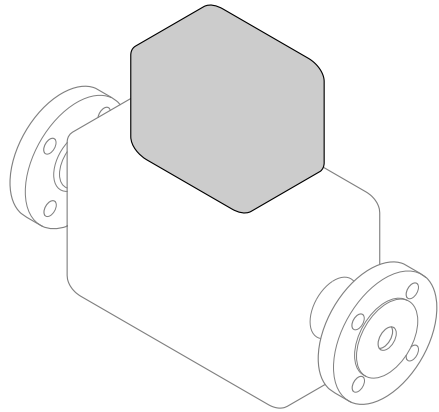
Brief Operating Instructions
Proline 100
PROFINET

Part 2 of 2
Transmitter



These Instructions are Brief Operating Instructions; they are not a substitute for the Operating Instructions pertaining to the device.

These Brief Operating Instructions contain all the information for the transmitter. When commissioning, please also refer to the "Sensor Brief Operating Instructions" → 🖹 2.

Brief Operating Instructions for the device

The device consists of a transmitter and a sensor.

The process of commissioning these two components is described in two separate manuals:
- Sensor Brief Operating Instructions
- Transmitter Brief Operating Instructions

Please refer to both Brief Operating Instructions when commissioning the device as the contents of the manuals complement one another:

Sensor Brief Operating Instructions
The Sensor Brief Operating Instructions are aimed at specialists with responsibility for installing the measuring device.
- Incoming acceptance and product identification
- Storage and transport
- Installation

Transmitter Brief Operating Instructions
The Transmitter Brief Operating Instructions are aimed at specialists with responsibility for commissioning, configuring and parameterizing the measuring device (until the first measured value).
- Product description
- Installation
- Electrical connection
- Operation options
- System integration
- Commissioning
- Diagnostic information

Additional device documentation

These Brief Operating Instructions are the **Transmitter Brief Operating Instructions**.

The "Sensor Brief Operating Instructions" are available via:
- Internet: www.endress.com/deviceviewer
- Smart phone/tablet: *Endress+Hauser Operations App*

Detailed information about the device can be found in the Operating Instructions and the other documentation:
- Internet: www.endress.com/deviceviewer
- Smart phone/tablet: *Endress+Hauser Operations App*

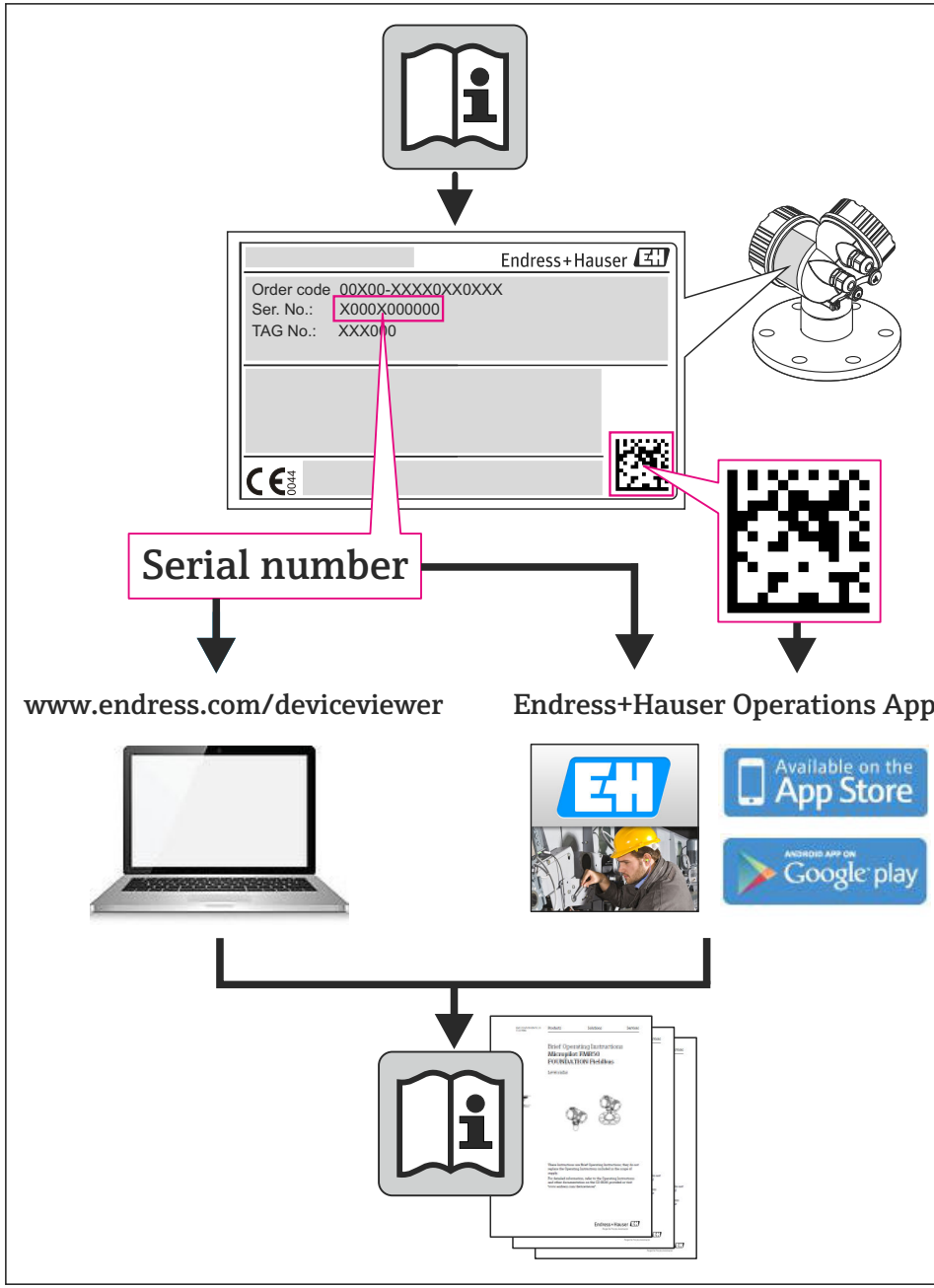

Endress+Hauser
Order code 00X00-XXXX0XX0XXX
Ser. No.: X000X000000
TAG No.: XXX000
0044
Serial number
www.endress.com/deviceviewer
Endress+Hauser Operations App
Available on the App Store
ANDROID APP ON Google play

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Table of contents

1 Document information

1.1 Symbols used

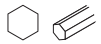
1.1.1 Safety symbols

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

1.1.2 Electrical symbols

Symbol	Meaning	Symbol	Meaning
⎓	Direct current	~	Alternating current
⎓ ~	Direct current and alternating current	⏚	**Ground connection** A grounded terminal which, as far as the operator is concerned, is grounded via a grounding system.
⏚	**Protective ground connection** A terminal which must be connected to ground prior to establishing any other connections.	⏚	**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.

1.1.3 Tool symbols

Symbol	Meaning	Symbol	Meaning
	Torx screwdriver		Flat blade screwdriver
	Cross-head screwdriver		Allen key
	Open-ended wrench		

1.1.4 Symbols for certain types of information

Symbol	Meaning	Symbol	Meaning
	**Permitted** Procedures, processes or actions that are permitted.		**Preferred** Procedures, processes or actions that are preferred.
	**Forbidden** Procedures, processes or actions that are forbidden.		**Tip** Indicates additional information.
	Reference to documentation		Reference to page
	Reference to graphic	1., 2., 3. ...	Series of steps
	Result of a step		Visual inspection

1.1.5 Symbols in graphics

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

2 Basic safety instructions

2.1 Requirements for the personnel

The personnel must fulfill the following requirements for its tasks:

- 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

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.

