed description of how to integrate the device into an automation system (e.g. from Rockwell Automation) is available as a separate document: www.endress.com → Select country → Automation → Digital Communication → Fieldbus device integration → EtherNet/IP

 For information on the protocol-specific data of EtherNet/IP (→ 78)

10 Commissioning

10.1 Function check

Before commissioning the device, make sure that the post-installation and post-connection checks have been performed.

- "Post-mounting check" checklist (→  23)
- "Post-connection check" checklist (→  29)

10.2 Configuring the device address via software

Software addressing is carried out in the **Communication** submenu.

Navigation path

"Setup" menu → Communication

When delivered, the measuring device has the following factory settings:

Ethernet network and Web server

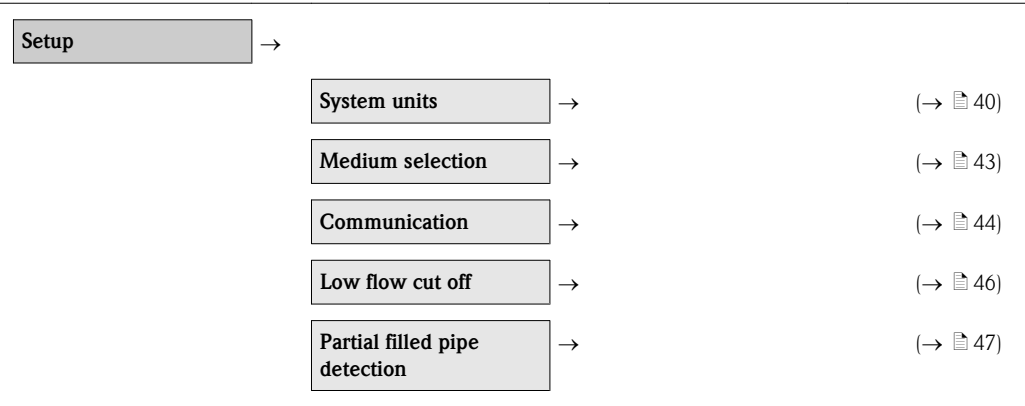
IP address	192.168.1.212
Subnet mask	255.255.255.0
Default gateway	192.168.1.212

- 
- If hardware addressing is active, software addressing is disabled.
 - If a switch is changed to the "ON" position, then the first three octets of the software address are retained.
 - If the IP address of the device is not known, the device address currently configured can be read out (→  54).

10.3 Configuring the measuring device

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

Overview of the submenus in the "Setup" menu



Structure of the submenu

System units

→

Mass flow unit

Mass unit

Volume flow unit

Volume unit

Corrected volume flow unit

Corrected volume unit

Density unit

Reference density unit

Temperature unit

Pressure unit

Parameter overview with brief description

Parameters	Description	Selection/ User entry	Factory setting
Mass flow unit	Select the unit for mass flow. <i>Result</i> The selected unit applies for: – Output – Low flow cut off – Simulation process variable	Unit choose list	Country-dependent: ■ kg/h ■ lb/min
Mass unit	Select the unit for mass. <i>Result</i> The selected unit is taken from: Mass flow unit	Unit choose list	Country-dependent: ■ kg ■ lb
Volume flow unit	Select the unit for volume flow. <i>Result</i> The selected unit applies for: – Output – Low flow cut off – Simulation process variable	Unit choose list	Country-dependent: ■ l/h ■ gal/min (us)
Volume	Select the unit for volume. <i>Result</i> The selected unit is taken from: Volume flow unit		Country-dependent ■ l ■ gal (us)

Corrected volume flow unit	Select the unit for corrected volume flow. <i>Result</i> The selected unit applies for: – Output – Low flow cut off – Simulation process variable	Unit choose list	Country-dependent: ■ NI/h ■ Scf/min
Corrected volume unit	Select the unit for standard volume. <i>Result</i> The selected unit is taken from: Corrected volume flow unit	Unit choose list	Country-dependent: ■ NI ■ Scf
Density unit	Select the unit for density. <i>Result</i> The selected unit applies for: – Output – Low value partial filled pipe detection – High value partial filled pipe detection – Simulation process variable – Density adjustment (in the Expert menu)	Unit choose list	Country-dependent ■ kg/l ■ lb/cf
Reference density unit	Select the unit for reference density. <i>Result</i> The selected unit applies for: – Output – Low value partial filled pipe detection – High value partial filled pipe detection – Simulation process variable – Fixed reference density – Density adjustment (in the Expert menu)	Unit choose list	Country-dependent: ■ kg/NI ■ lb/scf
Temperature unit	Select the unit for temperature. <i>Result</i> The selected unit applies for: – Output – Reference temperature – Simulation process variable	Unit choose list	Country-dependent: ■ °C (Celsius) ■ °F (Fahrenheit)
Pressure unit	Select the unit for pipe pressure.	Unit choose list	Country-dependent: ■ bar a ■ psi a

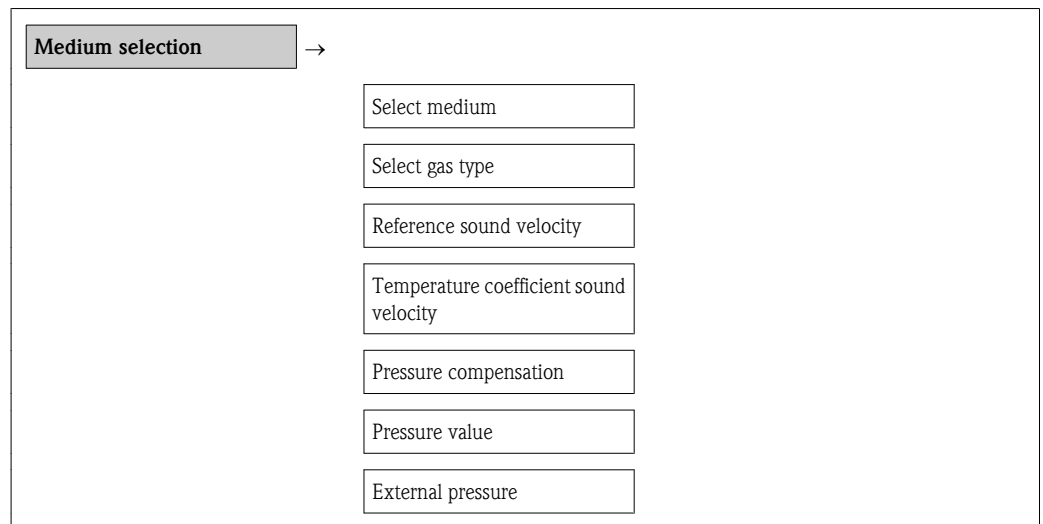
10.3.2 Selecting and setting the medium

The **Medium selection** submenu contains parameters that have to be configured for selecting and setting the medium.

Navigation path

"Setup" menu → Medium selection

Structure of the submenu



Parameter overview with brief description

Parameters	Prerequisite	Description	Selection/ User entry	Factory setting
Medium selection	–	Select the medium type.	■ Liquid ■ Gas	Liquid
Select gas type	The following option is selected in the Medium selection parameter: Gas	Select the gas type for the measurement application.	Gas type choose list	Air
Reference sound velocity	The following option is selected in the Select gas type parameter: Others	Enter the sound velocity of the gas at 0°C (32°F).	0 to 99 999 m/s	0 m/s
Temperature coefficient sound velocity	The following option is selected in the Select gas type parameter: Others	Enter the temperature coefficient of the sound velocity of the gas.	Max. 15-digit, positive floating-point number	0 (m/s)/K
Pressure compensation	The following option is selected in the Medium selection parameter: Gas	Enable the automatic pressure correction.	■ Off ■ Fixed value ■ External value	Off
Pressure value	The following option is selected in the Pressure compensation parameter: Fixed value	Enter a value for the process pressure to be used for pressure correction.	0 to 99 999 [bar, psi]	Country-dependent: ■ 1.01325 bar ■ 14.7 psi

External pressure	The following option is selected in the Pressure compensation parameter: External value	External value	0 to 99 999 [bar, psi]	Country-dependent: ■ 1.01325 bar ■ 14.7 psi
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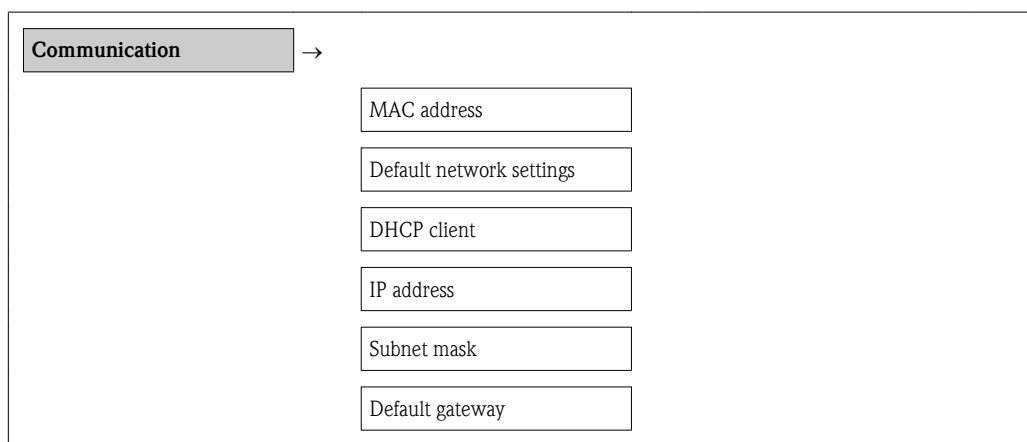
10.3.3 Configuring communication interface

