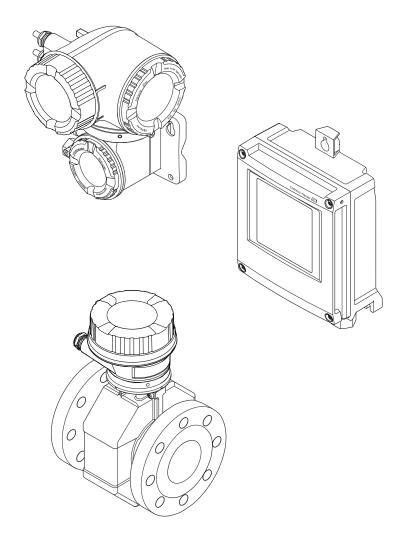
01.01.zz (Device firmware)

Operating Instructions **Proline Promag P 500 PROFIBUS PA**

Electromagnetic flowmeter







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

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1 About this document

1.1 Document function

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

1.2 Symbols used

1.2.1 Safety symbols

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

1.2.2 Electrical symbols

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

1.2.3 Communication symbols

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

Symbol	Meaning
Ϋ́Υ.	LED Light emitting diode is on.
	LED Light emitting diode is flashing.

1.2.4 Tool symbols

Symbol	Meaning
	Torx screwdriver
•	Phillips head screwdriver
Ń	Open-ended wrench

1.2.5 Symbols for certain types of information

Symbol	Meaning
	Permitted Procedures, processes or actions that are permitted.
	Preferred Procedures, processes or actions that are preferred.
×	Forbidden Procedures, processes or actions that are forbidden.
i	Tip Indicates additional information.
Ĩ	Reference to documentation.
	Reference to page.
	Reference to graphic.
►	Notice or individual step to be observed.
1., 2., 3	Series of steps.
L.	Result of a step.
?	Help in the event of a problem.
	Visual inspection.

1.2.6 Symbols in graphics

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

Symbol	Meaning
×	Safe area (non-hazardous area)
≈≠	Flow direction

1.3 Documentation

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

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

Detailed list of the individual documents along with the documentation code $\rightarrow \cong 231$

1.3.1 Standard documentation

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

1.3.2 Supplementary device-dependent documentation

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

1.4 Registered trademarks

PROFIBUS®

Registered trademark of the PROFIBUS User Organization, Karlsruhe, Germany

2 Basic safety instructions

2.1 Requirements for the personnel

The personnel for installation, commissioning, diagnostics and maintenance must fulfill the following requirements:

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

The operating personnel must fulfill the following requirements:

- Are instructed and authorized according to the requirements of the task by the facility's owner-operator.
- Follow the instructions in this manual.

2.2 Designated use

Application and media

The measuring device described in these Brief Operating Instructions is intended only for flow measurement of liquids with a minimum conductivity of 5 μ S/cm.

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

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

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

- Keep within the specified pressure and temperature range.
- Only use the measuring device in full compliance with the data on the nameplate and the general conditions listed in the Operating Instructions and supplementary documentation.
- Based on the nameplate, check whether the ordered device is permitted for the intended use in the hazardous area (e.g. explosion protection, pressure vessel safety).
- Use the measuring device only for media to which the process-wetted materials are sufficiently resistant.
- Protect the measuring device permanently against corrosion from environmental influences.

Incorrect use

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

WARNING

Danger of breakage due to corrosive or abrasive fluids and ambient conditions!

- Verify the compatibility of the process fluid with the sensor material.
- Ensure the resistance of all fluid-wetted materials in the process.
- ► Keep within the specified pressure and temperature range.

NOTICE

Verification for borderline cases:

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

Residual risks

WARNING

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

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

WARNING

Danger from medium escaping!

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

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

2.3 Workplace safety

For work on and with the device:

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

For welding work on the piping:

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

If working on and with the device with wet hands:

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

2.4 Operational safety

Risk of injury.

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

Conversions to the device

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

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

Repair

To ensure continued operational safety and reliability,

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

2.5 Product safety

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

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

2.6 IT security

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

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

2.7 Device-specific IT security

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

Function/interface	Factory setting	Recommendation
Write protection via hardware write protection switch $\rightarrow \square 11$	Not enabled.	On an individual basis following risk assessment.
Access code (also applies for Web server login or FieldCare connection) $\rightarrow \bigoplus 12$	Not enabled (0000).	Assign a customized access code during commissioning.
WLAN (order option in display module)	Enabled.	On an individual basis following risk assessment.
WLAN security mode	Enabled (WPA2- PSK)	Do not change.
WLAN passphrase (password) → 🗎 12	Serial number	Assign a customized access code during commissioning.
WLAN mode	Access Point	On an individual basis following risk assessment.
Web server→ 🗎 12	Enabled.	On an individual basis following risk assessment.
CDI-RJ45 service interface $\rightarrow \square 13$	-	On an individual basis following risk assessment.

2.7.1 Protecting access via hardware write protection

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

Hardware write protection is disabled when the device is delivered $\rightarrow \cong 143$.

2.7.2 Protecting access via a password

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

User-specific access code

Protect write access to the device parameters via the local display, Web browser or operating tool (e.g. FieldCare, DeviceCare). Access authorization is clearly regulated through the use of a user-specific access code.

- WLAN passphrase The network key protects a connection between an operating unit (e.g. notebook or tablet) and the device via the WLAN interface which can be ordered as an option.
- Infrastructure mode

When the device is operated in infrastructure mode, the WLAN passphrase corresponds to the WLAN passphrase configured on the operator side.

User-specific access code

Write access to the device parameters via the local display, Web browser or operating tool (e.g. FieldCare, DeviceCare) can be protected by the modifiable, user-specific access code ($\rightarrow \square 141$).

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

WLAN passphrase: Operation as WLAN access point

A connection between an operating unit (e.g. notebook or tablet) and the device via the WLAN interface ($\rightarrow \bowtie 89$), which can be ordered as an optional extra, is protected by the network key. The WLAN authentication of the network key complies with the IEEE 802.11 standard.

When the device is delivered, the network key is pre-defined depending on the device. It can be changed via the **WLAN settings** submenu in the **WLAN passphrase** parameter ($\rightarrow \square$ 135).

Infrastructure mode

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

General notes on the use of passwords

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

The device can be operated and configured via a Web browser with the integrated Web server ($\rightarrow \cong 81$). The connection is via the service interface (CDI-RJ45) or the WLAN interface.

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

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

Fi I

For detailed information on device parameters, see: The "Description of Device Parameters" document $\rightarrow \bigoplus 232$.

2.7.4 Access via service interface (CDI-RJ45)

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

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

3 Product description

The measuring system consists of a transmitter and a sensor. The transmitter and sensor are mounted in physically separate locations. They are interconnected by connecting cables.

3.1 Product design

Two versions of the transmitter are available.

3.1.1 Proline 500 – digital

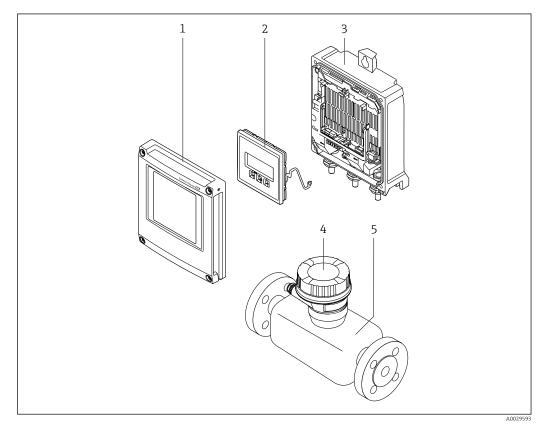
Signal transmission: digital

Order code for "Integrated ISEM electronics", option A "Sensor"

For use in applications not required to meet special requirements due to ambient or operating conditions.

As the electronics are located in the sensor, the device is ideal: For simple transmitter replacement.

- A standard cable can be used as the connecting cable.
- Not sensitive to external EMC interference.



Important components of a measuring device

- *1 Electronics compartment cover*
- 2 Display module
- 3 Transmitter housing
- 4 Sensor connection housing with integrated ISEM electronics: connecting cable connection
- 5 Sensor

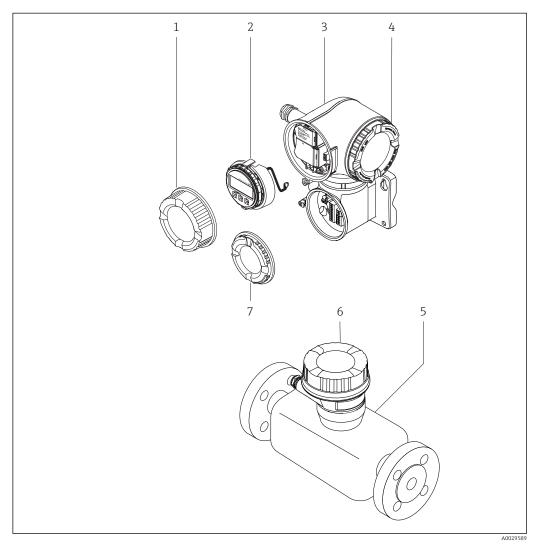
3.1.2 Proline 500

Signal transmission: analog Order code for "Integrated ISEM electronics", option **B** "Transmitter"

For use in applications required to meet special requirements due to ambient or operating conditions.

As the electronics are located in the transmitter, the device is ideal in the event of: • Sensor operation in underground installations.

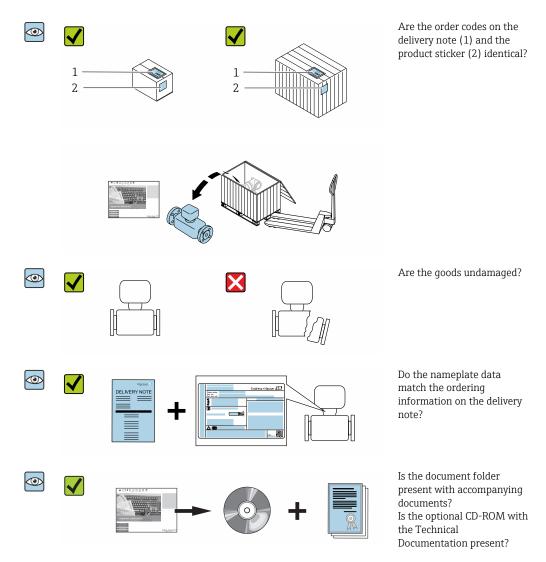
Permanent sensor immersion in water.



- Important components of a measuring device
- 1 Connection compartment cover
- 2 Display module
- 3 Transmitter housing with integrated ISEM electronics
- 4 Electronics compartment cover
- 5 Sensor
- 6 Sensor connection housing: connecting cable connection
- 7 Connection compartment cover: connecting cable connection

4 Incoming acceptance and product identification

4.1 Incoming acceptance



4.2 Product identification

The following options are available for identification of the device:

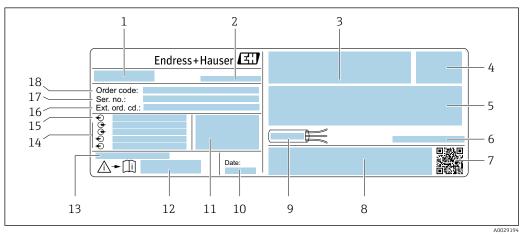
- Nameplate specifications
- Order code with breakdown of the device features on the delivery note
- Enter serial numbers from nameplates in the *W@M Device Viewer* (www.endress.com/deviceviewer): All information about the device is displayed.
- Enter the serial number from nameplates in the *Endress+Hauser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

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

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

4.2.1 Transmitter nameplate

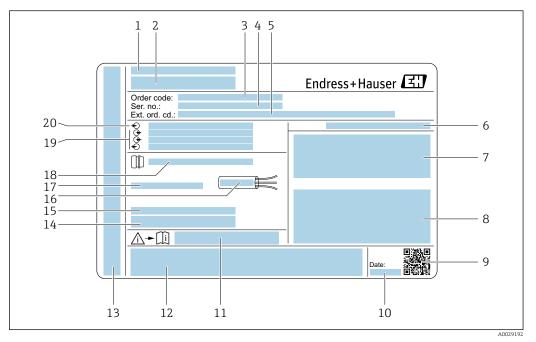
Proline 500 – digital



Example of a transmitter nameplate

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

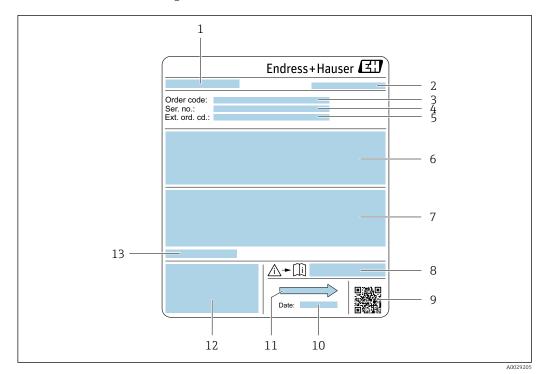
Proline 500



Example of a transmitter nameplate

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

4.2.2 Sensor nameplate



- ☑ 5 Example of sensor nameplate
- 1 Name of the sensor
- 2 Manufacturing location
- 3 Order code
- 4 Serial number (ser. no.)
- 5 Extended order code (Ext. ord. cd.)
- 6 Flow; nominal diameter of the sensor; pressure rating; nominal pressure; system pressure; fluid temperature range; material of liner and electrodes
- 7 Approval information for explosion protection, Pressure Equipment Directive and degree of protection
- 8 Document number of safety-related supplementary documentation
- 9 2-D matrix code
- 10 Manufacturing date: year-month
- 11 Flow direction
- 12 CE mark, C-Tick
- 13 Permitted ambient temperature (T_a)



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 approvalrelated 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 +).

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

4.2.3 Symbols on measuring device

5 Storage and transport

5.1 Storage conditions

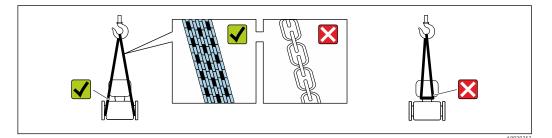
Observe the following notes for storage:

- Store in the original packaging to ensure protection from shock.
- Do not remove protective covers or protective caps installed on process connections. They prevent mechanical damage to the sealing surfaces and contamination in the measuring tube.
- Protect from direct sunlight to avoid unacceptably high surface temperatures.
- Select a storage location where moisture cannot collect in the measuring device as fungus and bacteria infestation can damage the lining.
- Store in a dry and dust-free place.
- Do not store outdoors.

Storage temperature \rightarrow \cong 217

5.2 Transporting the product

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



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

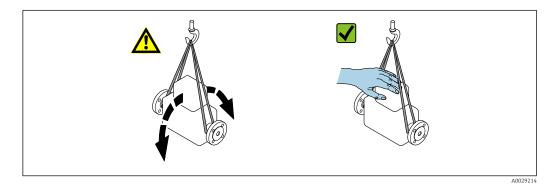
5.2.1 Measuring devices without lifting lugs

WARNING

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

Risk of injury if the measuring device slips.

- Secure the measuring device against slipping or turning.
- Observe the weight specified on the packaging (stick-on label).



5.2.2 Measuring devices with lifting lugs

ACAUTION

Special transportation instructions for devices with lifting lugs

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

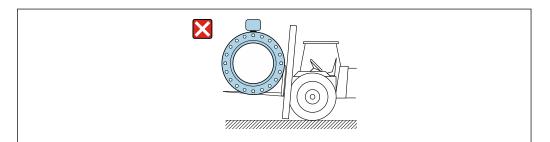
5.2.3 Transporting with a fork lift

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

ACAUTION

Risk of damaging the magnetic coil

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



5.3 Packaging disposal

All packaging materials are environmentally friendly and 100 % recyclable:

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

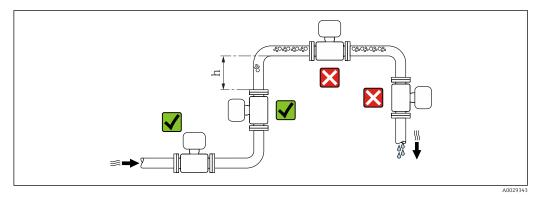
Paper pads

6 Installation

6.1 Installation conditions

6.1.1 Mounting position

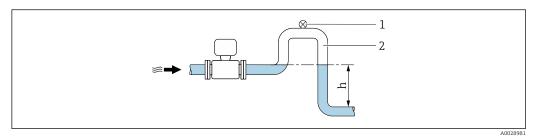
Mounting location



Preferably install the sensor in an ascending pipe, and ensure a sufficient distance to the next pipe elbow: $h \ge 2 \times DN$.

Installation in down pipes

Install a siphon with a vent valve downstream of the sensor in down pipes whose length $h \ge 5 \text{ m}$ (16.4 ft). This precaution is to avoid low pressure and the consequent risk of damage to the measuring tube. This measure also prevents the system losing prime.



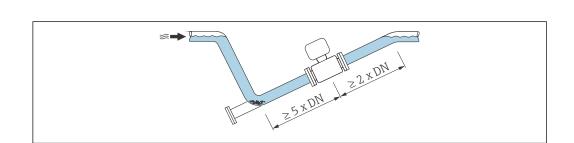
■ 6 Installation in a down pipe

- 1 Vent valve
- 2 Pipe siphon
- h Length of down pipe

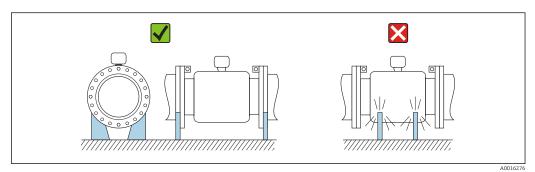
Installation in partially filled pipes

A partially filled pipe with a gradient necessitates a drain-type configuration.

No inlet runs necessary with order code for "Design", option C, H, I



For heavy sensors $DN \ge 350$ (14")



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).

	Recommendation		
A	Vertical orientation	A0015591	
В	Horizontal orientation, transmitter at top	A0015589	✓ ✓ ¹⁾
С	Horizontal orientation, transmitter at bottom	A0015590	
D	Horizontal orientation, transmitter at side	A0015592	×

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

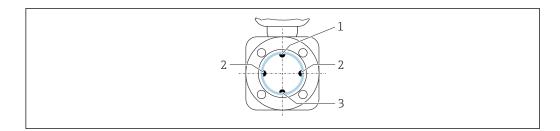
2) Applications with high process temperatures may increase the ambient temperature. To maintain the maximum ambient temperature for the transmitter, this orientation is recommended.

3) To prevent the electronics module from overheating in the case of a sharp rise in temperature (e.g. CIP or SIP processes), install the device with the transmitter component pointing downwards.

4) With the empty pipe detection function switched on: empty pipe detection only works if the transmitter housing is pointing upwards.

Horizontal

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



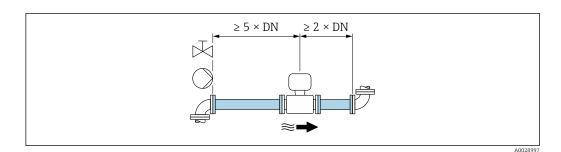
- 1 EPD electrode for empty pipe detection
- 2 Measuring electrodes for signal detection
- 3 Reference electrode for potential equalization



Measuring devices with tantalum or platinum electrodes can be ordered without an EPD electrode. In this case, empty pipe detection is performed via the measuring electrodes.

Inlet and outlet runs

If possible, install the sensor upstream from fittings such as valves, T-pieces or elbows. Observe the following inlet and outlet runs to comply with accuracy specifications:



Installation dimensions

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

6.1.2 Environment and process requirements

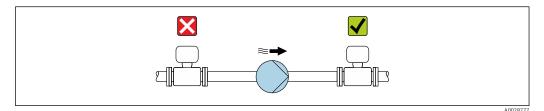
Ambient temperature range

Transmitter	 Standard: -40 to +60 °C (-40 to +140 °F) Optional: -50 to +60 °C (-58 to +140 °F) (order code for "Test, certificate", option JN "Ambient temperature of transmitter -50 °C (-58 °F)")
Local display	-20 to $+60$ °C (-4 to $+140$ °F), the readability of the display may be impaired at temperatures outside the temperature range.
Sensor	 Process connection material, carbon steel: -10 to +60 °C (+14 to +140 °F) Process connection material, stainless steel: -40 to +60 °C (-40 to +140 °F)
Liner	Do not exceed or fall below the permitted temperature range of the liner .

If operating outdoors:

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

System pressure



Never install the sensor on the pump suction side in order to avoid the risk of low pressure, and thus damage to the liner.

Furthermore, install pulse dampers if reciprocating, diaphragm or peristaltic pumps are used.

- 📔 🛛 Information on the liner's resistance to partial vacuum

 - Information on the vibration resistance of the measuring system \rightarrow 🖺 217

Vibrations

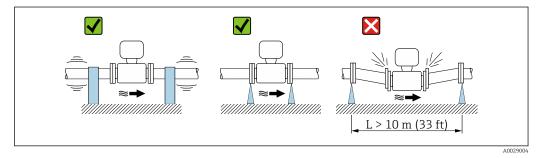


Image: Measures to prevent vibration of the device

In the event of very strong vibrations, the pipe and sensor must be supported and fixed.

- Information on the shock resistance of the measuring system \rightarrow 🗎 217
- Information on the vibration resistance of the measuring system \rightarrow 🖺 217

Thermal insulation

If process fluids are very hot, it is necessary to insulate pipes in order to reduce energy loss and to prevent individuals from accidentally coming into contact with hot pipes. Please observe the applicable standards and guidelines for insulating pipes.

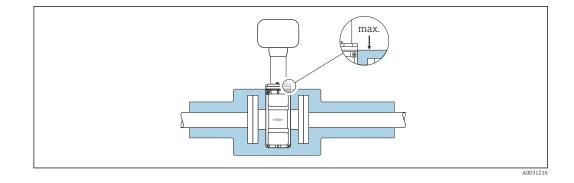
A housing support/an extended neck is used for heat dissipation:

- Devices with the order code for "Lining", option B "PFA high-temperature" always come with a housing support.
- In the case of all other devices, a housing support can be ordered via the order code for "Sensor option", option **CG** "Sensor extended neck".

WARNING

Electronics overheating on account of thermal insulation!

The housing support is used for heat dissipation and must be completely free (i.e. uncovered). At the very maximum, the sensor insulation may extend as far as the upper edge of the two sensor half-shells.



Adapters

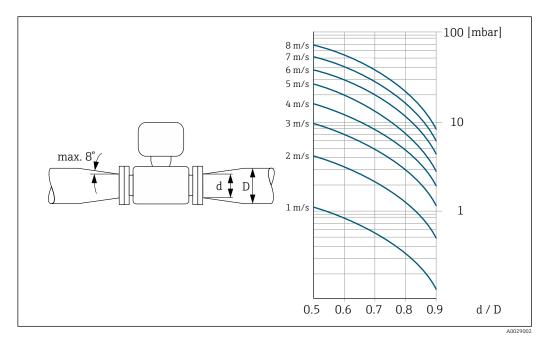
Suitable adapters to DIN EN 545 (double-flange reducers) can be used to install the sensor in larger-diameter pipes. The resultant increase in the rate of flow improves measuring accuracy with very slow-moving fluids. The nomogram shown here can be used to calculate the pressure loss caused by reducers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

The nomogram only applies to liquids with a viscosity similar to that of water. •



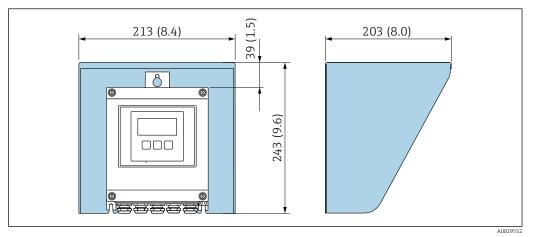
1. Calculate the ratio of the diameters d/D.

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

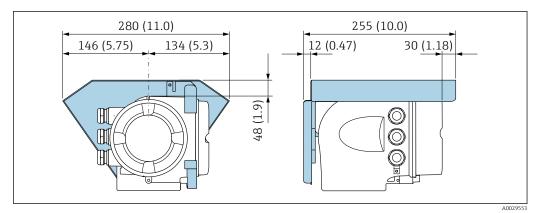


6.1.3 Special mounting instructions

Protective cover



🗟 8 Weather protection cover for Proline 500 – digital



Weather protection cover for Proline 500

6.2 Mounting the measuring device

6.2.1 Required tools

For transmitter

For mounting on a post:

- Proline 500 digital transmitter
 - Open-ended wrench AF 10
 - Torx screwdriver TX 25
- Proline 500 transmitter
 Open-ended wrench AF 13

For wall mounting: Drill with drill bit Ø 6.0 mm

For sensor

For flanges and other process connections: Corresponding mounting tools

6.2.2 Preparing the measuring device

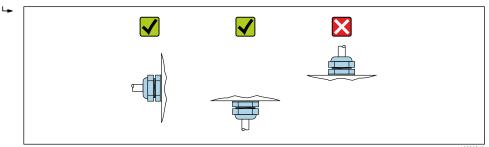
- 1. Remove all remaining transport packaging.
- 2. Remove any protective covers or protective caps present from the sensor.
- 3. Remove stick-on label on the electronics compartment cover.

6.2.3 Mounting the sensor

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 sensor matches the flow direction of the medium.
- 2. To ensure compliance with device specifications, install the measuring device between the pipe flanges in a way that it is centered in the measurement section.
- 3. If using ground disks, comply with the Installation Instructions provided.
- 4. Observe required screw tightening torques $\rightarrow \cong 30$.
- 5. Install the measuring device or turn the transmitter housing so that the cable entries do not point upwards.



Mounting the seals

ACAUTION

An electrically conductive layer could form on the inside of the measuring tube! Risk of measuring signal short circuit.

Do not use electrically conductive sealing compounds such as graphite.

Comply with the following instructions when installing seals:

- 1. For DIN flanges: only use seals according to DIN EN 1514-1.
- 2. For "PFA" liner: generally additional seals are not required.
- 3. For "PTFE" liner: generally additional seals are **not** required.

Mounting the ground cable/ground disks

Comply with the information on potential equalization and detailed mounting instructions for the use of ground cables/ground disks .

Screw tightening torques

Please note the following:

- The screw tightening torques listed below apply only to lubricated threads and to pipes not subjected to tensile stress.
- Tighten the screws uniformly and in diagonally opposite sequence.
- Overtightening the screws will deform the sealing faces or damage the seals.

R Nominal screw tightening torques → 🗎 33

Maximum screw tightening torques

Maximum screw tightening torques for EN 1092-1 (DIN 2501)

Nominal diameter	Pressure rating	Screws	Flange thickness	Max. screw tightening torque [Nm]	
[mm]	[bar]	[mm]	[mm]	PTFE	PFA
15	PN 40	4 × M12	16	11	-
25	PN 40	4 × M12	18	26	20
32	PN 40	4 × M16	18	41	35
40	PN 40	4 × M16	18	52	47
50	PN 40	4 × M16	20	65	59
65 ¹⁾	PN 16	8 × M16	18	43	40
65	PN 40	8 × M16	22	43	40
80	PN 16	8 × M16	20	53	48
80	PN 40	8 × M16	24	53	48
100	PN 16	8 × M16	20	57	51
100	PN 40	8 × M20	24	78	70
125	PN 16	8 × M16	22	75	67
125	PN 40	8 × M24	26	111	99
150	PN 16	8 × M20	22	99	85
150	PN 40	8 × M24	28	136	120
200	PN 10	8 × M20	24	141	101
200	PN 16	12 × M20	24	94	67
200	PN 25	12 × M24	30	138	105
250	PN 10	12 × M20	26	110	-
250	PN 16	12 × M24	26	131	-
250	PN 25	12 × M27	32	200	-
300	PN 10	12 × M20	26	125	-
300	PN 16	12 × M24	28	179	-
300	PN 25	16 × M27	34	204	-
350	PN 10	16 × M20	26	188	-
350	PN 16	16 × M24	30	254	-
350	PN 25	16 × M30	38	380	-
400	PN 10	16 × M24	26	260	-
400	PN 16	16 × M27	32	330	-
400	PN 25	16 × M33	40	488	-
450	PN 10	20 × M24	28	235	-
450	PN 16	20 × M27	40	300	-

Nominal diameter	Pressure rating	Screws	Flange thickness	Max. screw tightening torque [Nm]	
[mm]	[bar]	[mm]	[mm]	PTFE	PFA
450	PN 25	20 × M33	46	385	-
500	PN 10	20 × M24	28	265	-
500	PN 16	20 × M30	34	448	-
500	PN 25	20 × M33	48	533	-
600	PN 10	20 × M27	28	345	-
600	PN 16	20 × M33	36	658	-
600	PN 25	20 × M36	58	731	_

1) Sizing as per EN 1092-1 (not DIN 2501)

Nominal diameter		Pressure rating	Screws	Max. screw tightening torque [Nn ([lbf · ft])	
[mm]	[in]	[psi]	[in]	PTFE	PFA
15	1/2	Class 150	4 × 1/2	6 (4)	- (-)
15	1/2	Class 300	4 × 1/2	6 (4)	- (-)
25	1	Class 150	4 × 1/2	11 (8)	10 (7)
25	1	Class 300	4 × 5/8	14 (10)	12 (9)
40	1 ½	Class 150	4 × 1/2	24 (18)	21 (15)
40	1 1⁄2	Class 300	4 × ¾	34 (25)	31 (23)
50	2	Class 150	4 × 5/8	47 (35)	44 (32)
50	2	Class 300	8 × 5/8	23 (17)	22 (16)
80	3	Class 150	4 × 5/8	79 (58)	67 (49)
80	3	Class 300	8 × ¾	47 (35)	42 (31)
100	4	Class 150	8 × 5/8	56 (41)	50 (37)
100	4	Class 300	8 × ¾	67 (49)	59 (44)
150	6	Class 150	8 × ¾	106 (78)	86 (63)
150	6	Class 300	12 × ¾	73 (54)	67 (49)
200	8	Class 150	8 × ¾	143 (105)	109 (80)
250	10	Class 150	12 × 7/8	135 (100)	- (-)
300	12	Class 150	12 × 7/8	178 (131)	- (-)
350	14	Class 150	12 × 1	260 (192)	- (-)
400	16	Class 150	16 × 1	246 (181)	- (-)
450	18	Class 150	16 × 1 1/8	371 (274)	- (-)
500	20	Class 150	20 × 1 1/8	341 (252)	- (-)
600	24	Class 150	20 × 1 ¼	477 (352)	- (-)

Maximum screw tightening torques for JIS B2220

Nominal diameter	Pressure rating	Screws	Max. screw tightening torque [Nm]	
[mm]	[bar]	[mm]	PTFE	PFA
25	10K	4 × M16	32	27
	20K	4 × M16	32	27

Nominal diameter	Pressure rating	Screws	Max. screw tightening torque [Nm]	
[mm]	[bar]	[mm]	PTFE	PFA
32	10K	4 × M16	38	-
	20K	4 × M16	38	-
40	10K	4 × M16	41	37
	20K	4 × M16	41	37
50	10K	4 × M16	54	46
	20K	8 × M16	27	23
65	10K	4 × M16	74	63
	20K	8 × M16	37	31
80	10K	8 × M16	38	32
	20K	8 × M20	57	46
100	10K	8 × M16	47	38
	20K	8 × M20	75	58
125	10K	8 × M20	80	66
	20K	8 × M22	121	103
150	10K	8 × M20	99	81
	20K	12 × M22	108	72
200	10K	12 × M20	82	54
	20K	12 × M22	121	88
250	10K	12 × M22	133	-
	20K	12 × M24	212	-
300	10K	16 × M22	99	-
	20K	16 × M24	183	-

Screw tightening torques for AS 2129, Table E

Nominal diameter	Screws	Max. screw tightening torque [Nm]	
[mm]	[mm]	PTFE	
25	4 × M12	21	
50	4 × M16	42	

Screw tightening torques for AS 4087, PN 16

Nominal diameter	Screws	Max. screw tightening torque [Nm]	
[mm]	[mm]	PTFE	
50	4 × M16	42	

Nominal screw tightening torques

Nominal diameter	Pressure rating	Screws	Nom. screw tightening torque [Nm]	
[mm]	[bar]	[mm]	HG	PUR
350	10K	16 × M22	109	109
	20K	16 × M30×3	217	217
400	10K	16 × M24	163	163
	20K	16 × M30×3	258	258
450	10K	16 × M24	155	155
	20K	16 × M30×3	272	272
500	10K	16 × M24	183	183
	20K	16 × M30×3	315	315
600	10K	16 × M30	235	235
	20K	16 × M36×3	381	381

Nominal screw tightening torques for JIS B2220

6.2.4 Mounting the transmitter housing: Proline 500 – digital

ACAUTION

Ambient temperature too high!

Danger of electronics overheating and housing deformation.

- ▶ Do not exceed the permitted maximum ambient temperature $\rightarrow \cong 25$.
- If operating outdoors: Avoid direct sunlight and exposure to weathering, particularly in warm climatic regions.

Excessive force can damage the housing!

► Avoid excessive mechanical stress.

The transmitter can be mounted in the following ways:

- Post mounting
- Wall mounting

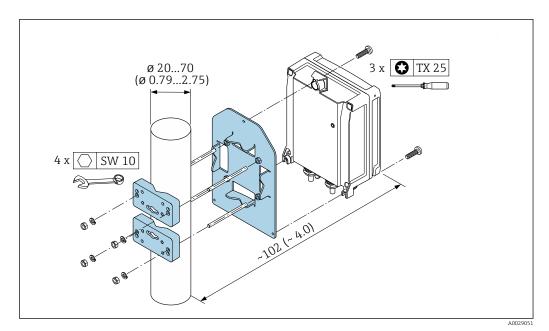
Post mounting

WARNING

Excessive tightening torque applied to the fixing screws!