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

To ensure that the measuring device remains in proper condition for the operation time:
- ▶ 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.
- ▶ Check the nameplate to verify if the device ordered can be put to its intended use in the approval-related area (e.g. explosion protection, pressure vessel safety).
- ▶ Use the measuring device only for media against which the process-wetted materials are adequately resistant.
- ▶ If the measuring device is not operated at atmospheric temperature, compliance with the relevant basic conditions specified in the associated device documentation is absolutely essential.
- ▶ Protect the measuring device permanently against corrosion from environmental influences.

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

⚠ WARNING

Danger of breakage of the measuring tube due to corrosive or abrasive fluids or from environmental conditions.
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.
- ▶ Keep within the specified pressure and temperature range.

⚠ WARNING

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

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.

The external surface temperature of the housing can increase by max. 10 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.

If working on and with the device with wet hands:

- ▶ It is recommended to wear gloves on account of the higher risk of electric shock.

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.

2.5 Product safety

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

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

2.6 IT security

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

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

3 Product description

The device consists of a transmitter and a sensor.

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

4 Installation

For detailed information about mounting the sensor, see the Sensor Brief Operating Instructions

4.1 Mounting the measuring device

4.1.1 Mounting grounding rings

Promag H

For detailed information about mounting the grounding rings, see the "Mounting the sensor" section of the Sensor Brief Operating Instructions

4.1.2 Screw tightening torques

Promag

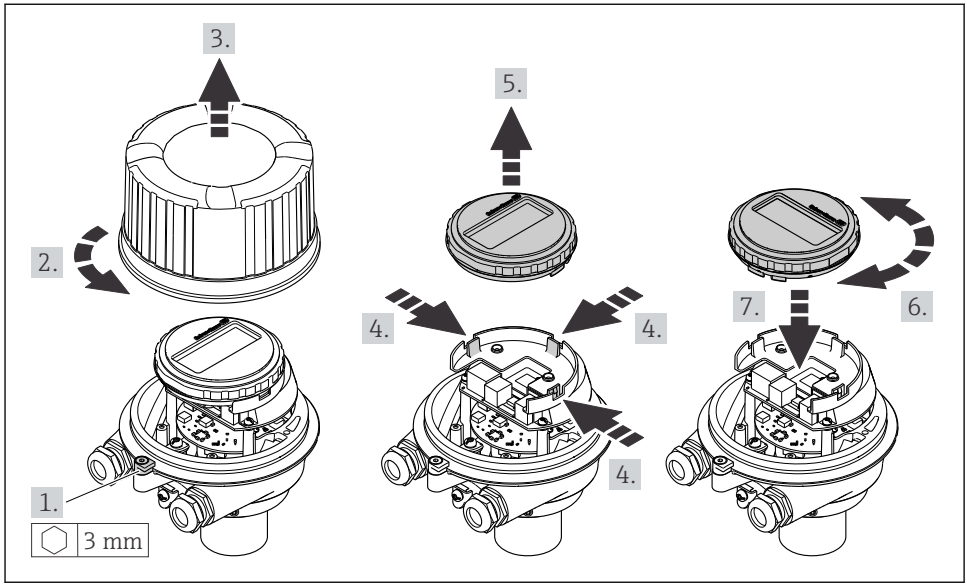
For detailed information on the screw tightening torques, see the "Mounting the sensor" section of the Operating Instructions for the device

4.1.3 Turning the display module

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

The display module can be turned to optimize display readability.

Aluminum housing version



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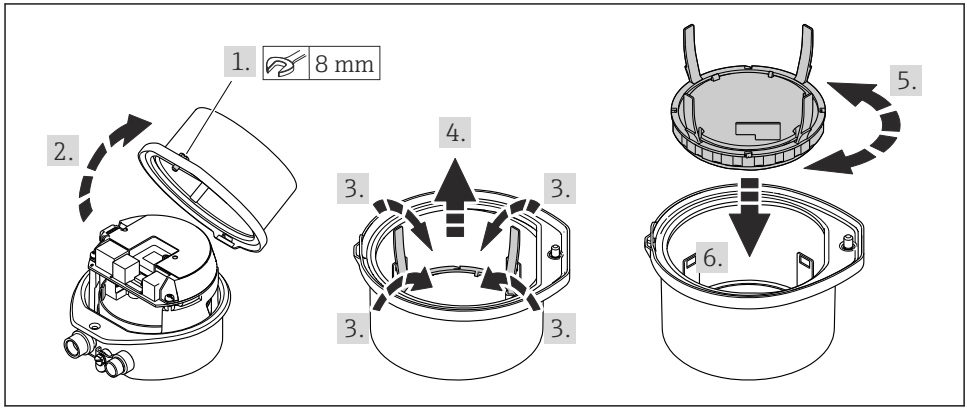
Compact and ultra-compact housing version



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5 Electrical connection

The measuring device does not have an internal circuit breaker. For this reason, assign the measuring device a switch or power-circuit breaker so that the power supply line can be easily disconnected from the mains.

5.1 Connection conditions

5.1.1 Required tools

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

5.1.2 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) to +80 °C (+176 °F)
- Minimum requirement: cable temperature range ≥ ambient temperature +20 K

Power supply cable

Standard installation cable is sufficient.

Signal cable

PROFINET

Standard IEC 61156-6 specifies CAT 5 as the minimum category for a cable used for PROFINET. CAT 5e and CAT 6 are recommended.

For more information on planning and installing PROFINET networks, see: "PROFINET Cabling and Interconnection Technology", Guideline for PROFINET

Cable diameter

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

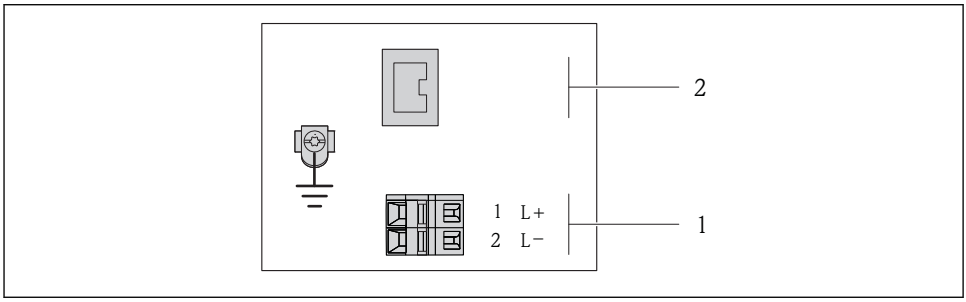
5.1.3 Terminal assignment

Transmitter

PROFINET connection version

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

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



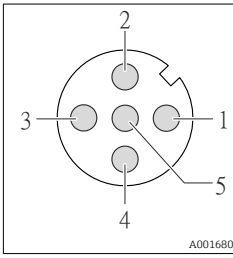
1 PROFINET terminal assignment

1 Power supply: DC 24 V
2 PROFINET

Order code for "Output"	Terminal number		
	Power supply		Output
	2 (L-)	1 (L+)	Device plug M12x1
Option **R**	DC 24 V		PROFINET
Order code for "Output": Option **R**: PROFINET			

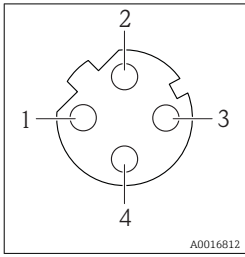
5.1.4 Pin assignment, device plug

Supply voltage



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

Device plug for signal transmission (device side)



Pin		Assignment
1	+	TD +
2	+	RD +
3	-	TD –
4	-	RD –
Coding		**Plug/socket**
D		Socket

5.1.5 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 .
3. If measuring device is delivered with cable glands:
   Observe cable specification .