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

Navigation path

"Setup" menu → Communication

Structure of the submenu



Parameter overview with brief description

Parameter	Description	Display/ Selection/ User entry	Factory setting
MAC address	Displays the MAC address of the measuring device.  MAC = Media Access Control	Unique 12-digit character string comprising letters and numbers, e.g.: 00:07:05:10:01:5F	–
Default network settings	Select whether to restore network settings.	■ Off ■ On	Off
DHCP client	Select to activate/deactivate DHCP client functionality. <i>Result</i> If the Web server's DHCP client functionality is activated, the IP address, subnet mask and default gateway are automatically set.  Identification is via the MAC address of the measuring device.	■ Off ■ On	On
IP address	Enter the IP address of the measuring device.	Max. 12-digit numerical values, e.g.: 192.168.212.212	192.168.1.212

Subnet mask	Enter the subnet mask of the measuring device.	Max. 12-digit numerical values, e.g.: 255.255.255.248	255.255.255.0
Default gateway	Enter the default gateway of the measuring device.	Max. 12-digit numerical values, e.g.: 192.93.179.254	192.168.1.212

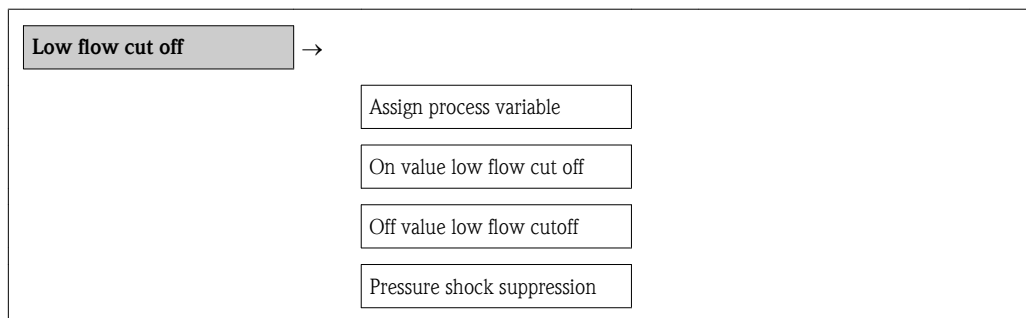
10.3.4 Configuring the low flow cut off

The **Low flow cut off** submenu contains parameters that have to be set for configuring the low flow cut off.

Navigation path

"Setup" menu → Low flow cut off

Structure of the submenu



Parameter overview with brief description

Parameters	Prerequisite	Description	Selection/ User entry	Factory setting
Assign process variable	–	Select the process variable for low flow cut off.	■ Off ■ Mass flow ■ Volume flow ■ Corrected volume flow	Mass flow
On value low flow cut off	One of the following options is selected in the Assign process variable parameter: ■ Mass flow ■ Volume flow ■ Corrected volume flow	Enter the on-value for the low flow cut off.	Max. 15-digit, positive floating-point number	For liquids: depends on country and nominal diameter
Off value low flow cut off	One of the following options is selected in the Assign process variable parameter: ■ Mass flow ■ Volume flow ■ Corrected volume flow	Enter the off-value for the low flow cut off.	0 to 100 %	50 %
Pressure shock suppression	One of the following options is selected in the Assign process variable parameter: ■ Mass flow ■ Volume flow ■ Corrected volume flow	Enter the time interval for signal suppression (= active pressure shock suppression).	0 to 100 s	0 s

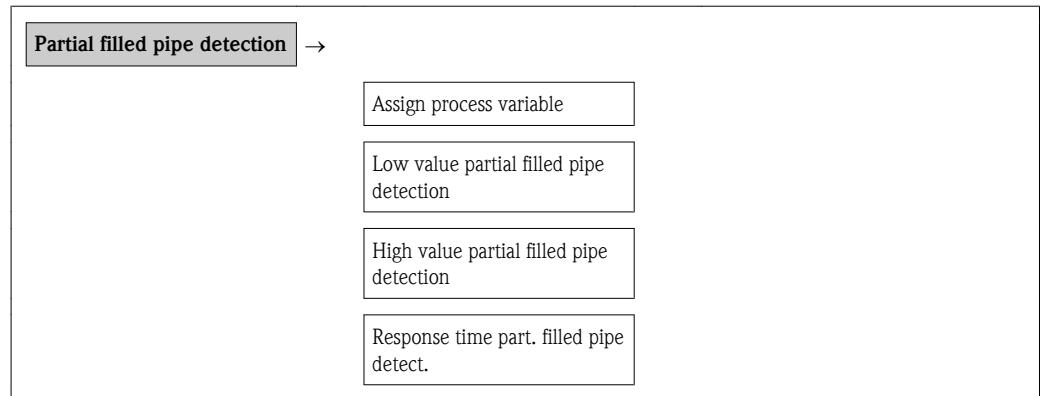
10.3.5 Configuring the partial filled pipe detection

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

Navigation path

"Setup" menu → Partial filled pipe detection

Structure of the submenu



Parameter overview with brief description

Parameters	Prerequisite	Description	Selection/ User entry	Factory setting
Assign process variable	–	Select a process variable to detect empty or partially filled pipes.	■ Off ■ Density ■ Reference density	Density
Low value partial filled pipe detection	One of the following options is selected in the Assign process variable parameter: ■ Density ■ Reference density	Enter a lower limit value to activate detection of an empty or partially filled pipe.	Max. 15-digit, positive floating-point number	Country-dependent: ■ 0.2 kg/l ■ 12.5 lb/cf
High value partial filled pipe detection	One of the following options is selected in the Assign process variable parameter: ■ Density ■ Reference density	Enter an upper limit value to activate detection of an empty or partially filled pipe.	Max. 15-digit, positive floating-point number	Country-dependent: ■ 6 kg/l ■ 374.6 lb/cf
Response time part. filled pipe detect.	One of the following options is selected in the Assign process variable parameter: ■ Density ■ Reference density	Enter the time interval until the diagnostic message △S862 Partly filled pipe detection is displayed for an empty or partially filled pipe.	0 to 100 s	1 s

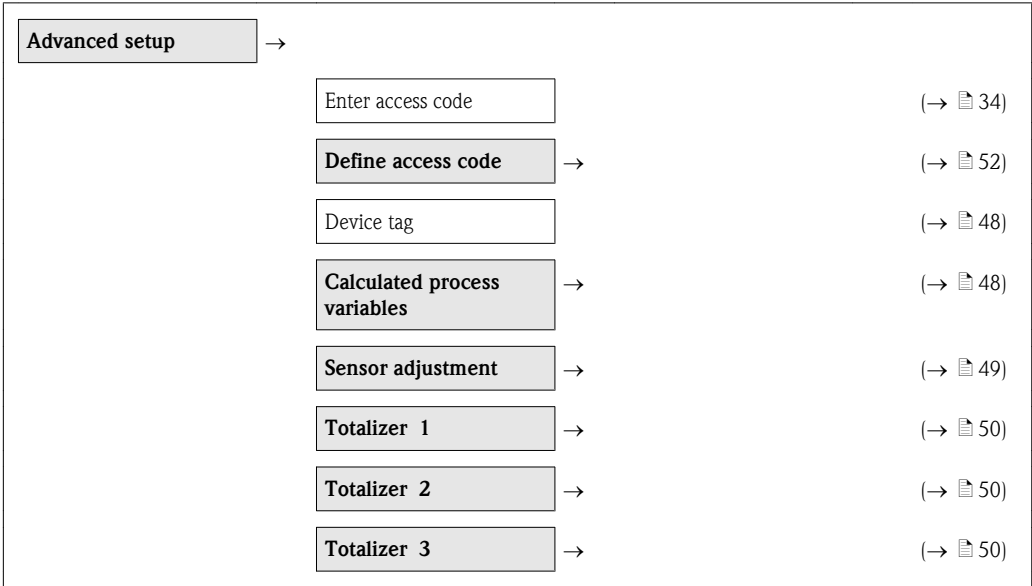
10.4 Advanced settings

The **Advanced setup** menu with its submenus contains all parameters needed for specific settings.

Navigation path

"Setup" menu → Advanced setup

Overview of the parameters and submenus in the "Advanced setup" menu taking the example of the Web browser



10.4.1 Defining the tag name

To enable quick 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.

Navigation path

Setup → Advanced setup → Device tag

Parameter overview with brief description

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

 The number of characters displayed depends on the characters used.

 For information on the tag name in the "FieldCare" operating tool (→  38)

10.4.2 Calculated process variables

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

Navigation path

"Setup" menu → Advanced setup → Calculated values

Structure of the submenu



	Corrected volume flow calculation	
	External reference density	
	Fixed reference density	
	Reference temperature	
	Linear expansion coefficient	
	Square expansion coefficient	

Parameter overview with brief description

Parameter	Prerequisites	Description	Selection/input	Factory settings
Corrected volume flow calculation	–	Select the reference density for calculating the corrected volume flow.	■ Fixed reference density ■ Calculated reference density ■ Reference density according to API 53 ■ External reference density	Calculated reference density
External reference density	–	Shows external reference density.	Floating-point number with sign	Country-dependent: 0 kg/Nl (0 lb/scf)
Fixed reference density	The following option is selected in the Corrected volume flow calculation parameter: Fixed reference density	Enter the fixed value for the reference density.	Positive floating-point number with leading sign	Country-dependent: 0.001 kg/Nl (0.062 lb/scf)
Reference temperature	The following option is selected in the Corrected volume flow calculation parameter: Calculated reference density	Enter the reference temperature for calculating the reference density.	Floating-point number with sign	Country-dependent: 20 °C (68 ° F)
Linear expansion coefficient	The following option is selected in the Corrected volume flow calculation parameter: Calculated reference density	Enter the linear, medium-specific expansion coefficient for calculating the reference density.	0 to 1	0.0
Square expansion coefficient	–	For media with a non-linear expansion pattern, use this function to enter a quadratic, medium-specific expansion coefficient for calculating the reference density.	0 to 1	0.0