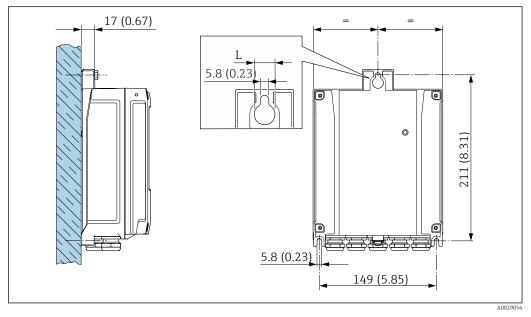
Risk of damaging the plastic transmitter.

• Tighten the fixing screws as per the tightening torque: 2 Nm (1.5 lbf ft)



📧 10 Engineering unit mm (in)

Wall mounting



🖻 11 Engineering unit mm (in)

L Depends on order code for "Transmitter housing"

Order code for "Transmitter housing"

- Option **A**, aluminum coated: L =14 mm (0.55 in)
- Option **D**, polycarbonate: L = 13 mm (0.51 in)
- 1. Drill the holes.
- 2. Insert wall plugs into the drilled holes.
- 3. Screw in the securing screws slightly at first.
- 4. Fit the transmitter housing over the securing screws and mount in place.
- 5. Tighten the securing screws.

6.2.5 Mounting the transmitter housing: Proline 500

ACAUTION

Ambient temperature too high!

Danger of electronics overheating and housing deformation.

- Do not exceed the permitted maximum ambient temperature $\rightarrow \cong 25$.
- ► If operating outdoors: Avoid direct sunlight and exposure to weathering, particularly in warm climatic regions.

ACAUTION

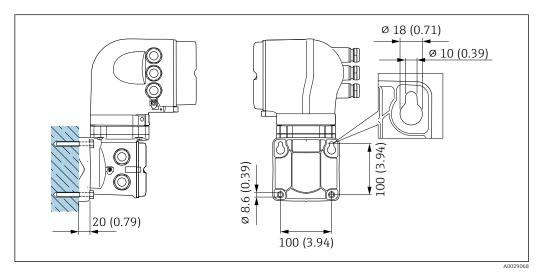
Excessive force can damage the housing!

• Avoid excessive mechanical stress.

The transmitter can be mounted in the following ways:

- Post mounting
- Wall mounting

Wall mounting



🖻 12 Engineering unit mm (in)

1. Drill the holes.

2. Insert wall plugs into the drilled holes.

- 3. Screw in the securing screws slightly at first.
- 4. Fit the transmitter housing over the securing screws and mount in place.
- 5. Tighten the securing screws.

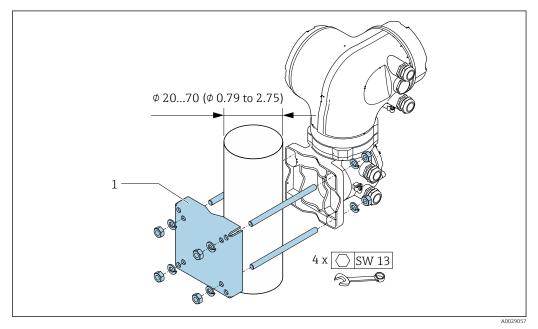
Post mounting

WARNING

Order code for "Transmitter housing", option L "Cast, stainless": cast transmitters are very heavy.

They are unstable if they are not mounted on a secure, fixed post.

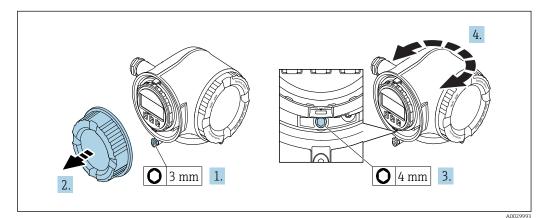
• Only mount the transmitter on a secure, fixed post on a stable surface.



■ 13 Engineering unit mm (in)

6.2.6 Turning the transmitter housing: Proline 500

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

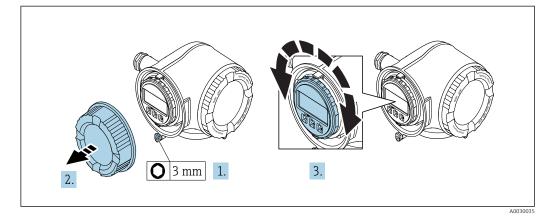


- **1.** Depending on the device version: Loosen the securing clamp of the connection compartment cover.
- 2. Unscrew the connection compartment cover.
- 3. Release the fixing screw.
- 4. Turn the housing to the desired position.
- 5. Firmly tighten the securing screw.
- 6. Screw on the connection compartment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

7. Depending on the device version: Attach the securing clamp of the connection compartment cover.

6.2.7 Turning the display module: Proline 500

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



- **1.** Depending on the device version: Loosen the securing clamp of the connection compartment cover.
- 2. Unscrew the connection compartment cover.
- **3.** Turn the display module to the desired position: max. $8 \times 45^{\circ}$ in each direction.
- 4. Screw on the connection compartment cover.
- **5.** Depending on the device version: Attach the securing clamp of the connection compartment cover.

6.3 Post-installation check

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

7 Electrical connection

NOTICE

The measuring device does not have an internal circuit breaker.

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

7.1 Connection conditions

7.1.1 Required tools

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

7.1.2 Requirements for connecting cable

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

Electrical safety

In accordance with applicable federal/national regulations.

Protective ground cable

Cable $\geq 2.08 \text{ mm}^2$ (14 AWG)

The grounding impedance must be less than $1 \,\Omega$.

Permitted temperature range

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

Power supply cable

Standard installation cable is sufficient.

Signal cable

PROFIBUS PA

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

For further information on planning and installing PROFIBUS networks see:

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

Current output 0/4 to 20 mA

Standard installation cable is sufficient.

Pulse/frequency/switch output

Standard installation cable is sufficient.

Relay output

Standard installation cable is sufficient.

Current input 0/4 to 20 mA Standard installation cable is sufficient.

Status input

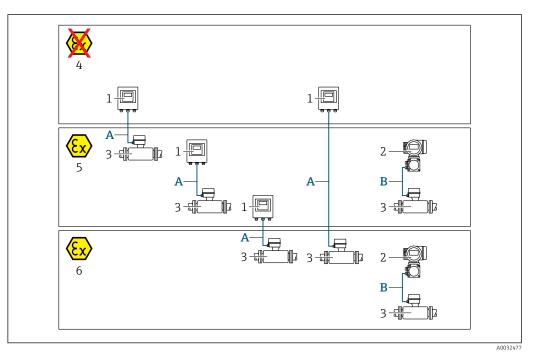
Standard installation cable is sufficient.

Cable diameter

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

Choice of connecting cable between the transmitter and sensor

Depends on the type of transmitter and the installation zones



- 1 Proline 500 digital transmitter
- 2 Proline 500 transmitter
- 3 Promag sensor
- 4 Non-hazardous area
- 5 Hazardous area: Zone 2; Class I, Division 2
- 6 Hazardous area: Zone 1; Class I, Division 1
- A Standard cable to 500 digital transmitter → ≅ 40 Transmitter installed in the non-hazardous area or hazardous area: Zone 2; Class I, Division 2 / sensor installed in the hazardous area: Zone 2; Class I, Division 2 or Zone 1; Class I, Division 1
- B Signal cable to 500 transmitter → 10 40 Transmitter and sensor installed in the hazardous area: Zone 2; Class I, Division 2 oder Zone 1; Class I, Division 1

A: Connecting cable between sensor and transmitter: Proline 500 – digital Standard cable

A standard cable with the following specifications can be used as the connecting cable.

Design	4 cores (2 pairs); uninsulated stranded CU wires; pair-stranded with common shield
Shielding	Tin-plated copper-braid, optical cover \geq 85 %
Cable length	Maximum 300 m (1000 ft), see the following table.

	Cable lengths for use in			
Cross-section	Non-hazardous area, Hazardous area: Zone 2; Class I, Division 2	Hazardous area: Zone 1; Class I, Division 1		
0.34 mm ² (AWG 22)	80 m (270 ft)	50 m (165 ft)		
0.50 mm ² (AWG 20)	120 m (400 ft)	60 m (200 ft)		
0.75 mm ² (AWG 18)	180 m (600 ft)	90 m (300 ft)		
1.00 mm ² (AWG 17)	240 m (800 ft)	120 m (400 ft)		
1.50 mm ² (AWG 15)	300 m (1000 ft)	180 m (600 ft)		
2.50 mm ² (AWG 13)	300 m (1000 ft)	300 m (1000 ft)		

Optionally available connecting cable

Design	$2 \times 2 \times 0.34$ mm ² (AWG 22) PVC cable ¹⁾ with common shield (2 pairs, uninsulated stranded CU wires; pair-stranded)
Flame resistance	According to DIN EN 60332-1-2
Oil-resistance	According to DIN EN 60811-2-1
Shielding	Tin-plated copper-braid, optical cover \ge 85 %
Operating temperature	When mounted in a fixed position: –50 to +105 $^\circ C$ (–58 to +221 $^\circ F); when cable can move freely: –25 to +105 ^\circ C (–13 to +221 ^\circ F)$
Available cable length	Fixed: 20 m (65 ft); variable: up to maximum 50 m (165 ft)

1) UV radiation can impair the cable outer sheath. Protect the cable from direct sunshine where possible.

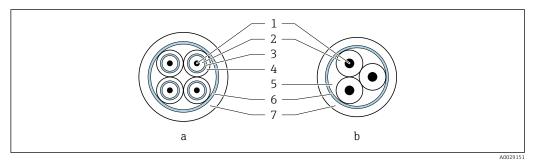
B: Connecting cable between sensor and transmitter: Proline 500

Signal cable

Design	$3\times0.38~mm^2$ (20 AWG) with common, braided copper shield (Ø \sim 9.5 mm (0.37 in)) and individual shielded cores
Conductor resistance	≤50 Ω/km (0.015 Ω/ft)
Capacitance: core/shield	<420 pF/m (128 pF/ft)
Cable length (max.)	Depends on the medium conductivity, max. 200 m (656 ft)
Cable lengths (available for order)	5 m (15 ft), 10 m (32 ft), 20 m (65 ft) or variable length up to max. 200 m (656 ft)
Operating temperature	-20 to +80 °C (-68 to +176 °F)

Coil current cable

Design	$3\times0.75~mm^2$ (18 AWG) with common, braided copper shield (Ø \sim 9 mm (0.35 in)) and individual shielded cores
Conductor resistance	<37 Ω/km (0.011 Ω/ft)
Capacitance: core/core, shield grounded	≤120 pF/m (37 pF/ft)
Cable length (max.)	Depends on the medium conductivity, max. 200 m (656 ft)
Cable lengths (available for order)	5 m (15 ft), 10 m (32 ft), 20 m (65 ft) or variable length up to max. 200 m (656 ft)
Operating temperature	-20 to +80 °C (-68 to +176 °F)
Test voltage for cable insulation	≤ AC 1433 V rms 50/60 Hz or ≥ DC 2026 V



■ 14 Cable cross-section

- а Electrode cable
- b Coil current cable
- 1 Core
- 2 Core insulation
- 3 Core shield
- Core jacket 4
- 5 Core reinforcement 6 Cable shield
- 7
- Outer jacket

Reinforced connecting cables

Reinforced connecting cables with an additional, reinforcing metal braid should be used for:

- When laying the cable directly in the ground
- Where there is a risk of damage from rodents

Operation in zones of severe electrical interference

The measuring system meets the general safety requirements $\rightarrow \square$ 230 and EMC specifications $\rightarrow \cong 218$.

Grounding is by means of the ground terminal provided for the purpose inside the connection housing. The stripped and twisted lengths of cable shield to the ground terminal must be as short as possible.

7.1.3 **Terminal assignment**

Transmitter: supply voltage, input/outputs

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

Supply	pply voltage Input/output 1		Input/	output 2	Input/output 3		Input/output 4		
1 (+)	2 (-)	26 (B)	27 (A)	24 (+)	25 (-)	22 (+)	23 (-)	20 (+)	21 (-)
		Device-specific terminal assignment: adhesive label in terminal cover.							

Transmitter and sensor connection housing: connecting cable

The sensor and transmitter, which are mounted in separate locations, are interconnected by a connecting cable. The cable is connected via the sensor connection housing and the transmitter housing.

Terminal assignment and connection of the connecting cable:

- Proline 500 digital $\rightarrow \cong 47$
- Proline $500 \rightarrow \textcircled{5}2$

7.1.4 Device plugs available

P Device plugs may not be used in hazardous areas!

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

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

7.1.5 Pin assignment of device plug

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

7.1.6 Shielding and grounding

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

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

To comply with both requirements, there are basically three different types of shielding in the fieldbus system:

- Shielding at both ends
- Shielding at one end on the feed side with capacitance termination at the field device
- Shielding at one end on the feed side

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

taken into account for this device. Operation in the event of disturbance variables as per NAMUR NE21 is thus guaranteed.

- 1. Observe national installation requirements and guidelines during installation.
- 2. Where there are large differences in potential between the individual grounding points,

connect only one point of the shielding directly to the reference ground.

3. In systems without potential equalization,

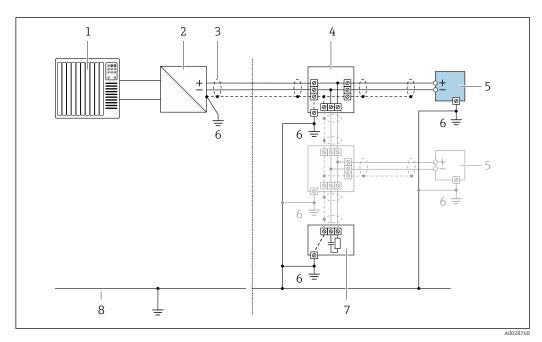
the cable shielding of fieldbus systems should be grounded on one side only, for example at the fieldbus supply unit or at safety barriers.

NOTICE

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

Damage to the bus cable shield.

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



■ 15 Connection example for PROFIBUS PA

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

7.1.7 Preparing the measuring device

Carry out the steps in the following order:

1. Mount the sensor and transmitter.

- 2. Connection housing, sensor: Connect connecting cable.
- 3. Transmitter: Connect connecting cable.
- 4. Transmitter: Connect signal cable and cable for supply voltage.

NOTICE

Insufficient sealing of the housing!

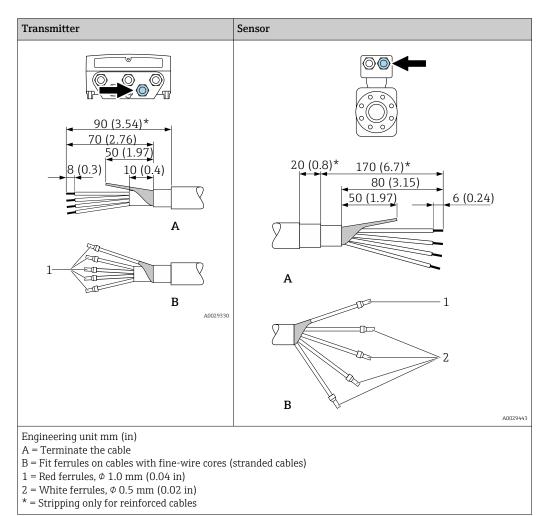
Operational reliability of the measuring device could be compromised.

- ► Use suitable cable glands corresponding to the degree of protection.
- 1. Remove dummy plug if present.
- If the measuring device is supplied without cable glands: Provide suitable cable gland for corresponding connecting cable.
- 3. If the measuring device is supplied with cable glands: Observe requirements for connecting cables $\rightarrow \square$ 38.

7.1.8 Preparing the connecting cable: Proline 500 – digital

When terminating the connecting cable, pay attention to the following points:

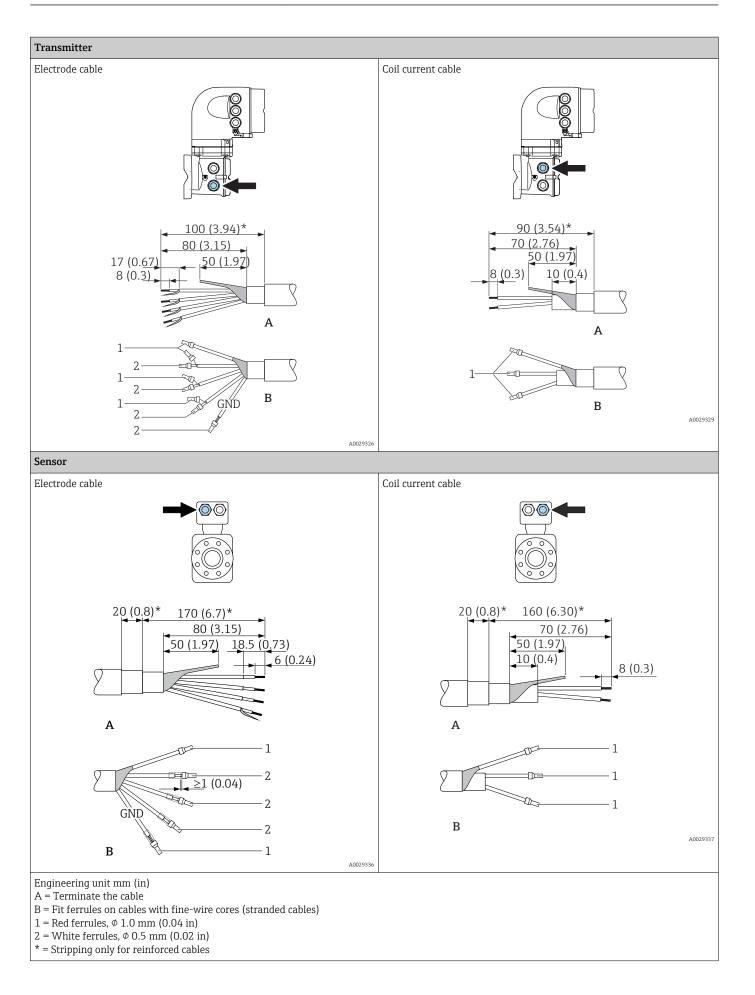
For cables with fine-wire cores (stranded cables):
 Fit the cores with ferrules.



7.1.9 Preparing the connecting cable: Proline 500

When terminating the connecting cable, pay attention to the following points:

- In the case of the electrode cable: Make sure that the ferrules do not touch the core shields on the sensor side. Minimum distance = 1 mm (exception: green "GND" cable)
- In the case of the coil current cable:
 Insulate one core of the three-core cable at the level of the core reinforcement. You only require two cores for the connection.
- 3. For cables with fine-wire cores (stranded cables): Fit the cores with ferrules.



7.2 Connecting the measuring device: Proline 500 - digital

NOTICE

Limitation of electrical safety due to incorrect connection!

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

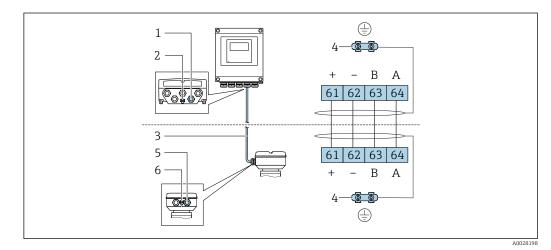
7.2.1 Connecting the connecting cable

WARNING

Risk of damaging the electronic components!

- Connect the sensor and transmitter to the same potential equalization.
- Only connect the sensor to a transmitter with the same serial number.
- Ground the connection housing of the sensor via the external screw terminal.

Connecting cable terminal assignment



- 1 Cable entry for cable on transmitter housing
- 2 Protective earth (PE)
- 3 Connecting cable ISEM communication
- 4 Grounding via ground connection; on device plug versions grounding is through the plug itself
- 5 Cable entry for cable or connection of device plug on sensor connection housing
- 6 Protective earth (PE)

Connecting the connecting cable to the sensor connection housing

Connection via terminals with order code for "Sensor connection housing":

- Option **A** "Aluminum, coated" → 🖺 48
- Option **L** "Cast, stainless" \rightarrow \cong 48

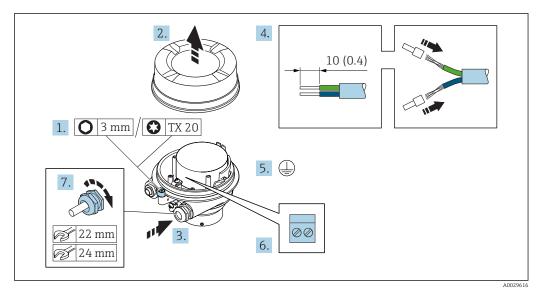
Connecting the connecting cable to the transmitter

The cable is connected to the transmitter via terminals $\rightarrow \oplus$ 49.

Connecting the sensor connection housing via terminals

For the device version with the order code for "Sensor connection housing":

- Option A "Aluminum coated"
- Option L "Cast, stainless"

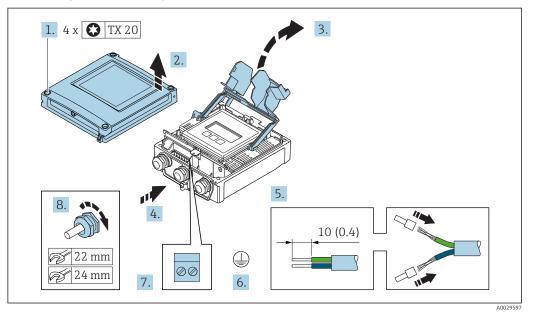


- 1. Loosen the securing clamp of the housing cover.
- 2. Unscrew the housing cover.
- **3.** Push the cable through the cable entry . To ensure tight sealing, do not remove the sealing ring from the cable entry.
- 4. Strip the cable and cable ends. In the case of stranded cables, fit ferrules.
- 5. Connect the protective ground.
- 6. Connect the cable in accordance with the connecting cable terminal assignment.
- 7. Firmly tighten the cable glands.
 - └ This concludes the process for connecting the connecting cable.

WARNING

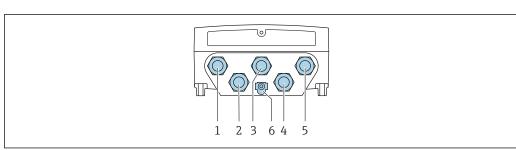
Housing degree of protection voided due to insufficient sealing of the housing.

- Screw in the thread on the cover without using any lubricant. The thread on the cover is coated with a dry lubricant.
- 8. Screw on the housing cover.
- 9. Tighten the securing clamp of the housing cover.



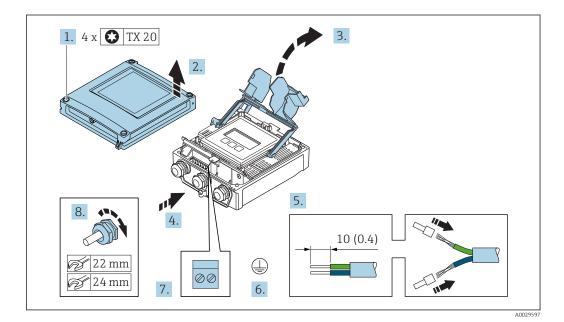
Connecting the connecting cable to the transmitter

- 1. Loosen the 4 fixing screws on the housing cover.
- 2. Open the housing cover.
- 3. Fold open the terminal cover.
- 4. Push the cable through the cable entry . To ensure tight sealing, do not remove the sealing ring from the cable entry.
- 5. Strip the cable and cable ends. In the case of stranded cables, fit ferrules.
- 6. Connect the protective ground.
- **7.** Connect the cable in accordance with the connecting cable terminal assignment $\rightarrow \cong 47$.
- 8. Firmly tighten the cable glands.
 - └ This concludes the process for connecting the connecting cable.
- 9. Close the housing cover.
- **10.** Tighten the securing screw of the housing cover.
- After connecting the connecting cable:
 Connect the signal cable and the supply voltage cable →
 ⁽²⁾ 50.



7.2.2 Connecting the signal cable and the supply voltage cable

- 1 Terminal connection for supply voltage
- 2 Terminal connection for signal transmission, input/output
- 3 Terminal connection for signal transmission, input/output
- 4 Terminal connection for connecting cable between sensor and transmitter
- 5 Terminal connection for signal transmission, input/output; optional: connection for external WLAN antenna
- 6 Protective earth (PE)



- 1. Loosen the 4 fixing screws on the housing cover.
- 2. Open the housing cover.
- 3. Fold open the terminal cover.
- 4. Push the cable through the cable entry . To ensure tight sealing, do not remove the sealing ring from the cable entry.
- 5. Strip the cable and cable ends. In the case of stranded cables, fit ferrules.
- 6. Connect the protective ground.
- 7. Connect the cable in accordance with the terminal assignment .
 - ▶ Signal cable terminal assignment: The device-specific terminal assignment is documented on an adhesive label in the terminal cover.
 Supply voltage terminal assignment: Adhesive label in the terminal cover or →
 →
 41.
- 8. Firmly tighten the cable glands.
 - └ This concludes the cable connection process.
- 9. Close the terminal cover.
- **10.** Close the housing cover.

WARNING

Housing degree of protection may be voided due to insufficient sealing of the housing.

► Screw in the screw without using any lubricant.

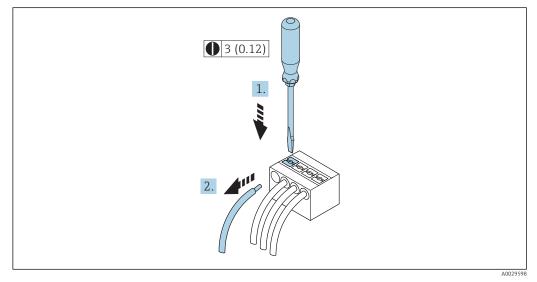
WARNING

Excessive tightening torque applied to the fixing screws!

Risk of damaging the plastic transmitter.

- ▶ Tighten the fixing screws as per the tightening torque: 2 Nm (1.5 lbf ft)
- **11.** Tighten the 4 fixing screws on the housing cover.

Removing a cable



■ 16 Engineering unit mm (in)

1. To remove a cable from the terminal, use a flat-blade screwdriver to push the slot between the two terminal holes

2. while simultaneously pulling the cable end out of the terminal.

7.3 Connecting the measuring device: Proline 500

NOTICE

Limitation of electrical safety due to incorrect connection!

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

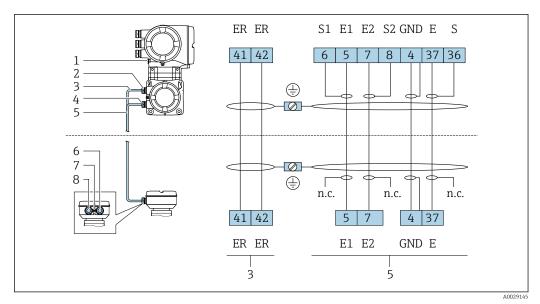
7.3.1 Connecting the connecting cable

WARNING

Risk of damaging the electronic components!

- Connect the sensor and transmitter to the same potential equalization.
- Only connect the sensor to a transmitter with the same serial number.
- Ground the connection housing of the sensor via the external screw terminal.

Connecting cable terminal assignment



1 Protective earth (PE)

2 Cable entry for coil current cable on transmitter connection housing

- 3 Coil current cable
- 4 Cable entry for signal cable on transmitter connection housing
- 5 Signal cable
- 6 Cable entry for signal cable on sensor connection housing
- 7 Protective earth (PE)
- 8 Cable entry for coil current cable on sensor connection housing

Connecting the connecting cable to the sensor connection housing

Connection via terminals with order code for "Housing": Option A "Aluminum coated" $\rightarrow \cong 53$

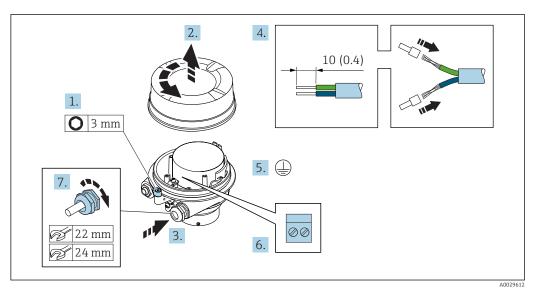
Connecting the connecting cable to the transmitter

The cable is connected to the transmitter via terminals $\rightarrow \square 54$.

Connecting the sensor connection housing via terminals

For the device version with the order code for "Housing":

- Option A "Aluminum coated"
- Option L "Cast, stainless"

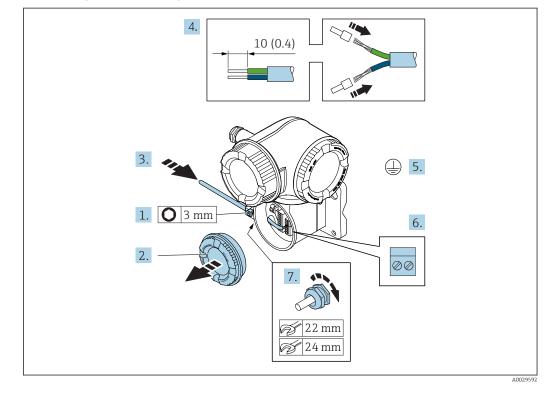


- 1. Loosen the securing clamp of the housing cover.
- 2. Unscrew the housing cover.
- **3.** Push the cable through the cable entry . To ensure tight sealing, do not remove the sealing ring from the cable entry.
- 4. Strip the cable and cable ends. In the case of stranded cables, fit ferrules.
- 5. Connect the protective ground.
- 6. Connect the cable in accordance with the connecting cable terminal assignment.
- 7. Firmly tighten the cable glands.
 - ← This concludes the process for connecting the connecting cables.

WARNING

Housing degree of protection voided due to insufficient sealing of the housing.

- Screw in the thread on the cover without using any lubricant. The thread on the cover is coated with a dry lubricant.
- 8. Screw on the housing cover.
- 9. Tighten the securing clamp of the housing cover.

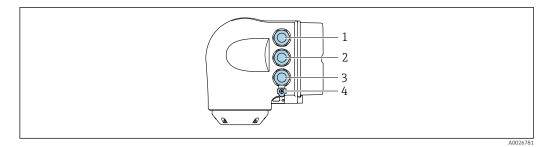


Connecting the connecting cable to the transmitter

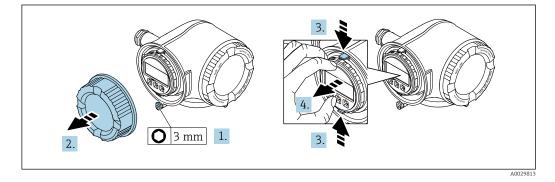
- **1.** Loosen the securing clamp of the connection compartment cover.
- 2. Unscrew the connection compartment cover.
- **3.** Push the cable through the cable entry . To ensure tight sealing, do not remove the sealing ring from the cable entry.
- 4. Strip the cable and cable ends. In the case of stranded cables, also fit ferrules.
- 5. Connect the protective ground.
- 6. Connect the cable in accordance with the connecting cable terminal assignment $\rightarrow \cong 52$.
- 7. Firmly tighten the cable glands.
 - └ This concludes the process for connecting the connecting cables.
- 8. Screw on the connection compartment cover.
- 9. Tighten the securing clamp of the connection compartment cover.
- **10**. After connecting the connecting cables:

Connect the signal cable and the supply voltage cable $\rightarrow \oplus 55$.

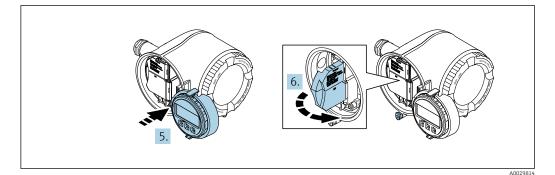
7.3.2 Connecting the signal cable and the supply voltage cable



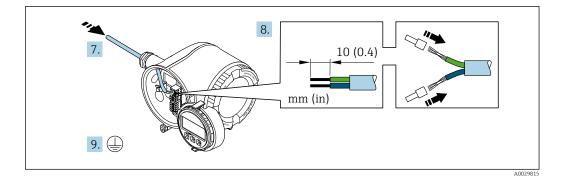
- 1 Terminal connection for supply voltage
- 2 Terminal connection for signal transmission, input/output
- 3 Terminal connection for signal transmission, input/output or terminal connection for network connection via service interface (CDI-RJ45)
- 4 Protective earth (PE)



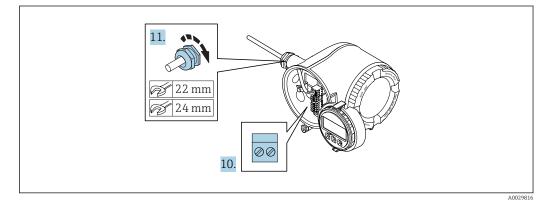
- 1. Loosen the securing clamp of the connection compartment cover.
- 2. Unscrew the connection compartment cover.
- 3. Squeeze the tabs of the display module holder together.
- 4. Remove the display module holder.