5.2 Connecting the measuring device

NOTICE

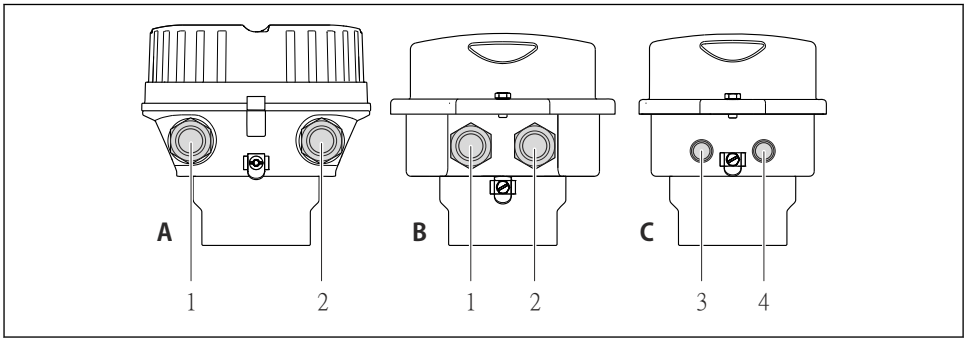
Limitation of electrical safety due to incorrect connection!

- ▶ For use in potentially explosive atmospheres, observe the information in the device-specific Ex documentation.

5.2.1 Connecting the transmitter

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

- Housing version: compact or ultra-compact
- Connection version: device plug or terminals



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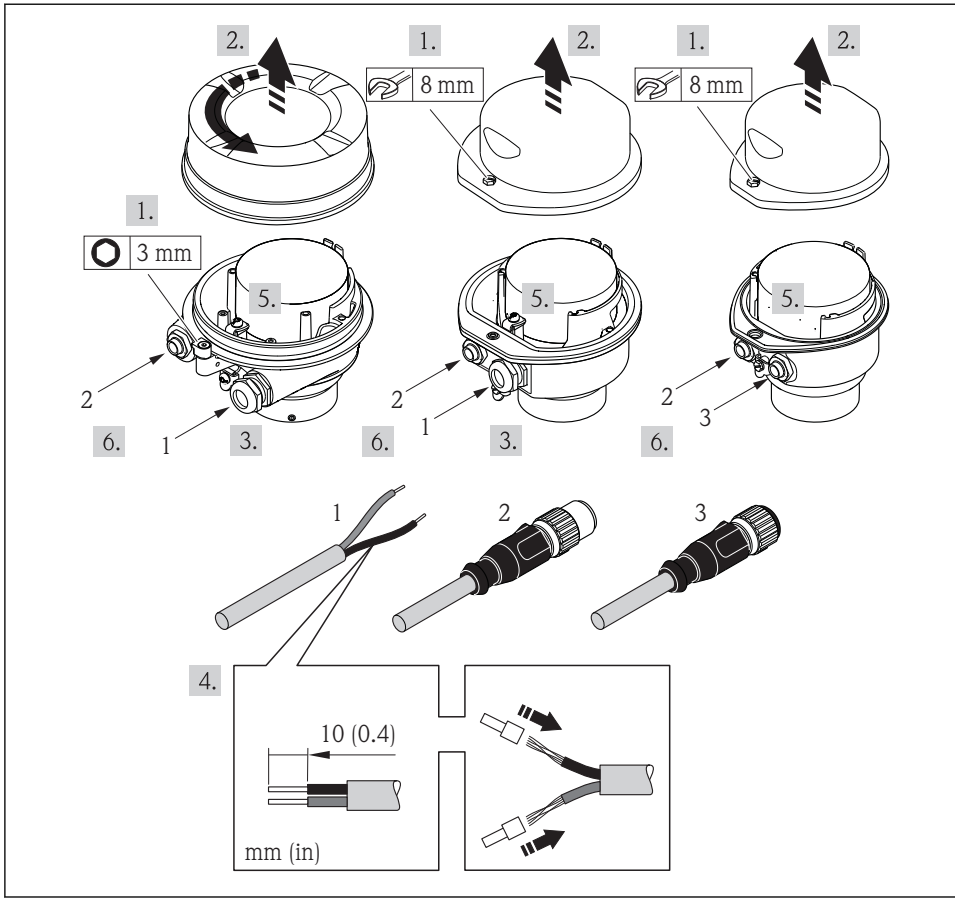
2 *Housing versions and connection versions*

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



3 Device versions with connection examples

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

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

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

5.2.2 Ensuring potential equalization

Promass, Cubemass

Requirements

Please consider the following to ensure correct measurement:
- Same electrical potential for the fluid and sensor
- Company-internal grounding concepts

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

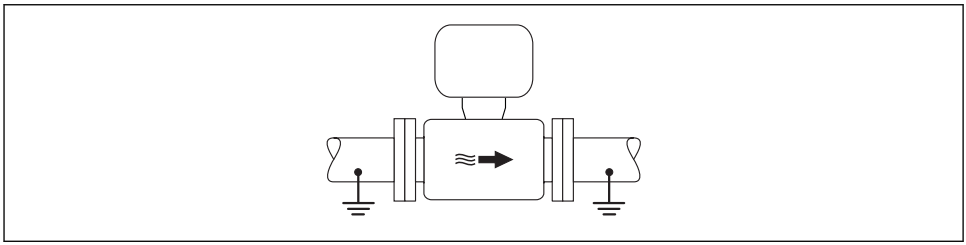
Promag E and P

CAUTION

Electrode damage can result in the complete failure of the device!
- ▶ Same electrical potential for the fluid and sensor
- ▶ Company-internal grounding concepts
- ▶ Pipe material and grounding

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

Metal, grounded pipe



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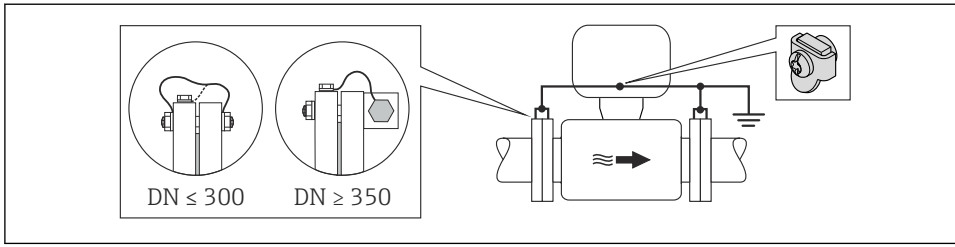
4 *Potential equalization via measuring tube*

Unlined and ungrounded metal pipe

This connection method also applies in situations where:
- The customary potential equalization is not used
- Equalizing currents are present

Ground cable	Copper wire, at least 6 mm^2 (0.0093 in^2)



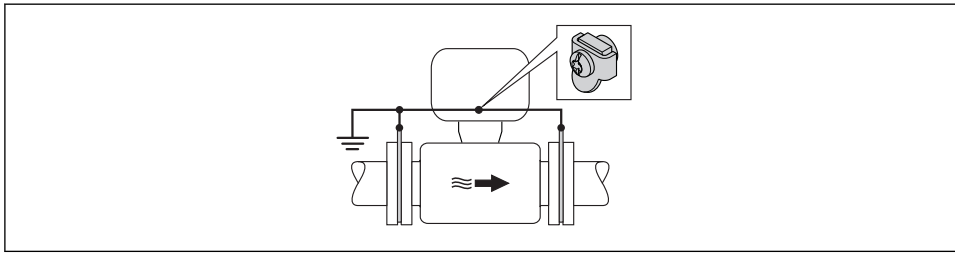
5 Potential equalization via ground terminal and pipe flanges

1. Connect both sensor flanges to the pipe flange via a ground cable and ground them.
2. If DN ≤ 300 (12"): Mount the ground cable directly on the conductive flange coating of the sensor with the flange screws.
3. If DN ≥ 350 (14"): Mount the ground cable directly on the metal transport bracket. Observe screw tightening torques: see the Sensor Brief Operating Instructions.
4. Connect the connection housing of the transmitter or sensor to ground potential by means of the ground terminal provided for the purpose.