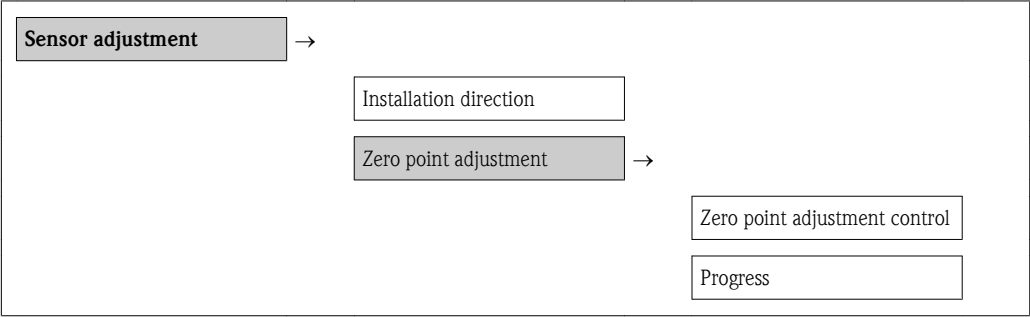
10.4.3 Carrying out a sensor adjustment

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

Navigation path

"Setup" menu → Advanced setup → Sensor adjustment

Structure of the submenu



Parameter overview with brief description

Parameters	Description	Selection/ User entry	Factory setting
Installation direction	Change the sign of the direction of flow of the fluid.	■ Flow in arrow direction ■ Flow against arrow direction	Flow in arrow direction
Zero point adjustment control	Start the zero point adjustment.	■ Cancel ■ Start	Cancel
Progress		0 - 100 %	0

10.4.4 Configuring the totalizer

You can configure each totalizer in the three submenus **Totalizer 1-3**.

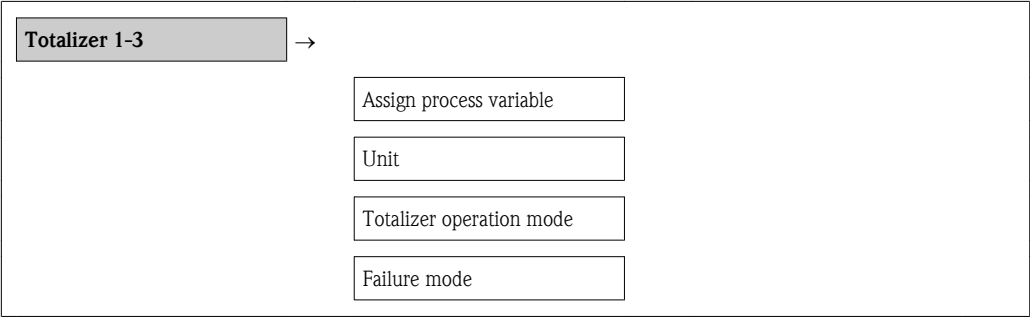
Navigation path

"Setup" menu → Advanced setup → Totalizer 1

"Setup" menu → Advanced setup → Totalizer 2

"Setup" menu → Advanced setup → Totalizer 3

Structure of the submenu



Parameter overview with brief description

Parameters	Prerequisite	Description	Selection/	Factory setting
------------	--------------	-------------	------------	-----------------

Assign process variable	-	Select process variable for totalizer. <i>Result</i> The selection determines the choose list of the Unit parameter.	■ Off ■ Mass flow ■ Volume flow ■ Corrected volume flow	Mass flow
Unit	One of the following options is selected in the Assign process variable parameter: ■ Mass flow ■ Volume flow ■ Corrected volume flow	Select the unit for the process variable of the totalizer.	Unit choose list	Country-dependent: ■ kg ■ lb
Totalizer operation mode	One of the following options is selected in the Assign process variable parameter: ■ Mass flow ■ Volume flow ■ Corrected volume flow	Select totalizer calculation mode.	■ Net flow total ■ Forward flow total ■ Reverse flow total	Net flow total
Failure mode	One of the following options is selected in the Assign process variable parameter: ■ Mass flow ■ Volume flow ■ Corrected volume flow	Define how the totalizer behaves in an alarm condition.	■ Stop ■ Actual value ■ Last valid value	Stop

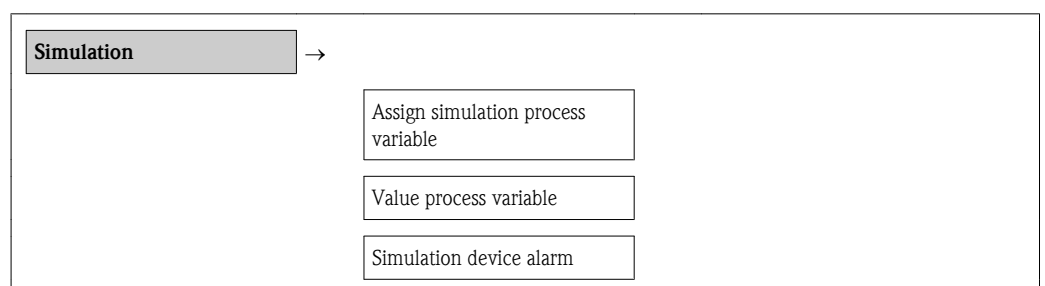
10.5 Simulation

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 path

"Diagnostics" menu → Simulation

Structure of the submenu



Parameter overview with brief description

Parameters	Prerequisite	Description	Selection/ User entry	Factory setting
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	Off

Value process variable	One of the following options is selected in the Assign simulation process variable parameter: ■ Mass flow ■ Volume flow ■ Corrected volume flow ■ Density ■ Reference density ■ Temperature	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	Off

10.6 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 (→ 52)
- Write protection via write protection switch (→ 52)

10.6.1 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 path

"Setup" menu → Advanced setup → Define access code

Structure of the submenu

Define access code

→

Define access code

Confirm access code

Defining the access code via the Web browser

1. Navigate to the **Define access code** parameter.
2. Define a max. 4-digit numeric code as an access code.
3. Enter the access code again 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.
-  The user role with which the user is currently logged on via the Web browser is indicated by the **Access status tooling** parameter. Navigation path: Display/operation → Access status tooling

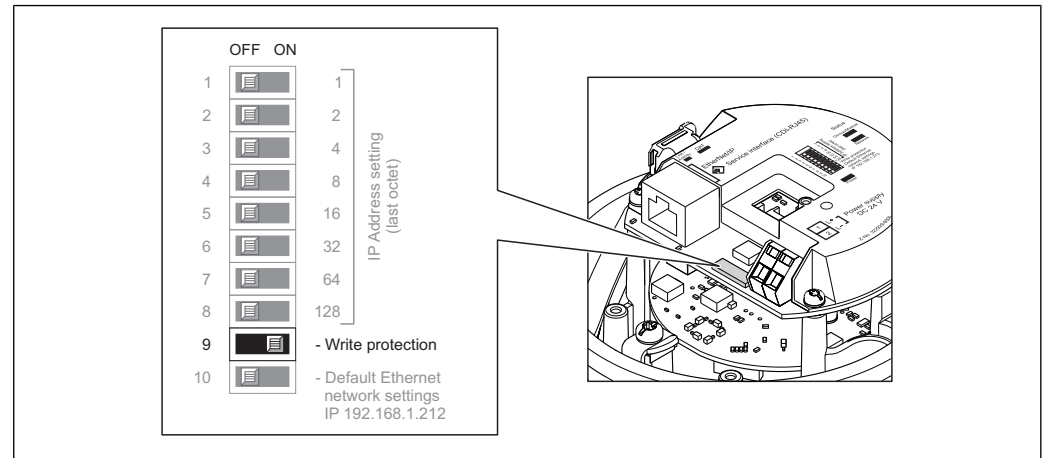
10.6.2 Write protection via write protection switch

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 Ethernet network



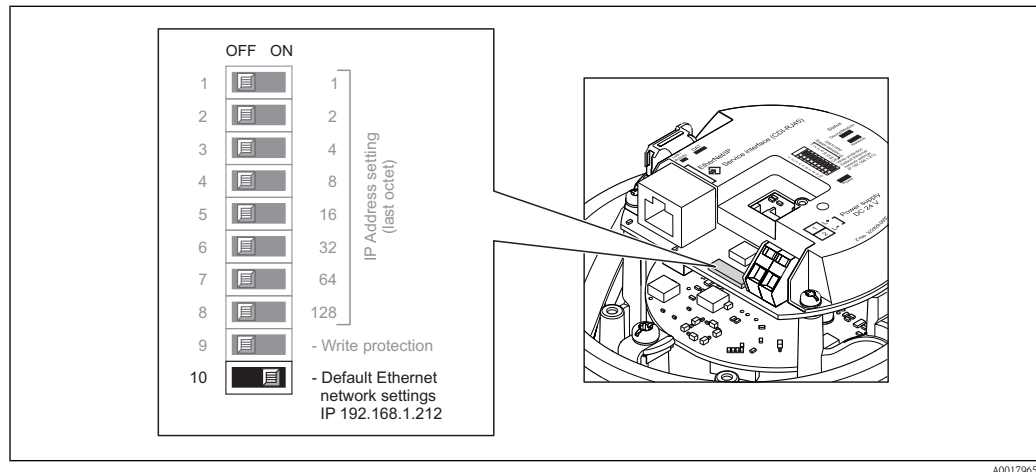
A0017915

1. Depending on the housing version, loosen the securing clamp or fixing screw of the housing cover.
2. Depending on the housing version, unscrew or open the housing cover.
3. Setting the write protection switch on the I/O electronics module to the ON position enables the hardware write protection. Setting the write protection switch on the I/O electronics module to the OFF position (factory setting) disables the hardware write protection.
 - ✓ If hardware write protection is enabled, the **Hardware locked** option is displayed in the **Locking status** parameter (→ 54); if disabled, no option is displayed in the **Locking status** parameter (→ 54)
4. Reverse the removal procedure to reassemble the transmitter.