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

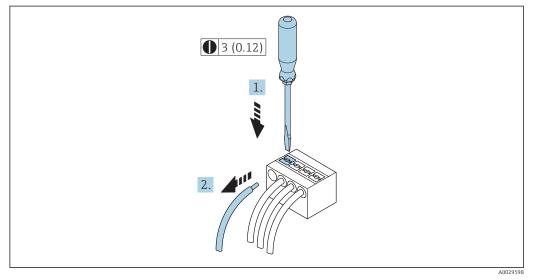


- 7. Push the cable through the cable entry . To ensure tight sealing, do not remove the sealing ring from the cable entry.
- 8. Strip the cable and cable ends. In the case of stranded cables, also fit ferrules.
- 9. Connect the protective ground.



- **10.** Connect the cable in accordance with the terminal assignment .
 - ▶ Signal cable terminal assignment: The device-specific terminal assignment is documented on an adhesive label in the terminal cover.
 Supply voltage terminal assignment: Adhesive label in the terminal cover or →
 △ 41.
- **11.** Firmly tighten the cable glands.
 - \blacktriangleright This concludes the cable connection process.
- 12. Close the terminal cover.
- **13.** Fit the display module holder in the electronics compartment.
- **14.** Screw on the connection compartment cover.
- **15.** Secure the securing clamp of the connection compartment cover.

Removing a cable



■ 17 Engineering unit mm (in)

1. To remove a cable from the terminal, use a flat-blade screwdriver to push the slot between the two terminal holes

2. while simultaneously pulling the cable end out of the terminal.

7.4 Ensuring potential equalization

7.4.1 Requirements

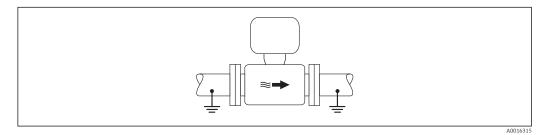
ACAUTION

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

7.4.2 Connection example, standard scenario

Metal, grounded pipe



Potential equalization via measuring tube

7.4.3 Connection example in special situations

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
DN ≤ 300

Potential equalization via ground terminal and pipe flanges

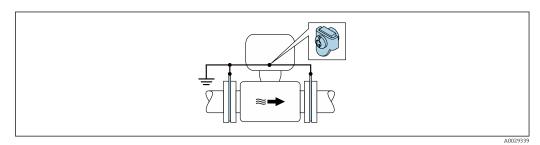
- 1. Connect both sensor flanges to the pipe flange via a ground cable and ground them.
- 2. If $DN \le 300$ (12"): Mount the ground cable directly on the conductive flange coating of the sensor with the flange screws.
- If DN ≥ 350 (14"): Mount the ground cable directly on the metal transport bracket. 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)
--------------	---



🗷 20 Potential equalization via ground terminal and ground disks

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

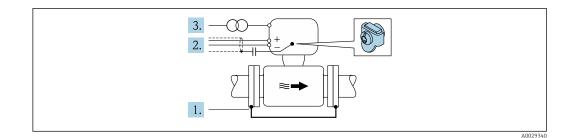
2. Connect the ground disks to ground potential.

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 mm ² (0.0093 in ²)	
--------------	---	--



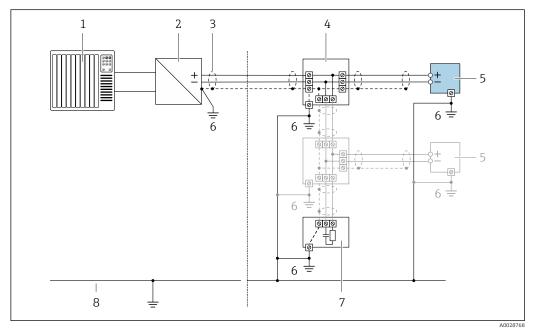
Prerequisite: The sensor is installed in the pipe in a way that provides electrical insulation.

- 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).

7.5 Special connection instructions

7.5.1 Connection examples

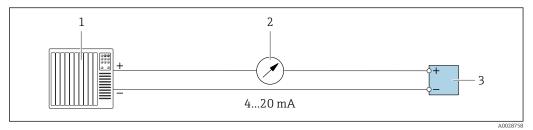
PROFIBUS PA



■ 21 Connection example for PROFIBUS PA

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

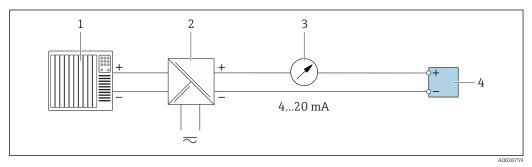
Current output 4-20 mA



■ 22 Connection example for 4-20 mA current output (active)

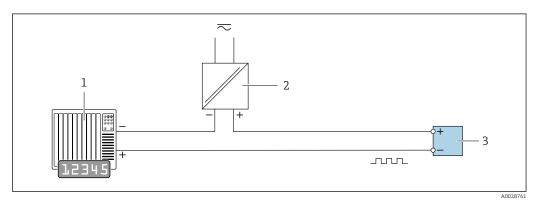
- 1 Automation system with current input (e.g. PLC)
- 2 Analog display unit: observe maximum load

3 Transmitter



- 23 Connection example for 4-20 mA current output (passive)
- 1 Automation system with current input (e.g. PLC)
- 2 Active barrier for power supply (e.g. RN221N)
- 3 Analog display unit: observe maximum load
- 4 Transmitter

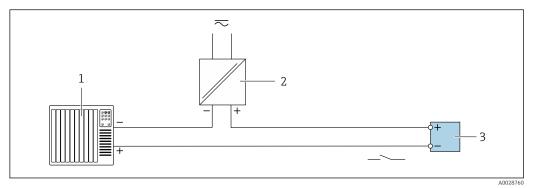
Pulse/frequency output



24 Connection example for pulse/frequency output (passive)

- 1 Automation system with pulse/frequency input (e.g. PLC)
- 2 Power supply
- 3 Transmitter: Observe input values $\rightarrow \cong 210$

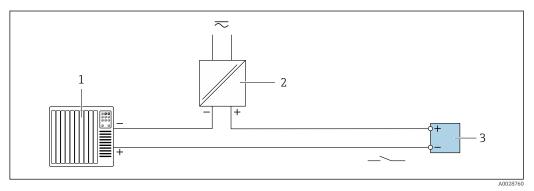
Switch output





- 1 Automation system with switch input (e.g. PLC)
- 2 Power supply
- 3 Transmitter: Observe input values $\rightarrow \cong 210$

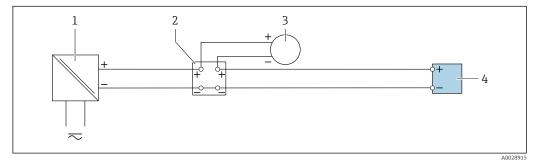
Relay output



26 Connection example for relay output (passive)

- 1 Automation system with relay input (e.g. PLC)
- 2 Power supply
- 3 Transmitter: Observe input values $\rightarrow \cong 211$

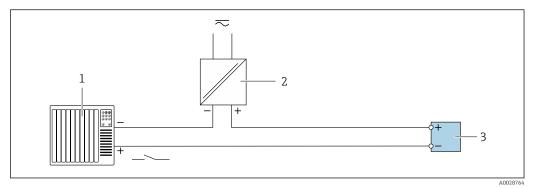
Current input

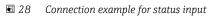


■ 27 Connection example for 4 to 20 mA current input

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

Status input





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

7.6 Hardware settings

7.6.1 Setting the device address

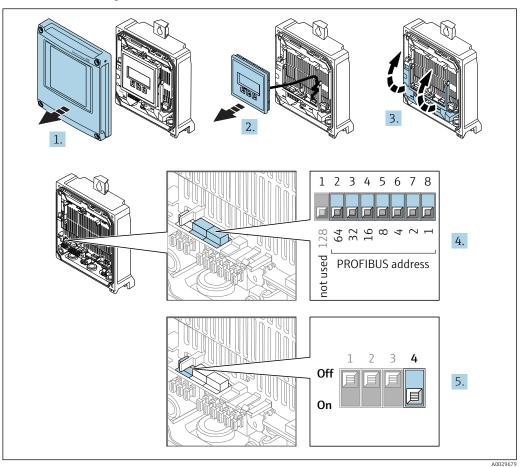
The address must always be configured for a PROFIBUS DP/PA device. The valid address range is between 1 and 126. In a PROFIBUS DP/PA network, each address can only be assigned once. If an address is not configured correctly, the device is not recognized by the master. All measuring devices are delivered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

Risk of electric shock when opening the transmitter housing.

- Before opening the transmitter housing:
- Disconnect the device from the power supply.

Proline 500 – digital transmitter

Hardware addressing



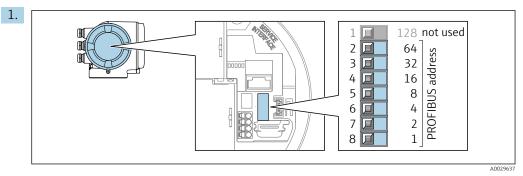
- 1. Open the housing cover.
- 2. Remove the display module.
- 3. Fold open the terminal cover.
- 4. Set the desired device address using the DIP switches.
- **5.** To switch addressing from software addressing to hardware addressing: set the DIP switch to **On**.
 - └ The change of device address takes effect after 10 seconds. The device is restarted.

Software addressing

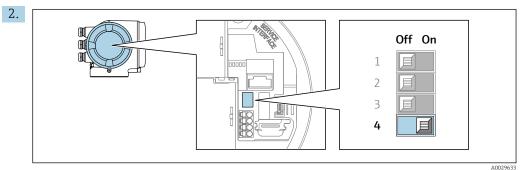
- To switch addressing from hardware addressing to software addressing: set DIP switch No. 4 to **Off**.
 - └→ The device address configured in the **Device address** parameter (→ B 110) takes effect after 10 seconds. The device is restarted.

Proline 500 transmitter

Hardware addressing



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



To switch addressing from software addressing to hardware addressing: set the DIP switch to $\mathbf{On}.$

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

Software addressing

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

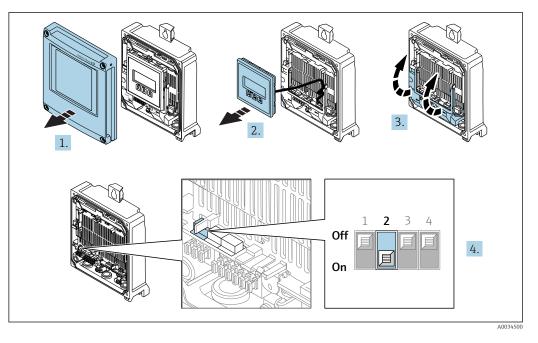
7.6.2 Activating the default IP address

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

Activating the default IP address by DIP switch: Proline 500 - digital

Risk of electric shock when opening the transmitter housing.

- Before opening the transmitter housing:
- Disconnect the device from the power supply.

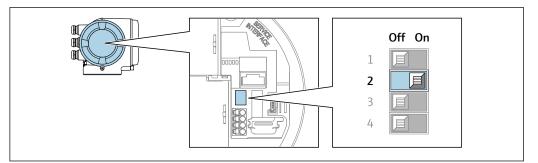


- 1. Loosen the 4 fixing screws on the housing cover.
- 2. Open the housing cover.
- 3. Fold open the terminal cover.
- 4. Set DIP switch No. 2 on the I/O electronics module from $OFF \rightarrow ON$.
- 5. Reverse the removal procedure to reassemble the transmitter.
- 6. Reconnect the device to the power supply.
 - └ The default IP address is used once the device is restarted.

Activating the default IP address via the DIP switch: Proline 500

Risk of electric shock when opening the transmitter housing.

- Before opening the transmitter housing:
- ► Disconnect the device from the power supply.



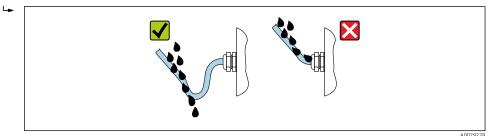
- **1.** Depending on the housing version, loosen the securing clamp or fixing screw of the housing cover.
- 2. Depending on the housing version, unscrew or open the housing cover and disconnect the local display from the main electronics module where necessary .
- **3.** Set DIP switch No. 2 on the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

7.7 Ensuring the degree of protection

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

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

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



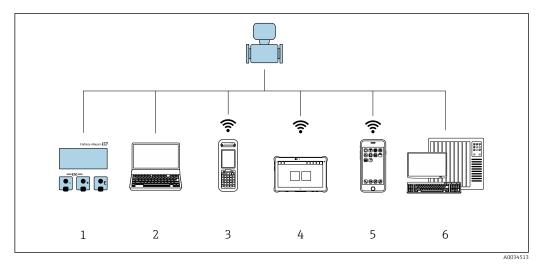
6. Insert dummy plugs into unused cable entries.

7.8 Post-connection check

Are cables or the device undamaged (visual inspection)?	
Do the cables used meet the requirements?	
Do the cables have adequate strain relief?	
Are all the cable glands installed, firmly tightened and leak-tight? Cable run with "water trap" $\rightarrow \cong 66$?	
Is the potential equalization established correctly ?	

8 Operation options

8.1 Overview of operation options

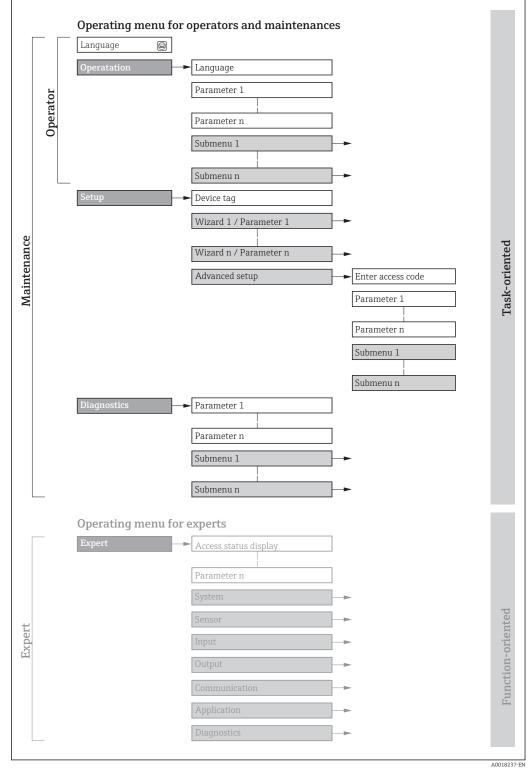


- 1 Local operation via display module
- 2 Computer with Web browser (e.g. Internet Explorer) or with operating tool (e.g. FieldCare, DeviceCare, AMS Device Manager, SIMATIC PDM)
- 3 Field Xpert SFX350 or SFX370
- 4 Field Xpert SMT70
- 5 Mobile handheld terminal
- 6 Control system (e.g. PLC)

8.2 Structure and function of the operating menu

8.2.1 Structure of the operating menu

For an overview of the operating menu for experts: "Description of Device Parameters" document supplied with the device $\Rightarrow \cong 232$



Schematic structure of the operating menu

8.2.2 Operating philosophy

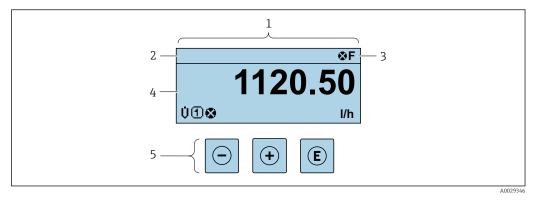
The individual parts of the operating menu are assigned to certain user roles (operator, maintenance etc.). Each user role contains typical tasks within the device lifecycle.

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

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

8.3 Access to the operating menu via the local display

8.3.1 Operational display



1 Operational display

2 Device tag $\rightarrow \square 107$

3 Status area

4 Display area for measured values (4-line)

5 Operating elements $\rightarrow \square 76$

Status area

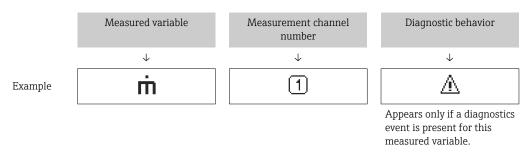
The following symbols appear in the status area of the operational display at the top right:

- Status signals → 🗎 162
 - F: Failure
 - **C**: Function check
 - S: Out of specification
- M: Maintenance required
- Diagnostic behavior →

 ¹⁶³
 - 🛛 🐼: Alarm
- <u>M</u>: Warning
- $\widehat{\square}$: Locking (the device is locked via the hardware)
- •: Communication (communication via remote operation is active)

Display area

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



Measured values

Symbol	Meaning
Ú	Volume flow
G	Conductivity
'n	Mass flow
Σ	Totalizer Image: The measurement channel number indicates which of the three totalizers is displayed.
Ð	Status input

Measurement channel numbers

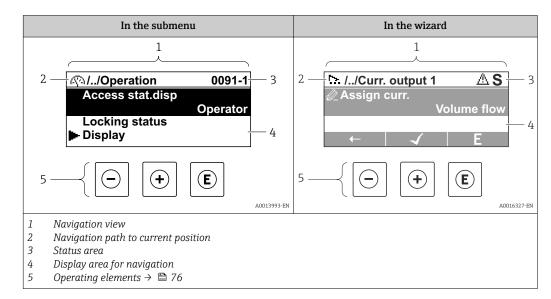
	Symbol	Meaning
	14	Measurement channel 1 to 4
Ī	The manufacture of the new part is displayed only if more than one shannel is present for the same more	

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

Diagnostic behavior

The diagnostic behavior pertains to a diagnostic event that is relevant to the displayed measured variable. For information on the symbols $\rightarrow \square 163$

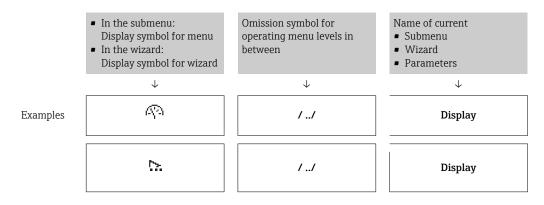
The number and display format of the measured values can be configured via the **Format display** parameter ($\rightarrow \cong 125$).



8.3.2 Navigation view

Navigation path

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



For more information about the icons in the menu, refer to the "Display area" section $\rightarrow \cong 73$

Status area

The following appears in the status area of the navigation view in the top right corner: • In the submenu

- The direct access code for the parameter you are navigating to (e.g. 0022-1)
- If a diagnostic event is present, the diagnostic behavior and status signal
- In the wizard

ľ

If a diagnostic event is present, the diagnostic behavior and status signal

- For information on the diagnostic behavior and status signal $\rightarrow \square$ 162
- For information on the function and entry of the direct access code $\rightarrow \square 78$

Display area

Menus

Symbol	Meaning		
(A)	Operation Appears: In the menu next to the "Operation" selection At the left in the navigation path in the Operation menu		
Setup Appears: In the menu next to the "Setup" selection At the left in the navigation path in the Setup menu			
ਪੁ	Diagnostics Appears: In the menu next to the "Diagnostics" selection At the left in the navigation path in the Diagnostics menu		
-3 *	 Expert Appears: In the menu next to the "Expert" selection At the left in the navigation path in the Expert menu 		

Submenus, wizards, parameters

Symbol Meaning	
•	Submenu
₩.	Wizard
Parameters within a wizard No display symbol exists for parameters in submenus.	

Locking

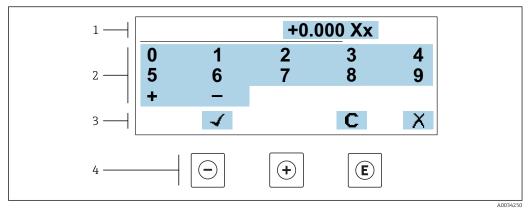
Symbol	Meaning			
ô	 Parameter locked When displayed in front of a parameter name, indicates that the parameter is locked. By a user-specific access code By the hardware write protection switch 			

Wizard operation

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

8.3.3 Editing view

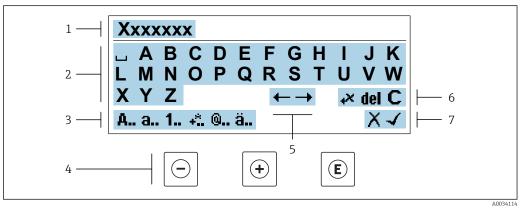
Numeric editor



☑ 30 For entering values in parameters (e.g. limit values)

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

Text editor



■ 31 For entering text in parameters (e.g. tag name)

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

Using the operating elements in the editing view

Operatin	ng key(s)	Meaning		
	$\overline{\ominus}$	Minus key Move the entry position to the left.		
C.	+)	Plus key Move the entry position to the right.		

Operating key(s)) Meaning			
 Enter key Press the key briefly: confirm your selection. Press the key for 2 s: confirm the entry. 				
-++	Escape key combination (press keys simultaneously) Close the editing view without accepting the changes.			

Input screens

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

Controlling data entries

Symbol	Meaning		
+→	Move entry position		
X	Reject entry		
-	Confirm entry		
×,	Delete character immediately to the left of the entry position		
del	Delete character immediately to the right of the entry position		
С	Clear all the characters entered		

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

8.3.4 Operating elements

8.3.5 Opening the context menu

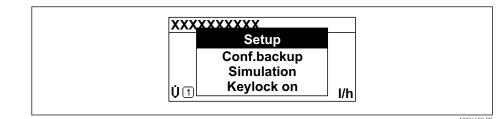
Using the context menu, the user can call up the following menus quickly and directly from the operational display:

- Setup
- Data backup
- Simulation

Calling up and closing the context menu

The user is in the operational display.

- **1.** Press the \Box and \blacksquare keys for longer than 3 seconds.
 - └ The context menu opens.



2. Press - + + simultaneously.

└ The context menu is closed and the operational display appears.

Calling up the menu via the context menu

1. Open the context menu.

2. Press \pm to navigate to the desired menu.

3. Press E to confirm the selection.

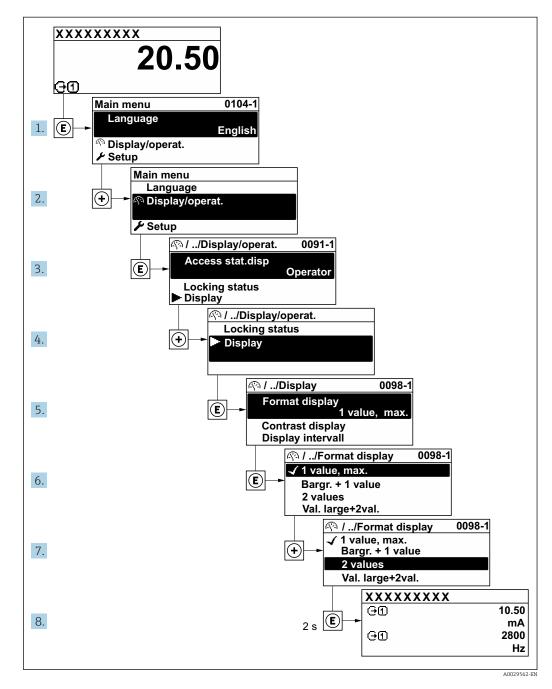
└ The selected menu opens.

8.3.6 Navigating and selecting from list

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

For an explanation of the navigation view with symbols and operating elements $\rightarrow \cong 72$

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



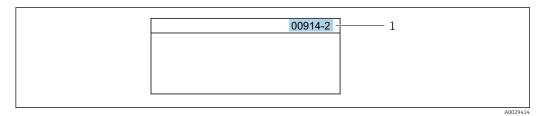
8.3.7 Calling the parameter directly

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

Navigation path

Expert \rightarrow Direct access

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



1 Direct access code

Note the following when entering the direct access code:

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

Example: Enter 00914-2 → Assign process variable parameter

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

8.3.8 Calling up help text

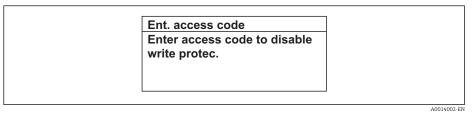
Help text is available for some parameters and can be called up from the navigation view. The help text provides a brief explanation of the parameter function and thereby supports swift and safe commissioning.

Calling up and closing the help text

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

1. Press E for 2 s.

← The help text for the selected parameter opens.



- 32 Example: Help text for parameter "Enter access code"
- 2. Press + \pm simultaneously.
 - └ The help text is closed.

8.3.9 Changing the parameters

Parameters can be changed via the numeric editor or text editor.

- Numeric editor: Change values in a parameter, e.g. specifications for limit values.Text editor: Enter text in a parameter, e.g. tag name.
- Text cutor. Enter text in a parameter, e.g. tag name.

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

Ent. ac	cess code
nvalid	or out of range inpu
value	
Min:0	
Max:99	99

For a description of the editing view - consisting of the text editor and numeric editor - with symbols → 🗎 74, for a description of the operating elements → 🗎 76

8.3.10 User roles and related access authorization

The two user roles "Operator" and "Maintenance" have different write access to the parameters if the customer defines a user-specific access code. This protects the device configuration via the local display from unauthorized access $\rightarrow \cong 141$.

Defining access authorization for user roles

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

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

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

Access authorization to parameters: "Maintenance" user role

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

Access authorization to parameters: "Operator" user role

Access code status	Read access	Write access
After an access code has been defined.	V	1)

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

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

8.3.11 Disabling write protection via access code

If the B-symbol appears on the local display in front of a parameter, the parameter is write-protected by a user-specific access code and its value cannot be changed at the moment using local operation \rightarrow B 141.

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

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

2. Enter the access code.

➡ The B -symbol in front of the parameters disappears; all previously writeprotected parameters are now re-enabled.

8.3.12 Enabling and disabling the keypad lock

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

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

Switching on the keypad lock

The keypad lock is switched on automatically:

- If the device has not been operated via the display for > 1 minute.
- Each time the device is restarted.

To activate the keylock manually:

1. The device is in the measured value display.

Press the \Box and \blacksquare keys for 3 seconds.

└ A context menu appears.

- 2. In the context menu select the **Keylock on** option.
 - └ The keypad lock is switched on.

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

Switching off the keypad lock

- - ← The keypad lock is switched off.

8.4 Access to the operating menu via the Web browser

8.4.1 Function range

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

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

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

Prerequisites 8.4.2

Computer hardware

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

Computer software

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

Computer settings

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



In the event of connection problems: $\rightarrow \square 157$

Measuring device: Via CDI-RJ45 service interface

Device	CDI-RJ45 service interface	
Measuring device	The measuring device has an RJ45 interface.	
Web server	Web server must be enabled; factory setting: ON	
	For information on enabling the Web server $\rightarrow \square 87$	

Measuring device: via WLAN interface

Device	WLAN interface
Measuring device	The measuring device has a WLAN antenna: • Transmitter with integrated WLAN antenna • Transmitter with external WLAN antenna
Web server	 Web server and WLAN must be enabled; factory setting: ON i For information on enabling the Web server → 87

8.4.3 Establishing a connection

Via service interface (CDI-RJ45)

Preparing the measuring device

Proline 500 – digital

- 1. Loosen the 4 fixing screws on the housing cover.
- 2. Open the housing cover.
- **3.** The location of the connection socket depends on the measuring device and the communication protocol:

Connect the computer to the RJ45 connector via the standard Ethernet connecting cable .

Proline 500

- Depending on the housing version: Release the securing clamp or securing screw of the housing cover.
- 2. Depending on the housing version: Unscrew or open the housing cover.
- **3.** The location of the connection socket depends on the measuring device and the communication protocol:

Connect the computer to the RJ45 connector via the standard Ethernet connecting cable .

Configuring the Internet protocol of the computer

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

IP address of the device: 192.168.1.212 (factory setting)

- 1. Switch on the measuring device.
- **2.** Connect to the computer using a cable $\rightarrow \cong 88$.
- 3. If a 2nd network card is not used, close all the applications on the notebook.
 - ← Applications requiring Internet or a network, such as e-mail, SAP applications, Internet or Windows Explorer.
- 4. Close any open Internet browsers.
- 5. Configure the properties of the Internet protocol (TCP/IP) as defined in the table:

IP address	192.168.1.XXX; for XXX all numerical sequences except: 0, 212 and 255 \rightarrow e.g. 192.168.1.213
Subnet mask 255.255.0	
Default gateway 192.168.1.212 or leave cells empty	

Via WLAN interface

Configuring the Internet protocol of the mobile terminal

NOTICE

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

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

NOTICE

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

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

Preparing the mobile terminal

• Enable WLAN reception on the mobile terminal.

Establishing a connection from the mobile terminal to the measuring device

- In the WLAN settings of the mobile terminal: Select the measuring device using the SSID (e.g. EH_Promag_500_A802000).
- 2. If necessary, select the WPA2 encryption method.
- **3.** Enter the password: serial number of the measuring device ex-works (e.g. L100A802000).
 - └→ LED on display module flashes: it is now possible to operate the measuring device with the Web browser, FieldCare or DeviceCare.
 - The serial number can be found on the nameplate.
- To ensure the safe and swift assignment of the WLAN network to the measuring point, it is advisable to change the SSID name. It should be possible to clearly assign the new SSID name to the measuring point (e.g. tag name) because it is displayed as the WLAN network.

Disconnecting

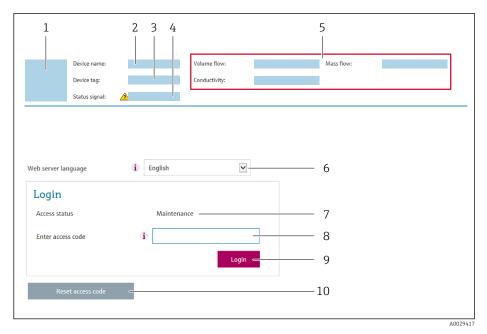
 After configuring the device: Terminate the WLAN connection between the operating unit and measuring device.

Starting the Web browser

1. Start the Web browser on the computer.

2. Enter the IP address of the Web server in the address line of the Web browser: 192.168.1.212

└ The login page appears.



- 1 Picture of device
- 2 Device name
- 3 Device tag4 Status sign
- 4 Status signal5 Current measured values
- 6 Operating language
- 7 User role
- 8 Access code
- 9 Login
- 10 Reset access code ($\rightarrow \square 138$)

If a login page does not appear, or if the page is incomplete $\rightarrow \square 157$

8.4.4 Logging on

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

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

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

Output curr. 1: 6.76 mA Correct.vol.flow: 15547326.0000 NI/h Device name Endress+Hauser 🖽 Device tag: Mass flow: 1554.7325 kg/h Density: 0.0001 kg/l VDevice ok 15547326.0000 l/h 0.0001 kg/NI Status signal: Volume flow: Ref.density: Measured values Menu Instrument health status Data management Network Logging Logout (Maintenance) Main menu 1 2 i English ⊻ -Display language 3

8.4.5 User interface

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

Header

The following information appears in the header:

- Device name
- Device tag
- Device status with status signal $\rightarrow \cong 165$
- Current measured values

Function row

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

Navigation area

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

Working area

Depending on the selected function and the related submenus, various actions can be performed in this area:

- Configuring parameters
- Reading measured values
- Calling up help text
- Starting an upload/download

8.4.6 Disabling the Web server

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

Navigation

"Expert" menu \rightarrow Communication \rightarrow Web server

Parameter overview with brief description

Parameter	Description	Selection	Factory setting
Web server functionality	Switch the Web server on and off.	OffHTML OffOn	On

Function scope of the "Web server functionality" parameter

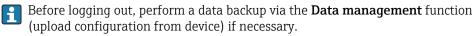
Option	Description	
Off	The web server is completely disabled.Port 80 is locked.	
HTML Off	The HTML version of the web server is not available.	
On	 The complete functionality of the web server is available. JavaScript is used. The password is transferred in an encrypted state. Any change to the password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

Enabling the Web server

If the Web server is disabled it can only be re-enabled with the **Web server functionality** parameter via the following operating options:

- Via local display
- Via Bedientool "FieldCare"
- Via "DeviceCare" operating tool

8.4.7 Logging out



1. Select the **Logout** entry in the function row.

← The home page with the Login box appears.

2. Close the Web browser.

3. If no longer needed:

Reset modified properties of the Internet protocol (TCP/IP) $\rightarrow \cong$ 83.

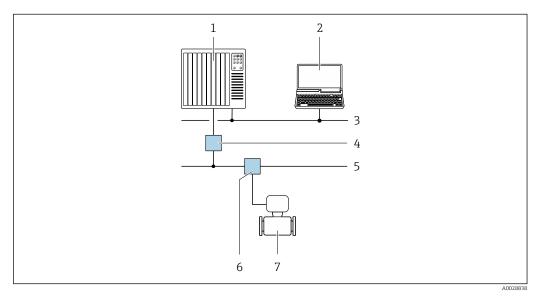
8.5 Access to the operating menu via the operating tool

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

8.5.1 Connecting the operating tool

Via PROFIBUS PA network

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



33 Options for remote operation via PROFIBUS PA network

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

Service interface

Via service interface (CDI-RJ45)

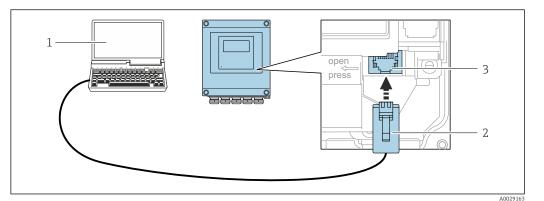
A point-to-point connection can be established to configure the device onsite. With the housing open, the connection is established directly via the service interface (CDI-RJ45) of the device.