Plastic pipe or pipe with insulating liner

This connection method also applies in situations where:
- The customary potential equalization is not used
- Equalizing currents are present

Ground cable	Copper wire, at least 6 mm^2 (0.0093 in^2)



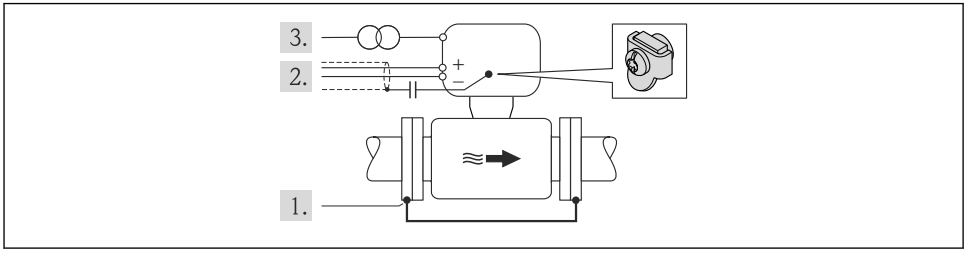
6 Potential equalization via ground terminal and ground disks

1. Connect the ground disks to the ground terminal via the ground cable.
2. Connect the ground disks to ground potential.

Pipe with a cathodic protection unit

This connection method is only used if the following two conditions are met:
- Metal pipe without liner or pipe with electrically conductive liner
- Cathodic protection is integrated in the personal protection equipment

Ground cable	Copper wire, at least 6 mm² (0.0093 in²)



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Prerequisite: The sensor is installed in the pipe in a way that provides electrical insulation.

1. Connect the two flanges of the pipe to one another via a ground cable.
2. Guide the shield of the signal lines through a capacitor.
3. Connect the measuring device to the power supply such that it is floating in relation to the protective ground (isolation transformer).

Promag H

⚠ CAUTION

Electrode damage can result in the complete failure of the device!
- ▶ Same electrical potential for the fluid and sensor
- ▶ Company-internal grounding concepts
- ▶ Pipe material and grounding

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

Metal process connections

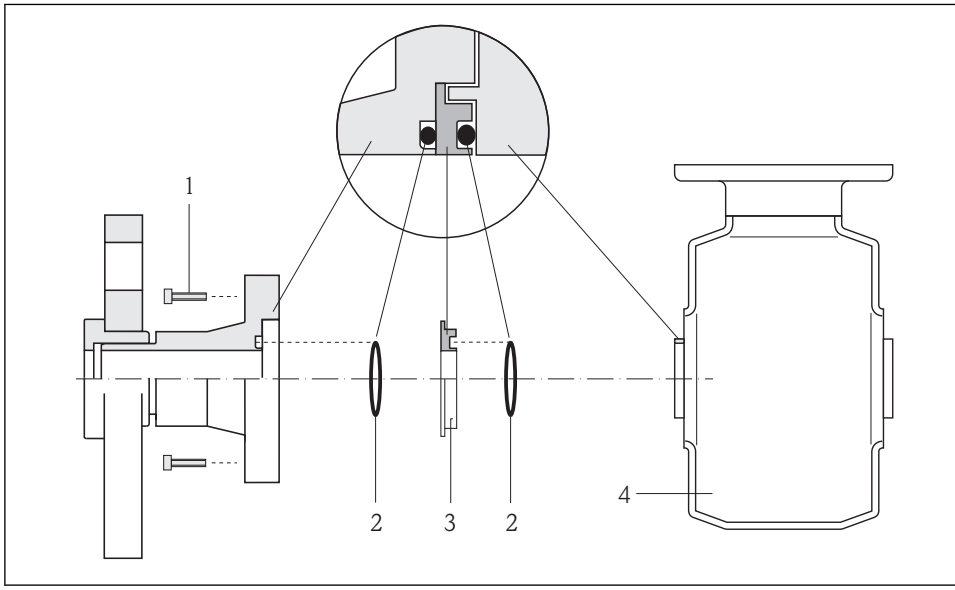
Potential equalization is generally via the metal process connections that are in contact with the medium and mounted directly on the sensor. Therefore there is generally no need for additional potential equalization measures.

Plastic process connections

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

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

Potential equalization via additional grounding ring



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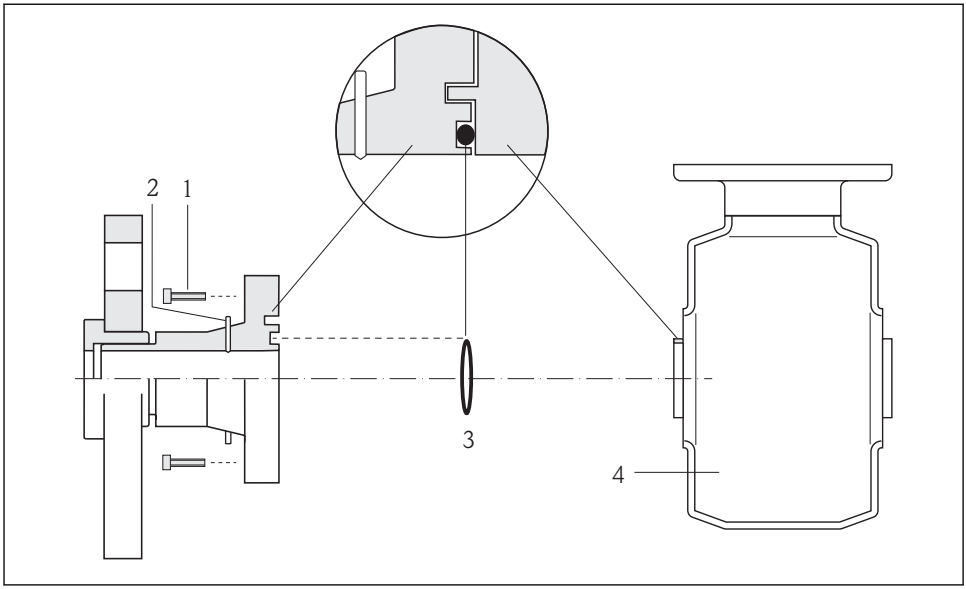
1 Hexagonal-headed bolts of process connection
2 O-ring seals
3 Plastic disk (spacer) or grounding ring
4 Sensor

Potential equalization via grounding electrodes on process connection



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

5.3 Hardware settings

5.3.1 Setting the device name

A measuring point can be quickly identified within a plant on the basis of the tag name. The tag name is equivalent to the device name (name of station of the PROFINET specification). The factory-assigned device name can be changed using the DIP switches or the automation system.

- Example of device name (factory setting): eh-promass100-xxxxx
- Example of device name (factory setting): eh-cubemass100-xxxxx

eh	Endress+Hauser
promass	Instrument family
100	Transmitter
xxxxx	Serial number of the device

The device name currently used is displayed in "Setup" menu → Name of station .

Setting the device name using the DIP switches

The last part of the device name can be set using DIP switches 1-8. The address range is between 1 and 254 (factory setting: serial number of the device)

Overview of the DIP switches

DIP switches	Bit	Description
1	1	Configurable part of the device name
2	2	
3	4	
4	8	
5	16	
6	32	
7	64	
8	128	
9	–	Enable hardware write protection
10	–	Default IP address: use 192.168.1.212

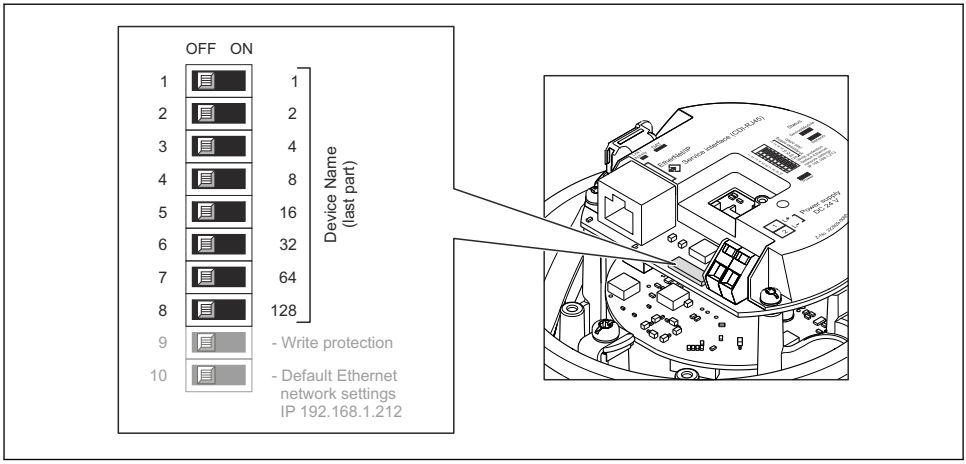
Example: set the device name eh-promass100-065

DIP switches	ON/OFF	Bit
1	ON	1
2…6	OFF	–
7	ON	64
8	OFF	–

Setting the device name

Risk of electric shock when opening the transmitter housing.

