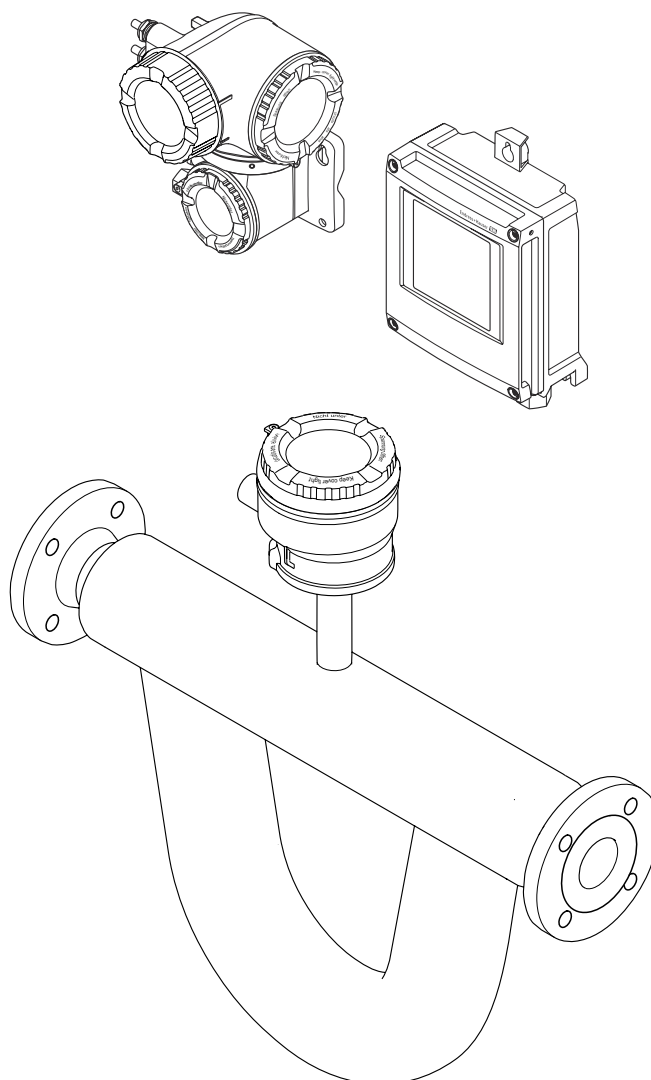


Operating Instructions

Proline Promass Q 500

Coriolis flowmeter
PROFINET with Ethernet-APL



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

Table of contents

1	About this document	6	6	Mounting	21
1.1	Document function	6	6.1	Mounting requirements	21
1.2	Symbols	6	6.1.1	Mounting position	21
1.2.1	Safety symbols	6	6.1.2	Environment and process requirements	24
1.2.2	Electrical symbols	6	6.1.3	Special mounting instructions	25
1.2.3	Communication-specific symbols	6	6.2	Mounting the measuring device	29
1.2.4	Tool symbols	7	6.2.1	Required tools	29
1.2.5	Symbols for certain types of information	7	6.2.2	Preparing the measuring device	29
1.2.6	Symbols in graphics	7	6.2.3	Mounting the measuring device	29
1.3	Documentation	8	6.2.4	Mounting the transmitter housing: Proline 500 – digital	30
1.3.1	Document function	8	6.2.5	Mounting the transmitter housing: Proline 500	31
1.4	Registered trademarks	8	6.2.6	Turning the transmitter housing: Proline 500	33
2	Safety instructions	9	6.2.7	Turning the display module: Proline 500	33
2.1	Requirements for the personnel	9	6.3	Post-installation check	34
2.2	Intended use	9	7	Electrical connection	35
2.3	Workplace safety	10	7.1	Electrical safety	35
2.4	Operational safety	10	7.2	Connecting requirements	35
2.5	Product safety	10	7.2.1	Required tools	35
2.6	IT security	10	7.2.2	Requirements for connecting cable	35
2.7	Device-specific IT security	11	7.2.3	Terminal assignment	40
2.7.1	Protecting access via hardware write protection	11	7.2.4	Available device plugs	40
2.7.2	Protecting access via a password	11	7.2.5	device plug pin assignment	41
2.7.3	Access via Web server	12	7.2.6	Shielding and grounding	41
2.7.4	Access via service interface (CDI-RJ45)	12	7.2.7	Preparing the measuring device	42
3	Product description	13	7.3	Connecting the measuring device: Proline 500 – digital	43
3.1	Product design	13	7.3.1	Connecting the connecting cable	43
3.1.1	Proline 500 – digital	13	7.3.2	Connecting the transmitter	48
3.1.2	Proline 500	14	7.3.3	Integrating the transmitter into a network	51
4	Incoming acceptance and product identification	15	7.4	Connecting the measuring device: Proline 500	52
4.1	Incoming acceptance	15	7.4.1	Connecting the connecting cable	52
4.2	Product identification	15	7.4.2	Connecting the transmitter	57
4.2.1	Transmitter nameplate	16	7.4.3	Integrating the transmitter into a network	60
4.2.2	Sensor nameplate	18	7.5	Potential equalization	61
4.2.3	Symbols on measuring device	19	7.5.1	Requirements	61
5	Storage and transport	20	7.6	Special connection instructions	61
5.1	Storage conditions	20	7.6.1	Connection examples	61
5.2	Transporting the product	20	7.7	Hardware settings	64
5.2.1	Measuring devices without lifting lugs	20	7.7.1	Setting the device name	64
5.2.2	Measuring devices with lifting lugs	21	7.7.2	Activating the default IP address	66
5.2.3	Transporting with a fork lift	21	7.8	Ensuring the degree of protection	68
5.3	Packaging disposal	21	7.9	Post-connection check	68
6	Mounting	21	8	Operation options	69
6.1	Mounting requirements	21	8.1	Overview of operation options	69
6.1.1	Mounting position	21			
6.1.2	Environment and process requirements	24			
6.1.3	Special mounting instructions	25			
6.2	Mounting the measuring device	29			
6.2.1	Required tools	29			
6.2.2	Preparing the measuring device	29			
6.2.3	Mounting the measuring device	29			