11 Operation

11.1 Read out and modify current Ethernet settings

If the Ethernet settings such as the IP address of the measuring device are unknown, they can be read out and modified as explained in the following example for an IP address.



Prerequisite

- Software addressing is enabled: All the DIP switches for hardware addressing are set to OFF.
(→ 27)

- Measuring device is switched on.

1. Change DIP switch No. 10 from OFF → ON.
2. Restart the device.
 - ✓ The device's Ethernet settings are reset to their factory settings:
IP address: 192.168.1.212; Subnet mask: 255.255.255.0; Default gateway: 192.168.1.212
3. Enter the default setting for the IP address in the address line of the Web browser.
4. In the operating menu navigate to the **IP address** parameter: "Setup" menu → Communication → IP address
 - ✓ The parameter displays the configured IP address.
5. Change the IP address of the device if necessary.
6. Change DIP switch No. 10 from ON → OFF.
7. Restart the device.
 - ✓ The modified IP address of the device is now enabled.

11.2 Read device locking status

The write protection types that are currently active can be determined using the **Locking status** parameter.

Navigation path

"Display/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 electronics module. This prevents write access to the parameters (→ 52).
Temporarily locked	Write access to the parameters is temporarily disabled due to internal device processing (e.g. data upload/download, reset). Once the internal processing has been completed, the parameters can be changed once again.

11.3 Reading measured values

You can read all measured values using the **Measured values** menu.

Navigation path

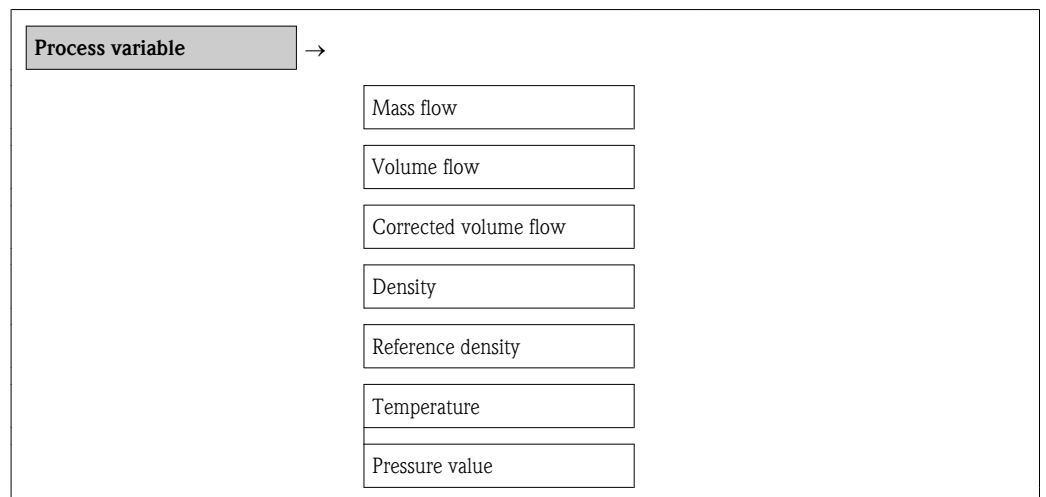
Diagnostics → Measured values

11.3.1 Process variables

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

Navigation path

"Diagnostics" menu → Measured values → Process variables

Structure of the submenu**Parameter overview with brief description**

Parameter overview with brief description

Parameter	Prerequisite	Description	Display
Mass flow	–	Displays the mass flow currently measured	Floating-point number with sign
Volume flow	–	Displays the volume flow currently calculated	Floating-point number with sign
Corrected volume flow	–	Displays the corrected volume flow currently calculated	Floating-point number with sign

Density	–	Displays the density currently measured	Floating-point number with sign
Reference density	–	Displays the density currently measured at reference temperature	Floating-point number with sign
Temperature	–	Displays the medium temperature currently measured	Floating-point number with sign
Pressure value	–	Displays either a fixed or external pressure value	Floating-point number with sign

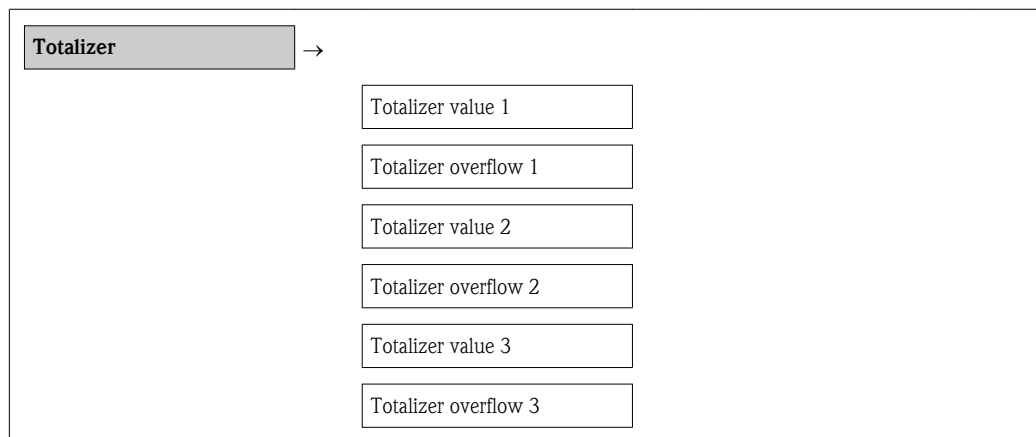
11.3.2 Totalizer

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

Navigation path

"Diagnostics" menu → Measured values → Totalizer

Structure of the submenu



Parameter overview with brief description

Parameters	Prerequisite	Description	Display
Totalizer value 1-3	One of the following options is selected in the Assign process variable parameter of the Totalizer 1-3 submenu: ■ Mass flow ■ Volume flow ■ Corrected volume flow	Displays the current totalizer counter value.	Floating point number with sign
Totalizer overflow 1-3	One of the following options is selected in the Assign process variable parameter of the Totalizer 1-3 submenu: ■ Mass flow ■ Volume flow ■ Corrected volume flow	Displays the current totalizer overflow.	Integer

11.4 Adapting the measuring device to the process conditions

The following are available for this purpose:

- Basic settings using the **Setup** menu (→ 40)
- Advanced settings using the **Advanced setup** menu (→ 48)

11.5 Performing a totalizer reset

In the **Operation** submenu, 2 parameters with various options for resetting the three totalizers are available:

- Control totalizer 1-3
- Reset all totalizers

Navigation path

"Display/operat." menu → Operation

Function scope of the "Control totalizer" parameter

Options	Description
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 the defined start value in the Preset parameter.
Reset + totalize	The totalizer is reset to 0 and the totaling process is restarted.
Preset + totalize	The totalizer is set to the defined start value in the Preset parameter and the totaling process is restarted.

Function scope of the "Reset all totalizers" parameter

Options	Description
Reset + totalize	Resets all the totalizers to 0 and restarts the totaling process. This deletes all the flow values previously totalized.

"Operation" submenu

Operation

→

Control totalizer 1

Preset value 1

Control totalizer 2

Preset value 2

Control totalizer 3

Preset value 3

Reset all totalizers

Parameter overview with brief description

Parameters	Prerequisite	Description	Selection/ User entry	Factory setting
------------	--------------	-------------	--------------------------	-----------------

Control totalizer 1-3	One of the following options is selected in the Assign process variable parameter of the Totalizer 1-3 submenu: ■ Mass flow ■ Volume flow ■ Corrected volume flow	Control totalizer value.	■ Totalize ■ Reset + hold ■ Preset + hold ■ Reset + totalize ■ Preset + totalize	Totalize
Preset value 1-3	One of the following options is selected in the Assign process variable parameter of the Totalizer 1-3 submenu: ■ Mass flow ■ Volume flow ■ Corrected volume flow	Specify start value for totalizer.	Floating point number with sign	Country-dependent: ■ 0 kg ■ 0 lb
Reset all totalizers	-	Reset all totalizers to 0 and start.	■ Cancel ■ Reset + totalize	Cancel

12 Diagnostics and troubleshooting

12.1 General troubleshooting

For output signals

Problem	Possible cause	Remedy
Green power LED on the main electronics module of the transmitter is dark	Supply voltage does not match that specified on the nameplate.	Apply the correct supply voltage (→ 26).
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

Problem	Possible cause	Remedy
No write access to parameters	Hardware write protection enabled	Set the write protection switch on the main electronics module to the OFF position (→ 52).
No connection via EtherNet/IP	Connector connected incorrectly	Check the pin assignment of the connector (→ 25).
Not connecting to Web server	■ Incorrect IP address ■ IP address is not known	1. If addressing via hardware: open the transmitter and check the IP address configured (last octet). 2. Check the IP address of the measuring device with the network manager. 3. If the IP address is not known, set DIP switch No. 10 on the I/O electronics module to ON, restart the device and enter the default setting for the IP address 192.168.1.212.  EtherNet/IP communication is interrupted by enabling the DIP switch.
Not connecting to Web server	Incorrect setting for the Ethernet interface of the computer	1. Check the properties of the Internet protocol (TCP/IP) (→ 33). 2. Check the network settings with the IT manager.
Not connecting to Web server	Web server disabled	Via the "FieldCare" operating tool check whether the Web server of the measuring device is enabled and enable it if necessary (→ 35).
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.
Web browser frozen and operation no longer possible	Data transfer active	Wait until data transfer or current action is finished.
Web browser frozen and operation no longer possible	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 (→ 33). 2. Clear the Web browser cache and restart the Web browser.
Content of Web browser incomplete or difficult to read	Unsuitable view settings.	Change the font size/display ratio of the Web browser.

12.2 Diagnostic information via light emitting diodes

12.2.1 Transmitter

Various light emitting diodes (LEDs) on the main electronics module of the transmitter provide information on device status.