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

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

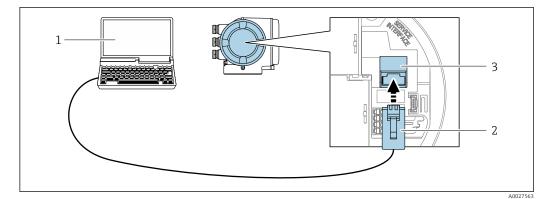
Proline 500 – digital transmitter



 34 Connection via service interface (CDI-RJ45)

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

Proline 500 transmitter

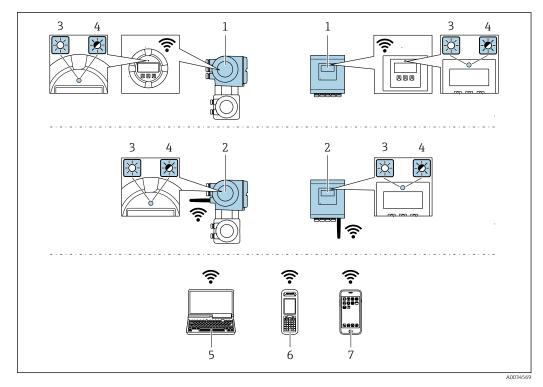


🛃 35 Connection via service interface (CDI-RJ45)

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

Via WLAN interface

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



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

Function	WLAN: IEEE 802.11 b/g (2.4 GHz)	
Encryption	WPA2-PSK AES-128 (in accordance with IEEE 802.11i)	
Configurable WLAN channels	1 to 11	
Degree of protection	IP67	
Available antennas	 Internal antenna External antenna (optional) In the event of poor transmission/reception conditions at the place of installation. Only one antenna active in each case! 	
Max. range	50 m (164 ft)	
Materials: External WLAN antenna	 Antenna: ASA plastic (acrylic ester-styrene-acrylonitrile) and nickel- plated brass Adapter: Stainless steel and nickel-plated brass Cable: Polyethylene Connector: Nickel-plated brass Angle bracket: Stainless steel 	

Configuring the Internet protocol of the mobile terminal

NOTICE

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

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

NOTICE

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

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

Preparing the mobile terminal

• Enable WLAN reception on the mobile terminal.

Establishing a connection from the mobile terminal to the measuring device

- In the WLAN settings of the mobile terminal: Select the measuring device using the SSID (e.g. EH_Promag_500_A802000).
- 2. If necessary, select the WPA2 encryption method.
- **3.** Enter the password: serial number of the measuring device ex-works (e.g. L100A802000).
 - LED on display module flashes: it is now possible to operate the measuring device with the Web browser, FieldCare or DeviceCare.

The serial number can be found on the nameplate.

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

Disconnecting

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

8.5.2 FieldCare

Function scope

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

Access is via:

- PROFIBUS PA protocol $\rightarrow \cong 88$
- CDI-RJ45 service interface $\rightarrow \cong 88$
- WLAN interface → 🖺 89

Typical functions:

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

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

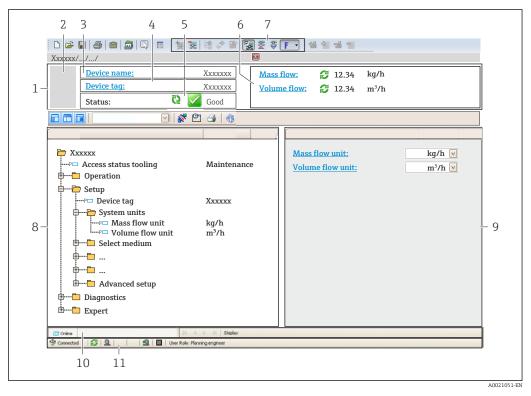
Source for device description files

See information $\rightarrow \square 94$

Establishing a connection

- 1. Start FieldCare and launch the project.
- 2. In the network: Add a device.
 - └ The **Add device** window opens.
- 3. Select the **CDI Communication TCP/IP** option from the list and press **OK** to confirm.
- 4. Right-click **CDI Communication TCP/IP** and select the **Add device** option in the context menu that opens.
- 5. Select the desired device from the list and press **OK** to confirm.
 The **CDI Communication TCP/IP (Configuration)** window opens.
- 6. Enter the device address in the **IP address** field: 192.168.1.212 and press **Enter** to confirm.
- 7. Establish the online connection to the device.
- $\fbox{}$ For additional information, see Operating Instructions BA00027S and BA00059S

User interface



- 1 Header
- 2 Picture of device
- 3 Device name
- 4 Device tag
- 5 Status area with status signal $\rightarrow \square 165$
- 6 Display area for current measured values
- 7 Edit toolbar with additional functions such as save/restore, event list and create documentation
- 8 Navigation area with operating menu structure
- 9 Working area
- 10 Range of action
- 11 Status area

8.5.3 DeviceCare

Function scope

Tool to connect and configure Endress+Hauser field devices.

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

For details, see Innovation Brochure IN01047S

Source for device description files

See information $\rightarrow \square 94$

8.5.4 SIMATIC PDM

Function scope

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

Source for device description files

See data $\rightarrow \square 94$

9 System integration

9.1 **Overview of device description files**

9.1.1 Current version data for the device

Firmware version	01.01.zz	 On the title page of the Operating instructions On the transmitter nameplate Firmware version Diagnostics → Device information → Firmware version
Release date of firmware version	11.2018	
Manufacturer ID	0x11	Manufacturer ID Diagnostics \rightarrow Device information \rightarrow Manufacturer ID
Device type ID	0x156C	Device type Diagnostics \rightarrow Device information \rightarrow Device type
Profile version	3.02	

For an overview of the different firmware versions for the device \rightarrow 199

9.1.2 Operating tools

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

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

9.2 Device master file (GSD)

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

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

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

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

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

9.2.1 Manufacturer-specific GSD

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

M	Ianufacturer-specific GSD	ID number	File name
Pl	ROFIBUS PA	0x156C	EH3x156C.gsd

Use manufacturer-specific GSD

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

Sources of supply for the manufacturer-specific GSD:

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

9.2.2 Profile GSD

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

ID number	Supported blocks	Supported channels
0x9740	1 Analog Input1 Totalizer	Channel Analog Input: volume flowChannel totalizer: volume flow
0x9741	 2 Analog Input 1 Totalizer	 Channel Analog Input 1: volume flow Channel Analog Input 2: mass flow Channel totalizer: volume flow
0x9742	 3 Analog Input 1 Totalizer	 Channel Analog Input 1: volume flow Channel Analog Input 2: mass flow Channel Analog Input 3: corrected volume flow Channel totalizer: volume flow

Use profile GSD

Assignment is performed in the **Ident number selector** parameter:

- ID number 0x9740: **1** AI, **1** Totalizer (0x9740) option
- ID number 0x9741: 2 AI, 1 Totalizer (0x9741) option
- ID number 0x9742: **Profile** option

9.3 Compatibility with earlier model

If the device is replaced, the measuring device Promag 500 supports the compatibility of the cyclic data with previous models. It is not necessary to adjust the engineering parameters of the PROFIBUS network with the Promag 500 GSD file.

Earlier models:

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

9.3.1 Automatic identification (factory setting)

The Promag 500 PROFIBUS PA automatically recognizes the measuring device configured in the automation system (Promag 50 PROFIBUS PA oder Promag 53 PROFIBUS PA) and makes the same input and output data and measured value status information available for cyclic data exchange.

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

9.3.2 Manual setting

The manual setting is made in the **Ident number selector** parameter via the **Promag 50** (0x1525) option or **Promag 53 (0x1527)** option.

Afterwards the Promag 500 PROFIBUS PA makes the same input and output data and measured value status information available for cyclic data exchange.

- If the Promag 500 PROFIBUS PA is acyclically configured via an operating program (Class 2 master), access is directly via the block structure or the parameters of the measuring device.
- If parameters have been changed in the device to be replaced (Promag 50 PROFIBUS PA or Promag 53 PROFIBUS PA) (parameter setting no longer corresponds to the original factory setting), these parameters must be changed accordingly in the new replacement Promag 500 PROFIBUS PA via an operating program (Class 2 master).

Example

The setting for low flow cut off has been changed from mass flow (factory setting) to corrected volume flow in a Promag 50 PROFIBUS PA currently in operation. This device is now replaced by a Promag 500 PROFIBUS PA.

After replacing the device, the assignment for the low flow cut off must also be changed manually in the Promag 500 PROFIBUS PA, i.e. to corrected volume flow, to ensure the measuring device behaves identically.

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

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

1. Replace the measuring device Promag 50 PROFIBUS PA or Promag 53 PROFIBUS PA with a Promag 500 PROFIBUS PA.

- 2. Set the device address: The same device address that was set for the Promag 50 or Promag 53 PROFIBUS PA must be used.
- 3. Connect the measuring device Promag 500 PROFIBUS PA.

If the factory setting had been changed on the replaced device (Promag 50 PROFIBUS PA or Promag 53 PROFIBUS PA), the following settings may need to be changed:

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

9.4 Using the GSD modules of the previous model

In the compatibility mode, all the modules already configured in the automation system are generally supported during cyclic data transmission. However, Promag 500 does not perform further processing for the following modules, i.e. the function is not executed:

- DISPLAY_VALUE
- BATCHING_QUANTITY
- BATCHING_FIX_COMP_QUANTITY

If the device is replaced, the Promag 500 device supports the compatibility of the cyclic data with previous models. It is not necessary to adjust the engineering parameters of the PROFIBUS network with the Promag 500 GSD file.

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

9.4.1 Using the CONTROL_BLOCK module in the previous model

If the CONTROL_BLOCK module is used in the previous model, the control variables are processed further if relevant functionalities can be assigned for the Promag 500.

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

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

Previous model: Promag 50 PROFIBUS PA

Previous model: Promag 53 PROFIBUS PA

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

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

9.5 Cyclic data transmission

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

9.5.1 Block model

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

Measuring device					Control system
	Analog Input block 1 to 4	→ 🖺 100	Output value AI	÷	
			Output value TOTAL	\rightarrow	
	Totalizer block 1 to 3	→ 🖺 100	Controller SETTOT	÷	
Flow			Configuration MODETOT	÷	
Block	Analog Output block 1 to 2	→ 🗎 102	Input values AO	÷	PROFIBUS PA
	Discrete Input block 1 to 2	→ 🖺 103	Output values DI	÷	
	Discrete Output block 1 to 3	→ 🖺 103	Input values DO	÷	

Defined order of modules

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

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

Slot	Module	Function block
14	AI	Analog Input block 1 to 4
5	TOTAL or SETTOT_TOTAL or SETOT_MODETOT_TOTAL	Totalizer block 1
6		Totalizer block 2
7		Totalizer block 3
89	AO	Analog Output block 1 to 2
1011	DI	Discrete Input block 1 to 2
1214	DO	Discrete Output block 1 to 3

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

9.5.2 Description of the modules

The data structure is described from the perspective of the PROFIBUS master:

• Input data: Are sent from the measuring device to the PROFIBUS master.

• Output data: Are sent from the PROFIBUS master to the measuring device.

AI module (Analog Input)

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

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

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

Selection: input variable

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

Factory setting

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

Data structure

Input data of Analog Input

Byte 1	Byte 2	Byte 3	Byte 4	Byte 5
Measure	d value: floating	point number (IE	EE 754)	Status

TOTAL module

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

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

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

Selection: totalizer value

Input variable		
Volume flow		
Mass flow		
Corrected volume flow		

Data structure

Input data of TOTAL

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

SETTOT_TOTAL module

The module combination consists of the SETTOT and TOTAL functions:

- SETTOT: Control the totalizers via the PROFIBUS master.
- TOTAL: Transmit totalizer value, along with the status, to the PROFIBUS master.

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

Selection: control totalizer

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

Factory setting

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

Data structure

Output data of SETTOT



Input data of TOTAL

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

SETTOT_MODETOT_TOTAL module

The module combination consists of the SETTOT, MODETOT and TOTAL functions: • SETTOT: Control the totalizers via the PROFIBUS master.

- MODETOT: Configure the totalizers via the PROFIBUS master.
- TOTAL: Transmit totalizer value, along with the status, to the PROFIBUS master.

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

Selection: totalizer configuration

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

Factory setting

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

Data structure

Output data of SETTOT and MODETOT

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

Input data of TOTAL

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

AO module (Analog Output)

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

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

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

Assigned compensation values

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

Function block	Compensation value
A0 1	External temperature ¹⁾
A0 2	External density

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



The selection is made via: Expert \rightarrow Sensor \rightarrow External compensation

Data structure

Output data of Analog Output

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

DI module (Discrete Input)

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

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

Two Discrete Input blocks are available (slot 10 to 11).

Selection: device function

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

1) Only available with the Heartbeat Verification application package

Factory setting

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

Data structure

Input data of Discrete Input

Byte 1	Byte 2
Discrete	Status

DO module (Discrete Output)

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

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

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

Assigned device functions

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

Function block	Device function	Values: control (meaning)	
DO 1	Flow override	• 0 (disable device function)	
DO 2	Start verification ¹⁾	• 1 (enable device function)	
DO 3	Relay output or switch output of the pulse/ frequency/switch output	0 (non-conductive)1 (conductive)	

1) Only available with the Heartbeat Verification application package

Data structure

Output data of Discrete Output

Byte 1	Byte 2
Discrete	Status

EMPTY_MODULE module

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

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

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

10 Commissioning

10.1 Function check

Before commissioning the measuring device:

- Make sure that the post-installation and post-connection checks have been performed.
- "Post-installation check" checklist \rightarrow \cong 37
- "Post-connection check" checklist $\rightarrow \triangleq 66$

10.2 Switching on the measuring device

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

If nothing appears on the local display or a diagnostic message is displayed, refer to the section on "Diagnostics and troubleshooting" → 🖺 156.

10.3 Connecting via FieldCare

- For FieldCare $\rightarrow \cong 88$ connection
- For connecting via FieldCare $\rightarrow \cong 92$
- For the FieldCare $\rightarrow \implies$ 92 user interface

10.4 Configuring the device address via software

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

Navigation

"Setup" menu \rightarrow Communication \rightarrow Device address

10.4.1 PROFIBUS network

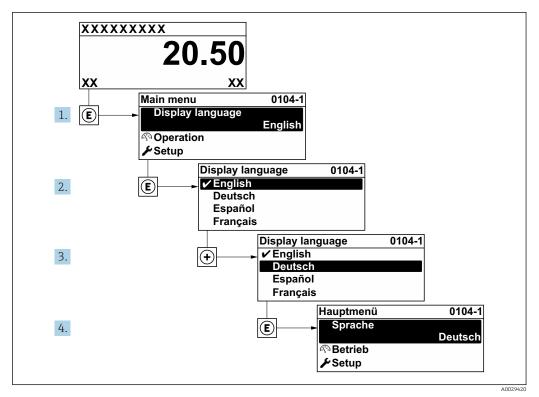
At time of delivery, the measuring device has the following factory setting:

Device address 126

To display the current device address: Device address parameter → ≅ 109
 If hardware addressing is active, software addressing is blocked → ≅ 62

10.5 Setting the operating language

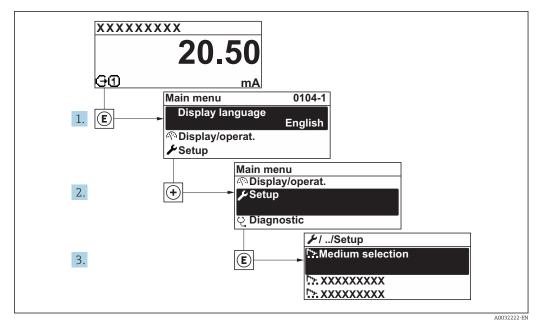
Factory setting: English or ordered local language



36 Taking the example of the local display

10.6 Configuring the measuring device

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



■ 37 Taking the example of the local display

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

Navigation

"Setup" menu

🗲 Setup	
Device tag	→ 🗎 108
► System units	→ 🗎 108
► Communication	→ 🗎 109
► Analog inputs	→ 🗎 111
► I/O configuration	→ 🗎 111
► Current input 1 to n	→ 🗎 112
► Status input 1 to n	→ 🗎 113
► Current output 1 to n	→ 🗎 114
 Pulse/frequency/switch output 1 to n 	→ 🗎 117
► Relay output 1 to n	→ 🗎 123
► Display	→ 🗎 124
► Low flow cut off	→ 🗎 126
► Empty pipe detection	→ 🗎 127
► Advanced setup	→ 🗎 128

10.6.1 Defining the tag name

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

1	XXXXXXXXX	

■ 38 Header of the operational display with tag name

1 Tag name

Enter the tag name in the "FieldCare" operating tool $\rightarrow \cong 92$

A0029422

Navigation

"Setup" menu \rightarrow Device tag

Parameter overview with brief description

Parameter	Description	User entry	Factory setting
Device tag	Enter the name for the measuring point.	Max. 32 characters, such as letters, numbers or special characters (e.g. @, %, /).	Promag 500 PA

10.6.2 Setting the system units

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

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

Navigation

"Setup" menu → System units

► System units		
	Volume flow unit	→ 🗎 108
	Volume unit	→ 🗎 108
	Conductivity unit	→ 🗎 109
	Temperature unit	→ 🖺 109
	Mass flow unit	→ 🗎 109
	Mass unit	→ 🗎 109
	Density unit	→ 🗎 109
	Corrected volume flow unit	→ 🗎 109
	Corrected volume unit	→ 🗎 109

Parameter overview with brief description

Parameter	Prerequisite	Description	Selection	Factory setting
Volume flow unit	-	Select volume flow unit. <i>Result</i> The selected unit applies for: • Output • Low flow cut off • Simulation process variable	Unit choose list	Country-specific: • l/h • gal/min (us)
Volume unit	-	Select volume unit.	Unit choose list	Country-specific: • m ³ • gal (us)

Parameter	Prerequisite	Description	Selection	Factory setting
Conductivity unit	The On option is selected in the Conductivity measurement parameter parameter.	Select conductivity unit. <i>Effect</i> The selected unit applies for: Simulation process variable	Unit choose list	µS/cm
Temperature unit	-	Select temperature unit. Result The selected unit applies for: • Temperature parameter • Maximum value parameter • External temperature parameter • Maximum value parameter • Minimum value parameter • Minimum value parameter	Unit choose list	Country-specific: • °C • °F
Mass flow unit	_	Select mass flow unit. <i>Result</i> The selected unit applies for: Output Low flow cut off Simulation process variable	Unit choose list	Country-specific: • kg/h • lb/min
Mass unit	-	Select mass unit.	Unit choose list	Country-specific: • kg • lb
Density unit	_	Select density unit. <i>Result</i> The selected unit applies for: • Output • Simulation process variable	Unit choose list	Country-specific: • kg/l • lb/ft ³
Corrected volume flow unit	-	Select corrected volume flow unit. Result The selected unit applies for: Corrected volume flow parameter ($\rightarrow \square 146$)	Unit choose list	Country-specific: • Nl/h • Sft ³ /h
Corrected volume unit	-	Select corrected volume unit.	Unit choose list	Country-specific: • Nm ³ • Sft ³

10.6.3 Configuring communication interface

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

Navigation

"Setup" menu \rightarrow Communication

► Communication	
Device address	→ 🗎 110

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

10.6.4 Configuring the analog inputs

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

Navigation

"Setup" menu \rightarrow Analog inputs

► Analog inputs	
► Analog input 1 to n	
Channel	→ 🗎 111
PV filter time	→ 🗎 111
Fail safe type	→ 🗎 111
Fail-safe value	→ 🗎 111

Parameter overview with brief description

Parameter	Prerequisite	Description	Selection / User entry	Factory setting
Channel	-	Select the process variable.	 Volume flow Mass flow Corrected volume flow Flow velocity Conductivity* Corrected conductivity* Temperature Electronic temperature Current input 1* Current input 2* Current input 3* 	Volume flow
PV filter time	-	Specify the time to suppress signal peaks. During the specified time the analog input does not respond to an erratic increase in the process variable.	Positive floating- point number	0
Fail safe type	-	Select the failure mode.	Fail-safe valueFallback valueOff	Off
Fail-safe value	In Fail safe type parameter, the Fail-safe value option is selected.	Specify the values to be output when an error occurs.	Signed floating-point number	0

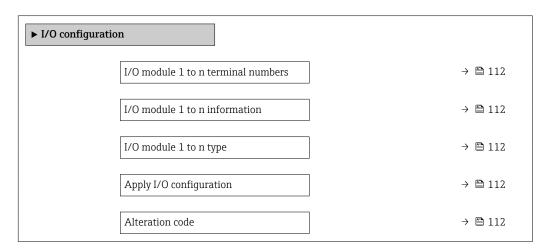
* Visibility depends on order options or device settings

10.6.5 Displaying the I/O configuration

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

Navigation

"Setup" menu \rightarrow I/O configuration



Parameter overview with brief description

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

* Visibility depends on order options or device settings

10.6.6 Configuring the current input

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

Navigation

"Setup" menu \rightarrow Current input

► Current input 1 t	o n		
	Terminal number]	→ 🖺 113

3
3
3
3
3
3

Parameter	Prerequisite	Description	User interface / Selection / User entry	Factory setting
Terminal number	-	Shows the terminal numbers used by the current input module.	Not used24-25 (I/O 2)	-
Signal mode	The measuring device is not approved for use in the hazardous area with type of protection Ex-i.	Select the signal mode for the current input.	 Passive Active[*] 	Active
0/4 mA value	-	Enter 4 mA value.	Signed floating-point number	0
20 mA value	-	Enter 20 mA value.	Signed floating-point number	Depends on country and nominal diameter
Current span	-	Select current range for process value output and upper/lower level for alarm signal.	 420 mA 420 mA NAMUR 420 mA US 020 mA 	Country-specific: • 420 mA NAMUR • 420 mA US
Failure mode	-	Define input behavior in alarm condition.	 Alarm Last valid value Defined value	Alarm
Failure value	In the Failure mode parameter, the Defined value option is selected.	Enter value to be used by the device if input value from external device is missing.	Signed floating-point number	0

* Visibility depends on order options or device settings

10.6.7 Configuring the status input

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

Navigation

"Setup" menu → Status input

► Status input 1 to n		
Assign status in	put	→ 🖺 114

Terminal number	→ 🗎 114
]
Active level] → 🗎 114
Terminal number	→ 🗎 114
Terminal number	7 目 114
Response time status input	→ 🗎 114
	י ר
Terminal number	→ 🗎 114

Parameter	Description	User interface / Selection / User entry	Factory setting
Terminal number	Shows the terminal numbers used by the status input module.	Not used24-25 (I/O 2)	-
Assign status input	Select function for the status input.	 Off Reset totalizer 1 Reset totalizer 2 Reset totalizer 3 Reset all totalizers Flow override 	Off
Active level	Define input signal level at which the assigned function is triggered.	HighLow	High
Response time status input	Define the minimum amount of time the input signal level must be present before the selected function is triggered.	5 to 200 ms	50 ms

10.6.8 Configuring the current output

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

Navigation

"Setup" menu \rightarrow Current output

► Current output 1 to n	
Terminal number	→ 🗎 115
Signal mode	→ 🗎 115
Assign current output 1 to n	→ 🗎 115
Current span	→ 🗎 115
0/4 mA value	→ 🗎 115
20 mA value	→ 🗎 115
Fixed current	→ 🗎 115

Damping output 1 to n	→ 🗎 115
Failure mode	→ 🗎 116
Failure current	→ 🗎 116

Parameter	Prerequisite	Description	User interface / Selection / User entry	Factory setting
Terminal number	-	Shows the terminal numbers used by the current output module.	Not used24-25 (I/O 2)	-
Signal mode	-	Select the signal mode for the current output.	 Passive * Active * 	Active
Assign current output 1 to n	-	Select process variable for current output.	 Off* Volume flow Mass flow Corrected volume flow Flow velocity Conductivity* Electronic temperature 	Volume flow
Current span	-	Select current range for process value output and upper/lower level for alarm signal.	 420 mA NAMUR 420 mA US 420 mA 020 mA Fixed current 	Country-specific: • 420 mA NAMUR • 420 mA US
0/4 mA value	One of the following options is selected in the Current span parameter (→ 🗎 115): • 420 mA NAMUR • 420 mA US • 420 mA • 020 mA	Enter 4 mA value.	Signed floating-point number	Country-specific: • 0 l/h • 0 gal/min (us)
20 mA value	One of the following options is selected in the Current span parameter (→ 🗎 115): • 420 mA NAMUR • 420 mA US • 420 mA • 020 mA	Enter 20 mA value.	Signed floating-point number	Depends on country and nominal diameter
Fixed current	The Fixed current option is selected in the Current span parameter ($\rightarrow \cong 115$).	Defines the fixed output current.	0 to 22.5 mA	22.5 mA
Damping output 1 to n	A process variable is selected in the Assign current output parameter ($\rightarrow \boxdot 115$) and one of the following options is selected in the Current span parameter ($\rightarrow \boxdot 115$): • 420 mA NAMUR • 420 mA US • 420 mA • 020 mA	Set reaction time for output signal to fluctuations in the measured value.	0.0 to 999.9 s	1.0 s

Parameter	Prerequisite	Description	User interface / Selection / User entry	Factory setting
Failure mode	A process variable is selected in the Assign current output parameter ($\rightarrow \boxminus 115$) and one of the following options is selected in the Current span parameter ($\rightarrow \boxminus 115$): • 420 mA NAMUR • 420 mA US • 420 mA • 020 mA	Define output behavior in alarm condition.	 Min. Max. Last valid value Actual value Defined value 	Max.
Failure current	The Defined value option is selected in the Failure mode parameter.	Enter current output value in alarm condition.	0 to 22.5 mA	22.5 mA

* Visibility depends on order options or device settings

10.6.9 Configuring the pulse/frequency/switch output

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

Navigation

"Setup" menu \rightarrow Advanced setup \rightarrow Pulse/frequency/switch output

Pulse/frequency/switch output 1 to n	
Operating mode	→ 🗎 117

Parameter overview with brief description

Parameter	Description	Selection	Factory setting
Operating mode	Define the output as a pulse, frequency or switch output.	PulseFrequencySwitch	Pulse

Configuring the pulse output

Navigation

"Setup" menu \rightarrow Pulse/frequency/switch output

 Pulse/frequency/switch output 1 to n 	
Operating mode] → 🖺 118
Terminal number] → 🗎 118
Signal mode) → 🗎 118
Assign pulse output) → 🗎 118
Value per pulse) → 🗎 118
Pulse width) → 🗎 118
Failure mode] → 🗎 118
Invert output signal] → 🗎 118

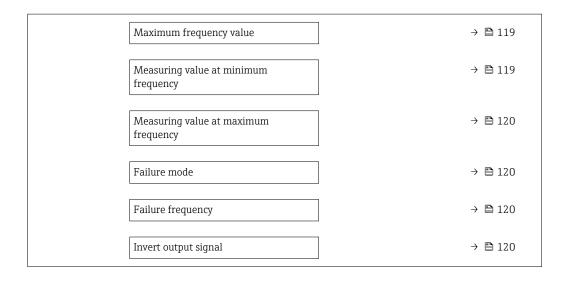
Parameter overview with brief description

Parameter	Prerequisite	Description	Selection / User interface / User entry	Factory setting
Operating mode	-	Define the output as a pulse, frequency or switch output.	PulseFrequencySwitch	Pulse
Terminal number	-	Shows the terminal numbers used by the PFS output module.	 Not used 24-25 (I/O 2) 	-
Signal mode	-	Select the signal mode for the PFS output.	PassiveActive	Passive
Assign pulse output 1 to n	The Pulse option is selected in the Operating mode parameter parameter.	Select process variable for pulse output.	 Off Volume flow Mass flow Corrected volume flow 	Off
Value per pulse	The Pulse option is selected in the Operating mode parameter ($\rightarrow \bowtie 117$) and a process variable is selected in the Assign pulse output parameter ($\rightarrow \bowtie 118$).	Enter measured value at which a pulse is output.	Signed floating-point number	Depends on country and nominal diameter
Pulse width	The Pulse option is selected in the Operating mode parameter ($\rightarrow \cong 117$) and a process variable is selected in the Assign pulse output parameter ($\rightarrow \cong 118$).	Define time width of the output pulse.	0.05 to 2 000 ms	100 ms
Failure mode	The Pulse option is selected in the Operating mode parameter ($\rightarrow \cong 117$) and a process variable is selected in the Assign pulse output parameter ($\rightarrow \cong 118$).	Define output behavior in alarm condition.	Actual valueNo pulses	No pulses
Invert output signal	-	Invert the output signal.	• No • Yes	No

Configuring the frequency output

Navigation "Setup" menu \rightarrow Pulse/frequency/switch output

Pulse/frequency/switch output 1 to n	
Operating mode) → 🗎 119
Terminal number) → 🗎 119
Signal mode) → 🗎 119
Assign frequency output] → 🗎 119
Minimum frequency value	→ 🖺 119



Parameter	Prerequisite	Description	Selection / User interface / User entry	Factory setting
Operating mode	-	Define the output as a pulse, frequency or switch output.	PulseFrequencySwitch	Pulse
Terminal number	-	Shows the terminal numbers used by the PFS output module.	 Not used 24-25 (I/O 2) 	-
Signal mode	-	Select the signal mode for the PFS output.	PassiveActive	Passive
Assign frequency output	The Frequency option is selected in the Operating mode parameter (→ 🗎 117) parameter.	Select process variable for frequency output.	 Off Volume flow Mass flow Corrected volume flow Flow velocity Conductivity* Electronic temperature 	Off
Minimum frequency value	The Frequency option is selected in the Operating mode parameter ($\rightarrow \cong 117$) and a process variable is selected in the Assign frequency output parameter ($\rightarrow \cong 119$).	Enter minimum frequency.	0.0 to 10000.0 Hz	0.0 Hz
Maximum frequency value	The Frequency option is selected in the Operating mode parameter ($\rightarrow \cong 117$) and a process variable is selected in the Assign frequency output parameter ($\rightarrow \cong 119$).	Enter maximum frequency.	0.0 to 10000.0 Hz	10 000.0 Hz
Measuring value at minimum frequency	The Frequency option is selected in the Operating mode parameter ($\rightarrow \cong 117$) and a process variable is selected in the Assign frequency output parameter ($\rightarrow \cong 119$).	Enter measured value for minmum frequency.	Signed floating-point number	Depends on country and nominal diameter

Parameter	Prerequisite	Description	Selection / User interface / User entry	Factory setting
Measuring value at maximum frequency	The Frequency option is selected in the Operating mode parameter ($\rightarrow \bowtie 117$) and a process variable is selected in the Assign frequency output parameter ($\rightarrow \boxplus 119$).	Enter measured value for maximum frequency.	Signed floating-point number	Depends on country and nominal diameter
Failure mode	The Frequency option is selected in the Operating mode parameter ($\rightarrow \cong 117$) and a process variable is selected in the Assign frequency output parameter ($\rightarrow \cong 119$).	Define output behavior in alarm condition.	 Actual value Defined value 0 Hz 	0 Hz
Failure frequency	The Frequency option is selected in the Operating mode parameter ($\rightarrow \boxdot 117$) and a process variable is selected in the Assign frequency output parameter ($\rightarrow \boxdot 119$).	Enter frequency output value in alarm condition.	0.0 to 12 500.0 Hz	0.0 Hz
Invert output signal	-	Invert the output signal.	NoYes	No

* Visibility depends on order options or device settings

Configuring the switch output

Navigation

"Setup" menu \rightarrow Pulse/frequency/switch output

 Pulse/frequency/switch output 1 to n 	
Operating mode) → 🗎 121
Terminal number	→ 🗎 121
Signal mode) → 🗎 121
Switch output function) → 🗎 122
Assign diagnostic behavior) → 🗎 122
Assign limit	→ 🗎 122
Assign flow direction check	→ 🗎 122
Assign status) → 🗎 122
Switch-on value) → 🗎 122
Switch-off value	→ 🗎 122
Switch-on delay	→ 🗎 122
Switch-off delay) → 🗎 123
Failure mode) → 🗎 123
Invert output signal) → 🗎 123

Parameter	Prerequisite	Description	Selection / User interface / User entry	Factory setting
Operating mode	-	Define the output as a pulse, frequency or switch output.	PulseFrequencySwitch	Pulse
Terminal number	-	Shows the terminal numbers used by the PFS output module.	Not used24-25 (I/O 2)	_
Signal mode	-	Select the signal mode for the PFS output.	PassiveActive	Passive

Parameter	Prerequisite	Description	Selection / User interface / User entry	Factory setting
Switch output function	The Switch option is selected in the Operating mode parameter.	Select function for switch output.	 Off On Diagnostic behavior Limit Flow direction check Status 	Off
Assign diagnostic behavior	 In the Operating mode parameter, the Switch option is selected. In the Switch output function parameter, the Diagnostic behavior option is selected. 	Select diagnostic behavior for switch output.	AlarmAlarm or warningWarning	Alarm
Assign limit	 The Switch option is selected in the Operating mode parameter parameter. The Limit option is selected in the Switch output function parameter parameter. 	Select process variable for limit function.	 Off Volume flow Mass flow Corrected volume flow Flow velocity Conductivity* Totalizer 1 Totalizer 2 Totalizer 3 Electronic temperature 	Volume flow
Assign flow direction check	 The Switch option is selected in the Operating mode parameter. The Flow direction check option is selected in the Switch output function parameter. 	Select process variable for flow direction monitoring.	 Off Volume flow Mass flow Corrected volume flow 	Volume flow
Assign status	 The Switch option is selected in the Operating mode parameter. The Status option is selected in the Switch output function parameter. 	Select device status for switch output.	 Partially filled pipe detection Low flow cut off Digital output 3 * 	Partially filled pipe detection
Switch-on value	 In the Operating mode parameter, the Switch option is selected. In the Switch output function parameter, the Limit option is selected. 	Enter measured value for the switch-on point.	Signed floating-point number	Country-specific: • 0 l/h • 0 gal/min (us)
Switch-off value	 In the Operating mode parameter, the Switch option is selected. In the Switch output function parameter, the Limit option is selected. 	Enter measured value for the switch-off point.	Signed floating-point number	Country-specific: • 0 l/h • 0 gal/min (us)
Switch-on delay	 The Switch option is selected in the Operating mode parameter. The Limit option is selected in the Switch output function parameter. 	Define delay for the switch-on of status output.	0.0 to 100.0 s	0.0 s