► Disconnect the device from the power supply before opening the transmitter housing.



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1. Depending on the housing version, loosen the securing clamp or fixing screw of the housing cover.
2. Depending on the housing version, unscrew or open the housing cover and disconnect the local display from the main electronics module where necessary .
3. Set the desired device name using the corresponding DIP switches on the I/O electronics module.
4. Reverse the removal procedure to reassemble the transmitter.
5. Reconnect the device to the power supply. The configured device address is used once the device is restarted.

If the device is reset via the PROFINET interface, it is not possible to reset the device name to the factory setting. The value 0 is used instead of the device name.

Setting the device name via the automation system

DIP switches 1-8 must all be set to **OFF** (factory setting) or all be set to **ON** to be able to set the device name via the automation system.

The complete device name (name of station) can be changed individually via the automation system.

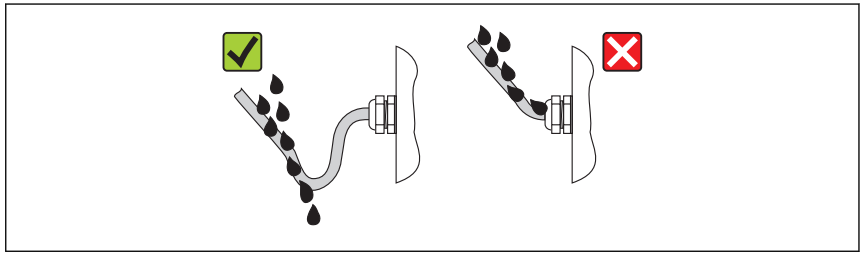
- The serial number used as part of the device name in the factory setting is not saved. It is not possible to reset the device name to the factory setting with the serial number. The value 0 is used instead of the serial number.
- When assigning the device name via the automation system, enter the device name in lower-case letters.

5.4 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").



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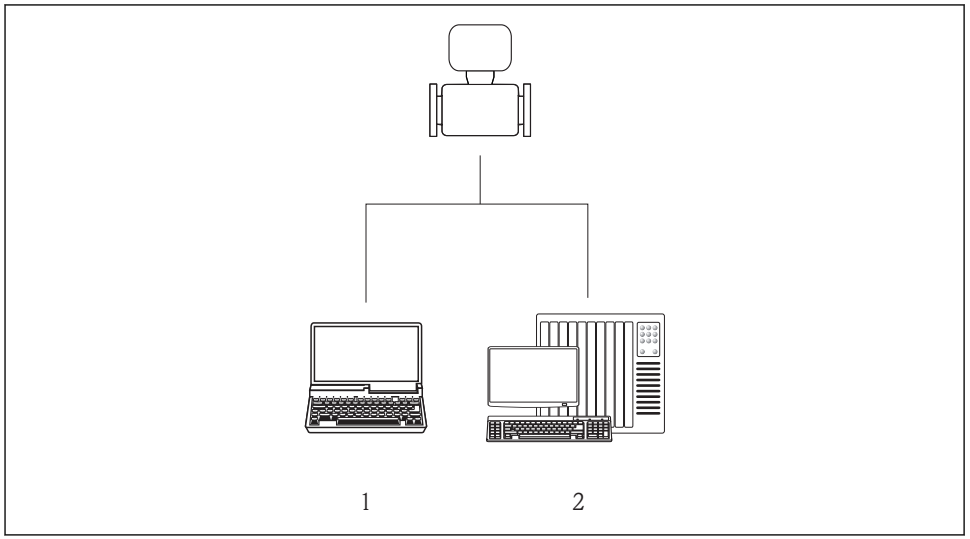
5. Insert dummy plugs into unused cable entries.

5.5 Post-connection check

Are cables or the device undamaged (visual inspection)?	❑
Do the cables comply with the requirements ?	❑
Do the cables have adequate strain relief?	❑
Are all the cable glands installed, firmly tightened and leak-tight? Cable run with "water trap" → 🖹 22 ?	❑
Depending on the device version: are all the device plugs firmly tightened ?	❑
Does the supply voltage match the specifications on the transmitter nameplate ?	❑
Is the terminal assignment or the pin assignment of the device plug correct?	❑
If supply voltage is present, is the power LED on the electronics module of the transmitter lit green ?	❑
Is the potential equalization established correctly ?	❑
Depending on the device version, is the securing clamp or fixing screw firmly tightened?	❑

6 Operation options

6.1 Overview of operating options

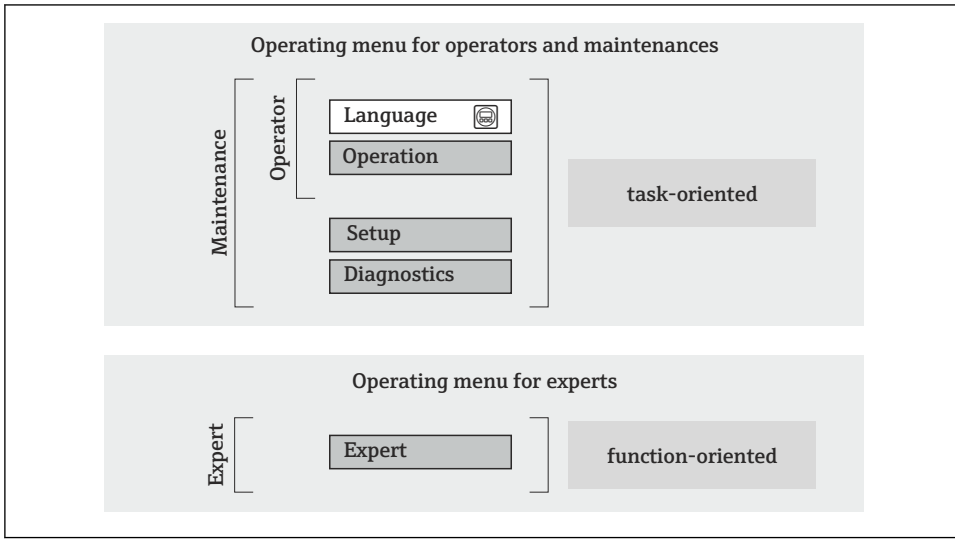


A0017760

1 Computer with Web browser (e.g. Internet Explorer) or with "FieldCare" operating tool
2 Automation system, e.g. Siemens S7-300 or S7-1500 with Step7 or TIA portal and latest GSD file.

6.2 Structure and function of the operating menu

6.2.1 Structure of the operating menu



7 *Schematic structure of the operating menu*

6.2.2 Operating philosophy

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

For detailed information on the operating philosophy, see the Operating Instructions for the device.

For custody transfer, once the device has been put into circulation or sealed, its operation is restricted.

6.3 Access to the operating menu via the Web browser

6.3.1 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.

For additional information about the Web server, see Special Documentation SD01458D

6.3.2 Prerequisites

Computer hardware

Interface	The computer must have an RJ45 interface.
Connecting cable	Standard Ethernet cable with RJ45 connector.
Screen	Recommended size: ≥12" (depends on the screen resolution) Web server operation is not optimized for touch screens!