LED	Color	Meaning
Power	Off	Supply voltage is off or too low.
	Green	Supply voltage is ok.
Device status	Green	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.
	Alternately flashing red/green	Boot loader is active.
Network status	Off	Device has no EtherNet/IP address
	Green	Device's EtherNet/IP connection is active
	Flashing green	Device has EtherNet/IP address but no EtherNet/IP connection
	Red	EtherNet/IP address of the device has been assigned twice
	Flashing red	Device's EtherNet/IP connection is in timeout mode
Link/Activity	Orange	Link available but no activity
	Flashing orange	Activity present

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

3 Remedy information with Service ID



Furthermore, diagnostic events that have occurred can be viewed in the **Diagnostics** menu:

- Via parameters (→ 67)
- Via submenus (→ 67)

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).

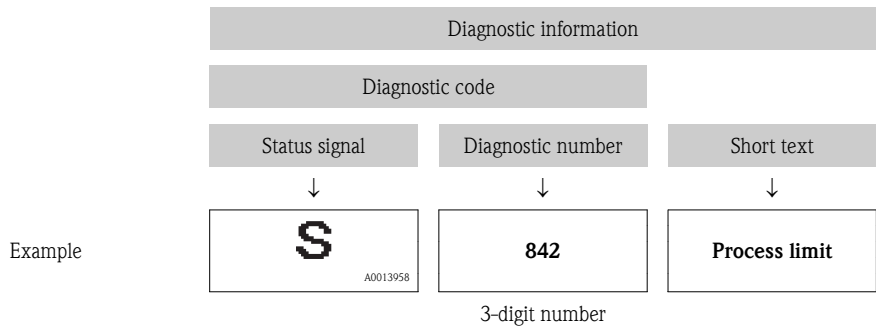
Symbol	Meaning
 A0017271	Failure A device error has occurred. The measured value is no longer valid.
 A0017278	Function check The device is in service mode (e.g. during a simulation).
 A0017277	Out of specification The device is operated: Outside its technical specification limits (e.g. outside the process temperature range)
 A0017276	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 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

Device tag: Promass

Status: Function check (C)

Mass flow: 0.0000 kg/s Density: 222.2200 kg/m³

Volume flow: 0.0000 l/min Reference density: 36839.7000 lb/Scf

Corrected volume flow: 0.0000 M/s

Menu / Variable

Value

Unit

Instrument health status

Failure (F)

Function check (C)

Diagnosis 1: C485 Simulation measured variable

Remedy information: Deactivate simulation (Service ID:147)

Out of specification (S)

Diagnosis 2: S862 Partly filled pipe

Remedy information: 1. Check for gas in process, 2. Adjust detection limits (Service ID:146)

Maintenance required (M)

A0017400-EN

1 Status area with status signal (→ 61)

2 Diagnostic information (→ 62)

3 Remedy information with Service ID

- i** Furthermore, diagnostic events that have occurred can be viewed in the **Diagnostics** menu:
- Via parameters (→ 67)
 - Via submenu (→ 67)

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 Diagnostic information via communication interface

12.5.1 Reading out diagnostic information

The current diagnostic event and associated diagnostic information can be read out via the input assembly (fix assembly):

Bytes	0	1	2	3	4	5	6	7
	↓				↓		↓	
Contents	"Empty" or "Reserved"				"Empty" or "Padding bytes"		Diagnostic number of diagnostic event which is displayed in the Actual diagnostics parameter (→  , e.g. 242)	

 For content of bytes 8 to 16 (→ )

12.6 Adapting the diagnostic information

12.6.1 Adapting the diagnostic behavior

Each diagnostic number is assigned a specific diagnostic behavior at the factory. The user can change this assignment for specific diagnostic numbers via the **Diagnostics No. xxx** parameter.

Navigation path

"Expert" menu → System → Diagnostic handling → Diagnostic behavior → Assign behavior of diagnostic no. xxx

You can assign the following options to the diagnostic number as the diagnostic behavior:

Options	Description
Alarm	Measurement is interrupted. The totalizers assume the defined alarm condition. A diagnostic message is generated.
Warning	Measurement is resumed. The totalizers are not affected. A diagnostic message is generated.

Options	Description
Logbook entry only	The device continues to measure. The diagnostic message is entered in the Event logbook (events list) submenu only and is not displayed in alternation with the measured value display.
Off	The diagnostic event is ignored, and no diagnostic message is generated or entered.

12.7 Overview of diagnostic information

Diagnostic number	Short text	Remedy information	Status signal from the factory	Diagnostic behavior from the factory
Diagnostics for the sensor				
022	Sensor temperature	1. Change main electronic module. 2. Change sensor.	F	Alarm
044	Sensor drift	1. Check or change main electronics. 2. Change sensor.	S	Alarm*
046	Sensor limit	1. Inspect sensor. 2. Check process conditions.	S	Alarm*
062	Sensor connection	1. Change main electronic module. 2. Change sensor.	F	Alarm
082	Data storage	1. Check module connections. 2. Contact service.	F	Alarm
083	Memory content	1. Restart device. 2. Contact service.	F	Alarm

* Diagnostic behavior can be changed: "Adapting the diagnostic behavior" section (→ 63)

Diagnostic number	Short text	Remedy information	Status signal from the factory	Diagnostic behavior from the factory
Diagnostics for the electronics				
242	Software incompatible	1. Check software. 2. Flash or change main electronic module.	F	Alarm
252	Modules incompatible	1. Check electronic modules 2. Change electronic modules	F	Alarm
262	Module connection	1. Check module connections. 2. Change electronic modules.	F	Alarm
270	Main electronic failure	Change main electronic module.	F	Alarm
271	Main electronic failure	1. Restart device. 2. Change main electronic module.	F	Alarm
272	Main electronic failure	1. Restart device. 2. Contact service.	F	Alarm
273	Main electronic failure	Replace electronics.	F	Alarm
274	Main electronic failure	Replace electronics.	S	Warning*

283	Memory content	1. Reset device. 2. Contact service.	F	Alarm
311	Electronic failure	1. Transfer data or reset device. 2. Contact service.	F	Alarm
382	Data storage	1. Insert DAT module. 2. Replace DAT module.	F	Alarm
383	Memory content	1. Restart device. 2. Check or replace DAT module. 3. Contact service.	F	Alarm

* Diagnostic behavior can be changed: "Adapting the diagnostic behavior" section (→ 63)

Diagnostic number	Short text	Remedy information	Status signal from the factory	Diagnostic behavior from the factory
Diagnostics for the configuration				
201	Device malfunction	1. Restart device. 2. Contact service.	F	Alarm
410	Data transfer	1. Check connection. 2. Retry data transfer.	F	Alarm
411	Up-/download active	Up-/download active, please wait	C	Warning
437	Incompatible configuration	1. Restart device. 2. Contact service.	F	Alarm
438	Dataset	1. Check data set file. 2. Check device configuration. 3. Up- and download new configuration.	M	Warning
453	Flow override	Deactivate flow override.	C	Warning
484	Simulation failsafe mode	Deactivate simulation.	C	Alarm
485	Simulation process variable	Deactivate simulation.	C	Warning
537	Configuration	1. Check IP addresses in the network. 2. Change the IP address.	F	Warning*

* Diagnostic behavior can be changed: "Adapting the diagnostic behavior" section (→ 63)

Diagnostic number	Short text	Remedy information	Status signal from the factory	Diagnostic behavior from the factory
Diagnostics for the process				
830	Ambient temperature range	Reduce the ambient temperature around the sensor housing.	S	Warning
831	Ambient temperature range	Increase the ambient temperature around the sensor housing.	S	Warning
832	Ambient temperature range	Reduce ambient temperature.	S	Warning*

833	Ambient temperature range	Increase ambient temperature.	S	Warning*
834	Process temperature	Reduce process temperature.	S	Warning*
835	Process temperature	Increase process temperature.	S	Warning*
842	Process limit	Low flow cut off active! 1. Check low flow cut off configuration.	S	Logbook entry only
843	Process limit	Check process conditions.	S	Warning
862	Partly filled pipe	1. Check for gas in process. 2. Adjust detection limits.	S	Warning
910	Measuring tube does not vibrate	1. Check electronics. 2. Inspect sensor.	F	Alarm
912	Inhomogeneous	Medium is inhomogeneous, e.g. gas or solid content 1. Check process conditions. 2. Increase system pressure.  In particular with outgassing media and/or increased gas content, the following measures are recommended to increase system pressure: ■ Install the instrument at the outlet side of a pump. ■ Install the instrument at the lowest point of an ascending pipeline. ■ Install a flow restriction, e.g. reducer or orifice plate, downstream from the instrument.	S	Warning*
913	Inhomogeneous	Oscillation amplitude limit! The medium properties do not allow a precise measurement. Cause: Process medium is very inhomogeneous (gas or solid content) 1. Check process conditions. 2. Increase voltage. 3. Check main electronic module or sensor.	S	Alarm*

* Diagnostic behavior can be changed: "Adapting the diagnostic behavior" section (→  63)

12.8 Pending diagnostic events

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

Navigation path

- "Diagnostics" menu → Actual diagnostics
- "Diagnostics" menu → Previous diagnostics

Parameter overview with brief description

Parameter	Prerequisite	Description	Display
-----------	--------------	-------------	---------

Actual diagnostics	1 diagnostic event has occurred	Displays the current diagnostic event along with the diagnostic information.  If two or more messages occur simultaneously, the message with the highest priority is shown on the display.	Diagnostic code, short message
Previous diagnostics	2 diagnostic events have already occurred	Displays the diagnostic event that occurred prior to the current diagnostic event along with the diagnostic information.	Diagnostic code, short message



To call up the measures to rectify a diagnostic event:

- Via Web browser (→  62)
- Via "FieldCare" operating tool (→  63)



Other diagnostic events that are pending can be viewed in the **Diagnostic list** submenu (→  67)

12.9 Diagnostic list

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

Navigation path

"Diagnostics" menu → Diagnostic list



To call up the measures to rectify a diagnostic event:

- Via Web browser (→  62)
- Via "FieldCare" operating tool (→  63)

12.10 Event logbook

12.10.1 Event history

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

Navigation path

"Diagnostics" menu → Event logbook → Events list

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

The event history includes entries for:

- Diagnostic events (→  64)
- Information events (→  68)

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:

- Diagnostics event
 - : Event has occurred
 - : Event has ended
- Information event
 - : Event has occurred



To call up the measures to rectify a diagnostic event:

- Via Web browser (→  62)
- Via "FieldCare" operating tool (→  63)

 For filtering the displayed event messages (→  68)

12.10.2 Filtering the event logbook

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

Navigation path

"Diagnostics" menu → Event logbook → Filter options

Filter categories

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

12.10.3 Overview of information events

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

Information event	Event text
I1000	—— (device ok)
I1089	Power on
I1090	Configuration reset
I1091	Configuration changed
I1110	Write protection switch changed
I1111	Density adjust. error
I1137	Electronic changed
I1151	History reset
I1155	Reset electronic temperature
I1157	Memory error event list
I1209	Density adjustment OK
I1221	Error during zero point adjustment
I1222	Zero point adjustment OK
I1335	Firmware changed
I1361	Incorrect Web server login

12.11 Resetting the measuring device

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

Navigation path

"Diagnostics" menu → Device reset → Device reset

Function scope of the "Device reset" parameter

Options	Description
Cancel	The user exists the parameter and no action is performed.
To factory defaults	Every parameter is reset to its factory setting.
To delivery settings	Every parameter for which a customized default setting was ordered is reset to that customized value; all other parameters are reset to their factory setting.  This option is not visible if no customized settings were ordered.
Restart device	Restarting the device resets every parameter whose data are saved in the volatile memory (RAM) to the parameter's factory setting (e.g. measured value data). The device configuration remains unchanged.

12.12 Device information

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

Navigation path

"Diagnostics" menu → Device information

Structure of the submenu

Device info

 →

Device tag (→  48)

Serial number

Firmware version

Device name

Order code

Extended order code 1

Extended order code 2

Extended order code 3

ENP version

IP address

Subnet mask

Default gateway

Parameter overview with brief description

Parameter	Prerequisite	Description	Display
-----------	--------------	-------------	---------

Serial number	-	Displays the serial number of the measuring device.  The number can be found on the nameplate of the sensor and transmitter.	Max. 11-digit character string comprising letters and numbers
Firmware version	-	Displays the device firmware version installed.	Character string in the format xx.yy.zz
Device name	-	Displays the name of the transmitter.  The name can be found on the nameplate of the transmitter.	Promass 100
Order code	-	Displays 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
Extended order code 1-3	Depending on the length of the extended order code, the code is divided into a maximum of 3 parameters.	Displays the 1st, 2nd or 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	-	Displays the version of the electronic nameplate.	Character string in the format xx.yy.zz
IP address	-	Displays the IP address of the Web server of the measuring device.	192.168.1.212
Subnet mask	-	Displays the subnet mask.	255.255.255.0
Default gateway	-	Displays the default gateway.	192.168.1.212

12.13 Disposal

12.13.1 Removing the measuring device

1. Switch off the device.
2. **WARNING!** Danger to persons from process conditions. Beware of hazardous process conditions such as pressure in the measuring device, high temperatures or aggressive fluids. Carry out the mounting and connection steps from the chapters "Mounting the measuring device" and "Connecting the measuring device" in the logically reverse sequence. Observe the safety instructions.

12.13.2 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.

13 Repair

13.1 General notes

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 correspondingly trained customers.
- Certified devices can be converted into other certified devices by Endress+Hauser Service or at the factory only.

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.

13.2 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 in the **Device information** submenu (→  69).

13.3 Endress+Hauser services



Contact your Endress+Hauser Sales Center for information on services and spare parts.

14 Maintenance

14.1 Maintenance tasks

No special maintenance work is required.

14.1.1 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.

14.1.2 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 fluid temperature for the measuring device (→  85).

14.2 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.



For a list of some of the measuring and test equipment, refer to the "Accessories" chapter of the "Technical Information" document for the device.

14.3 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.

15 Return

The measuring device must be returned if repairs or a factory calibration are required, or if the wrong measuring device has been ordered or delivered. According to legal regulations, Endress+Hauser, as an ISO-certified company, is required to follow certain procedures when handling returned products that are in contact with medium.

To ensure swift, safe and professional device returns, please read the return procedures and conditions on the Endress+Hauser website at www.services.endress.com/return-material

16 Disposal

16.1 Removing the measuring device

1. Switch off the device.
2. **WARNING!** Danger to persons from process conditions. Beware of hazardous process conditions such as pressure in the measuring device, high temperatures or aggressive fluids. Carry out the mounting and connection steps from the chapters "Mounting the measuring device" and "Connecting the measuring device" in the logically reverse sequence. Observe the safety instructions.

16.2 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.

17 Technical data

17.1 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.

17.2 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 (→  10)

17.3 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	3/8	0 to 2 000	0 to 73.5
15	½	0 to 6 500	0 to 238
25	1	0 to 18 000	0 to 660
40	1 ½	0 to 45 000	0 to 1 650
50	2	0 to 70 000	0 to 2 570
80	3	0 to 180 000	0 to 6 600
100	4	0 to 350 000	0 to 12 860
150	6	0 to 800 000	0 to 29 400
250	10	0 to 2 200 000	0 to 80 840

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/m ³] at operating conditions

DN		x
[mm]	[in]	[kg/m ³]
8	3/8	60
15	1/2	80
25	1	90
40	1 1/2	90
50	2	90
80	3	110
100	4	130
150	6	200
250	10	200

Calculation example for gas

- Sensor: Promass F, 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 F, 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 (→  86)

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.
---------------------	---

Input signal	Fieldbuses To increase the accuracy of certain measured variables or to calculate the corrected volume flow for gases, the automation system can continuously write different measured values to the measuring device via Modbus RS485 or EtherNet/IP: ■ Process pressure or fluid temperature to increase accuracy (e.g. external values from Cerabar M, Cerabar S or iTEMP) ■ Reference density for calculating the corrected volume flow
--------------	--

17.4 Output

Output signal

EtherNet/IP

Standards	In accordance with IEEE 802.3
------------------	-------------------------------

Signal on alarm

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

EtherNet/IP

Device diagnostics	Device condition can be read out in Input Assembly
---------------------------	--

Web browser

Plain text display	With information on cause and remedial measures
---------------------------	---

Light emitting diodes (LED)

Status information	Status indicated by various light emitting diodes The following information is displayed depending on the device version: ■ Supply voltage active ■ Data transmission active ■ Device alarm/error has occurred ■ EtherNet/IP network available ■ EtherNet/IP connection established
---------------------------	---

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
- Voltage supply

Protocol-specific data

EtherNet/IP

Protocol	■ The CIP Networks Library Volume 1: Common Industrial Protocol ■ The CIP Networks Library Volume 2: EtherNet/IP Adaptation of CIP
Communication type	■ 10Base-T ■ 100Base-TX
Device profile	Generic device (product type: 0x43)
Baud rates	Automatic 10/100 Mbit with half-duplex and full-duplex detection
Polarity	Auto-polarity for automatic correction of crossed TxD and RxD pairs
Supported CIP connections	Max. 3 connections
Explicit connections	Max. 5 connections
I/O connections	Max. 4 connections (scanner)
Configuration options for measuring device	■ DIP switches on the electronics module for IP addressing ■ Manufacturer-specific software (FieldCare) ■ Add-on Profile Level 3 for Rockwell Automation control systems ■ Web browser ■ Electronic Data Sheet (EDS) embedded in the measuring device

Configuration of MAC parameters	■ Speed: Auto ■ Duplex: Auto			
Configuration of the device address	■ DIP switches on the electronics module for IP addressing (last octet) ■ DHCP ■ Manufacturer-specific software (FieldCare) ■ Add-on Profile Level 3 for Rockwell Automation control systems ■ Web browser ■ EtherNet/IP tools, e.g. RSLinx (Rockwell Automation)			
Device Level Ring (DLR)	No			
Fix Input				
Exclusive Owner Multicast		Instance	Size [Byte]	RPI [ms]
	Instance configuration:	0x68	398	-
	O → T configuration:	0x66	64	5
	T → O configuration:	0x64	44	5
Input only Multicast		Instance	Size [Byte]	RPI [ms]
	Instance configuration:	0x68	398	-
	O → T configuration:	0x67	0	-
	T → O configuration:	0x64	44	5
Input Assembly	■ Current device diagnostics ■ Mass flow ■ Volume flow ■ Corrected volume flow ■ Density ■ Reference density ■ Temperature ■ Totalizer 1 ■ Totalizer 2 ■ Totalizer 3			
Configurable Input				
Exclusive Owner Multicast		Instance	Size [Byte]	RPI [ms]
	Instance configuration:	0x68	398	-
	O → T configuration:	0x66	64	5
	T → O configuration:	0x65	88	5
Fix Output				
Output Assembly	■ Activation of reset totalizers 1-3 ■ Activation of pressure compensation ■ Activation of reference density compensation ■ Activation of temperature compensation ■ Reset totalizers 1-3 ■ External pressure value ■ Pressure unit ■ External reference density ■ Reference density unit ■ External temperature ■ Temperature unit			

Configuration	
Configuration Assembly	■ Software write protection ■ Mass flow unit ■ Mass unit ■ Volume flow unit ■ Volume unit ■ Corrected volume flow unit ■ Corrected volume unit ■ Density unit ■ Reference density unit ■ Temperature unit ■ Pressure unit ■ Length ■ Totalizer 1-3: – Assignment – Unit – Operating mode – Failure mode ■ Alarm delay

17.5 Power supply

Terminal assignment	(→  25)										
Pin assignment, device plug	(→  25)										
Supply voltage	Transmitter For device version with all communication methods except Modbus RS485 intrinsically safe: DC 20 to 30 V										
Power consumption	<i>Transmitter</i> <table><tr><th colspan="2">Order code for "Output"</th><th colspan="2">Maximum power consumption</th></tr><tr><td colspan="2">Option N: EtherNet/IP</td><td colspan="2">3.3 W</td></tr></table>			Order code for "Output"		Maximum power consumption		Option N : EtherNet/IP		3.3 W	
Order code for "Output"		Maximum power consumption									
Option N : EtherNet/IP		3.3 W									
Current consumption	<i>Transmitter</i> <table><tr><th colspan="2">Order code for "Output"</th><th>Maximum current consumption</th><th>Maximum switch-on current</th></tr><tr><td colspan="2">Option N: EtherNet/IP</td><td>145 mA</td><td>18 A (< 0.125 ms)</td></tr></table>			Order code for "Output"		Maximum current consumption	Maximum switch-on current	Option N : EtherNet/IP		145 mA	18 A (< 0.125 ms)
Order code for "Output"		Maximum current consumption	Maximum switch-on current								
Option N : EtherNet/IP		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	(→  26)										
Potential equalization	No special measures for potential equalization are required.										