Parameter	Prerequisite	Description	Selection / User interface / User entry	Factory setting
Switch-off delay	 The Switch option is selected in the Operating mode parameter. The Limit option is selected in the Switch output function parameter. 	Define delay for the switch-off of status output.	0.0 to 100.0 s	0.0 s
Failure mode	-	Define output behavior in alarm condition.	Actual statusOpenClosed	Open
Invert output signal	-	Invert the output signal.	NoYes	No

* Visibility depends on order options or device settings

10.6.10 Configuring the relay output

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

Navigation

"Setup" menu \rightarrow Relay output 1 to n

► RelaisOutput 1 to n	
Switch output function	→ 🗎 124
Assign flow direction check	→ 🗎 124
Assign limit	→ 🗎 124
Assign diagnostic behavior	→ 🗎 124
Assign status	→ 🗎 124
Switch-off value	→ 🗎 124
Switch-on value	→ 🗎 124
Failure mode	→ 🗎 124

Parameter	Prerequisite	Description	Selection / User interface / User entry	Factory setting
Relay output function	-	Select the function for the relay output.	 Closed Open Diagnostic behavior Limit Flow direction check Digital Output 	Closed
Terminal number	-	Shows the terminal numbers used by the relay output module.	Not used24-25 (I/O 2)	-
Assign flow direction check	In the Relay output function parameter, the Flow direction check option is selected.	Select process variable for flow direction monitoring.	 Off Volume flow Mass flow Corrected volume flow 	Volume flow
Assign limit	The Limit option is selected in the Relay output function parameter parameter.	Select process variable for limit function.	 Off Volume flow Mass flow Corrected volume flow Flow velocity Conductivity* Totalizer 1 Totalizer 2 Totalizer 3 Electronic temperature 	Volume flow
Assign diagnostic behavior	In the Relay output function parameter, the Diagnostic behavior option is selected.	Select diagnostic behavior for switch output.	 Alarm Alarm or warning Warning	Alarm
Assign status	In the Relay output function parameter, the Digital Output option is selected.	Select device status for switch output.	 Partially filled pipe detection Low flow cut off Digital output 3* 	Partially filled pipe detection
Switch-off value	In the Relay output function parameter, the Limit option is selected.	Enter measured value for the switch-off point.	Signed floating-point number	Country-specific: • 0 l/h • 0 gal(us)/min
Switch-off delay	In the Relay output function parameter, the Limit option is selected.	Define delay for the switch-off of status output.	0.0 to 100.0 s	0.0 s
Switch-on value	In the Relay output function parameter, the Limit option is selected.	Enter measured value for the switch-on point.	Signed floating-point number	Country-specific: • 0 l/h • 0 gal(us)/min
Switch-on delay	In the Relay output function parameter, the Limit option is selected.	Define delay for the switch-on of status output.	0.0 to 100.0 s	0.0 s
Failure mode	-	Define output behavior in alarm condition.	Actual statusOpenClosed	Open

* Visibility depends on order options or device settings

10.6.11 Configuring the local display

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

Navigation "Setup" menu → Display

► Display	
Format display) → 🗎 125
Value 1 display	→ 🗎 125
0% bargraph value 1) → 🗎 125
100% bargraph value 1) → 🗎 125
Value 2 display	→ 🗎 125
Value 3 display) → 🗎 126
0% bargraph value 3] → 🗎 126
100% bargraph value 3] → 🗎 126
Value 4 display] → 🗎 126

Parameter	Prerequisite	Description	Selection / User entry	Factory setting
Format display	A local display is provided.	Select how measured values are shown on the display.	 1 value, max. size 1 bargraph + 1 value 2 values 1 value large + 2 values 4 values 	1 value, max. size
Value 1 display	A local display is provided.	Select the measured value that is shown on the local display.	 Volume flow Mass flow Corrected volume flow Flow velocity Totalizer 1 Totalizer 2 Totalizer 3 Current output 1* Electronic temperature 	Volume flow
0% bargraph value 1	A local display is provided.	Enter 0% value for bar graph display.	Signed floating-point number	Country-specific: • 0 l/h • 0 gal/min (us)
100% bargraph value 1	A local display is provided.	Enter 100% value for bar graph display.	Signed floating-point number	Depends on country and nominal diameter
Value 2 display	A local display is provided.	Select the measured value that is shown on the local display.	For the picklist, see the Value 1 display parameter $(\rightarrow \cong 125)$	None

Parameter	Prerequisite	Description	Selection / User entry	Factory setting
Value 3 display	A local display is provided.	Select the measured value that is shown on the local display.	For the picklist, see the Value 1 display parameter $(\rightarrow \bigoplus 125)$	None
0% bargraph value 3	A selection was made in the Value 3 display parameter.	Enter 0% value for bar graph display.	Signed floating-point number	Country-specific: • 0 l/h • 0 gal/min (us)
100% bargraph value 3	A selection was made in the Value 3 display parameter.	Enter 100% value for bar graph display.	Signed floating-point number	0
Value 4 display	A local display is provided.	Select the measured value that is shown on the local display.	For the picklist, see the Value 1 display parameter $(\rightarrow \textcircled{P} 125)$	None

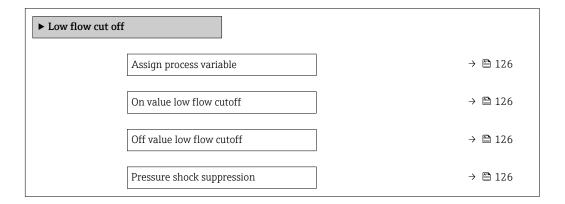
* Visibility depends on order options or device settings

10.6.12 Configuring the low flow cut off

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

Navigation

"Setup" menu \rightarrow Low flow cut off



Parameter	Prerequisite	Description	Selection / User entry	Factory setting
Assign process variable	-	Select process variable for low flow cut off.	 Off Volume flow Mass flow Corrected volume flow 	Volume flow
On value low flow cutoff	A process variable is selected in the Assign process variable parameter ($\rightarrow \square$ 126).	Enter on value for low flow cut off.	Positive floating- point number	Depends on country and nominal diameter
Off value low flow cutoff	A process variable is selected in the Assign process variable parameter ($\rightarrow \square$ 126).	Enter off value for low flow cut off.	0 to 100.0 %	50 %
Pressure shock suppression	A process variable is selected in the Assign process variable parameter ($\rightarrow \square$ 126).	Enter time frame for signal suppression (= active pressure shock suppression).	0 to 100 s	0 s

10.6.13 Configuring empty pipe detection

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

Navigation

"Setup" menu \rightarrow Empty pipe detection

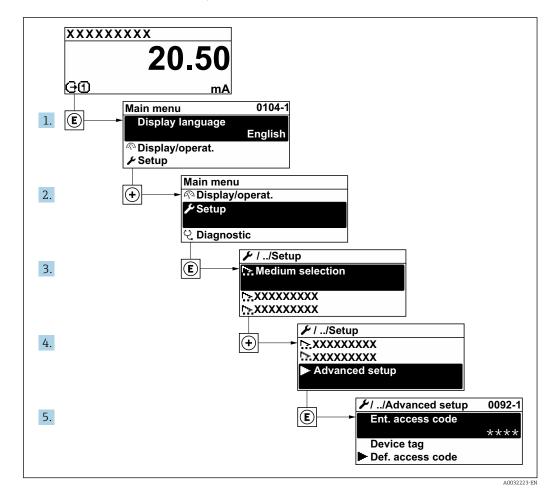
► Empty pipe detection	
Empty pipe detection	→ 🗎 127
New adjustment	→ 🗎 127
Progress	→ 🗎 127
Switch point empty pipe detection	→ 🗎 127
Response time empty pipe detection	→ 🗎 127

Parameter	Prerequisite	Description	Selection / User interface / User entry	Factory setting
Empty pipe detection	-	Switch empty pipe detection on and off.	OffOn	Off
New adjustment	The On option is selected in the Empty pipe detection parameter.	Select type of adjustment.	CancelEmpty pipe adjustFull pipe adjust	Cancel
Progress	The On option is selected in the Empty pipe detection parameter.	Shows the progress.	OkBusyNot ok	-
Switch point empty pipe detection	The On option is selected in the Empty pipe detection parameter.	Enter hysteresis in %, below this value the measuring tube will detected as empty.	0 to 100 %	10 %
Response time empty pipe detection	A process variable is selected in the Assign process variable parameter ($\rightarrow \square$ 127).	Enter the time before diagnostic message S862 "Pipe empty" is displayed for empty pipe detection.	0 to 100 s	1 s

10.7 Advanced settings

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

Navigation to the "Advanced setup" submenu

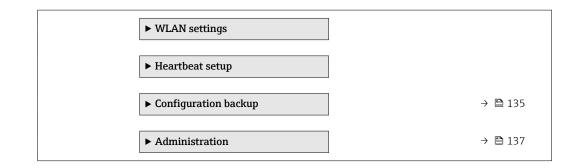


The number of submenus can vary depending on the device version. Some submenus are not dealt with in the Operating Instructions. These submenus and the parameters they contain are explained in the Special Documentation for the device.

Navigation

"Setup" menu \rightarrow Advanced setup

► Advanced setup	
Enter access code	
► Sensor adjustment	→ ⇒ 129
► Totalizer 1 to n	→ 🗎 129
► Display	→ 🗎 131
► Electrode cleaning circuit	→ 🗎 133



10.7.1 Carrying out a sensor adjustment

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

Navigation

"Setup" menu \rightarrow Advanced setup \rightarrow Sensor adjustment

► Sensor adjustme	ent		
	Installation direction]	→ 🖺 129

Parameter overview with brief description

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

10.7.2 Configuring the totalizer

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

Navigation

"Setup" menu \rightarrow Advanced setup \rightarrow Totalizer 1 to n

► Totalizer 1 to n	
Assign process variable] → 🗎 130
Unit totalizer) → 🗎 130
Totalizer operation mode) → 🗎 130
Control Totalizer 1 to n) → 🗎 130
Failure mode) → 🗎 130

Parameter	Description	Selection	Factory setting
Assign process variable	Select process variable for totalizer.	Volume flowMass flowCorrected volume flow	Volume flow
Unit totalizer	Select the unit for the process variable of the totalizer.	Unit choose list	Country-specific: • m ³ • ft ³
Control Totalizer 1 to n	Control totalizer value.	TotalizeReset + holdPreset + hold	Totalize
Totalizer operation mode	Select totalizer calculation mode.	 Net flow total Forward flow total Reverse flow total Last valid value 	Net flow total
Failure mode	Define the totalizer behavior in the event of a device alarm.	StopActual valueLast valid value	Actual value

10.7.3 Carrying out additional display configurations

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

Navigation

"Setup" menu \rightarrow Advanced setup \rightarrow Display

► Display	
Format display) → 🗎 132
Value 1 display	→ 🗎 132
0% bargraph value 1	→ 🗎 132
100% bargraph value 1	→ 🗎 132
Decimal places 1	→ 🗎 132
Value 2 display	→ 🗎 132
Decimal places 2	→ 🗎 132
Value 3 display) → 🗎 132
0% bargraph value 3] → 🗎 132
100% bargraph value 3] → 🗎 132
Decimal places 3] → 🗎 132
Value 4 display] → 🗎 132
Decimal places 4] → 🗎 133
Display language] → 🗎 133
Display interval] → 🗎 133
Display damping] → 🗎 133
Header] → 🗎 133
Header text] → 🗎 133
Separator] → 🗎 133
Backlight	-] → 🗎 133

Parameter	Prerequisite	Description	Selection / User entry	Factory setting
Format display	A local display is provided.	Select how measured values are shown on the display.	 1 value, max. size 1 bargraph + 1 value 2 values 1 value large + 2 values 4 values 	1 value, max. size
Value 1 display	A local display is provided.	Select the measured value that is shown on the local display.	 Volume flow Mass flow Corrected volume flow Flow velocity Totalizer 1 Totalizer 2 Totalizer 3 Current output 1* Electronic temperature 	Volume flow
0% bargraph value 1	A local display is provided.	Enter 0% value for bar graph display.	Signed floating-point number	Country-specific: • 0 l/h • 0 gal/min (us)
100% bargraph value 1	A local display is provided.	Enter 100% value for bar graph display.	Signed floating-point number	Depends on country and nominal diameter
Decimal places 1	A measured value is specified in the Value 1 display parameter.	Select the number of decimal places for the display value.	 x x.x x.xx x.xxx x.xxx x.xxxx 	X.XX
Value 2 display	A local display is provided.	Select the measured value that is shown on the local display.	For the picklist, see the Value 1 display parameter $(\rightarrow \cong 125)$	None
Decimal places 2	A measured value is specified in the Value 2 display parameter.	Select the number of decimal places for the display value.	 x x.x x.xx x.xxx x.xxx x.xxxx 	X.XX
Value 3 display	A local display is provided.	Select the measured value that is shown on the local display.	For the picklist, see the Value 1 display parameter $(\rightarrow \cong 125)$	None
0% bargraph value 3	A selection was made in the Value 3 display parameter.	Enter 0% value for bar graph display.	Signed floating-point number	Country-specific: • 0 l/h • 0 gal/min (us)
100% bargraph value 3	A selection was made in the Value 3 display parameter.	Enter 100% value for bar graph display.	Signed floating-point number	0
Decimal places 3	A measured value is specified in the Value 3 display parameter.	Select the number of decimal places for the display value.	 x x.x x.xx x.xxx x.xxx x.xxxx 	x.xx
Value 4 display	A local display is provided.	Select the measured value that is shown on the local display.	For the picklist, see the Value 1 display parameter $(\rightarrow \cong 125)$	None

Parameter	Prerequisite	Description	Selection / User entry	Factory setting
Decimal places 4	A measured value is specified in the Value 4 display parameter.	Select the number of decimal places for the display value.	 x x.x x.xx x.xxx x.xxx x.xxxx 	X.XX
Display language	A local display is provided.	Set display language.	 English Deutsch Français Español Italiano Nederlands Portuguesa Polski pycский язык (Russian) Svenska Türkçe 中文 (Chinese) 日本語 (Japanese) 한국 어 (Korean) Bahasa Indonesia tiếng Việt (Vietnamese) čeština (Czech) 	English (alternatively, the ordered language is preset in the device)
Display interval	A local display is provided.	Set time measured values are shown on display if display alternates between values.	1 to 10 s	5 s
Display damping	A local display is provided.	Set display reaction time to fluctuations in the measured value.	0.0 to 999.9 s	0.0 s
Header	A local display is provided.	Select header contents on local display.	Device tagFree text	Device tag
Header text	In the Header parameter, the Free text option is selected.	Enter display header text.	Max. 12 characters such as letters, numbers or special characters (e.g. @, %, /)	
Separator	A local display is provided.	Select decimal separator for displaying numerical values.	 . (point) , (comma) 	. (point)
Backlight	One of the following conditions is met: • Order code for "Display; operation", option F "4-line, illum.; touch control" • Order code for "Display; operation", option G "4-line, illum.; touch control +WLAN"	Switch the local display backlight on and off.	DisableEnable	Enable

* Visibility depends on order options or device settings

10.7.4 Performing electrode cleaning

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

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

Navigation

"Setup" menu \rightarrow Advanced setup \rightarrow Electrode cleaning circuit

► Electrode cleaning circuit	
Electrode cleaning circuit	→ 🗎 134
ECC duration	→ 🗎 134
ECC recovery time	→ 🗎 134
ECC cleaning cycle	→ 🗎 134
ECC Polarity	→ 🗎 134

Parameter overview with brief description

Parameter	Prerequisite	Description	Selection / User entry / User interface	Factory setting
Electrode cleaning circuit	For the following order code: "Application package", option EC "ECC electrode cleaning"	Enable the cyclic electrode cleaning circuit.	OffOn	Off
ECC duration	For the following order code: "Application package", option EC "ECC electrode cleaning"	Enter the duration of electrode cleaning in seconds.	0.01 to 30 s	2 s
ECC recovery time	For the following order code: "Application package", option EC "ECC electrode cleaning"	Define recovery time after electrode cleaning. During this time the current output values will be held at last valid value.	1 to 600 s	60 s
ECC cleaning cycle	For the following order code: "Application package", option EC "ECC electrode cleaning"	Enter the pause duration between electrode cleaning cycles.	0.5 to 168 h	0.5 h
ECC Polarity	For the following order code: "Application package", option EC "ECC electrode cleaning"	Select the polarity of the electrode cleaning circuit.	PositiveNegative	Depends on the electrode material: Platinum: Negative option Tantalum, Alloy C22, stainless steel: Positive option

10.7.5 WLAN configuration

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

Navigation

 $"Setup" menu \rightarrow Advanced setup \rightarrow WLAN Settings$

► WLAN settings			
	WLAN IP address		→ 🗎 135

Security type	→ 🗎 135	
WLAN passphrase	→ 🗎 135	
Assign SSID name	→ 🗎 135	
SSID name	→ 🗎 135	
Apply changes	→ 🗎 135	

Parameter	Prerequisite	Description	User entry / Selection	Factory setting
WLAN IP address	-	Enter IP address of the device WLAN interface.	4 octet: 0 to 255 (in the particular octet)	192.168.1.212
Network security	_	Select the security type of the WLAN network.	 Unsecured WPA2-PSK EAP-PEAP with MSCHAPv2* EAP-PEAP MSCHAPv2 no server authentic.* EAP-TLS* 	WPA2-PSK
WLAN passphrase	The WPA2-PSK option is selected in the Security type parameter.	Enter the network key (8 to 32 characters). The network key supplied with the device should be changed during commissioning for security reasons.	8 to 32-digit character string comprising numbers, letters and special characters	Serial number of the measuring device (e.g. L100A802000)
Assign SSID name	-	Select which name will be used for SSID: device tag or user- defined name.	Device tagUser-defined	User-defined
SSID name	 The User-defined option is selected in the Assign SSID name parameter parameter. The WLAN access point option is selected in the WLAN mode parameter parameter. 	Enter the user-defined SSID name (max. 32 characters). The user-defined SSID name may only be assigned once. If the SSID name is assigned more than once, the devices can interfere with one another.	Max. 32-digit character string comprising numbers, letters and special characters	EH_device designation_last 7 digits of the serial number (e.g. EH_Promag_500_A 802000)
Apply changes	-	Use changed WLAN settings.	CancelOk	Cancel

* Visibility depends on order options or device settings

10.7.6 Configuration management

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

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

Navigation

	A	~ ~ + · · · · ·	Coufiermention	1 1
"Setup" menu →	Advanced	Setup \rightarrow	Confiduration	раскир
becap mena ,	riavancea	becap ,	Gonngaradion	Duchup

► Configuration backup	
Operating time	→ 🗎 136
Last backup	→ 🗎 136
Configuration management	→ 🗎 136
Backup state	→ 🗎 136
Comparison result	→ 🗎 136

Parameter overview with brief description

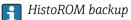
Parameter	Description	User interface / Selection	Factory setting
Operating time	Indicates how long the device has been in operation.	Days (d), hours (h), minutes (m) and seconds (s)	-
Last backup	Shows when the last data backup was saved to HistoROM backup.	Days (d), hours (h), minutes (m) and seconds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

* Visibility depends on order options or device settings

Function scope of the "Configuration management" parameter

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

Options	Description
Compare	The device configuration saved in the device memory is compared with the current device configuration of the HistoROM backup.
Clear backup data	The backup copy of the device configuration is deleted from the memory of the device.



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

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

10.7.7 Using parameters for device administration

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

Navigation

"Setup" menu \rightarrow Advanced setup \rightarrow Administration

► Administration	
► Define access code	→ 🗎 137
► Reset access code	→ 🗎 138
Device reset	→ 🗎 138

Using the parameter to define the access code

Navigation

"Setup" menu \rightarrow Advanced setup \rightarrow Administration \rightarrow Define access code

► Define access code	
Define access code	→ 🗎 137
Confirm access code	→ 🗎 137

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

Using the parameter to reset the access code

Navigation

"Setup" menu \rightarrow Advanced setup \rightarrow Administration \rightarrow Reset access code

► Reset access code	
Operating time] → 🗎 138
Reset access code] → 🗎 138

Parameter overview with brief description

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

Using the parameter to reset the device

Navigation

"Setup" menu \rightarrow Advanced setup \rightarrow Administration

Parameter overview with brief description

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

* Visibility depends on order options or device settings

10.8 Simulation

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

Navigation "Diagnostics" menu → Simulation

► Simulation	
Assign simulation process variable	→ 🗎 140
Process variable value	→ 🗎 140
Status input simulation	→ 🗎 140
Input signal level	→ 🗎 140
Current input 1 to n simulation	→ 🗎 140
Value current input 1 to n	→ 🗎 140
Current output 1 to n simulation	→ 🗎 140
Value current output 1 to n	→ 🗎 140
Frequency output simulation 1 to n	→ 🗎 140
Frequency value 1 to n	→ 🗎 140
Pulse output simulation 1 to n	→ 🗎 140
Pulse value 1 to n	→ 🗎 140
Switch output simulation 1 to n	→ 🗎 140
Switch status 1 to n	→ 🗎 140
Relay output 1 to n simulation	→ 🗎 140
Switch status 1 to n	→ 🗎 140
Device alarm simulation	→ 🗎 141
Diagnostic event category	→ 🗎 141
Diagnostic event simulation	→ 🗎 141

Parameter	Prerequisite	Description	Selection / User entry / User interface	Factory setting
Assign simulation process variable	-	Select a process variable for the simulation process that is activated.	 Off Volume flow Mass flow Corrected volume flow Flow velocity Conductivity* 	Off
Process variable value	A process variable is selected in the Assign simulation process variable parameter $(\rightarrow \cong 140).$	Enter the simulation value for the selected process variable.	Depends on the process variable selected	0
Status input simulation	-	Switch simulation of the status input on and off.	OffOn	Off
Input signal level	In the Status input simulation parameter, the On option is selected.	Select the signal level for the simulation of the status input.	HighLow	High
Current input 1 to n simulation	-	Switch simulation of the current input on and off.	OffOn	Off
Value current input 1 to n	In the Current input 1 to n simulation parameter, the On option is selected.	Enter the current value for simulation.	0 to 22.5 mA	0 mA
Current output 1 to n simulation	-	Switch the simulation of the current output on and off.	OffOn	Off
Value current output 1 to n	In the Current output 1 to n simulation parameter, the On option is selected.	Enter the current value for simulation.	3.59 to 22.5 mA	3.59 mA
Frequency output simulation 1 to n	In the Operating mode parameter, the Frequency option is selected.	Switch the simulation of the frequency output on and off.	OffOn	Off
Frequency value 1 to n	In the Frequency output simulation 1 to n parameter, the On option is selected.	Enter the frequency value for the simulation.	0.0 to 12 500.0 Hz	0.0 Hz
Pulse output simulation 1 to n	In the Operating mode parameter, the Pulse option is selected.	 Set and switch off the pulse output simulation. For Fixed value option: Pulse width parameter (→ □ 118) defines the pulse width of the pulses output. 	 Off Fixed value Down-counting value 	Off
Pulse value 1 to n	In the Pulse output simulation 1 to n parameter, the Down-counting value option is selected.	Enter the number of pulses for simulation.	0 to 65 535	0
Switch output simulation 1 to n	In the Operating mode parameter, the Switch option is selected.	Switch the simulation of the switch output on and off.	OffOn	Off
Switch status 1 to n	-	Select the status of the status output for the simulation.	 Open Closed	Open
Relay output 1 to n simulation	-	Switch simulation of the relay output on and off.	OffOn	Off
Switch status 1 to n	The On option is selected in the Switch output simulation 1 to n parameter parameter.	Select status of the relay output for the simulation.	 Open Closed	Open

Parameter	Prerequisite	Description	Selection / User entry / User interface	Factory setting
Pulse output simulation	-	Set and switch off the pulse output simulation. For Fixed value option: Pulse width parameter defines the pulse width of the pulses output.	OffFixed valueDown-counting value	Off
Pulse value	In the Pulse output simulation parameter, the Down-counting value option is selected.	Set and switch off the pulse output simulation.	0 to 65535	0
Device alarm simulation	-	Switch the device alarm on and off.	OffOn	Off
Diagnostic event category	-	Select a diagnostic event category.	SensorElectronicsConfigurationProcess	Process
Diagnostic event simulation	-	Select a diagnostic event to simulate this event.	 Off Diagnostic event picklist (depends on the category selected) 	Off
Logging interval	-	Define the logging interval tlog for data logging. This value defines the time interval between the individual data points in the memory.	1.0 to 3 600.0 s	-

* Visibility depends on order options or device settings

10.9 Protecting settings from unauthorized access

The following write protection options exist in order to protect the configuration of the measuring device from unintentional modification:

- Protect access to parameters via access code $\rightarrow \implies 141$
- Protect access to local operation via key locking \rightarrow 🖺 81
- Protect access to measuring device via write protection switch \rightarrow 🗎 143

10.9.1 Write protection via access code

The effects of the user-specific access code are as follows:

- Via local operation, the parameters for the measuring device configuration are writeprotected and their values can no longer be changed.
- Device access is protected via the Web browser, as are the parameters for the measuring device configuration.
- Device access is protected via FieldCare or DeviceCare (via CDI-RJ45 service interface), as are the parameters for the measuring device configuration.

Defining the access code via local display

1. Navigate to the **Define access code** parameter ($\rightarrow \square$ 137).

- **2.** Define a max. 16-digit character string comprising numbers, letters and special characters as the access code.
- 3. Enter the access code again in the **Confirm access code** parameter (→ 🗎 137) to confirm the code.

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



- If parameter write protection is activated via an access code, it can also only be deactivated via this access code $\rightarrow \cong 80$.
- The user role with which the user is currently logged on via the local display is indicated by the → 🖹 80 Access status parameter. Navigation path: Operation \rightarrow Access status

Parameters which can always be modified via the local display

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

	Parameters for configuring the local display	Parameters for configuring the totalizer
	\downarrow	\downarrow
Language	Format display	Control Totalizer
	Contrast display	Preset value
	Display interval	

Defining the access code via the Web browser

- 1. Navigate to the **Define access code** parameter ($\Rightarrow \triangleq 137$).
- 2. Define a max. 16-digit numeric code as an access code.
- **3.** Enter the access code again in the **Confirm access code** parameter ($\rightarrow \square 137$) to confirm the code.
 - ← The Web browser switches to the login page.

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

- If parameter write protection is activated via an access code, it can also only be deactivated via this access code $\rightarrow \cong 80$.
 - The user role with which the user is currently logged on via Web browser is indicated by the **Access status** parameter. Navigation path: Operation \rightarrow Access status

Resetting the access code

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

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



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

1. Navigate to the **Reset access code** parameter ($\rightarrow \implies 138$).

2. Enter the reset code.

← The access code has been reset to the factory setting **0000**. It can be redefined → 🗎 141.

10.9.2 Write protection via write protection switch

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

The parameter values are now read only and cannot be edited any more (exception **"Contrast display" parameter**):

- Via local display
- Via PROFIBUS PA protocol

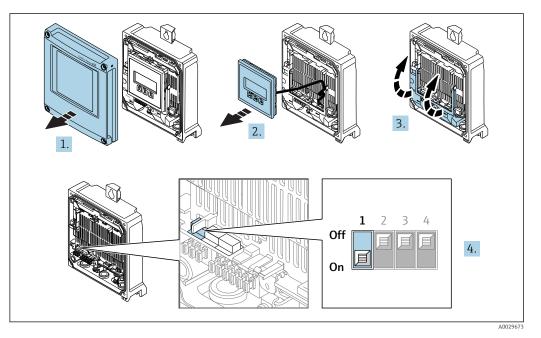
Proline 500 – digital

WARNING

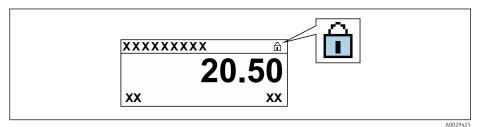
Excessive tightening torque applied to the fixing screws!

Risk of damaging the plastic transmitter.

• Tighten the fixing screws as per the tightening torque: 2 Nm (1.5 lbf ft)

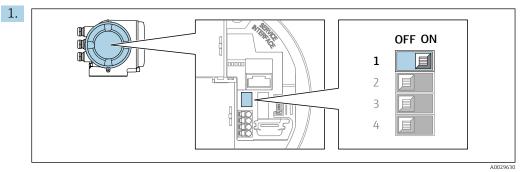


- 1. Open the housing cover.
- 2. Remove the display module.
- 3. Fold open the terminal cover.
- 4. Setting the write protection (WP) switch on the main electronics module to the **ON** position enables hardware write protection.
 - → In the Locking status parameter the Hardware locked option is displayed
 → 145. In addition, on the local display the @-symbol appears in front of the parameters in the header of the operational display and in the navigation view.



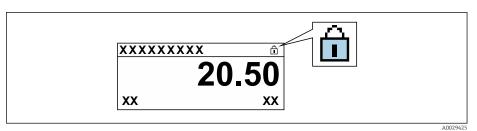
- **5.** Setting the write protection (WP) switch on the main electronics module to the **OFF** position (factory setting) disables hardware write protection.

Proline 500



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

 In the Locking status parameter the Hardware locked option is displayed
 →
 ⁽¹⁾
 145. In addition, on the local display the
 ⁽²⁾-symbol appears in front of the parameters in the header of the operational display and in the navigation view.



- 2. Setting the write protection (WP) switch on the main electronics module to the **OFF** position (factory setting) disables hardware write protection.
 - Isomorphic to be based on the locking status parameter → 145. On the local display, the a-symbol disappears from in front of the parameters in the header of the operational display and in the navigation view.

11 Operation

11.1 Reading the device locking status

Device active write protection: Locking status parameter

Operation \rightarrow Locking status

Function scope of the "Locking status" parameter

Options	Description
None	The access status displayed in the Access status parameter applies $\rightarrow \square$ 80. Only appears on local display.
Hardware locked	The DIP switch for hardware locking is activated on the PCB board. This locks write access to the parameters (e.g. via local display or operating tool) .
Temporarily locked	Write access to the parameters is temporarily locked on account of internal processes running in the device (e.g. data upload/download, reset etc.). Once the internal processing has been completed, the parameters can be changed once again.

11.2 Adjusting the operating language

P Detailed information:

- To configure the operating language $\rightarrow \cong 105$
- For information on the operating languages supported by the measuring device $\rightarrow \ \ \cong \ 225$

11.3 Configuring the display

Detailed information:

- On the basic settings for the local display $\rightarrow \implies 124$
- On the advanced settings for the local display $\rightarrow \implies 131$

11.4 Reading measured values

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

Navigation

"Diagnostics" menu \rightarrow Measured values

► Measured values	
► Process variables	→ 🗎 146
► Totalizer 1 to n	→ 🗎 147
► Input values	→ 🗎 148
► Output values	→ ⇒ 149

11.4.1 "Process variables" submenu

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

Navigation

"Diagnostics" menu \rightarrow Measured values \rightarrow Process variables

► Process variable	S	
	Volume flow	→ 🗎 146
	Mass flow	→ 🗎 146
	Corrected volume flow	→ 🖺 146
	Flow velocity	→ 🗎 146
	Conductivity	→ 🗎 146
	Corrected conductivity	→ 🗎 147
	Temperature	→ 🗎 147
	Density	→ 🗎 147

Parameter overview with brief description

Parameter	Prerequisite	Description	User interface
Volume flow	-	Displays the volume flow currently measured.	Signed floating-point number
		Dependency The unit is taken from the Volume flow unit parameter ($\rightarrow \square$ 108).	
Mass flow	-	Displays the mass flow currently calculated.	Signed floating-point number
		Dependency The unit is taken from the Mass flow unit parameter ($\rightarrow \square$ 109).	
Corrected volume flow	-	Displays the corrected volume flow currently calculated.	Signed floating-point number
		Dependency The unit is taken from the Corrected volume flow unit parameter $(\rightarrow \cong 109).$	
Flow velocity	-	Displays the flow velocity currently calculated.	Signed floating-point number
Conductivity	-	Displays the conductivity currently measured.	Signed floating-point number
		Dependency The unit is taken from the Conductivity unit parameter (\rightarrow 🗎 109).	