Computer software

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

Computer settings

User rights	User rights are required for TCP/IP and proxy server settings (for changes to the IP address, subnet mask etc.).
Proxy server settings of the Web browser	The Web browser setting *Use proxy server for LAN* must be **disabled**.
JavaScript	JavaScript must be enabled. If JavaScript cannot be enabled: enter http://XXX.XXX.X.XXX/basic.html in the address line of the Web browser, e.g. http://192.168.1.212/basic.html. A fully functional but simplified version of the operating menu structure starts in the Web browser.

Measuring device

Web server	Web server must be enabled; factory setting: ON

6.3.3 Establishing a connection

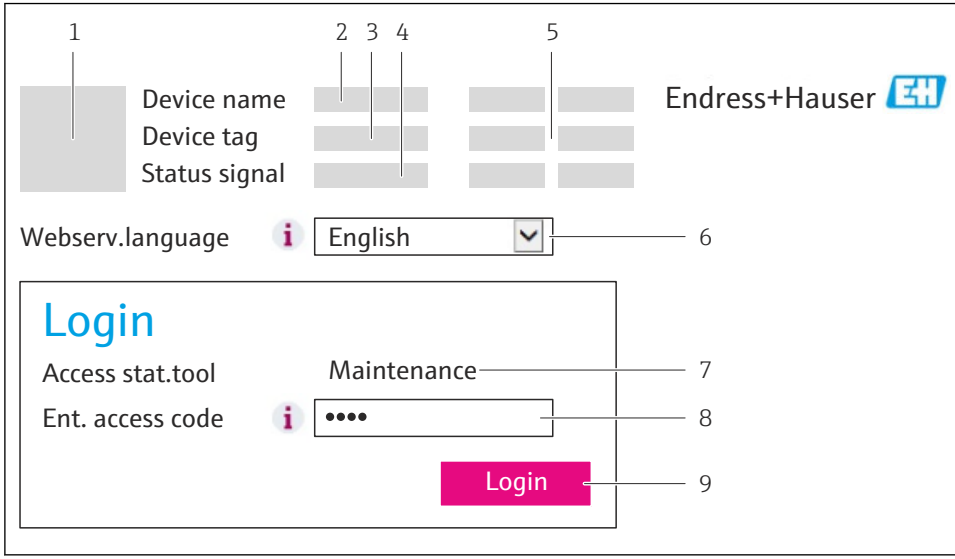
Configuring the Internet protocol of the computer

1. Via DIP switch 10, enable the default IP address 192.168.1.212 → 21.
2. Switch on the measuring device and connect to the computer via the cable .
3. Configure the properties of the Internet protocol (TCP/IP) as defined in the table:

IP address	192.168.1.212
Subnet mask	255.255.255.0
Default gateway	192.168.1.212 or leave cells empty

Starting the Web browser

The login page appears.

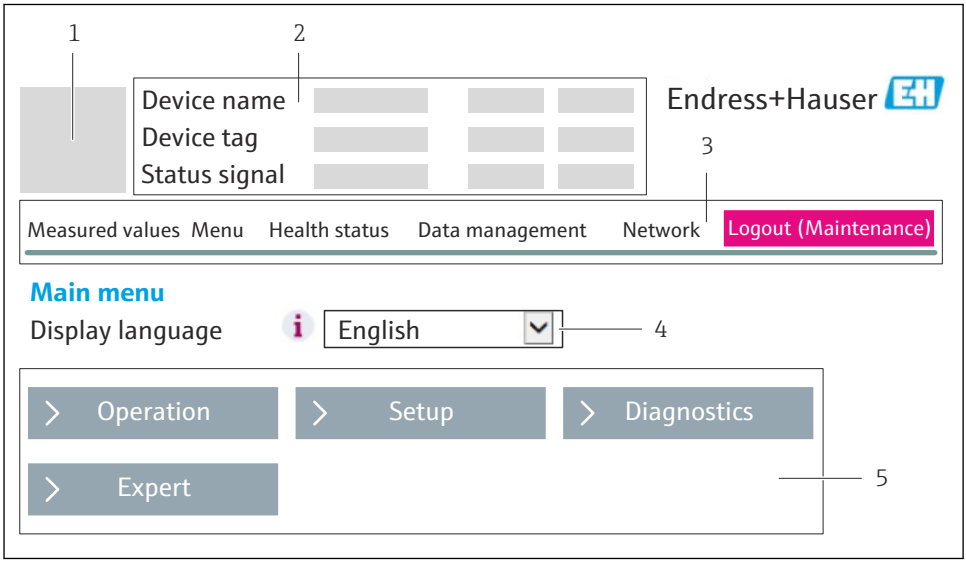


1 *Picture of device*
2 *Device name*
3 *Device tag*
4 *Status signal*
5 *Current measured values*
6 *Operating language*
7 *User role*
8 *Access code*
9 *Login*

6.3.4 Logging on

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

6.3.5 User interface



1 Picture of device
2 Header
3 Function row
4 Operating language
5 Navigation area

Header

The following information appears in the header:
- Device tag
- Device status with status signal
- 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

Functions	Meaning
Data management	Data exchange between PC and measuring device: ▪ Upload the configuration from the device (XML format, create configuration back-up) ▪ Save the configuration to the device (XML format, restore configuration) ▪ Export the event list (.csv file) ▪ Export parameter settings (.csv file, create documentation of the measuring point configuration) ▪ Export the Heartbeat verification log (PDF file, only available with the "Heartbeat Verification" application package)
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

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

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.

6.3.6 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.

Possible selection:
- Off
  - The Web server is completely disabled.
  - Port 80 is blocked.
- HTML Off
  The HTML version of the Web server is not available.
- On
  - The complete Web server functionality is available.
  - JavaScript is used.
  - The password is transmitted as an encrypted password.
  - Any change to the password is also transmitted in encrypted format.

Navigation

"Expert" menu → Communication → Web server

Parameter overview with brief description

Parameter	Description	Selection	Factory setting
Web server functionality	Switch the Web server on and off.	▪ Off ▪ HTML 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:
- Via the FieldCare operating tool
- Via the DeviceCare operating tool

6.3.7 Logging out

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

1. Select the **Logout** entry in the function row.
   ↳ The home page with the Login box appears.
2. Close the Web browser.
3. Reset the modified properties of the Internet protocol (TCP/IP) if they are no longer needed → 27.

6.4 Access to the operating menu via the operating tool

The operating menu can also be accessed via the FieldCare operating tool. See the Operating Instructions for the device.

7 System integration

7.1 Cyclic data transmission Promass, Cubemass

The cyclic data transmission described in this section applies to Coriolis flowmeters (Promass, Cubemass). For cyclic data transmission for electromagnetic flowmeters (Promag), see → 🖹 38.

7.1.1 Overview of the modules

The following tables shows which modules are available to the measuring device for cyclic data exchange. Cyclic data exchange is performed with an automation system.

Measuring device		Direction Data flow	Control system
Module	Slot		
Analog Input module → 🖹 31	1 to 14	→	PROFINET
Digital Input module → 🖹 32	1 to 14	→	
Diagnose Input module → 🖹 32	1 to 14	→	
Analog Output module → 🖹 34	18, 19, 20	←	
Digital Output module → 🖹 35	21, 22	←	
Totalizer 1 to 3 → 🖹 33	15...17	← →	
Heartbeat Verification module → 🖹 35	23	← →	

7.1.2 Description of the modules

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

Analog Input module

Transmit input variables from the measuring device to the automation system.

Selection: input variable

Slot	Input variables
1…14	▪ Mass flow ▪ Volume flow ▪ Corrected volume flow ▪ Target mass flow [1] ▪ Carrier mass flow [1] ▪ Density ▪ Reference density ▪ Concentration [1] ▪ Temperature ▪ Carrier tube temperature [2] ▪ Electronic temperature ▪ Oscillation frequency ▪ Oscillation amplitude ▪ Frequency fluctuation ▪ Oscillation damping ▪ Tube damping fluctuation ▪ Signal asymmetry ▪ Exciter current ▪ Dynamic viscosity [3] ▪ Kinematic viscosity [3] ▪ Temp. compensated dynamic viscosity [3] ▪ Temp. compensated kinematic viscosity [3]

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

Discrete Input module

Transmit discrete input values from the measuring device to the automation system.