Terminals	Transmitter Spring terminals for wire cross-sections 0.5 to 2.5 mm ² (20 to 14 AWG)
Cable entries	Transmitter ■ Cable gland: M20 × 1.5 with cable Ø 6 to 12 mm (0.24 to 0.47 in) ■ Thread for cable entry: – NPT ½" – G ½" – M20
Cable specification	(→  24)

17.6 Performance characteristics

Reference operating conditions	■ Error limits based on ISO 11631 ■ Water with +15 to +45 °C (+59 to +113 °F) at 2 to 6 bar (29 to 87 psi) ■ Specifications as per calibration protocol ±5 °C (±9 °F) and ±2 bar (±29 psi) ■ Accuracy based on accredited calibration rigs that are traced to ISO 17025.  To obtain measured errors, use the <i>Applicator</i> sizing tool (→  90)
Maximum measured error	o.r. = of reading; 1 g/cm ³ = 1 kg/l; T = medium temperature

Base accuracy

Mass flow and volume flow (liquids)

±0.05 % o.r. (PremiumCal, for mass flow)

±0.10 %

Mass flow (gases)

±0.35 % o.r.

 Design fundamentals (→  84)

Density (liquids)

■ Reference conditions: ±0.0005 g/cm³

■ Wide-range density specification: ±0.001 g/cm³ (valid range for special density calibration: 0.0 to 2 g/cm³, +5 to +80 °C (+41 to +176 °F))

Temperature

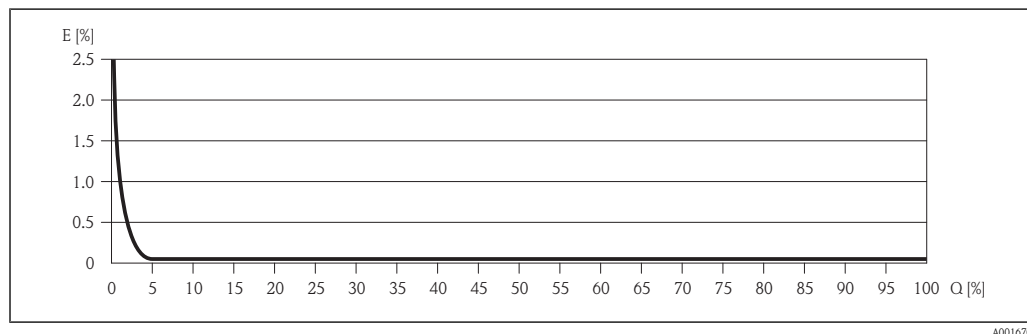
±0.5 °C ± 0.005 · T °C (±0.9 °F ± 0.005 · (T – 32) °F)

Zero point stability

DN		Zero point stability	
[mm]	[in]	[kg/h]	[lb/min]
8	3/8	0.030	0.001
15	1/2	0.200	0.007
25	1	0.540	0.019
40	1½	2.25	0.083
50	2	3.50	0.129
80	3	9.00	0.330
100	4	14.00	0.514

DN		Zero point stability	
[mm]	[in]	[kg/h]	[lb/min]
150	6	32.00	1.17
250	10	88.00	3.23

Example for max. measured error



A0016708

E Error: Maximum measured error as % o.r. (example using PremiumCal)

Q Flow rate as %

 Design fundamentals (→  84)

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
80	180 000	18 000	9 000	3 600	1 800	360
100	350 000	35 000	17 500	7 000	3 500	700
150	800 000	80 000	40 000	16 000	8 000	1 600
250	2 200 000	220 000	110 000	44 000	22 000	4 400

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]
3/8	73.5	7.35	3.675	1.47	0.735	0.147
1/2	238	23.8	11.9	4.76	2.38	0.476
1	660	66	33	13.2	6.6	1.32
1½	1 650	165	82.5	33	16.5	3.3

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]
2	2570	257	128.5	51.4	25.7	5.14
3	6600	660	330	132	66	13.2
4	12860	1286	643	257.2	128.6	25.72
6	29400	2940	1470	588	294	58.8
10	80840	8084	4042	1616.8	808.4	161.68

Repeatability

o.r. = of reading; $1 \text{ g/cm}^3 = 1 \text{ kg/l}$; T = medium temperature

Mass flow and volume flow (liquids)

$\pm 0.025 \%$ o.r. (PremiumCal, for mass flow)

$\pm 0.05 \%$ o.r.

Mass flow (gases)

$\pm 0.25 \%$ o.r.



Design fundamentals (→ 84)

Density (liquids)

$\pm 0.00025 \text{ g/cm}^3$

Temperature

$\pm 0.25 \text{ }^\circ\text{C} \pm 0.0025 \cdot T \text{ }^\circ\text{C} (\pm 0.45 \text{ }^\circ\text{F} \pm 0.0025 \cdot (T-32) \text{ }^\circ\text{F})$

Response time

- The response time depends on the configuration (damping).
- Response time in the event of erratic changes in the measured variable (only mass flow): after 100 ms 95 % of the full scale value

Influence of medium temperature

Mass flow and volume flow

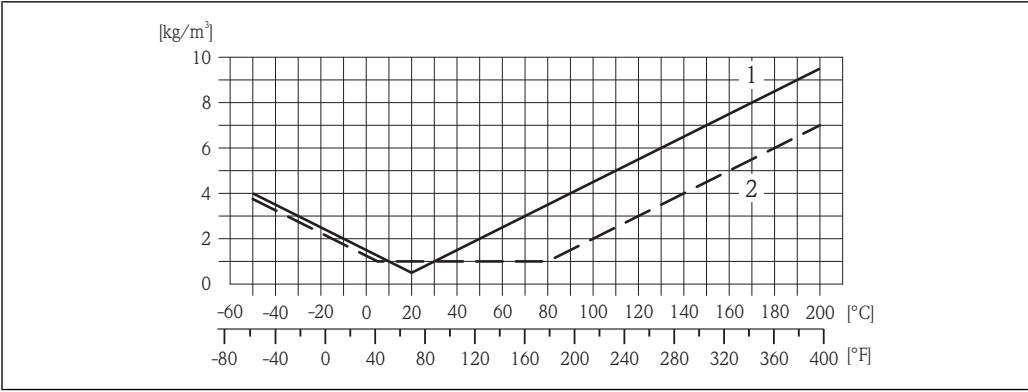
When there is a difference between the temperature for zero point adjustment and the process temperature, the typical measured error of the sensor is $\pm 0.0002 \%$ of the full scale value/ $^\circ\text{C}$ ($\pm 0.0001 \%$ of the full scale value/ $^\circ\text{F}$).

Density

When there is a difference between the density calibration temperature and the process temperature, the typical measured error of the sensor is $\pm 0.00005 \text{ g/cm}^3 / ^\circ\text{C}$ ($\pm 0.000025 \text{ g/cm}^3 / ^\circ\text{F}$). Field density calibration is possible.

Wide-range density specification (special density calibration)

If the process temperature is outside the calibrated range ($+5$ to $+80 \text{ }^\circ\text{C}$ ($+41$ to $+176 \text{ }^\circ\text{F}$)), the measured error is $\pm 0.00005 \text{ g/cm}^3 / ^\circ\text{C}$ ($\pm 0.000025 \text{ g/cm}^3 / ^\circ\text{F}$)



1 Field density calibration
2 Special density calibration

Temperature
 $\pm 0.005 \cdot T \text{ }^{\circ}\text{C}$ ($\pm 0.005 \cdot (T - 32) \text{ }^{\circ}\text{F}$)

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]
[mm]	[in]	
8	3/8	no influence
15	1/2	no influence
25	1	no influence
40	1 1/2	-0.003
50	2	-0.008
80	3	-0.009
100	4	-0.007
150	6	-0.009
250	10	-0.009

Design fundamentals Dependent on the flow:
Flow $\geq$ zero point stability : (base accuracy : 100)
– Maximum measured error as % o.r.: $\pm$ Base accuracy
– Repeatability as % o.r.: $\pm 1/2 \cdot$ Base accuracy
Flow $<$ zero point stability : (base accuracy : 100)
– Maximum measured error as % o.r.: $\pm$ (zero point stability : measured value) $\cdot$ 100
– Repeatability as % o.r.: $\pm 1/2 \cdot$ (zero point stability : measured value) $\cdot$ 100
o.r. = of reading

Base accuracy for	[% o.r.]
Mass flow, liquids, PremiumCal	0.05
Mass flow, liquids	0.10
Volume flow, liquids	0.10
Mass flow, gases	0.35

17.7 Installation

"Mounting requirements" (→  17)

17.8 Environment

Ambient temperature range	(→  19)
Storage temperature	−40 to +80 °C (−40 to +176 °F), preferably at +20 °C (+68 °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
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	■ SIP cleaning ■ CIP cleaning
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)  Details are provided in the Declaration of Conformity.