Parameter	Prerequisite	Description	User interface
Corrected conductivity	 One of the following conditions is met: Order code for "Sensor option", option CI "Medium temperature measurement" or The temperature is read into the flowmeter from an external device. 	Displays the conductivity currently corrected. <i>Dependency</i> The unit is taken from the Conductivity unit parameter ($\rightarrow \square$ 109).	Positive floating-point number
Temperature	 One of the following conditions is met: Order code for "Sensor option", option CI "Medium temperature measurement" or The temperature is read into the flowmeter from an external device. 	Displays the temperature currently calculated. Dependency The unit is taken from the Temperature unit parameter $(\rightarrow \cong 109).$	Positive floating-point number
Density	-	Displays the current fixed density or density read in from an external device. <i>Dependency</i> The unit is taken from the Density unit parameter.	Signed floating-point number

11.4.2 Totalizer

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

Navigation

"Diagnostics" menu \rightarrow Measured values \rightarrow Totalizer 1 to n

► Totalizer 1 to n	
Assign process variable] → 🗎 148
Totalizer value 1 to n) → 🗎 148
Totalizer status 1 to n] → 🗎 148
Totalizer status (Hex) 1 to n) → 🗎 148

Parameter	Prerequisite	Description	Selection / User entry / User interface	Factory setting
Assign process variable	-	Select process variable for totalizer.	Volume flowMass flowCorrected volume flow	Volume flow
Totalizer value 1 to n	In the Assign process variable parameter one of the following options is selected: • Volume flow • Mass flow • Corrected volume flow • Total mass flow • Condensate mass flow • Energy flow • Heat flow difference	Displays the current totalizer counter value.	Signed floating-point number	0 m ³
Totalizer status 1 to n	-	Displays the current totalizer status.	GoodUncertainBad	-
Totalizer status (Hex) 1 to n	In Target mode parameter, the Auto option is selected.	Displays the current status value (hex) of the totalizer.	0 to 0xFF	-

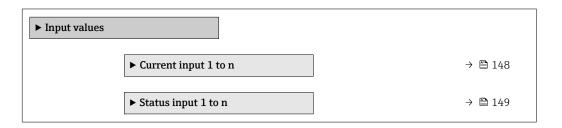
Parameter overview with brief description

11.4.3 "Input values" submenu

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

Navigation

"Diagnostics" menu \rightarrow Measured values \rightarrow Input values

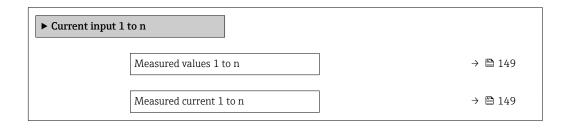


Input values of current input

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

Navigation

"Diagnostics" menu \rightarrow Measured values \rightarrow Input values \rightarrow Current input 1 to n



Parameter overview with brief description

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

Input values of status input

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

Navigation

"Diagnostics" menu \rightarrow Measured values \rightarrow Input values \rightarrow Status input 1 to n

► Status input 1 to n		
Value status input		→ 🗎 149

Parameter overview with brief description

Parameter	Description	User interface
Value status input	Shows the current input signal level.	HighLow

11.4.4 Output values

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

Navigation

"Diagnostics" menu \rightarrow Measured values \rightarrow Output values

► Output values	
► Current output 1 to n	→ 🗎 149
Pulse/frequency/switch output 1 to n	→ 🗎 150
► Relay output 1 to n	→ 🗎 150

Output values of current output

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

Navigation

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

► Current output 1 to n			
	Output current 1 to n]	→ 🗎 150
	Measured current 1 to n]	→ 🗎 150

Parameter overview with brief description

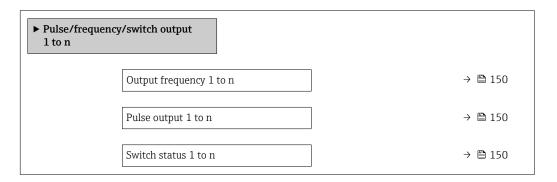
Parameter Description		User interface
Output current 1	Displays the current value currently calculated for the current output.	3.59 to 22.5 mA
Measured current	Displays the current value currently measured for the current output.	0 to 30 mA

Output values for pulse/frequency/switch output

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

Navigation

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



Parameter overview with brief description

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

Output values for relay output

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

Navigation

"Diagnostics" menu \rightarrow Measured values \rightarrow Output values \rightarrow Relay output 1 to n

► Relay output 1 to n			
Switch status	→ 🗎 151		
Switch cycles	→ 🗎 151		
Max. switch cycles number	→ 🗎 151		

Parameter overview with brief description

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

11.5 Adapting the measuring device to the process conditions

The following are available for this purpose:

- Basic settings using the Setup menu (→
 [™] 106)
- Advanced settings using the Advanced setup submenu ($\rightarrow \implies 128$)

11.6 Performing a totalizer reset

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

Function scope of	of the "Control	Totalizer " parameter
-------------------	-----------------	-----------------------

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

Navigation

"Operation" menu \rightarrow Totalizer handling

► Totalizer handlin	ng	
	Control Totalizer 1 to n	→ 🖺 152

Preset value 1 to n]	→ 🖺 152
Reset all totalizers		→ 🗎 152

Parameter overview with brief description

Parameter	Prerequisite	Description	Selection / User entry	Factory setting
Control Totalizer 1 to n	-	Control totalizer value.	 Totalize Reset + hold Preset + hold 	Totalize
Preset value 1 to n	In the Assign process variable parameter one of the following options is selected: • Volume flow • Mass flow • Corrected volume flow • Total mass flow • Condensate mass flow • Energy flow • Heat flow difference	Specify start value for totalizer.	Signed floating-point number	0 m ³
Reset all totalizers	-	Reset all totalizers to 0 and start.	CancelReset + totalize	Cancel

11.7 Showing data logging

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

Pata logging is also available via:

- Plant Asset Management Tool FieldCare $\rightarrow \square$ 91.
- Web browser

Function range

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

ד ^י ני/XXXXXXX	
175.77 40.69 l/h	
-100s 0	

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

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

Navigation "Diagnostics" menu \rightarrow Data logging

► Data logging	
Assign channel 1	→ 🖺 154
Assign channel 2	→ 🗎 154
Assign channel 3	→ 🗎 154
Assign channel 4	→ 🗎 154
Logging interval	→ 🗎 154
Clear logging data	→ 🗎 154
Data logging	→ 🗎 154
Logging delay	→ 🗎 154
Data logging control	→ 🗎 154
Data logging status	→ 🗎 155
Entire logging duration	→ 🗎 155
► Display channel 1	
 Display channel 2 	
]
Display channel 3	
► Display channel 4	

Parameter overview with brief description

Parameter	Prerequisite	Description	Selection / User entry / User interface	Factory setting
Assign channel 1	The Extended HistoROM application package is available.	Assign process variable to logging channel.	 Off Volume flow Mass flow Corrected volume flow Flow velocity Conductivity* Electronic temperature Current output 1* 	Off
Assign channel 2	The Extended HistoROM application package is available. The software options currently enabled are displayed in the Software option overview parameter.	Assign process variable to logging channel.	Picklist, see Assign channel 1 parameter (→ 🗎 154)	Off
Assign channel 3	The Extended HistoROM application package is available. The software options currently enabled are displayed in the Software option overview parameter.	Assign process variable to logging channel.	Picklist, see Assign channel 1 parameter (→ 🗎 154)	Off
Assign channel 4	The Extended HistoROM application package is available. The software options currently enabled are displayed in the Software option overview parameter.	Assign process variable to logging channel.	Picklist, see Assign channel 1 parameter (→ 🗎 154)	Off
Logging interval	The Extended HistoROM application package is available.	Define the logging interval for data logging. This value defines the time interval between the individual data points in the memory.	0.1 to 3 600.0 s	1.0 s
Clear logging data	The Extended HistoROM application package is available.	Clear the entire logging data.	CancelClear data	Cancel
Data logging	-	Select the data logging method.	 Overwriting Not overwriting	Overwriting
Logging delay	In the Data logging parameter, the Not overwriting option is selected.	Enter the time delay for measured value logging.	0 to 999 h	0 h
Data logging control	In the Data logging parameter, the Not overwriting option is selected.	Start and stop measured value logging.	 None Delete + start Stop 	None

Parameter	Prerequisite	Description	Selection / User entry / User interface	Factory setting
Data logging status	In the Data logging parameter, the Not overwriting option is selected.	Displays the measured value logging status.	DoneDelay activeActiveStopped	Done
Entire logging duration	In the Data logging parameter, the Not overwriting option is selected.	Displays the total logging duration.	Positive floating- point number	0 s

* Visibility depends on order options or device settings

12 Diagnostics and troubleshooting

12.1 General troubleshooting

For local display

Error	Possible causes	Solution
Local display dark and no output signals	Supply voltage does not match the value indicated on the nameplate.	Apply the correct supply voltage .
Local display dark and no output signals	The polarity of the supply voltage is wrong.	Correct the polarity.
Local display dark and no output signals	No contact between connecting cables and terminals.	Check the connection of the cables and correct if necessary.
Local display dark and no output signals	Terminals are not plugged into the I/O electronics module correctly. Terminals are not plugged into the main electronics module correctly.	Check terminals.
Local display dark and no output signals	I/O electronics module is defective. Main electronics module is defective.	Order spare part → 🗎 201.
Local display dark and no output signals	The connector between the main electronics module and display module is not plugged in correctly.	Check the connection and correct if necessary.
Local display dark and no output signals	The connecting cable is not plugged in correctly.	 Check the connection of the electrode cable and correct if necessary. Check the connection of the coil current cable and correct if necessary.
Local display is dark, but signal output is within the valid range	Display is set too bright or too dark.	 Set the display brighter by simultaneously pressing ± + E. Set the display darker by simultaneously pressing □ + E.
Local display is dark, but signal output is within the valid range	The cable of the display module is not plugged in correctly.	Insert the plug correctly into the main electronics module and display module.
Local display is dark, but signal output is within the valid range	Display module is defective.	Order spare part $\rightarrow \square 201$.
Backlighting of local display is red	Diagnostic event with "Alarm" diagnostic behavior has occurred.	Take remedial measures
Text on local display appears in a foreign language and cannot be understood.	Incorrect operating language is configured.	 Press □ + ± for 2 s ("home position"). Press □. Set the desired language in the Display language parameter (→ □ 133).
Message on local display: "Communication Error" "Check Electronics"	Communication between the display module and the electronics is interrupted.	 Check the cable and the connector between the main electronics module and display module. Order spare part →

For output signals

Error	Possible causes	Solution
Signal output outside the valid range	Main electronics module is defective.	Order spare part → 🗎 201.
Device shows correct value on local display, but signal output is incorrect, though in the valid range.	Configuration error	Check and correct the parameter configuration.
Device measures incorrectly.	Configuration error or device is operated outside the application.	 Check and correct parameter configuration. Observe limit values specified in the "Technical Data".

For access

Error	Possible causes	Solution
No write access to parameters	Hardware write protection enabled	Set the write protection switch on main electronics module to the OFF position $\rightarrow \bigoplus 143$.
No write access to parameters	Current user role has limited access authorization	1. Check user role $\rightarrow \square$ 80. 2. Enter correct customer-specific access code $\rightarrow \square$ 80.
No connection via PROFIBUS PA	Device plug connected incorrectly	Check the pin assignment of the connector .
No connection via PROFIBUS PA	PROFIBUS PA cable incorrectly terminated	Check terminating resistor .
Not connecting to Web server	Web server disabled	Using the "FieldCare" or "DeviceCare" operating tool, check whether the Web server of the measuring device is enabled, and enable it if necessary → 🗎 87.
	Incorrect setting for the Ethernet interface of the computer	1. Check the properties of the Internet protocol (TCP/IP) → 🗎 83. 2. Check the network settings with the IT manager.
Not connecting to Web server	Incorrect IP address	Check the IP address: 192.168.1.212 → 🗎 83
Not connecting to Web server	Incorrect WLAN access data	 Check WLAN network status. Log on to the device again using WLAN access data. Verify that WLAN is enabled on the measuring device and operating device .
	WLAN communication disabled	-
Not connecting to Web server, FieldCare or DeviceCare	No WLAN network available	 Check if WLAN reception is present: LED on display module is lit blue Check if WLAN connection is enabled: LED on display module flashes blue Switch on instrument function.
Network connection not present or unstable	WLAN network is weak.	 Operating device is outside of reception range: Check network status on operating device. To improve network performance, use an external WLAN antenna.
	Parallel WLAN and Ethernet communication	 Check network settings. Temporarily enable only the WLAN as an interface.

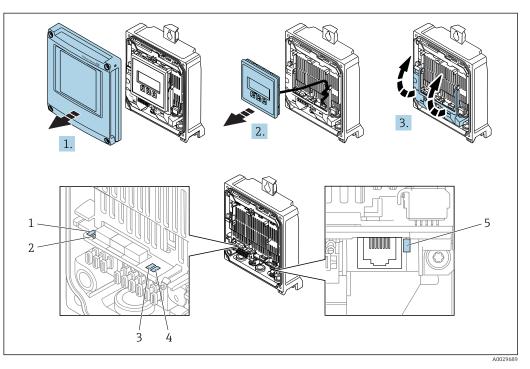
Error	Possible causes	Solution
Web browser frozen and operation no longer possible	Data transfer active	Wait until data transfer or current action is finished.
	Connection lost	 Check cable connection and power supply. Refresh the Web browser and restart if necessary.
Content of Web browser incomplete or difficult to read	Not using optimum version of Web server.	 Use the correct Web browser version . Clear the Web browser cache and restart the Web browser.
	Unsuitable view settings.	Change the font size/display ratio of the Web browser.
No or incomplete display of contents in the Web browser	 JavaScript not enabled JavaScript cannot be enabled	1. Enable JavaScript. 2. Enter http://XXX.XXX.X.XXX/ basic.html as the IP address.
Operation with FieldCare or DeviceCare via CDI-RJ45 service interface (port 8000)	Firewall of computer or network is preventing communication	Depending on the settings of the firewall used on the computer or in the network, the firewall must be adapted or disabled to allow FieldCare/DeviceCare access.
Flashing of firmware with FieldCare or DeviceCare via CDI-RJ45 service interface (via port 8000 or TFTP ports)	Firewall of computer or network is preventing communication	Depending on the settings of the firewall used on the computer or in the network, the firewall must be adapted or disabled to allow FieldCare/DeviceCare access.

12.2 Diagnostic information via light emitting diodes

12.2.1 Transmitter

Proline 500 – digital

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



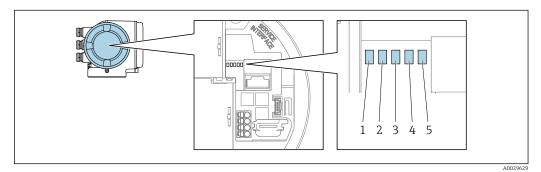
- 1 Supply voltage
- 2 Device status
- 3 Not used
- 4 Communication
- 5 Service interface (CDI) active, Ethernet Link/Activity
- 1. Open the housing cover.
- 2. Remove the display module.
- 3. Fold open the terminal cover.

LED		Color	Meaning
1	Supply voltage	Off	Supply voltage is off or too low.
		Green	Supply voltage is ok.
2	Device status	Off	Firmware error
		Green	Device status is ok.
		Flashing green	Device is not configured.
		Flashing red	A diagnostic event with "Warning" diagnostic behavior has occurred.
		Red	A diagnostic event with "Alarm" diagnostic behavior has occurred.
		Flashing red/green	The device restarts.
3	Not used	-	-
4	Communication	Off	Device does not receive any Profibus data.
		White	Device receives Profibus data.

LEI	D	Color	Meaning
5	Service interface (CDI),	Off	Not connected or no connection established.
	Ethernet Link/Activity	Yellow	Connected and connection established.
		Flashing yellow	Service interface active.

Proline 500

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



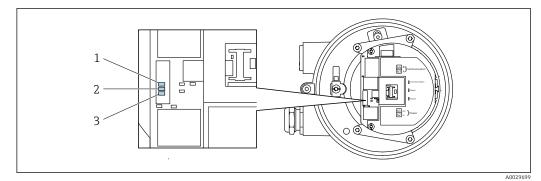
- 1 Supply voltage
- 2 Device status
- 3 Not used
- 4 Communication
- 5 Service interface (CDI) active, Ethernet Link/Activity

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

12.2.2 Sensor connection housing

Proline 500 – digital

Various light emitting diodes (LED) on the ISEM electronics (Intelligent Sensor Electronic Module) in the sensor connection housing provide information on the device status.



1 Communication

Device status

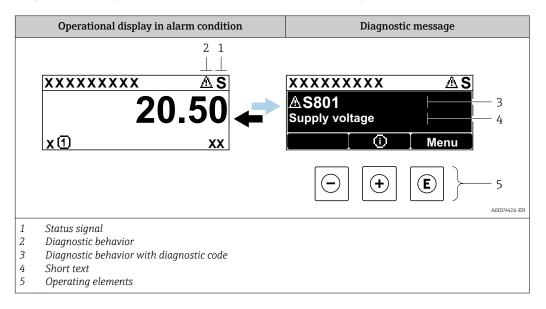
2 3 Supply voltage

LED		Color	Meaning
1	Communication	White	Communication active
2	Device status	Red	Error
		Flashing red	Warning
3	Supply voltage	Green	Supply voltage is ok
		Off	Supply voltage is off or too low

12.3 Diagnostic information on local display

12.3.1 Diagnostic message

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



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

Other diagnostic events that have occurred can be displayed in the **Diagnostics** menu:

- Via parameter
- Via submenus →
 [™]
 [™]
 ¹⁹⁴

Status signals

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

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

= Maintenance	Required
---------------	----------

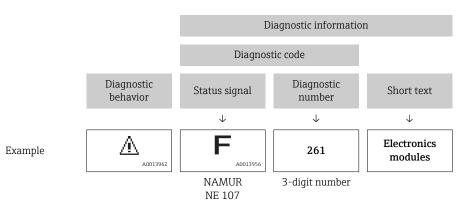
Symbol	Meaning
F	Failure A device error has occurred. The measured value is no longer valid.
С	Function check The device is in service mode (e.g. during a simulation).
S	Out of specification The device is operated: Outside its technical specification limits (e.g. outside the process temperature range)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

Diagnostic behavior

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

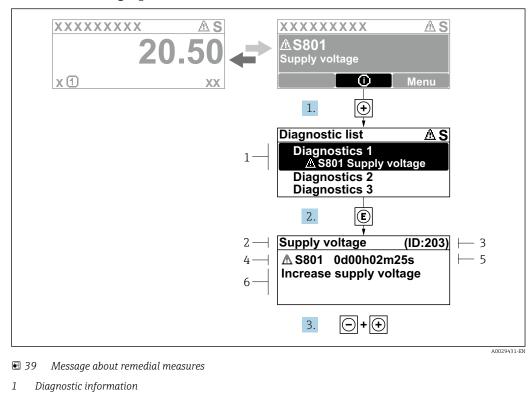
Diagnostic information

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



Operating elements

Key	Meaning
(+)	Plus key In a menu, submenu Opens the message about remedy information.
E	Enter key In a menu, submenu Opens the operating menu.



12.3.2 Calling up remedial measures

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

1. The user is in the diagnostic message.

Press 🛨 (① symbol).

- └ The **Diagnostic list** submenu opens.
- **2.** Select the desired diagnostic event with \pm or \Box and press \mathbb{E} .
 - └ The message about the remedial measures opens.
- 3. Press \Box + \pm simultaneously.
 - └ The message about the remedial measures closes.

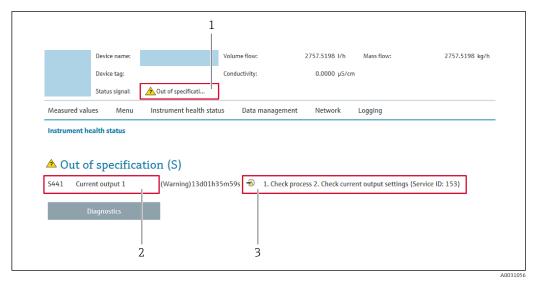
The user is in the **Diagnostics** menu at an entry for a diagnostics event, e.g. in the Diagnostic list submenu or Previous diagnostics parameter.

- 1. Press E.
 - └ The message for the remedial measures for the selected diagnostic event opens.
- **2.** Press \Box + \pm simultaneously.
 - └ The message for the remedial measures closes.

12.4 Diagnostic information in the Web browser

12.4.1 **Diagnostic options**

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



- 1 Status area with status signal
- 2 Diagnostic information $\rightarrow \square 163$
- 3 Remedy information with Service ID

In addition, diagnostic events which have occurred can be shown in the **Diagnostics** menu:

- Via parameter
- Via submenu → 🖺 194

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
\otimes	Failure A device error has occurred. The measured value is no longer valid.
V	Function check The device is in service mode (e.g. during a simulation).
<u>^</u>	Out of specification The device is operated: Outside its technical specification limits (e.g. outside the process temperature range)
	Maintenance required Maintenance is required. The measured value is still valid.

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

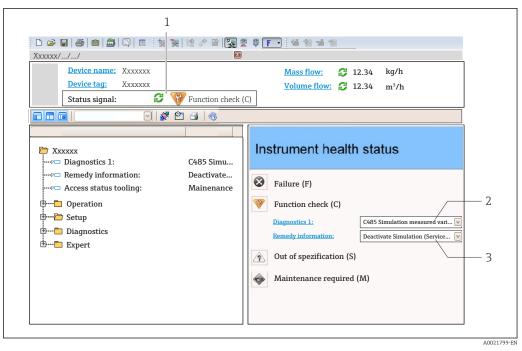
12.4.2 Calling up remedy information

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

12.5 Diagnostic information in FieldCare or DeviceCare

12.5.1 Diagnostic options

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



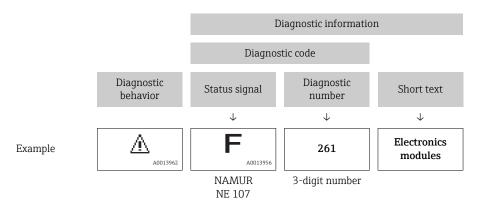
- 1 Status area with status signal $\rightarrow \square 162$
- 2 Diagnostic information $\rightarrow \square 163$
- 3 Remedy information with Service ID

In addition, diagnostic events which have occurred can be shown in the **Diagnostics** menu:

- Via parameter
- Via submenu → 🗎 194

Diagnostic information

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



12.5.2 Calling up remedy information

Remedy information is provided for every diagnostic event to ensure that problems can be rectified quickly:

- On the home page
- Remedy information is displayed in a separate field below the diagnostics information. In the **Diagnostics** menu

Remedy information can be called up in the working area of the user interface.

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

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

12.6 Adapting the diagnostic information

12.6.1 Adapting the diagnostic behavior

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

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

Expert \rightarrow System \rightarrow Diagnostic handling \rightarrow Diagnostic behavior

א [ַ] ¢ //Diagn. behavior	0658-1
Diagnostic no.442	
	Warning
Diagnostic no.443	

Available diagnostic behaviors

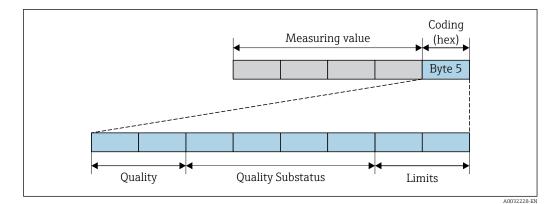
The following diagnostic behaviors can be assigned:

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

Displaying the measured value status

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

A0019179-EN



☑ 40 Structure of the coding byte

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

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

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

The diagnostic information is grouped as follows:

- Diagnostic information pertaining to the sensor: diagnostic number 000 to 199 $\rightarrow \cong 168$
- Diagnostic information pertaining to the electronics: diagnostic number 200 to 399 $\rightarrow \textcircled{B}$ 169
- Diagnostic information pertaining to the configuration: diagnostic number 400 to 599 $\rightarrow \textcircled{B}$ 169
- Diagnostic information pertaining to the process: diagnostic number 800 to 999 $\rightarrow \, \boxdot \, 169$

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

Diagnostic behavior	N	leasured value st	Device diagnosis		
(configurable)	Quality	Quality Substatus	Coding (hex)	Category (NE107)	(fixed assignment)
Alarm	BAD	Maintenance alarm	0x24 to 0x27	F (Failure)	Maintenance alarm
Warning	GOOD	Maintenance demanded	0xA8 to 0xAB	M (Maintenance)	Maintenance demanded
Logbook entry only	GOOD	ok	0x80 to 0x8E	_	_
Off	0000	UK			

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

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

Die erste stie behanden	M	leasured value sta	Danian dia manin		
Diagnostic behavior (configurable)	Quality	Quality Substatus	Coding (hex)	Category (NE107)	Device diagnosis (fixed assignment)
Alarm	BAD	Maintenance alarm	0x24 to 0x27	F (Failure)	Maintenance alarm
Warning					
Logbook entry only	GOOD		0.00 0.00		
Off	GOOD	ok	0x80 to 0x8E	_	_

Diagnostic number 200 to 301, 303 to 399

Diagnostic information 302

Diagnostic behavior	N	leasured value sta	Device diagnosis		
(configurable)	Quality	Quality Substatus	Coding (hex)	Category (NE107)	(fixed assignment)
Alarm	BAD	Function check, local override	0x24 to 0x27	С	Function check
Warning	GOOD	Function check	0xBC to 0xBF	_	-

Diagnostic information 302 (device verification active) is output during internal or external Heartbeat verification.

- Signal status: Function check
- Choice of diagnostic behavior: alarm or warning (factory setting)

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

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

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

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

Diagnostic behavior	M	leasured value st	Device diagnosis		
Diagnostic behavior (configurable)	Quality	Quality Substatus	Coding (hex)	Category (NE107)	(fixed assignment)
Alarm	BAD	Process related	0x28 to 0x2B	F (Failure)	Invalid process condition
Warning	UNCERTA IN	Process related	0x78 to 0x7B	S (Out of specification)	Invalid process condition

Diagnostic behavior	N	leasured value st	Device diagnosis		
Diagnostic behavior (configurable)	Quality	Quality Substatus	Coding (hex)	Category (NE107)	(fixed assignment)
Logbook entry only	GOOD	ok	0x80 to 0x8E	_	_
Off	GOOD	UK	0200 10 0201	_	_

12.7 Overview of diagnostic information

The amount of diagnostic information and the number of measured variables affected increase if the measuring device has one or more application packages.

In the case of some items of diagnostic information, the diagnostic behavior can be changed. Change the diagnostic information $\rightarrow \square$ 167

12.7.1 Diagnostic of sensor

	Diagnostic	information	Remedy instructions	Influenced measured
No.	S	hort text		variables
043	Sensor short circuit		1. Check sensor cable and sensor	Conductivity
	Measured variable status [fr	om the factory] ¹⁾	 Execute Heartbeat Verification Replace sensor cable or sensor 	Corrected conductivityDensity
	Quality	Uncertain		Electronic temperatureEmpty pipe detection
	Quality substatus	Maintenance demanded		 Flow velocity
	Coding (hex)	0x68 to 0x6B		Low flow cut offMass flow
	Status signal	S		Reference density
	Diagnostic behavior	Warning		Corrected volume flowTemperatureStatusVolume flow

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

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

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

	Diagnostic	nformation	Remedy instructions	Influenced measured
No.	SI	nort text		variables
169	Conductivity measurement fail	ed	1. Check grounding conditions	 Conductivity
	Measured variable status	d variable status 2. Deactivate conductivity measurement	Corrected conductivityElectronic temperature	
	Quality	Bad		Empty pipe detectionFlow velocityLow flow cut off
	Quality substatus	Maintenance alarm		
	Coding (hex)	0x24 to 0x27		Mass flowCorrected volume flow
	Status signal	М		Temperature
	Diagnostic behavior	Warning		StatusVolume flow

No.	Diagnostic information No. Short text		Remedy instructions	Influenced measured variables
170	Coil resistance		Check ambient and process temperature	ConductivityCorrected conductivity
	Measured variable status			 Density
	Quality	Bad		Electronic temperatureEmpty pipe detectionFlow velocity
	Quality substatus	Maintenance alarm		
	Coding (hex)	0x24 to 0x27		Low flow cut offMass flow
	Status signal	F		 Reference density
	Diagnostic behavior	Alarm		Corrected volume flowTemperatureStatusVolume flow

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

	Diagnostic information		Remedy instructions	Influenced measured
No.	. Short text			variables
181			1. Check sensor cable and sensor	Conductivity
	Measured variable status	red variable status2. Execute Heartbeat Verification3. Replace sensor cable or sensor	Corrected conductivityDensity	
	Quality	Bad		Electronic temperatureEmpty pipe detection
	Quality substatus	Maintenance alarm		 Flow velocity
	Coding (hex)	0x24 to 0x27		Low flow cut offMass flow
	Status signal	F		 Reference density
	Diagnostic behavior	Alarm		Corrected volume flowTemperatureStatusVolume flow

12.7.2 Diagnostic of electronic

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

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

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

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

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

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

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

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

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

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

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

	Diagnostic information		Remedy instructions	Influenced measured
No.	s	hort text		variables
283	5		1. Reset device	 Conductivity Corrected conductivity Measured values 1
			2. Contact service	
	Quality	Bad		 Measured values 2 Measured values 3 Density Electronic temperature Empty pipe detection
	Quality substatus	Maintenance alarm		
	Coding (hex)	0x24 to 0x27		
	Status signal	F		Flow velocityLow flow cut off
	Diagnostic behavior	Alarm		 Low now cut off Mass flow Reference density Corrected volume flow Temperature Status Volume flow

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

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

	Diagnostic information		Remedy instructions	Influenced measured
No.	S	hort text		variables
303	I/O 1 to n configuration chang	(parameter 'Apply I/O configuration')	-	
	Measured variable status			
	Quality	Bad	and check wiring	
	Quality substatus	Maintenance alarm		
	Coding (hex)	0x24 to 0x27		
	Status signal	М		
	Diagnostic behavior	Warning		

	Diagnostic information		Remedy instructions	Influenced measured
No.		Short text		variables
311			1. Do not reset device	Conductivity
			2. Contact service	Corrected conductivityMeasured values 1
	Quality	Bad	 Mathematical De Ele En Flo Lo Mathematical Re Co Te Stat 	Measured values 2Measured values 3
	Quality substatus Coding (hex)	Maintenance alarm 0x24 to 0x27		 Density Electronic temperature Empty pipe detection
	Status signal	М		 Flow velocity Low flow cut off
	Diagnostic behavior	Warning		 Mass flow Reference density Corrected volume flow Temperature Status Volume flow

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

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

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

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

Diagnostic information		Remedy instructions	Influenced measured	
No.	5	Short text		variables
375	I/O- 1 to n communication failed		 Restart device Check if failure recurs Replace module rack inclusive electronic 	 Conductivity
	Measured variable status			Corrected conductivityMeasured values 1
	Quality	Bad	modules	 Measured values 2 Measured values 3
	Quality substatus	Maintenance alarm		 Density
	Coding (hex)	0x24 to 0x27		Electronic temperatureEmpty pipe detection
	Status signal	F		 Flow velocity
	Diagnostic behavior	Alarm		 Low flow cut off Mass flow Reference density Corrected volume flow Temperature Status Volume flow

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

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

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

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

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

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

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

	Diagnostic information		Remedy instructions	Influenced measured variables
No.	SI	hort text		
512	Sensor electronic (ISEM) faulty	7	1. Check ECC recovery time	 Conductivity
	Measured variable status		2. Turn off ECC	Corrected conductivityDensity
	Quality	Bad		 Electronic temperature Empty pipe detection Flow velocity Low flow cut off Mass flow Reference density Corrected volume flow
	Quality substatus	Maintenance alarm		
	Coding (hex)	0x24 to 0x27		
	Status signal	F		
	Diagnostic behavior	Alarm		Confected volume nowTemperatureStatusVolume flow

12.7.3 Diagnostic of configuration

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

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

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

	Diagnostic information		Remedy instructions	Influenced measured	
No.		Short text		variables	
412	Processing download		Download active, please wait	Conductivity	
	Measured variable status	_		-	
	Quality	Uncertain		Electronic temperatureEmpty pipe detection	
	Quality substatus	Initial value		 Flow velocity 	
	Coding (hex)	0x4C to 0x4F		Low flow cut offMass flow	
	Status signal	С		 Reference density 	
	Diagnostic behavior	Warning		Corrected volume flowTemperatureStatusVolume flow	

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

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

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

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

	Diagnostic	information	Remedy instructions	Influenced measured
No.	Short text			variables
442	1 5 1		1. Check process	-
	Measured variable status [from the factory] ¹⁾		2. Check frequency output settings	
	Quality	Good		
	Quality substatus	Function check		
	Coding (hex)	0xBC to 0xBF		
	Status signal	S		
	Diagnostic behavior	Warning		

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

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

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

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

	Diagnostic information		Remedy instructions	Influenced measured
No.	S	hort text		variables
463	51		1. Check module/channel configuration	 Measured values 1
	Measured variable status	2. Check I/O module configuration	Measured values 2Measured values 3	
	Quality	Bad		
	Quality substatus	Maintenance alarm		
	Coding (hex)	0x24 to 0x27		
	Status signal	F		
	Diagnostic behavior	Alarm		

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

No.	J	nformation 10rt text	Remedy instructions	Influenced measured variables
484	Failure mode simulation Measured variable status		Deactivate simulation	ConductivityCorrected conductivityDensity
	Quality Quality substatus Coding (hex) Status signal Diagnostic behavior	Bad Function check 0x3C to 0x3F C Alarm		 Electronic temperature Empty pipe detection Flow velocity Low flow cut off Mass flow Reference density Corrected volume flow Temperature Status Volume flow

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

	Diagnostic information		Remedy instructions	Influenced measured
No.	S	hort text		variables
486	6 Current input 1 to n simulation		Deactivate simulation	 Measured values 1
	Measured variable status			 Measured values 2 Measured values 3
	Quality	Good		
	Quality substatus	Function check		
	Coding (hex)	0xBC to 0xBF		
	Status signal	С		
	Diagnostic behavior	Warning		

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

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

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

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

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

No.	Diagnostic information		Remedy instructions	Influenced measured variables
496			Deactivate simulation status input	-
	Quality	Good		
	Quality substatus	Function check	-	
	Coding (hex)	0xBC to 0xBF	-	
	Status signal	С		
	Diagnostic behavior	Warning		

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

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

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

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

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

	Diagnostic information		Remedy instructions	Influenced measured
No.	S	hort text		variables
537	5		1. Check IP addresses in network	-
			2. Change IP address	
	Quality	Good		
	Quality substatus	Function check		
	Coding (hex)	0xBC to 0xBF		
	Status signal	F		
	Diagnostic behavior	Warning		

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

12.7.4 Diagnostic of process

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

	Diagnostic information		Remedy instructions	Influenced measured
No.	5	Short text		variables
832	Electronic temperature too hid Measured variable status [fi		Reduce ambient temperature	ConductivityCorrected conductivity
	Quality	Bad		 Measured values 1 Measured values 2 Measured values 3 Density Electronic temperature Empty pipe detection
	Quality substatus	Process related		
	Coding (hex)	0x28 to 0x2B		
	Status signal	S		Flow velocityLow flow cut off
	Diagnostic behavior	Warning		 Mass flow Reference density Corrected volume flow Temperature Status Volume flow

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

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

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

	Diagnostic information		Remedy instructions	Influenced measured
No.	Short text			variables
835	35 Process temperature too low		Increase process temperature	 Conductivity Corrected conductivity
	Measured variable status [fro	om the factory] ¹⁾		variables
	Quality	Uncertain		 Flow velocity
	Quality substatus	Process related		
	Coding (hex)	0x78 to 0x7B		
	Status signal	S		1
	Diagnostic behavior	Warning		

	Diagnostic information		Remedy instructions	Influenced measured	
No.	SI	hort text		variables	
842	Process limit		Low flow cut off active!	 Flow velocity 	
	Measured variable status [fro	om the factory] ¹⁾	1. Check low flow cut off configuration	Mass flowCorrected volume flow	
	Quality	Uncertain		StatusVolume flow	
	Quality substatus	Process related		- volume now	
	Coding (hex)	0x78 to 0x7B			
	Status signal	S			
	Diagnostic behavior	Warning			

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

	Diagnostic information		Remedy instructions	Influenced measured
No.		Short text		variables
937	Sensor symmetry		1. Eliminate external magnetic field near	Conductivity Connected conductivity
	Measured variable status [f	rom the factory] ¹⁾	sensor 2. Turn off diagnostic message	Corrected conductivityDensity
	Quality	Bad		Electronic temperatureEmpty pipe detection
	Quality substatus	Maintenance alarm		 Flow velocity
	Coding (hex)	0x24 to 0x27		Low flow cut offMass flow
	Status signal	S		 Reference density
	Diagnostic behavior	Warning		Corrected volume flowTemperatureStatusVolume flow

	Diagnostic information		Remedy instructions	Influenced measured
No.	S	hort text		variables
938	EMC interference		1. Check ambient conditions regarding	Conductivity
	Measured variable status [fro	om the factory] ¹⁾	EMC influence Corrected conductivity 2. Turn off diagnostic message Density	
	Quality	Bad		Electronic temperatureEmpty pipe detection
	Quality substatus	Maintenance alarm		 Flow velocity
	Coding (hex)	0x24 to 0x27		Low flow cut offMass flow
	Status signal	F		Reference density
	Diagnostic behavior	Alarm		Corrected volume flowTemperatureStatusVolume flow

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

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

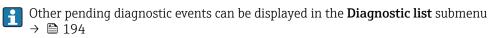
	Diagnostic information		Remedy instructions	Influenced measured
No.	SI	hort text		variables
962	Pipe empty		1. Perform full pipe adjustment	Conductivity
	Measured variable status [fro	om the factory] ¹⁾	 Perform empty pipe adjustment Turn off empty pipe detection 	Corrected conductivityFlow velocity
	Quality	Bad	 Low flow cut off Mass flow Corrected volume flow Status Volume flow 	
	Quality substatus	Process related		Corrected volume flowStatus
	Coding (hex)	0x28 to 0x2B		
	Status signal	S		
	Diagnostic behavior	Warning		

12.8 Pending diagnostic events

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

To call up the measures to rectify a diagnostic event:

- Via local display →
 164
- Via Web browser → 🖺 165
- Via "DeviceCare" operating tool →
 [™]
 [™]
 166



Navigation

"Diagnostics" menu

억 Diagnostics	
Actual diagnostics	→ 🗎 193
Previous diagnostics	→ ⇒ 193
Operating time from restart	→ 🗎 194
Operating time	→ 🗎 194

Parameter overview with brief description

Parameter	Prerequisite	Description	User interface
Actual diagnostics	A diagnostic event has occurred.	Shows the current occured diagnostic event along with its diagnostic information.	Symbol for diagnostic behavior, diagnostic code and short message.
		If two or more messages occur simultaneously, the message with the highest priority is shown on the display.	
Previous diagnostics	Two diagnostic events have already occurred.	Shows the diagnostic event that occurred prior to the current diagnostic event along with its diagnostic information.	Symbol for diagnostic behavior, diagnostic code and short message.