Selection: device function

Slot	Device function	Status (meaning)
1…14	Empty pipe detection	▪ 0 (device function not active) ▪ 1 (device function active)
	Low flow cut off	

Diagnose Input module

Transmit discrete input values (diagnostic information) from the measuring device to the automation system.

Selection: device function

Slot	Device function	Status (meaning)
1…14	Last diagnostics	Diagnostic information number and status
	Current diagnosis	

Status

Coding (hex)	Status
0x00	No device error is present.
0x01	Failure (F): A device error is present. The measured value is no longer valid.
0x02	Function check (C): The device is in service mode (e.g. during a simulation).
0x04	Maintenance required (M): Maintenance is required. The measured value is still valid.
0x08	Out of specification (S): The device is being operated outside its technical specification limits (e.g. process temperature range).

Totalizer module

The Totalizer module consists of the Totalizer Value, Totalizer Control and Totalizer Mode submodules.

Totalizer Value submodule

Transmit transmitter value from the device to the automation system.

Selection: input variable

Slot	Sub-slot	Input variable
15…17	1	▪ Mass flow ▪ Volume flow ▪ Corrected volume flow ▪ Target mass flow [1)] ▪ Carrier mass flow [1)]

1) Only available with the Concentration application package

Totalizer Control submodule

Control the totalizer via the automation system.

Selection: control totalizer

Slot	Sub-slot	Value	Control totalizer
15…17	2	0	Totalize
		1	Reset + hold
		2	Preset + hold
		3	Reset + totalize

Slot	Sub-slot	Value	Control totalizer
		4	Preset + totalize
		5	Hold

Totalizer Mode submodule

Configure the totalizer via the automation system.

Selection: totalizer configuration

Slot	Sub-slot	Value	Control totalizer
15...17	3	0	Balancing
		1	Balance the positive flow
		2	Balance the negative flow

Analog Output module

Transmit compensation values from the automation system to the measuring device.

Assigned compensation values

The configuration is performed via: "Expert" menu → Sensor → External compensation

Slot	Compensation value
18	External pressure
19	External temperature
20	External reference density

Available units

Pressure		Temperature		Density	
Unit code	Unit	Unit code	Unit	Unit code	Unit
1610	Pa a	1001	°C	32840	kg/Nm^3
1616	kPa a	1002	°F	32841	kg/Nl
1614	MPa a	1000	K	32842	g/Scm_3
1137	bar	1003	°R	32843	kg/Scm_3
1611	Pa g			32844	lb/Sft_3
1617	kPa g				
1615	MPa g				
32797	bar g				

Pressure		Temperature		Density	
Unit code	Unit	Unit code	Unit	Unit code	Unit
1142	psi a				
1143	psi g				

Failsafe mode

A failsafe mode can be defined for using the compensation values.

If the status is GOOD or UNCERTAIN, the compensation values transmitted by the automation system are used. If the status is BAD, the failsafe mode is activated for the use of the compensation values.

Parameters are available per compensation value to define the failsafe mode: "Expert" menu → Sensor → External compensation

Fail safe type parameter
- Fail safe value option: The value defined in the Fail safe value parameter is used.
- Fallback value option: The last valid value is used.
- Off option: The failsafe mode is disabled.

Fail safe value parameter
Use this parameter to enter the compensation value which is used if the Fail safe value option is selected in the Fail safe type parameter.

Digital Output module

Transmit discrete output values from the automation system to the measuring device.

Assigned device functions

Slot	Device function	Status (meaning)
21	Flow override	▪ 0 (disable device function) ▪ 1 (enable device function)
22	Zero point adjustment	

Heartbeat Verification module

Receive discrete output values from the automation system and transmit discrete input values from the measuring device to the automation system.

The Heartbeat Verification module receives discrete output data from the automation system and transmits discrete input data from the measuring device to the automation system.

The discrete output value is provided by the automation system in order to start Heartbeat Verification. The discrete input value is depicted in the first byte. The second byte contains status information pertaining to the input value.

The discrete input value is used by the measuring device to transmit the status of the Heartbeat Verification device functions to the automation system. The module cyclically transmits the discrete input value, along with the status, to the automation system. The

discrete input value is depicted in the first byte. The second byte contains status information pertaining to the input value.

Only available with the Heartbeat Verification application package.

Assigned device functions

Slot	Device function	Bit	Verification status
23	Status verification (input data)	0	Verification has not been performed
		1	Verification has failed
		2	Currently performing verification
		3	Verification terminated
	Verification result (input data)	**Bit**	**Verification result**
		4	Verification has failed
		5	Verification performed successfully
		6	Verification has not been performed
		7	–
	Start verification (output data)	**Verification control**	
		A change in the status from 0 to 1 starts the verification	

7.1.3 Status coding

Status	Coding (hex)	Meaning
BAD - Maintenance alarm	0x24	A measured value is not available because a device error has occurred.
BAD - Process related	0x28	A measured value is not available because the process conditions are not within the device's technical specification limits.
BAD - Function check	0x3C	A function check is active (e.g. cleaning or calibration)
UNCERTAIN - Initial value	0x4F	A pre-defined value is output until a correct measured value is available again or until remedial measures have been carried out that change this status.
UNCERTAIN - Maintenance demanded	0x68	Signs of wear and tear have been detected on the measuring device. Short-term maintenance is needed to ensure that the measuring device remains operational. The measured value might be invalid. The use of the measured value depends on the application.
UNCERTAIN - Process related	0x78	The process conditions are not within the device's technical specification limits. This could have a negative impact on the quality and accuracy of the measured value. The use of the measured value depends on the application.

Status	Coding (hex)	Meaning
GOOD - OK	0x80	No error has been diagnosed.
GOOD - Maintenance demanded	0xA8	The measured value is valid. It is highly advisable to service the device in the near future.
GOOD - Function check	0xBC	The measured value is valid. The measuring device is performing an internal function check. The function check does not have any noticeable effect on the process.

7.1.4 Factory setting

The slots are already assigned in the automation system for initial commissioning.

Assigned slots

Slot	Factory setting
1	Mass flow
2	Volume flow
3	Corrected volume flow
4	Density
5	Reference density
6	Temperature
7...12	–
15	Totalizer 1
16	Totalizer 2
17	Totalizer 3

7.2 Cyclic data transmission Promag

The cyclic data transmission described in this section applies to electromagnetic flowmeters (Promag). For cyclic data transmission for Coriolis flowmeters (Promass, Cubemass), see → 31.

7.2.1 Overview of the modules

The following tables shows which modules are available to the measuring device for cyclic data exchange. Cyclic data exchange is performed with an automation system.

Measuring device		Direction Data flow	Control system
Module	Slot		
Analog Input module → 38	1…10	→	PROFINET
Digital Input module → 38	1…10	→	
Diagnose Input module → 39	1…10	→	
Analog Output module → 40	14, 15	←	
Digital Output module → 42	16	←	
Totalizer 1 to 3 → 39	11…13	← →	
Heartbeat Verification module → 42	17	← →	

7.2.2 Description of the modules

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

Analog Input module

Transmit input variables from the measuring device to the automation system.

Selection: input variable

Slot	Input variables
1…10	▪ Volume flow ▪ Mass flow ▪ Corrected volume flow ▪ Flow velocity ▪ Conductivity ▪ Corrected conductivity ▪ Temperature ▪ Electronic temperature

Discrete Input module

Transmit discrete input values from the measuring device to the automation system.

Selection: device function

Slot	Device function	Status (meaning)
1...10	Empty pipe detection	▪ 0 (device function not active) ▪ 1 (device function active)
	Low flow cut off	

Diagnose Input module

Transmit discrete input values (diagnostic information) from the measuring device to the automation system.