17.9 Process

Medium temperature range	Sensor ■ −50 to +150 °C (−58 to +302 °F) ■ −50 to +200 °C (−58 to +392 °F) with extended temperature (order code for "Measuring tube mat." option SD, SE, SF, TH) Seals No internal seals
Medium density	0 to 5 000 kg/m ³ (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.
Secondary containment pressure range	The sensor housing is filled with dry nitrogen and protects the electronics and mechanics inside.

- DN 8 to 50 (3/8 to 2"): 40 bar (580 psi)
- DN 80 (3"): 25 bar (362 psi)
- DN 100 to 150 (4 to 6"): 16 bar (232 psi)
- DN 250 (10"): 10 bar (145 psi)

Rupture disk	To increase the level of safety, a device version with a rupture disk with a triggering pressure of 10 to 15 bar (145 to 217.5 psi) can be used.
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 (→  76) ■ 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 (→  77)
Pressure loss	 To calculate the pressure loss, use the <i>Applicator</i> sizing tool (→  90)

17.10 Mechanical construction

Design, dimensions	 For the dimensions and installation lengths of the device, see the "Technical Information" document, "Mechanical construction" section																				
Weight	Compact version <i>Weight in SI units</i> All values (weight) refer to devices with EN/DIN PN 40 flanges. Weight information in [kg] <table><tr><th>DN [mm]</th><th>Weight [kg]</th></tr><tr><td>8</td><td>9</td></tr><tr><td>15</td><td>10</td></tr><tr><td>25</td><td>12</td></tr><tr><td>40</td><td>17</td></tr><tr><td>50</td><td>28</td></tr><tr><td>80</td><td>53</td></tr><tr><td>100</td><td>94</td></tr><tr><td>150</td><td>152</td></tr><tr><td>250</td><td>398</td></tr></table>	DN [mm]	Weight [kg]	8	9	15	10	25	12	40	17	50	28	80	53	100	94	150	152	250	398
DN [mm]	Weight [kg]																				
8	9																				
15	10																				
25	12																				
40	17																				
50	28																				
80	53																				
100	94																				
150	152																				
250	398																				

Weight in US units

All values (weight) refer to devices with EN/DIN PN 40 flanges. Weight information in [lbs]

DN [in]	Weight [lbs]
3/8	20
1/2	22
1	26
1 1/2	37
2	62
3	117
4	207
6	335
10	878

Materials

Transmitter housing

- Order code for "Housing", option **A**: aluminum coating AlSi10Mg
- Order code for "Housing", option **B, C**:
 - Hygienic version, stainless steel 1.4301/304
 - Hygienic version, stainless steel 1.4404/316L

Transmitter cable entries

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

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

Electrical connection	Material
Cable gland M20 × 1.5	Nickel-plated brass
Thread G 1/2" via adapter	
Thread NPT 1/2" via adapter	

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

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

Electrical connection	Material
Cable gland M20 × 1.5	Stainless steel 1.4404/316L
Thread G 1/2" via adapter	
Thread NPT 1/2" via adapter	

Sensor housing

- Acid and alkali-resistant outer surface
- Stainless steel 1.4301/1.4307/304L/304

Measuring tubes

- DN 8 to 100 (3/8 to 4"): Stainless steel 1.4539/904L; manifold: 1.4404/316L
- DN 150 (6"): Stainless steel 1.4404/316L
- DN 250 (10"): Stainless steel 1.4404/316L; manifold: CF3M
- DN 8 to 150 (3/8 to 6"): Alloy 2.4602/N 06022

Surface quality:

- $Ra_{max} = 0.8 \mu m$ (32 μin)
- $Ra_{max} = 0.4 \mu m$ (16 μin)

Process connections

- Flanges based on EN 1092-1 (DIN2501)/ based on ASME B 16.5:
 - Stainless steel 1.4404/316L
 - Alloy 2.4602/N 06022
- Flanges as per JIS B2220:
 - Stainless steel SUS 316L
 - Alloy 2.4602/N 06022
- All other process connections:
 - Stainless steel 1.4404/316L



List of all available process connections (→ 88)

Seals

Welded process connections without internal seals

Safety Barrier Promass 100

Housing: Polyamide

Process connections

- Flanges:
 - EN 1092-1 (DIN 2501)
 - ASME B16.5
 - JIS B2220
- VCO connections
- Tri-Clamp (OD tubes)
- Threaded hygienic connection:
 - DIN 11851
 - SMS 1145
 - ISO 2853
 - DIN 11864-1 Form A
- Flange with notch
 - DIN 11864-2 Form A



For information on the materials of the process connections (→ 88)

17.11 Operability

Remote operation

Service interface (CDI-RJ45)

Operation of the measuring device with the service interface (CDI-RJ45) via:

- Web browser
- "FieldCare" operating tool with COM DTM "CDI Communication TCP/IP"

Ethernet network

Operation of the measuring device in the Ethernet network via:

- Web browser
- "FieldCare" operating tool with COM DTM "CDI Communication TCP/IP"
- Add-on Profile Level 3 for "RSLogix" automation system with "RSLogix5000" software from Rockwell Automation

Languages	Can be operated in the following languages: ■ Via "FieldCare" operating tool: English, German, French, Spanish, Italian, Dutch, Japanese ■ Via Web browser English, German, French, Spanish, Italian, Dutch, Portuguese, Polish, Russian, Turkish, Chinese, Japanese, Bahasa (Indonesian), Vietnamese, Czech
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17.12 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
Pressure Equipment Directive	■ With the identification PED/G1/x (x = category) on the sensor nameplate, Endress+Hauser confirms conformity with the "Basic Safety Requirements" specified of Appendix 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 Protection Measures for Electrical Equipment for Measurement, Control, Regulation and Laboratory Procedures.

- 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
Status classification as per NE107
- NAMUR NE 131
Requirements for field devices for standard applications
- NAMUR NE 132
Coriolis mass meter

17.13 Accessories

 For an overview of the accessories that can be ordered, see the "Technical Information" document

17.14 Documentation

-  The following document types are available:
- On the CD-ROM supplied with the device
 - In the Download Area of the Endress+Hauser Internet site: www.endress.com → Download

Standard documentation

*Device type: 8F1B**-*

Communication	Document type	Documentation code
----	Brief Operating Instructions	KA01116D
EtherNet/IP	Operating Instructions	BA01065D

Supplementary device-dependent documentation

*Device type: 8*1B**-*

Document type	Approval	Documentation code
Safety Instructions	ATEX/IECEX Ex i	XA00159D
	ATEX/IECEX Ex nA	XA01029D
	cCSAus IS	XA00160D
Information on the Pressure Equipment Directive		SD00142D

Installation Instructions		Specified for each individual accessory  For an overview of the accessories that can be ordered, see the "Technical Information" document
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18 Appendix

18.1 Overview of the operating menu

The following table provides an overview of the entire operating menu structure with menus and parameters. The page reference indicates where a description of the parameter can be found in the manual.

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Mass unit	(→ 41)
Volume flow unit	(→ 41)
Volume unit	(→ 41)
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Corrected volume unit	(→ 42)
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Reference density unit	(→ 42)
Temperature unit	(→ 42)
Pressure unit	(→ 42)
Medium selection →	(→ 43)
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Select gas type	(→ 43)
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Temperature coefficient sound velocity	(→ 43)
Pressure compensation	(→ 43)
Pressure value	(→ 43)

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Communication	→	(→  44)
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Default network settings		(→  44)
DHCP client		(→  44)
IP address		(→  44)
Subnet mask		(→  45)
Default gateway		(→  45)
Low flow cut off	→	(→  46)
Assign process variable		(→  46)
On value low flow cut off		(→  46)
Off value low flow cutoff		(→  46)
Pressure shock suppression		(→  46)
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High value partial filled pipe detection		(→  47)
Response time part. filled pipe detect.		(→  47)
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	Calculated process variables	→ (→  49)
	Corrected volume flow calculation	(→  49)
	External reference density	(→  49)
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	Reference temperature	(→  49)
	Linear expansion coefficient	(→  49)

	Square expansion coefficient		(→ 49)
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	Installation direction		(→ 50)
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	Filter options		(→ 68)
	Device info →		(→ 69)
	Device tag		(→ 48)
	Serial number		(→ 70)
	Firmware version		(→ 70)
	Device name		(→ 70)
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Subnet mask		(→  70)
Default gateway		(→  70)
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	Temperature	(→  56)
	Pressure value	(→  56)
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	Assign simulation process variable	(→  51)
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	Device reset	(→  68)
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Corrected volume unit	(→  41)
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	User mass text
	User mass factor
	User mass offset
	User volume text
	User volume factor
	User volume offset
	User corrected volume text
	User corrected volume factor
	User density text
	User density offset
	User density factor
	User pressure text
	User pressure offset
	User pressure factor
Process param. →	
	Flow damping
	Density damping
	Flow override
	Temperature damping
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	Assign process variable
	On value low flow cut off
	Off value low flow cutoff

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	Mass flow factor		
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	Volume flow factor		
	Corrected volume flow offset		
	Corrected volume flow factor		
	Density offset		
	Density factor		
	Reference density offset		
	Reference density factor		
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	Firmware version	(→ 70)
	Device name	(→ 70)
	Order code	(→ 70)
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Configuration counter		
Min/max values	→	
Reset min/max values		
		Electronics temperature →
		Minimum value
		Maximum value
		Medium temperature →
		Minimum value
		Maximum value
		Carrier pipe temperature →
		Minimum value
		Maximum value
		Oscillation frequency →
		Minimum value
		Maximum value
		Oscillation amplitude →
		Minimum value
		Maximum value
		Oscillation damping →
		Minimum value
		Maximum value
		Signal asymmetry →
		Minimum value
		Maximum value
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