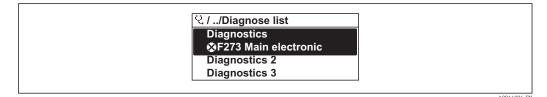
Parameter	Prerequisite	Description	User interface
Operating time from restart	-	Shows the time the device has been in operation since the last device restart.	Days (d), hours (h), minutes (m) and seconds (s)
Operating time	-	Indicates how long the device has been in operation.	Days (d), hours (h), minutes (m) and seconds (s)

12.9 Diagnostic list

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

Navigation path

Diagnostics \rightarrow Diagnostic list



■ 41 Taking the example of the local display

To call up the measures to rectify a diagnostic event:

- Via local display $\rightarrow \square 164$
- Via Web browser $\rightarrow \square 165$
- Via "FieldCare" operating tool $\rightarrow \square$ 166
- Via "DeviceCare" operating tool →
 [™]
 [™]
 166

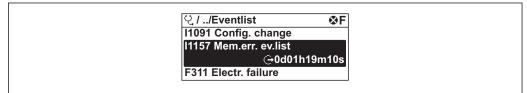
12.10 Event logbook

12.10.1 Reading out the event logbook

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

Navigation path

Diagnostics menu \rightarrow **Event logbook** submenu \rightarrow Event list



■ 42 Taking the example of the local display

A0014008-EN

- A maximum of 20 event messages can be displayed in chronological order.
- If the **Extended HistoROM** application package (order option) is enabled in the device, the event list can contain up to 100 entries .
- The event history includes entries for:
- Diagnostic events $\rightarrow \square 170$
- Information events $\rightarrow \square$ 195

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

- Diagnostic event
 - \odot : Occurrence of the event
 - \blacksquare : End of the event
- Information event
 - \odot : Occurrence of the event

To call up the measures to rectify a diagnostic event:

- Via local display $\rightarrow \triangleq 164$
- Via Web browser → 🗎 165
- Via "FieldCare" operating tool →

 ¹⁶⁶
- Via "DeviceCare" operating tool $\rightarrow \square$ 166

For filtering the displayed event messages $\rightarrow \square$ 195

12.10.2 Filtering the event logbook

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

Navigation path

Diagnostics \rightarrow Event logbook \rightarrow Filter options

Filter categories

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

12.10.3 Overview of information events

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

Info number	Info name
I1000	(Device ok)
I1079	Sensor changed
I1089	Power on
I1090	Configuration reset
I1091	Configuration changed
I1092	HistoROM backup deleted
I1137	Electronic changed
I1151	History reset
I1155	Reset electronic temperature
I1156	Memory error trend
I1157	Memory error event list
I1184	Display connected
I1256	Display: access status changed
I1278	I/O module reset detected
I1335	Firmware changed
I1351	Empty pipe detection adjustment failure

Info number	Info name
I1353	Empty pipe detection adjustment ok
I1361	Web server: login failed
I1397	Fieldbus: access status changed
I1398	CDI: access status changed
I1443	Coating thickness not determined
I1444	Device verification passed
I1445	Device verification failed
I1457	Measured error verification failed
I1459	I/O module verification failed
I1461	Sensor verification failed
I1462	Sensor electronic module verific. failed
I1512	Download started
I1513	Download finished
I1514	Upload started
I1515	Upload finished
I1618	I/O module 2 replaced
I1619	I/O module 3 replaced
I1621	I/O module 4 replaced
I1622	Calibration changed
I1624	Reset all totalizers
I1625	Write protection activated
I1626	Write protection deactivated
I1627	Web server: login successful
I1628	Display: login successful
I1629	CDI: login successful
I1631	Web server access changed
I1632	Display: login failed
I1633	CDI: login failed
I1634	Reset to factory settings
I1635	Reset to delivery settings
I1636	Fieldbus address reset
I1639	Max. switch cycles number reached
I1649	Hardware write protection activated
I1650	Hardware write protection deactivated
I1712	New flash file received
I1725	Sensor electronic module (ISEM) changed
I1726	Configuration backup failed

12.11 Resetting the measuring device

Using the **Device reset** parameter ($\rightarrow \square 138$) it is possible to reset the entire device configuration or some of the configuration to a defined state.

Options	Description
Cancel	No action is executed and the user exits the parameter.
To delivery settings	Every parameter for which a customer-specific default setting was ordered is reset to this customer-specific value. All other parameters are reset to the factory setting.
Restart device	The restart resets every parameter whose data are in the volatile memory (RAM) to the factory setting (e.g. measured value data). The device configuration remains unchanged.
Restore S-DAT backup	Restore the data that are saved on the S-DAT. The data record is restored from the electronics memory to the S-DAT.
	This option is displayed only in an alarm condition.

12.11.1 Function scope of the "Device reset" parameter

12.12 Device information

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

Navigation

"Diagnostics" menu \rightarrow Device information

► Device informat	ion		
	Device tag]	→ 🗎 198
	Serial number]	→ 🗎 198
	Firmware version]	→ 🗎 198
	Device name]	→ 🗎 198
	Order code]	→ 🗎 198
	Extended order code 1		→ 🗎 198
	Extended order code 2		→ 🗎 198
	Extended order code 3		→ 🗎 198
	ENP version		→ 🗎 198
	PROFIBUS ident number		→ 🗎 198
	Status PROFIBUS Master Config		→ 🗎 198

Parameter overview with brief description

Parameter	Description	User interface	Factory setting
Device tag	Shows name of measuring point.	Max. 32 characters, such as letters, numbers or special characters (e.g. @, %, /).	Promag 500 PA
Serial number	Shows the serial number of the measuring device.	Max. 11-digit character string comprising letters and numbers.	-
Firmware version	Shows the device firmware version installed.	Character string in the format xx.yy.zz	-
Device name	Shows the name of the transmitter. The name can be found on the nameplate of the transmitter.	Promag 300/500	_
Order code	Shows the device order code. The order code can be found on the nameplate of the sensor and transmitter in the "Order code" field.	Character string composed of letters, numbers and certain punctuation marks (e.g. /).	-
Extended order code 1	Shows the 1st part of the extended order code. The extended order code can also be found on the nameplate of the sensor and transmitter in the "Ext. ord. cd." field.	Character string	-
Extended order code 2	Shows the 2nd part of the extended order code. The extended order code can also be found on the nameplate of the sensor and transmitter in the "Ext. ord. cd." field.	Character string	-
Extended order code 3	Shows the 3rd part of the extended order code. The extended order code can also be found on the nameplate of the sensor and transmitter in the "Ext. ord. cd." field.	Character string	-
ENP version	Shows the version of the electronic nameplate (ENP).	Character string	2.02.00
PROFIBUS ident number	Displays the PROFIBUS identification number.	0 to FFFF	0x156C
Status PROFIBUS Master Config	Displays the status of the PROFIBUS Master configuration.	ActiveNot active	Not active

Release date	Firmware version	Order code for "Firmware version"	Firmware changes	Documentation type	Documentation
08.2016	01.00.zz	Option 70	Original firmware	Operating Instructions	BA01405D/06/EN/01.16
11.2018	01.01.zz	Option 68	 Local display - enhanced performance and data entry via text editor Optimized keypad lock for local display Web server feature update Support for trend data function Heartbeat function enhanced to include detailed results (page 3/4 of the report) Device configuration as PDF (parameter log, similar to FDT print) Network capability of Ethernet (service) interface Comprehensive Heartbeat feature update Local display - support for WLAN infrastructure mode Implementation of reset code 	Operating Instructions	BA01405D/06/EN/02.18

12.13 Firmware history

It is possible to flash the firmware to the current version or the previous version using the service interface.

For the compatibility of the firmware version with the previous version, the installed device description files and operating tools, observe the information about the device in the "Manufacturer's information" document.

- The manufacturer's information is available:
 - In the Download Area of the Endress+Hauser web site: www.endress.com → Downloads
 - Specify the following details:
 - Product root: e.g. 5P5B
 - The product root is the first part of the order code: see the nameplate on the device.
 - Text search: Manufacturer's information
 - Media type: Documentation Technical Documentation

13 Maintenance

13.1 Maintenance tasks

No special maintenance work is required.

13.1.1 Exterior cleaning

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

13.1.2 Interior cleaning

No interior cleaning is planned for the device.

13.1.3 Replacing seals

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

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

Replacement seals (accessory part) $\rightarrow \cong 231$

13.2 Measuring and test equipment

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

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

List of some of the measuring and testing equipment: \rightarrow \cong 203

13.3 Endress+Hauser services

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

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

Maintenance

14 Repairs

14.1 General notes

14.1.1 Repair and conversion concept

The Endress+Hauser repair and conversion concept provides for the following:

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

14.1.2 Notes for repair and conversion

For repair and modification of a measuring device, observe the following notes:

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

14.2 Spare parts

W@M Device Viewer (www.endress.com/deviceviewer):

All the spare parts for the measuring device, along with the order code, are listed here and can be ordered. If available, users can also download the associated Installation Instructions.

P Measuring device serial number:

- Is located on the nameplate of the device.
- Can be read out via the Serial number parameter (→
 ¹ 198) in the Device information submenu.

14.3 Endress+Hauser services

Endress+Hauser offers a wide range of services.

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

14.4 Return

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

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

14.5 Disposal

14.5.1 Removing the measuring device

1. Switch off the device.

WARNING

Danger to persons from process conditions.

- Beware of hazardous process conditions such as pressure in the measuring device, high temperatures or aggressive fluids.
- 2. Carry out the mounting and connection steps from the "Mounting the measuring device" and "Connecting the measuring device" sections in reverse order. Observe the safety instructions.

14.5.2 Disposing of the measuring device

WARNING

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

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

Observe the following notes during disposal:

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

15 Accessories

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

15.1 Device-specific accessories

15.1.1 For the transmitter

Accessories	Description
Transmitter • Proline 500 – digital • Proline 500	Transmitter for replacement or storage. Use the order code to define the following specifications: • Approvals • Output • Input • Display/operation • Housing • Software • Proline 500 – digital transmitter: Order code: 5X5BXX-XXXXXXA • Proline 500 transmitter: Order code: 5X5BXX-XXXXXXXB
	Proline 500 transmitter for replacement: It is essential to specify the serial number of the current transmitter when ordering. Based on the serial number, the device-specific data (e.g., calibration factors) of the replacement device can be used for the new transmitter.
	 Proline 500 - digital transmitter: Installation Instructions EA01151 Proline 500 transmitter: Installation Instructions EA01152
External WLAN antenna	 External WLAN antenna with 1.5 m (59.1 in) connecting cable and two angle brackets. Order code for "Enclosed accessories", option P8 "Wireless antenna wide area". Image: The external WLAN antenna is not suitable for use in hygienic applications. Further information on the WLAN interface → B 89. Order number: 71351317 Installation Instructions EA01238D
Pipe mounting set	Pipe mounting set for transmitter. Proline 500 – digital transmitter Order number: 71346427 Proline 500 transmitter Order number: 71346428
Protective cover Transmitter • Proline 500 – digital • Proline 500	Is used to protect the measuring device from the effects of the weather: e.g. rainwater, excess heating from direct sunlight. Proline 500 - digital transmitter Order number: 71343504 Proline 500 transmitter Order number: 71343505 Installation Instructions EA01160

Display guard Proline 500 – digital	Is used to protect the measuring device from the effects of the weather: e.g. rainwater, excess heating from direct sunlight. Order number: 71228792 For details, see Installation Instructions EA01093	
Ground cable	Set, consisting of two ground cables for potential equalization.	
Connecting cable Proline 500 – digital Sensor – Transmitter	The connecting cable can be ordered directly with the measuring device (order code for "Cable, sensor connection) or as an accessory (order number DK5012). The following cable lengths are available: order code for "Cable, sensor connection" • Option B: 20 m (65 ft) • Option E: User configurable up to max. 50 m • Option F: User configurable up to max. 165 ft	
	Maximum possible cable length for a Proline 500 – digital connecting cable: 300 m (1000 ft)	
Connecting cable Proline 500 Sensor – Transmitter	The connecting cable can be ordered directly with the measuring device (order code for "Cable, sensor connection) or as an accessory (order number DK5012). The following cable lengths are available: order code for "Cable, sensor connection" • Option 1: 5 m (16 ft) • Option 2: 10 m (32 ft) • Option 3: 20 m (65 ft) • Option 4: User configurable cable length (m) • Option 5: User configurable cable length (ft) Reinforced connecting cable with an additional, reinforcing metal braid: • Option 6: User configurable cable length (m) • Option 7: User configurable cable length (ft) • Option 7: User configurable cable length (ft)	

15.1.2 For the sensor

Accessories	Description
Ground disks	Are used to ground the medium in lined measuring tubes to ensure proper measurement. For details, see Installation Instructions EA00070D

Accessories	Description
Applicator	 Software for selecting and sizing Endress+Hauser measuring devices: Choice of measuring devices for industrial requirements Calculation of all the necessary data for identifying the optimum flowmeter: e.g. nominal diameter, pressure loss, flow velocity and accuracy. Graphic illustration of the calculation results Determination of the partial order code, administration, documentation and access to all project-related data and parameters over the entire life cycle of a project.
	Applicator is available:Via the Internet: https://portal.endress.com/webapp/applicatorAs a downloadable DVD for local PC installation.
W@M	W@M Life Cycle Management Improved productivity with information at your fingertips. Data relevant to a plant and its components is generated from the first stages of planning and during the asset's complete life cycle. W@M Life Cycle Management is an open and flexible information platform with online and on-site tools. Instant access for your staff to current, in-depth data shortens your plant's engineering time, speeds up procurement processes and increases plant uptime. Combined with the right services, W@M Life Cycle Management boosts productivity in every phase. For more information, visit www.endress.com/lifecyclemanagement
FieldCare	FDT-based plant asset management tool from Endress+Hauser.

Service-specific accessories 15.2

15.3 System components

DeviceCare

status and condition.

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Accessories	Description
Memograph M graphic data manager	The Memograph M graphic data manager provides information on all the relevant measured variables. Measured values are recorded correctly, limit values are monitored and measuring points analyzed. The data are stored in the 256 MB internal memory and also on a SD card or USB stick.

Operating Instructions BA00027S and BA00059S

Tool to connect and configure Endress+Hauser field devices.

Innovation brochure IN01047S

It can configure all smart field units in your system and helps you manage them. By using the status information, it is also a simple but effective way of checking their

16 Technical data

16.1 Application

The measuring device is only suitable for flow measurement of liquids with a minimum conductivity of 5 $\mu S/cm.$

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

To ensure that the device remains in proper operating condition for its service life, use the measuring device only for media against which the process-wetted materials are sufficiently resistant.

16.2 Function and system design

Measuring principle	Electromagnetic flow measurement on the basis of Faraday's law of magnetic induction.		
Measuring system	The measuring system consists of a transmitter and a sensor. The transmitter and sensor are mounted in physically separate locations. They are interconnected by connecting cables.		
	For information on the structure of the device $\rightarrow \cong 14$		

16.3 Input

Measured variable	Direct measured variables			
	Volume flow (proportional to induced voltage)Electrical conductivity			
	Calculated measured variables			
	Mass flowCorrected volume flow			
Measuring range	Typically $v = 0.01$ to 10 m/s (0.03 to 33 ft/s) with the specified accuracy			
	Flow characteristic values in SI units: DN 15 to 125 ($\frac{1}{2}$ to 4")			
	Nominal Recommended			

	ninal neter	Recommended flow	Factory settings		
		min./max. full scale value (v ~ 0.3/10 m/s)	output		Low flow cut off (v ~ 0.04 m/s)
[mm]	[in]	[dm³/min]	[dm ³ /min]	[dm ³]	[dm³/min]
15	1/2	4 to 100	25	0.2	0.5
25	1	9 to 300	75	0.5	1
32	-	15 to 500	125	1	2
40	1 ½	25 to 700	200	1.5	3
50	2	35 to 1100	300	2.5	5
65	-	60 to 2 000	500	5	8

Nom dian	iinal ieter	Recommended flow	Factory settings		
		min./max. full scale value (v ~ 0.3/10 m/s)	Full scale value current output (v ~ 2.5 m/s)	Pulse value (~ 2 pulse/s)	Low flow cut off (v ~ 0.04 m/s)
[mm]	[in]	[dm³/min]	[dm ³ /min]	[dm ³]	[dm ³ /min]
80	3	90 to 3 000	750	5	12
100	4	145 to 4700	1200	10	20

Flow characteristic values in SI units: DN 150 to 600 (6 to 24")

Nominal diameter		Recommended flow	Factory settings		
		min./max. full scale value (v ~ 0.3/10 m/s)	Full scale value current output (v ~ 2.5 m/s)	Pulse value (~ 2 pulse/s)	Low flow cut off (v ~ 0.04 m/s)
[mm]	[in]	[m³/h]	[m³/h]	[m ³]	[m ³ /h]
150	6	20 to 600	150	0.03	2.5
200	8	35 to 1 100	300	0.05	5
250	10	55 to 1700	500	0.05	7.5
300	12	80 to 2 400	750	0.1	10
350	14	110 to 3 300	1000	0.1	15
400	16	140 to 4200	1200	0.15	20
450	18	180 to 5 400	1 500	0.25	25
500	20	220 to 6 600	2 000	0.25	30
600	24	310 to 9600	2 500	0.3	40

Flow characteristic values in US units

Nominal diameter		Recommended flow	Factory settings		
		min./max. full scale value (v ~ 0.3/10 m/s)	Full scale value current output (v ~ 2.5 m/s)	Pulse value (~ 2 pulse/s)	Low flow cut off (v ~ 0.04 m/s)
[in]	[mm]	[gal/min]	[gal/min]	[gal]	[gal/min]
1/2	15	1.0 to 27	6	0.1	0.15
1	25	2.5 to 80	18	0.2	0.25
1 1/2	40	7 to 190	50	0.5	0.75
2	50	10 to 300	75	0.5	1.25
3	80	24 to 800	200	2	2.5
4	100	40 to 1250	300	2	4
6	150	90 to 2 650	600	5	12
8	200	155 to 4850	1200	10	15
10	250	250 to 7 500	1500	15	30
12	300	350 to 10600	2400	25	45
14	350	500 to 15000	3600	30	60
16	400	600 to 19000	4800	50	60
18	450	800 to 24000	6000	50	90

Nominal diameter		Recommended flow	Factory settings		
		min./max. full scale value (v ~ 0.3/10 m/s)	Full scale value current output (v ~ 2.5 m/s)	Pulse value (~ 2 pulse/s)	Low flow cut off (v ~ 0.04 m/s)
[in]	[mm]	[gal/min]	[gal/min]	[gal]	[gal/min]
20	500	1000 to 30000	7500	75	120
24	600	1 400 to 44 000	10500	100	180

Recommended measuring range

"Flow limit" section $\rightarrow \square 220$

 Operable flow range
 Over 1000 : 1

 Input signal
 External measured values

 To increase the accuracy of certain measured variables or to calculate the corrected volume flow, the automation system can continuously write different measured values to the measuring device:
 • Medium temperature to increase the accuracy of the electrical conductivity (e.g. iTEMP)

 • Reference density for calculating the corrected volume flow
 ✓ Various pressure transmitters and temperature measuring devices can be ordered from Endress+Hauser: see "Accessories" section → 🗎 205

 It is recommended to read in external measured values to calculate the corrected volume flow.
 Current input

The measured values are written from the automation system to the measuring device via the current input $\rightarrow \cong 208$.

Digital communication

The measured values are written from the automation system to the measuring device via PROFIBUS PA.

Current input 0/4 to 20 mA

Current input	0/4 to 20 mA (active/passive)
Current span	 4 to 20 mA (active) 0/4 to 20 mA (passive)
Resolution	1 μΑ
Voltage drop	Typically: 0.6 to 2 V for 3.6 to 22 mA (passive)
Maximum input voltage	≤ 30 V (passive)
Open-circuit voltage	< 28.8 V (active)
Possible input variables	PressureTemperatureDensity

Status input

Maximum input values	 DC -3 to 30 V If status input is active (ON): R_i >3 kΩ
Response time	Adjustable: 5 to 200 ms
Input signal level	 Low signal: DC -3 to +5 V High signal: DC 12 to 30 V
Assignable functions	 Off Reset the individual totalizers separately Reset all totalizers Flow override

16.4 Output

Output signal

PROFIBUS PA

PROFIBUS PA	In accordance with EN 50170 Volume 2, IEC 61158-2 (MBP), galvanically isolated
Data transmission	31.25 kbit/s
Current consumption	10 mA
Permitted supply voltage	9 to 32 V
Bus connection	With integrated reverse polarity protection

Current output 0/4 to 20 mA

Current output	0/4 to 20 mA
Maximum output values	22.5 mA
Current span	Can be set to:
	 4 to 20 mA (active) 0/4 to 20 mA (passive)
	Ex-i, passive
Open-circuit voltage	DC 28.8 V (active)
Maximum input voltage	DC 30 V (passive)
Load	0 to 700 Ω
Resolution	0.38 μΑ
Damping	Adjustable: 0.07 to 999 s
Assignable measured variables	 Volume flow Mass flow Corrected volume flow Flow velocity Conductivity Corrected conductivity Temperature Electronic temperature

Pulse/frequency/switch output

Function	Can be set to pulse, frequency or switch output
Version	Open collector
	Can be set to: • Active • Passive Ex-i, passive
Maximum input values	DC 30 V, 250 mA (passive)
Open-circuit voltage	DC 28.8 V (active)
Voltage drop	For 22.5 mA: ≤ DC 2 V
Pulse output	
Maximum input values	DC 30 V, 250 mA (passive)
Maximum output current	22.5 mA (active)
Open-circuit voltage	DC 28.8 V (active)

Pulse width	Adjustable: 0.05 to 2 000 ms
Maximum pulse rate	10 000 Impulse/s
Pulse value	Adjustable
Assignable measured variables	Volume flowMass flowCorrected volume flow
Frequency output	
Maximum input values	DC 30 V, 250 mA (passive)
Maximum output current	22.5 mA (active)
Open-circuit voltage	DC 28.8 V (active)
Output frequency	Adjustable: end value frequency 2 to 10000 Hz (f $_{max}$ = 12500 Hz)
Damping	Adjustable: 0 to 999 s
Pulse/pause ratio	1:1
Assignable measured variables	 Volume flow Mass flow Corrected volume flow Flow velocity Conductivity Corrected conductivity Temperature Electronic temperature
Switch output	
Maximum input values	DC 30 V, 250 mA (passive)
Open-circuit voltage	DC 28.8 V (active)
Switching behavior	Binary, conductive or non-conductive
Switching delay	Adjustable: 0 to 100 s
Number of switching cycles	Unlimited
Assignable functions	 Off On Diagnostic behavior Limit value: Off Volume flow Mass flow Corrected volume flow Flow velocity Conductivity Corrected conductivity Totalizer 1-3 Temperature Electronic temperature Flow direction monitoring Status Empty pipe detection Low flow

Relay output

Function	Switch output
Version	Relay output, galvanically isolated
Switching behavior	Can be set to: • NO (normally open), factory setting • NC (normally closed)

Maximum switching capacity (passive)	 DC 30 V, 0.1 A AC 30 V, 0.5 A
Assignable functions	 Off On Diagnostic behavior Limit value: Off Volume flow Mass flow Corrected volume flow Flow velocity Conductivity Corrected conductivity Totalizer 1-3 Temperature Electronic temperature Flow direction monitoring Status Empty pipe detection Low flow

User configurable input/output

One specific input or output is assigned to a user-configurable input/output (configurable I/O) during device commissioning.

The following inputs and outputs are available for assignment:

- Choice of current output: 4 to 20 mA (active), 0/4 to 20 mA (passive)
- Pulse/frequency/switch output
- Choice of current input: 4 to 20 mA (active), 0/4 to 20 mA (passive)
- Status input

The technical values correspond to those of the inputs and outputs described in this section.

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

PROFIBUS PA

Status and alarm messages	Diagnostics in accordance with PROFIBUS PA Profile 3.02
Failure current FDE (Fault Disconnection Electronic)	0 mA

Current output 0/4 to 20 mA

4 to 20 mA

Failure mode	 Choose from: 4 to 20 mA in accordance with NAMUR recommendation NE 43 4 to 20 mA in accordance with US Min. value: 3.59 mA Max. value: 22.5 mA Freely definable value between: 3.59 to 22.5 mA Actual value Last valid value
--------------	---

0 to 20 mA

Failure mode	Choose from:
	 Maximum alarm: 22 mA
	 Freely definable value between: 0 to 20.5 mA

Pulse/frequency/switch output

Pulse output				
Failure mode	Choose from: • Actual value • No pulses			
Frequency output				
Failure mode	Choose from: • Actual value • 0 Hz • Defined value (f max 2 to 12 500 Hz)			
Switch output				
Failure mode	Choose from: • Current status • Open • Closed			

Relay output

Failure mode	Choose from:
	 Current status
	 Open
	 Closed

Local display

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



Status signal as per NAMUR recommendation NE 107

Interface/protocol

- Via digital communication:
 - PROFIBUS PA
- Via service interface CDI-RJ45 service interface
 - WLAN interface

Plain text display	With information on cause and remedial measures
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Web server

Plain text display	With information on cause and remedial measures
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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 			
	Diagnostic information via light emitting diodes			

Low flow cut off	The switch points for low flow cut off are user-selectable.				
Galvanic isolation	ly isolated from one another and from earth (PE).				
Protocol-specific data	Manufacturer ID	0x11			
	Ident number	0x156C			
	Profile version	3.02			
	Device description files (GSD, DTM, DD)	Information and files under: • www.endress.com • www.profibus.org			
	Supported functions	 Identification & Maintenance Simplest device identification on the part of the control system and nameplate PROFIBUS upload/download Reading and writing parameters is up to ten times faster with PROFIBUS upload/download Condensed status Simplest and self-explanatory diagnostic information by categorizing diagnostic messages that occur 			
	Configuration of the device address	 DIP switches on the I/O electronics module Local display Via operating tools (e.g. FieldCare) 			
	Compatibility with earlier model	If the device is replaced, the measuring device Promag 500 supports the compatibility of the cyclic data with previous models. It is not necessary to adjust the engineering parameters of the PROFIBUS network with the Promag 500 GSD file. Earlier models: Promag 50 PROFIBUS PA ID No.: 1525 (hex) Extended GSD file: EH3x1525.gsd Standard GSD file: EH3_1525.gsd			
		 Promag 53 PROFIBUS PA ID No.: 1527 (hex) Extended GSD file: EH3x1527.gsd Standard GSD file: EH3_1527.gsd 			
	System integration	 Information regarding system integration → 99. Cyclic data transmission Block model Description of the modules 			

16.5 Power supply

Terminal assignment	→ 🗎 41
Device plugs available	→ 🗎 42
Pin assignment, device plug	→ 🗎 42

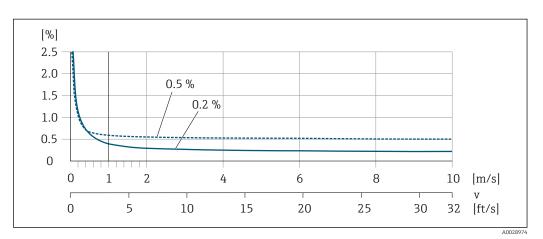
Supply voltage	Order code for "Power supply"	terminal voltage		Frequency range
	Option D	DC24 V	±20%	-
	Option E	AC100 to 240 V	-15+10%	50/60 Hz, ±4 Hz

Order code for		terminal voltage Frequency range			
"Power supply"					
Ontion I	1	DC24 V	±20%	-	
	1	AC100 to 240 V	-15+10%	50/60 Hz, ±4 Hz	
Transmitter					
Max. 10 W (active pow	wer)				
switch-on current	Max. 36	A (as per NAMU	R Recommendatio	on NE21)	
Transmitter					
		Hz; 230 V, 50	/60 Hz)		
 Totalizers stop at the last value measured. Depending on the device version, the configuration is retained in the device memoryor in the pluggable data memory (HistoROM DAT). Error messages (incl. total operated hours) are stored. 					
→ ¹ 52					
→ 🗎 57					
Spring-loaded terminals: Suitable for strands and strands with ferrules. Conductor cross-section 0.2 to 2.5 mm^2 (24 to 12 AWG).					
 Cable gland: M20 × 1.5 with cable Ø 6 to 12 mm (0.24 to 0.47 in) Thread for cable entry: NPT ½" G ½" M20 Device plug for digital communication: M12 					
→ 🗎 38					
16.6 Perform	nance	character	istics		
 Error limits following DIN EN 29104, in future ISO 20456 Water, typically: +15 to +45 °C (+59 to +113 °F); 0.5 to 7 bar (73 to 101 psi) Data as indicated in the calibration protocol Accuracy based on accredited calibration rigs according to ISO 17025 					
or Error limits under reference operating conditions o.r. = of reading					
	Option I Transmitter Max. 10 W (active powers) switch-on current Transmitter • Max. 400 mA (24 V) • Max. 200 mA (110) • Totalizers stop at the Depending on the data of the pluggable data of t	"Power supply" Option I Transmitter Max. 10 W (active power) switch-on current Max. 36 Transmitter • Max. 400 mA (24 V) • Max. 200 mA (110 V, 50/60 • Totalizers stop at the last value • Depending on the device verse the pluggable data memory (1000) • Error messages (incl. total ope $\rightarrow \boxdot 52$ $\rightarrow \boxdot 57$ Spring-loaded terminals: Suitable Conductor cross-section 0.2 to 100 • Cable gland: M20 × 1.5 with • Thread for cable entry: • NPT $\frac{1}{2}$ " • G $\frac{1}{2}$ " • M20 • Device plug for digital commutation of the caliburation of the cali	"Power supply" DC24 V Option I DC24 V AC100 to 240 V Transmitter Max. 10 W (active power) switch-on current Max. 36 A (as per NAMU) Transmitter Max. 400 mA (24 V) Max. 200 mA (110 V, 50/60 Hz; 230 V, 50) • Totalizers stop at the last value measured. • Depending on the device version, the config the pluggable data memory (HistoROM DA') • Error messages (incl. total operated hours) →	Power supply" $DC24 V$ $\pm 20\%$ $AC100 to 240 V$ $\pm 20\%$ $AC100 to 240 V$ DransmitterMax. 10 W (active power)switch-on currentMax. 36 A (as per NAMUR Recommendation)switch-on currentMax. 36 A (as per NAMUR Recommendation)TransmitterMax. 200 mA (24 V)• Max. 200 mA (110 V, 50/60 Hz; 230 V, 50/60 Hz)• Totalizers stop at the last value measured.• Depending on the device version, the configuration is retather pluggable data memory (HistoROM DAT).• Error messages (incl. total operated hours) are stored.• \blacksquare 52• \blacksquare 57Spring-loaded terminals: Suitable for strands and strands we Conductor cross-section 0.2 to 2.5 mm² (24 to 12 AWG).• Cable gland: M20 × 1.5 with cable Ø 6 to 12 mm (0.24 to 12 for thread for cable entry: • M20• \square 5816.6Performance characteristics• Error limits following DIN EN 29104, in future ISO 20456 	

Volume flow

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

Fluctuations in the supply voltage do not have any effect within the specified range.