Selection: device function

Slot	Device function	Status (meaning)
1...10	Last diagnostics	Diagnostic information number and status
	Current diagnosis	

Status

Coding (hex)	Status
0x00	No device error is present.
0x01	Failure (F): A device error is present. The measured value is no longer valid.
0x02	Function check (C): The device is in service mode (e.g. during a simulation).
0x04	Maintenance required (M): Maintenance is required. The measured value is still valid.
0x08	Out of specification (S): The device is being operated outside its technical specification limits (e.g. process temperature range).

Totalizer module

The Totalizer module consists of the Totalizer Value, Totalizer Control and Totalizer Mode submodules.

Totalizer Value submodule

Transmit transmitter value from the device to the automation system.

Selection: input variable

Slot	Sub-slot	Input variable
11...13	1	▪ Volume flow ▪ Mass flow ▪ Corrected volume flow

Totalizer Control submodule

Control the totalizer via the automation system.

Selection: control totalizer

Slot	Sub-slot	Value	Control totalizer
11...13	2	0	Totalize
		1	Reset + hold
		2	Preset + hold
		3	Reset + totalize
		4	Preset + totalize
		5	Hold

Totalizer Mode submodule

Configure the totalizer via the automation system.

Selection: totalizer configuration

Slot	Sub-slot	Value	Control totalizer
11...13	3	0	Balancing
		1	Balance the positive flow
		2	Balance the negative flow

Analog Output module

Transmit compensation values from the automation system to the measuring device.

Assigned compensation values

The configuration is performed via: "Expert" menu → Sensor → External compensation

Slot	Compensation value
14	External density
15	External temperature

Available units

Density		Temperature	
Unit code	Unit	Unit code	Unit
1100	g/cm^3	1001	°C
1101	g/m^3	1002	°F

Density		Temperature	
Unit code	**Unit**	**Unit code**	**Unit**
1099	kg/dm³	1000	K
1103	kg/l	1003	°R
1097	kg/m³		
1628	SD4°C		
1629	SD15°C		
1630	SD20°C		
32833	SG4°C		
32832	SG15°C		
32831	SG20°C		
1107	lb/ft³		
1108	lb/gal (us)		
32836	lb/bbl (us;liq.)		
32835	lb/bbl (us;beer)		
32837	lb/bbl (us;oil)		
32834	lb/bbl (us;tank)		
1403	lb/gal (imp)		
32838	lb/bbl (imp;beer)		
32839	lb/bbl (imp;oil)		

Failsafe mode

A failsafe mode can be defined for using the compensation values.

If the status is GOOD or UNCERTAIN, the compensation values transmitted by the automation system are used. If the status is BAD, the failsafe mode is activated for the use of the compensation values.

Parameters are available per compensation value to define the failsafe mode: "Expert" menu → Sensor → External compensation

Fail safe type parameter
- Fail safe value option: The value defined in the Fail safe value parameter is used.
- Fallback value option: The last valid value is used.
- Off option: The failsafe mode is disabled.

Fail safe value parameter
Use this parameter to enter the compensation value which is used if the Fail safe value option is selected in the Fail safe type parameter.

Digital Output module

Transmit discrete output values from the automation system to the measuring device.

Assigned device functions

Slot	Device function	Status (meaning)
16	Flow override	▪ 0 (disable device function) ▪ 1 (enable device function)

Heartbeat Verification module

Receive discrete output values from the automation system and transmit discrete input values from the measuring device to the automation system.

The Heartbeat Verification module receives discrete output data from the automation system and transmits discrete input data from the measuring device to the automation system.

The discrete output value is provided by the automation system in order to start Heartbeat Verification. The discrete input value is depicted in the first byte. The second byte contains status information pertaining to the input value.

The discrete input value is used by the measuring device to transmit the status of the Heartbeat Verification device functions to the automation system. The module cyclically transmits the discrete input value, along with the status, to the automation system. The discrete input value is depicted in the first byte. The second byte contains status information pertaining to the input value.

Only available with the Heartbeat Verification application package.

Assigned device functions

Slot	Device function	Bit	Verification status
17	Status verification (input data)	0	Verification has not been performed
		1	Verification has failed
		2	Currently performing verification
		3	Verification terminated
	Verification result (input data)	**Bit**	**Verification result**
		4	Verification has failed
		5	Verification performed successfully
		6	Verification has not been performed
		7	–
	Start verification (output data)	**Verification control**	
		A change in the status from 0 to 1 starts the verification	

7.2.3 Status coding

Status	Coding (hex)	Meaning
BAD - Maintenance alarm	0x24	A measured value is not available because a device error has occurred.
BAD - Process related	0x28	A measured value is not available because the process conditions are not within the device's technical specification limits.
BAD - Function check	0x3C	A function check is active (e.g. cleaning or calibration)
UNCERTAIN - Initial value	0x4F	A pre-defined value is output until a correct measured value is available again or until remedial measures have been carried out that change this status.
UNCERTAIN - Maintenance demanded	0x68	Signs of wear and tear have been detected on the measuring device. Short-term maintenance is needed to ensure that the measuring device remains operational. The measured value might be invalid. The use of the measured value depends on the application.
UNCERTAIN - Process related	0x78	The process conditions are not within the device's technical specification limits. This could have a negative impact on the quality and accuracy of the measured value. The use of the measured value depends on the application.
GOOD - OK	0x80	No error has been diagnosed.
GOOD - Maintenance demanded	0xA8	The measured value is valid. It is highly advisable to service the device in the near future.
GOOD - Function check	0xBC	The measured value is valid. The measuring device is performing an internal function check. The function check does not have any noticeable effect on the process.

7.2.4 Factory setting

The slots are already assigned in the automation system for initial commissioning.

Assigned slots

Slot	Factory setting
1	Volume flow
2	Mass flow
3	Corrected volume flow
4	Flow velocity
5	Conductivity
6	Corrected conductivity

Slot	Factory setting
7	Temperature
8…10	–
11	Totalizer 1
12	Totalizer 2
13	Totalizer 3

8 Commissioning

8.1 Function check

Before commissioning the measuring device:

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

- "Post-installation check" checklist
- "Post-connection check" checklist → 23

8.2 Setting the operating language

Factory setting: English or ordered local language

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

8.3 Identifying the device in the PROFINET network

A device can be quickly identified within a plant using the PROFINET flash function. If the PROFINET flash function is activated in the automation system, the LED indicating the network status flashes and the red backlight of the onsite display is switched on.

For detailed information on the flash function, see the Operating Instructions for the device.

8.4 Startup parameterization

By activating the startup parameterization function (NSU: Normal Startup Unit), the configuration of the most important measuring device parameters is taken from the automation system.

For configurations taken from the automation system, see the Operating Instructions for the device.

8.5 Configuring the measuring device

The **Setup** menu with its submenus enable fast commissioning of the measuring device. The submenus contain all the parameters required for configuration, such as parameters for measurement or communication.

The submenus available in the particular device can vary on account of the device version (e.g. sensor).

Submenu	Meaning
Medium selection	Define the medium
Output conditioning	Define the output conditioning
System units	Configure the units for all measured values
Communication	Configure the digital communication interface

Submenu	Meaning
Display	Configure the measured value display
Low flow cut off	Set the low flow cut off
Partially filled pipe detection	Configure partial and empty pipe detection
Empty pipe detection	Configure empty pipe detection

8.6 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
- Write protection via write protection switch
- Write protection via startup parameterization → 45

For detailed information on protecting the settings against unauthorized access, see the Operating Instructions for the device.

9 Diagnostic information

Any faults detected by the measuring device are displayed as a diagnostic message in the operating tool once the connection has been established and on the home page of the web browser once the user has logged on.

Remedial measures are provided for each diagnostic message to ensure that problems can be rectified quickly.
- Web browser: Remedial measures are displayed in red on the home page next to the diagnostic message → 28.
- FieldCare: Remedial measures are displayed on the home page in a separate field below the diagnostic message: see the Operating Instructions for the device

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