■ 43 Maximum measured error in % o.r.

Electrical conductivity

Max. measured error not specified.

Accuracy of outputs

The outputs have the following base accuracy specifications.

Current output

Accuracy	±5 µA
----------	-------

Pulse/frequency output

o.r. = of reading

Accuracy	Max. ± 50 ppm o.r. (over the entire ambient temperature range)
----------	--

Repeatability

o.r. = of reading

Volume flow

Max. ± 0.1 % o.r. \pm 0.5 mm/s (0.02 in/s)

Electrical conductivity Max. ±5 % o.r.

Influence of ambient temperature

Current output

Temperature coefficient Max. 1 µA/°C

Pulse/frequency output

Temperature coefficient	No additional effect. Included in accuracy.
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16.7 Installation

"Mounting requirements" $\rightarrow \square 23$

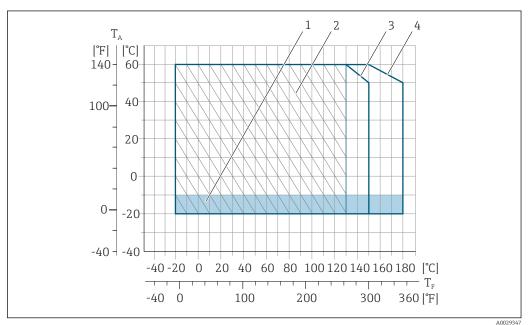
16.8 Environment

Ambient temperature range	→ 🗎 25
	Temperature tables
	Observe the interdependencies between the permitted ambient and fluid temperatures when operating the device in hazardous areas.
	For detailed information on the temperature tables, see the separate document entitled "Safety Instructions" (XA) for the device.
Storage temperature	The storage temperature corresponds to the operating temperature range of the transmitter and the sensor $\rightarrow \square 25$.
	 Protect the measuring device against direct sunlight during storage in order to avoid unacceptably high surface temperatures. Select a storage location where moisture cannot collect in the measuring device as fungus or bacteria infestation can damage the liner. If protection caps or protective covers are mounted these should never be removed before installing the measuring device.
Degree of protection	Transmitter • As standard: IP66/67, type 4X enclosure • When housing is open: IP20, type 1 enclosure • Display module: IP20, type 1 enclosure
	Sensor As standard: IP66/67, type 4X enclosure
	External WLAN antenna IP67
Vibration resistance	 Vibration, sinusoidal according to IEC 60068-2-6 2 to 8.4 Hz, 7.5 mm peak 8.4 to 2 000 Hz, 2 g peak
	 Vibration broad-band random, according to IEC 60068-2-64 10 to 200 Hz, 0.01 g²/Hz 200 to 2 000 Hz, 0.003 g²/Hz Total: 2.70 g rms
Shock resistance	Shock, half-sine according to IEC 60068-2-27 6 ms 50 g
Shock resistance	Shock due to rough handling following IEC 60068-2-31
Mechanical load	 Protect the transmitter housing against mechanical effects, such as shock or impact. Never use the transmitter housing as a ladder or climbing aid.

Electromagnetic
compatibility (EMC)As per IEC/EN 61326 and NAMUR Recommendation 21 (NE 21)Details are provided in the Declaration of Conformity.

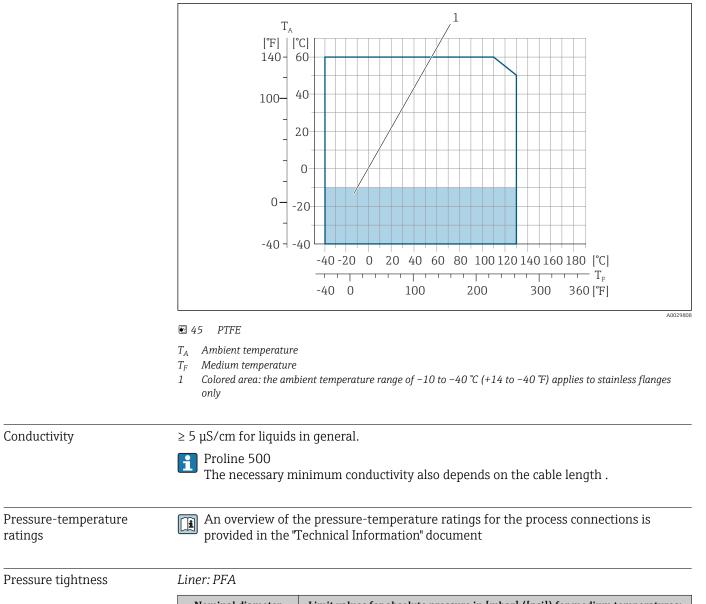
16.9 Process

Medium temperature range -20 to +150 °C (-4 to +302 °F) for PFA, DN 25 to 200 (1 to 8") -20 to +180 °C (-4 to +356 °F) for PFA high-temperature, DN 25 to 200 (1 to 8") -40 to +130 °C (-40 to +266 °F) for PTFE, DN 15 to 600 (½ to 24")



🛃 44 PFA

- *T_A Ambient temperature*
- *T_F Medium temperature*
- 1 Colored area: the ambient temperature range –10 to –20 °C (+14 to –4 °F) applies to stainless flanges only
- 2 Hatched area: harsh environment only for medium temperature range -20 to +130 °C (-4 to +266 °F)
- 3 -20 to +150 °C (-4 to +302 °F) for PFA, DN 25 to 200 (1 to 8")
- 4 -20 to +180 °C (-4 to +356 °F) for PFA high-temperature, DN 25 to 200 (1 to 8")



Nominal diameter		Limit values for absolute pressure in [mbar] ([psi]) for medium temperatures				
[mm]	[in]	+25 °C (+77 °F) +80 °C (+176 °F)		+100 to +180 °C (+212 to +356 °F)		
25	1	0 (0)	0 (0)	0 (0)		
32	-	0 (0)	0 (0)	0 (0)		
40	1 1/2	0 (0)	0 (0)	0 (0)		
50	2	0 (0)	0 (0)	0 (0)		
65	-	0 (0)	0 (0)	0 (0)		
80	3	0 (0)	0 (0)	0 (0)		
100	4	0 (0)	0 (0)	0 (0)		
125	-	0 (0)	0 (0)	0 (0)		
150	6	0 (0)	0 (0)	0 (0)		
200	8	0 (0)	0 (0)	0 (0)		

ratings

Nominal	diameter	Limit values for absolute pressure in [mbar] ([psi]) for medium temperatures:					
[mm]	[in]	+25 °C (+77 °F)	+80 °C (+176 °F)	+100 °C (+212 °F)	+130 °C (+266 °F		
15	1/2	0 (0)	0 (0)	0 (0)	100 (1.45)		
25	1	0 (0)	0 (0)	0 (0)	100 (1.45)		
32	-	0 (0)	0 (0)	0 (0)	100 (1.45)		
40	1 1/2	0 (0)	0 (0)	0 (0)	100 (1.45)		
50	2	0 (0)	0 (0)	0 (0)	100 (1.45)		
65	-	0 (0)	-	40 (0.58)	130 (1.89)		
80	3	0 (0)	-	40 (0.58)	130 (1.89)		
100	4	0 (0)	-	135 (1.96)	170 (2.47)		
125	-	135 (1.96)	-	240 (3.48)	385 (5.58)		
150	6	135 (1.96)	-	240 (3.48)	385 (5.58)		
200	8	200 (2.90)	-	290 (4.21)	410 (5.95)		
250	10	330 (4.79)	-	400 (5.80)	530 (7.69)		
300	12	400 (5.80)	-	500 (7.25)	630 (9.14)		
350	14	470 (6.82)	-	600 (8.70)	730 (10.6)		
400	16	540 (7.83)	-	670 (9.72)	800 (11.6)		
450	18		I		1		
500	20		No negative pre	ssure permitted!			
600	24	1					

Liner: PTFE

Flow limit	 The diameter of the pipe and the flow rate determine the nominal diameter of the sensor The optimum velocity of flow is between 2 to 3 m/s (6.56 to 9.84 ft/s). Also match the velocity of flow (v) to the physical properties of the fluid: v < 2 m/s (6.56 ft/s): for abrasive fluids (e.g. potter's clay, lime milk, ore slurry) v > 2 m/s (6.56 ft/s): for fluids producing buildup (e.g. wastewater sludge) 					
	A necessary increase in the flow velocity can be achieved by reducing the sensor nominal diameter.					
	For an overview of the full scale values for the measuring range, see the "Measuring range" section $\rightarrow \square 206$					
Pressure loss	 No pressure loss occurs if the sensor is installed in a pipe with the same nominal diameter. Pressure losses for configurations incorporating adapters according to DIN EN 545 → 27 					
System pressure	→ 🗎 26					
Vibrations	→ 🖹 26					
	16.10 Mechanical construction					

Design, dimensions

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

Weight

All values (weight exclusive of packaging material) refer to devices for standard pressure ratings.

Transmitter

- Proline 500 digital polycarbonate: 1.4 kg (3.1 lbs)
- Proline 500 digital aluminum: 2.4 kg (5.3 lbs)
- Proline 500 aluminum: 6.5 kg (14.3 lbs)
- Proline 500 cast, stainless: 15.6 kg (34.4 lbs)

Sensor

- Sensor with aluminum connection housing version: see the information in the following table
- Cast connection housing version, stainless: +3.7 kg (+8.2 lbs)

Weight in SI units

Nominal d	liameter	ter EN (DIN), AS ¹⁾		ASME		JIS	
[mm]	[in]	Pressure rating	[kg]	Pressure rating	[kg]	Pressure rating	[kg]
15	1/2	PN 40	4.5	Class 150	4.5	10K	4.5
25	1	PN 40	5.3	Class 150	5.3	10K	5.3
32	-	PN 40	6	Class 150	-	10K	5.3
40	1 ½	PN 40	7.4	Class 150	7.4	10K	6.3
50	2	PN 40	8.6	Class 150	8.6	10K	7.3
65	-	PN 16	10	Class 150	-	10K	9.1
80	3	PN 16	12	Class 150	12	10K	10.5
100	4	PN 16	14	Class 150	14	10K	12.7
125	-	PN 16	19.5	Class 150	-	10K	19
150	6	PN 16	23.5	Class 150	23.5	10K	22.5
200	8	PN 10	43	Class 150	43	10K	39.9
250	10	PN 10	63	Class 150	73	10K	67.4
300	12	PN 10	68	Class 150	108	10K	70.3
350	14	PN 10	103	Class 150	173	10K	79
400	16	PN 10	118	Class 150	203	10K	100
450	18	PN 10	159	Class 150	253	10K	128
500	20	PN 10	154	Class 150	283	10K	142
600	24	PN 10	206	Class 150	403	10K	188

1) For flanges to AS, only DN 25 and 50 are available.

Weight in US units

Nominal diameter		ASME		
[mm]	[in]	Pressure rating	[lbs]	
15	1/2	Class 150	9.92	
25	1	Class 150	11.7	
40	1 ½	Class 150	16.3	
50	2	Class 150	19.0	
80	3	Class 150	26.5	
100	4	Class 150	30.9	

Process connection internal diameter

Nominal diameter		ASME		
[mm]	[in]	Pressure rating	[lbs]	
150	6	Class 150	51.8	
200	8	Class 150	94.8	
250	10	Class 150	161.0	
300	12	Class 150	238.1	
350	14	Class 150	381.5	
400	16	Class 150	447.6	
450	18	Class 150	557.9	
500	20	Class 150	624.0	
600	24	Class 150	888.6	

Pressure rating

Measuring tube specification

dian	neter									
		EN (DIN)	ASME	AS 2129	AS 4087	JIS	PI	FA	PT	FE
[mm]	[in]	[bar]	[psi]	[bar]	[bar]	[bar]	[mm]	[in]	[mm]	[in]
15	1/2	PN 40	Class 150	-	-	20K	-	-	15	0.59
25	1	PN 40	Class 150	Table E	-	20K	23	0.91	26	1.02
32	-	PN 40	-	-	-	20K	32	1.26	35	1.38
40	1 1/2	PN 40	Class 150	-	-	20K	36	1.42	41	1.61
50	2	PN 40	Class 150	Table E	PN 16	10K	48	1.89	52	2.05
65	-	PN 16	-	-	-	10K	63	2.48	67	2.64
80	3	PN 16	Class 150	-	-	10K	75	2.95	80	3.15
100	4	PN 16	Class 150	-	-	10K	101	3.98	104	4.09
125	-	PN 16	-	-	-	10K	126	4.96	129	5.08
150	6	PN 16	Class 150	-	-	10K	154	6.06	156	6.14
200	8	PN 10	Class 150	-	-	10K	201	7.91	202	7.95
250	10	PN 10	Class 150	-	-	10K	-	-	256	10.1
300	12	PN 10	Class 150	-	-	10K	-	-	306	12.0
350	14	PN 10	Class 150	-	-	10K	-	-	337	13.3
400	16	PN 10	Class 150	-	-	10K	-	-	387	15.2
450	18	PN 10	Class 150	-	-	10K	-	-	432	17.0
500	20	PN 10	Class 150	-	-	10K	-	-	487	19.2
600	24	PN 10	Class 150	-	-	10K	-	-	593	23.3

Materials

Transmitter housing

Nominal

Housing of Proline 500 – digital transmitter

Order code for "Transmitter housing":

- Option **A** "Aluminum coated": aluminum, AlSi10Mg, coated
- Option D "Polycarbonate": polycarbonate

Housing of Proline 500 transmitter

Order code for "Transmitter housing":

- Option **A** "Aluminum coated": aluminum, AlSi10Mg, coated
- Option L "Cast, stainless": cast, stainless steel, 1.4409 (CF3M) similar to 316L

Window material

Order code for "Transmitter housing":

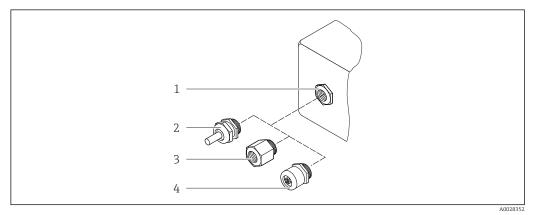
- Option A "Aluminum, coated": glass
- Option **D** "Polycarbonate": plastic
- Option L "Cast, stainless": glass

Sensor connection housing

Order code for "Sensor connection housing":

- Option A "Aluminum coated": aluminum, AlSi10Mg, coated
- Option L "Cast, stainless": 1.4409 (CF3M) similar to 316L

Cable entries/cable glands



■ 46 Possible cable entries/cable glands

- 1 Female thread M20 × 1.5
- 2 Cable gland $M20 \times 1.5$
- 3 Adapter for cable entry with internal thread $G \frac{1}{2}$ or NPT $\frac{1}{2}$ "
- 4 Device plugs

Cable entries and adapters	Material
Cable gland M20 × 1.5	Plastic
 Adapter for cable entry with internal thread G ¹/₂" Adapter for cable entry with internal thread NPT ¹/₂" 	Nickel-plated brass
 Only available for certain device versions: Order code for "Transmitter housing": Option A "Aluminum, coated" Option D "Polycarbonate" Order code for "Sensor connection housing": Proline 500 - digital: Option A "Aluminum coated" Option L "Cast, stainless" Proline 500: Option A "Aluminum coated" Option L "Cast, stainless" 	
 Adapter for cable entry with internal thread G ½" Adapter for cable entry with internal thread NPT ½" 	Stainless steel, 1.4404 (316L)
 Only available for certain device versions: Order code for "Transmitter housing": Option L "Cast, stainless" Order code for "Sensor connection housing": Option L "Cast, stainless" 	
Adapter for device plug	Stainless steel, 1.4404 (316L)
Device plug for digital communication: Only available for certain device versions .	

Device plug

Electrical connection	Material
Plug M12x1	Socket: Stainless steel, 1.4404 (316L)Contact housing: Polyamide
	 Contacts: Gold-plated brass

Connecting cable

Connecting cable for sensor - Proline 500 - digital transmitter

PVC cable with copper shield

Connecting cable for sensor - Proline 500 transmitter

- Standard cable: PVC cable with copper shield
- Reinforced cable: PVC cable with copper shield and additional steel wire braided jacket

UV rays can impair the cable outer sheath. Protect the cable from exposure to sun as much as possible.

Sensor housing

- DN 15 to 300 (1/2 to 12"): coated aluminum AlSi10Mg
- DN 350 to 600 (14 to 24"): carbon steel with protective varnish

Measuring tubes

Stainless steel, 1.4301/304/1.4306/304LFor flanges made of carbon with Al/Zn protective coating (DN 15 to 300 ($\frac{1}{2}$ to 12")) or protective varnish (DN 350 to 600 (14 to 24"))

Liner

PFA

PTFE

Process connections

EN 1092-1 (DIN 2501) Stainless steel, 1.4571 (F316L); carbon steel, E250C ¹⁾/S235JRG2/P245GH

ASME B16.5 Stainless steel, F316L; carbon steel, A105¹⁾

JIS B2220

Stainless steel, 1.0425 (F316L) ¹⁾; carbon steel, A105/A350 LF2

AS 2129 Table E

- DN 25 (1"): carbon steel, A105/S235JRG2
- DN 40 (1 ¹/₂"): carbon steel, A105/S275JR

AS 4087 PN 16 Carbon steel, A105/S275JR

Electrodes

Stainless steel, 1.4435 (F316L); Alloy C22, 2.4602 (UNS N06022); platinum; tantalum; titanium

¹⁾ DN 15 to 300 (½ to 12") with Al/Zn protective coating; DN 350 to 600 (14 to 24") with protective varnish

Seals

As per DIN EN 1514-1, form IBC

	Accessories				
	Protective cover				
	Stainless steel, 1.4404 (316L)				
	External WLAN antenna				
	 Antenna: ASA plastic (acrylic ester-styrene-acrylonitrile) and nickel-plated brass Adapter: Stainless steel and nickel-plated brass Cable: Polyethylene Plug: Nickel-plated brass Angle bracket: Stainless steel 				
	Ground disks				
	Stainless steel, 1.4435 (F316L); Alloy C22, 2.4602 (UNS N06022); tantalum; titanium				
Fitted electrodes	 Measuring electrodes, reference electrodes and electrodes for empty pipe detection: Standard: stainless steel, 1.4435 (F316L); Alloy C22, 2.4602 (UNS N06022); tantalum, titanium Optional: only platinum measuring electrodes 				
Process connections	 EN 1092-1 (DIN 2501) ASME B16.5 JIS B2220 AS 2129 Table E AS 4087 PN 16 				
	For information on the different materials used in the process connections $\rightarrow \cong 224$				
Surface roughness	Stainless steel electrodes, 1.4435 (F316L); Alloy C22, 2.4602 (UNS N06022); platinum; tantalum; titanium: ≤ 0.3 to 0.5 μm (11.8 to 19.7 μin) (All data relate to parts in contact with fluid)				
	Liner with PFA: ≤ 0.4 µm (15.7 µin) (All data relate to parts in contact with fluid)				

16.11 Operability

Languages
Can be operated in the following languages:
Via local operation

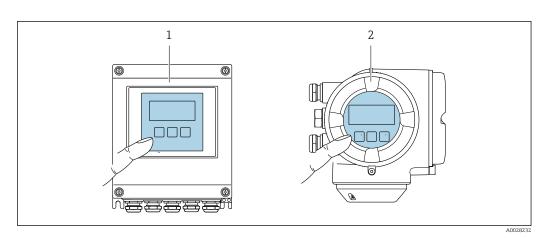
English, German, French, Spanish, Italian, Dutch, Portuguese, Polish, Russian, Turkish, Chinese, Japanese, Korean, Bahasa (Indonesian), Vietnamese, Czech, Swedish
Via Web browser

English, German, French, Spanish, Italian, Dutch, Portuguese, Polish, Russian, Turkish, Chinese, Japanese, Korean, Bahasa (Indonesian), Vietnamese, Czech, Swedish
Via "FieldCare", "DeviceCare" operating tool: English, German, French, Spanish, Italian, Chinese, Japanese

Local operation

Via display module

- Equipment:
- Order code for "Display; operation", option F "4-line, illuminated, graphic display; touch control"
- Order code for "Display; operation", option G "4-line, illuminated, graphic display; touch control + WLAN"
- Information about WLAN interface $\rightarrow \cong 89$



- 47 Operation with touch control
- 1 Proline 500 digital
- 2 Proline 500

Display elements

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

Operating elements

- External operation via touch control (3 optical keys) without opening the housing: , \boxdot ,
- Operating elements also accessible in the various zones of the hazardous area

Remote operation	→ 🖹 88
Service interface	→ 🖹 88
Supported operating tools	Different operating tools can be used for local or remote access to the measuring device. Depending on the operating tool used, access is possible with different operating units and via a variety of interfaces.

Supported operating tools	Operating unit	Interface	Additional information
Web browser	Notebook, PC or tablet with Web browser	CDI-RJ45 service interfaceWLAN interface	Special Documentation for device
DeviceCare SFE100	Notebook, PC or tablet with Microsoft Windows system	 CDI-RJ45 service interface WLAN interface Fieldbus protocol 	→ 🗎 205
FieldCare SFE500	Notebook, PC or tablet with Microsoft Windows system	CDI-RJ45 service interfaceWLAN interfaceFieldbus protocol	→ 🗎 205

Other operating tools based on FDT technology with a device driver such as DTM/ iDTM or DD/EDD can be used for device operation. These operating tools are available from the individual manufacturers. Integration into the following operating tools, among others, is supported:

- FactoryTalk AssetCentre (FTAC) by Rockwell Automation → www.rockwellautomation.com
- Process Device Manager (PDM) by Siemens → www.siemens.com
- Field Device Manager (FDM) by Honeywell \rightarrow www.honeywellprocess.com
- FieldMate by Yokogawa → www.yokogawa.com
- PACTWare → www.pactware.com

The associated device description files are available at: www.endress.com \rightarrow Downloads

Web server

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

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

Supported functions

Data exchange between the operating unit (such as a notebook for example) and the measuring device:

- Upload the configuration from the measuring device (XML format, configuration backup)
- Save the configuration to the measuring device (XML format, restore configuration)
- Export event list (.csv file)
- Export parameter settings (.csv file or PDF file, document the measuring point configuration)
- Export the Heartbeat verification log (PDF file, only available with the "Heartbeat Verification" application package)
- Flash firmware version for device firmware upgrade, for instance
- Download driver for system integration
- Visualize up to 1000 saved measured values (only available with the **Extended HistoROM** application package $\rightarrow \triangleq 231$)

Web server special documentation $\rightarrow \cong 232$

HistoROM data management The measuring device features HistoROM data management. HistoROM data management comprises both the storage and import/export of key device and process data, making operation and servicing far more reliable, secure and efficient.

When the device is delivered, the factory settings of the configuration data are stored as a backup in the device memory. This memory can be overwritten with an updated data record, for example after commissioning.

Additional information on the data storage concept

There are different types of data storage units in which device data are stored and used by the device:

	Device memory	T-DAT	S-DAT
Available data	 Event logbook such as diagnostic events for example Parameter data record backup Device firmware package Driver for system integration for exporting via Web server, e.g: GSD for PROFIBUS PA 	 Measured value logging ("Extended HistoROM" order option) Current parameter data record (used by firmware at run time) Peakhold indicator (min/max values) Totalizer values 	 Sensor data: nominal diameter etc. Serial number Calibration data Device configuration (e.g. SW options, fixed I/O or multi I/O)
Storage location	Fixed on the user interface board in the connection compartment	Attachable to the user interface board in the connection compartment	In the sensor plug in the transmitter neck part

Data backup

Automatic

- The most important device data (sensor and transmitter) are automatically saved in the DAT modules
- If the transmitter or measuring device is replaced: once the T-DAT containing the previous device data has been exchanged, the new measuring device is ready for operation again immediately without any errors
- If the sensor is replaced: once the sensor has been replaced, new sensor data are transferred from the S-DAT in the measuring device and the measuring device is ready for operation again immediately without any errors
- If exchanging the electronics module (e.g. I/O electronics module): Once the electronics module has been replaced, the software of the module is compared against the current device firmware. The module software is upgraded or downgraded where necessary. The electronics module is available for use immediately afterwards and no compatibility problems occur.

Manual

Additional parameter data record (complete parameter settings) in the integrated device memory HistoROM backup for:

- Data backup function Backup and subsequent restoration of a device configuration in the device memory HistoROM backup
- Data comparison function

Comparison of the current device configuration with the device configuration saved in the device memory HistoROM backup

Data transfer

Manual

- Transfer of a device configuration to another device using the export function of the specific operating tool, e.g. with FieldCare, DeviceCare or Web server: to duplicate the configuration or to store in an archive (e.g. for backup purposes)
- Transmission of the drivers for system integration via Web server, e.g.: GSD for PROFIBUS PA

Event list

Automatic

- Chronological display of up to 20 event messages in the events list
- If the Extended HistoROM application package (order option) is enabled: up to 100 event messages are displayed in the events list along with a time stamp, plain text description and remedial measures
- The events list can be exported and displayed via a variety of interfaces and operating tools e.g. DeviceCare, FieldCare or Web server

Data logging

Manual

- If the **Extended HistoROM** application package (order option) is enabled:
- Record up to 1000 measured values via 1 to 4 channels
- User configurable recording interval
- Record up to 250 measured values via each of the 4 memory channels
- Export the measured value log via a variety of interfaces and operating tools e.g. FieldCare, DeviceCare or web server

16.12 Certificates and approvals

Currently available certificates and approvals can be called up via the product configurator.

CE mark	The device meets the legal requirements of the applicable EU Directives. These are listed in the corresponding EU Declaration of Conformity along with the standards applied.
	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.
Pharmaceutical compatibility	 FDA USP Class VI TSE/BSE Certificate of Suitability
Certification PROFIBUS	PROFIBUS interface
	 The measuring device is certified and registered by the PNO (PROFIBUS User Organization Organization). The measuring system meets all the requirements of the following specifications: Certified in accordance with PROFIBUS PA Profile 3.02 The device can also be operated with certified devices of other manufacturers (interoperability)
Radio approval	The measuring device has radio approval.
	For detailed information on the radio approval, see the Special Documentation

Pressure Equipment Directive	 With the identification PED/G1/x (x = category) on the sensor nameplate, Endress+Hauser confirms conformity with the "Essential Safety Requirements" specified in Appendix I of the Pressure Equipment Directive 2014/68/EU. Devices not bearing this marking (PED) are designed and manufactured according to good engineering practice. They meet the requirements of Article 4 paragraph 3 of the Pressure Equipment Directive 2014/68/EU. The range of application is indicated in tables 6 to 9 in Annex II of the Pressure Equipment Directive 2014/68/EU.
Measuring instrument approval	The measuring device is qualified to OIML R117 and has an OIML Certificate of Conformity (optional).
	PWIS-free
	PWIS = paint-wetting impairment substances
	Order code for "Service": • Option HC : PWIS-free (version A) • Option HD : PWIS-free (version B) • Option HE : PWIS-free (version C)
	For more information on PWIS-free certification, see "Test specification" document TS01028D
Other standards and guidelines	 EN 60529 Degrees of protection provided by enclosures (IP code) EN 61010-1 Safety requirements for electrical equipment for measurement, control and laboratory use - general requirements 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 transmitter with analog output signal. NAMUR NE 53 Software of field devices and signal-processing devices with digital electronics NAMUR NE 105 Specifications for integrating fieldbus devices in engineering tools for field devices NAMUR NE 107 Self-monitoring and diagnosis of field devices NAMUR NE 131 Requirements for field devices for standard applications

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

The application packages can be ordered with the device or subsequently from Endress+Hauser. Detailed information on the order code in question is available from your

local Endress+Hauser sales center or on the product page of the Endress+Hauser website: www.endress.com.

Diagnostics functions	Package	Description
	Extended HistoROM	Comprises extended functions concerning the event log and the activation of the measured value memory.
		Event log: Memory volume is extended from 20 message entries (standard version) to up to 100 entries.
		 Data logging (line recorder): Memory capacity for up to 1000 measured values is activated. 250 measured values can be output via each of the 4 memory channels. The recording interval can be defined and configured by the user. Measured value logs can be accessed via the local display or operating tool e.g. FieldCare, DeviceCare or Web server.

Heartbeat Technology	Package	Description
	Heartbeat Verification +Monitoring	 Heartbeat Verification Meets the requirement for traceable verification to DIN ISO 9001:2008 Chapter 7.6 a) "Control of monitoring and measuring equipment". Functional testing in the installed state without interrupting the process. Traceable verification results on request, including a report. Simple testing process via local operation or other operating interfaces. Clear measuring point assessment (pass/fail) with high test coverage within the framework of manufacturer specifications. Extension of calibration intervals according to operator's risk assessment.
		 Heartbeat Monitoring Continuously supplies data, which are characteristic of the measuring principle, to an external condition monitoring system for the purpose of preventive maintenance or process analysis. These data enable the operator to: Draw conclusions - using these data and other information - about the impact process influences (such as corrosion, abrasion, buildup etc.) have on the measuring performance over time. Schedule servicing in time. Monitor the process or product quality, e.g. gas pockets.

Cleaning	Package	Description
	Electrode cleaning circuit (ECC)	The electrode cleaning circuit (ECC) function has been developed to have a solution for applications where magnetite (Fe_3O_4) deposits frequently occur (e.g. hot water). Since magnetite is highly conductive this build up leads to measuring errors and ultimately to the loss of signal. The application package is designed to AVOID build up of highly conductive matter and thin layers (typical of magnetite).

16.14 Accessories

Overview of accessories available for order \rightarrow \cong 203

16.15 Supplementary documentation

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

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

Standard documentation Brief Operating Instructions

Brief Operating Instructions for the sensor

Measuring device	Documentation code
Proline Promag P	KA01290D

Brief Operating Instructions for transmitter

Measuring device	Documentation code
Proline 500 – digital	KA01407D
Proline 500	KA01406D

Technical Information

Measuring device	Documentation code
Promag P 500	TI01226D

Description of device parameters

Measuring device	Documentation code
Promag 500	GP01056D

Device-dependent
additional documentationSafety instructionsSafety instructions for electrical equipment for hazardous areas.

Contents	Documentation code
ATEX/IECEx Ex i	XA01522D
ATEX/IECEx Ex ec	XA01523D
cCSAus IS	XA01524D
cCSAus Ex e ia/Ex d ia	XA01525D
cCSAus Ex nA	XA01526D
INMETRO Ex i	XA01527D
INMETRO Ex ec	XA01528D
NEPSI Ex i	XA01529D
NEPSI Ex nA	XA01530D
EAC Ex i	XA01658D
EAC Ex nA	XA01659D
JPN	XA01776D

Special Documentation

Contents	Documentation code
Information on the Pressure Equipment Directive	SD01614D
Radio approvals for WLAN interface for A309/A310 display module	SD01793D

Contents	Documentation code
Heartbeat Technology	SD01747D
Web server	SD01660D

Installation Instructions

Contents	Comment
Installation instructions for spare part sets and accessories	 Access the overview of all the available spare part sets via W@MDevice Viewer → ¹ 201 Accessories available for order with Installation Instructions → ¹ 203

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