6.2.4	Mounting the transmitter housing: Proline 500 – digital	30			
6.2.5	Mounting the transmitter housing: Proline 500	31			
6.2.6	Turning the transmitter housing: Proline 500	33			
6.2.7	Turning the display module: Proline 500	33			
6.3	Post-installation check	34			
7	Electrical connection	35			
7.1	Electrical safety	35			
7.2	Connecting requirements	35			
7.2.1	Required tools	35			
7.2.2	Requirements for connecting cable	35			
7.2.3	Terminal assignment	40			
7.2.4	Available device plugs	40			
7.2.5	device plug pin assignment	41			
7.2.6	Shielding and grounding	41			
7.2.7	Preparing the measuring device	42			
7.3	Connecting the measuring device: Proline 500 – digital	43			
7.3.1	Connecting the connecting cable	43			
7.3.2	Connecting the transmitter	48			
7.3.3	Integrating the transmitter into a network	51			
7.4	Connecting the measuring device: Proline 500	52			
7.4.1	Connecting the connecting cable	52			
7.4.2	Connecting the transmitter	57			
7.4.3	Integrating the transmitter into a network	60			
7.5	Potential equalization	61			
7.5.1	Requirements	61			
7.6	Special connection instructions	61			
7.6.1	Connection examples	61			
7.7	Hardware settings	64			
7.7.1	Setting the device name	64			
7.7.2	Activating the default IP address	66			
7.8	Ensuring the degree of protection	68			
7.9	Post-connection check	68			
8	Operation options	69			
8.1	Overview of operation options	69			

8.2	Structure and function of the operating menu	70	10.5	Configuring the measuring device	113
8.2.1	Structure of the operating menu	70	10.5.1	Defining the tag name	114
8.2.2	Operating philosophy	71	10.5.2	Displaying the communication interface	114
8.3	Access to the operating menu via the local display	72	10.5.3	Setting the system units	116
8.3.1	Operational display	72	10.5.4	Selecting and setting the medium ..	119
8.3.2	Navigation view	74	10.5.5	Configuration of the Analog Inputs ..	121
8.3.3	Editing view	76	10.5.6	Displaying the I/O configuration ...	124
8.3.4	Operating elements	78	10.5.7	Configuring the current input	125
8.3.5	Opening the context menu	78	10.5.8	Configuring the status input	126
8.3.6	Navigating and selecting from list ...	80	10.5.9	Configuring the current output	127
8.3.7	Calling the parameter directly	80	10.5.10	Configuring the pulse/frequency/switch output	131
8.3.8	Calling up help text	81	10.5.11	Configuring the relay output	140
8.3.9	Changing the parameters	81	10.5.12	Configuring the local display	143
8.3.10	User roles and related access authorization	82	10.5.13	Configuring the low flow cut off	149
8.3.11	Disabling write protection via access code	82	10.5.14	Configuring partially filled pipe detection	150
8.3.12	Enabling and disabling the keypad lock	83	10.6	Advanced settings	151
8.4	Access to operating menu via Web browser ..	84	10.6.1	Using the parameter to enter the access code	152
8.4.1	PROFINET with Ethernet-APL	84	10.6.2	Calculated process variables	152
8.4.2	Prerequisites	84	10.6.3	Carrying out a sensor adjustment ...	154
8.4.3	Establishing a connection	86	10.6.4	Configuring the totalizer	160
8.4.4	Logging on	88	10.6.5	Carrying out additional display configurations	162
8.4.5	User interface	89	10.6.6	WLAN configuration	169
8.4.6	Disabling the Web server	90	10.6.7	Viscosity application package	170
8.4.7	Logging out	90	10.6.8	Concentration Measurement application package	171
8.5	Access to the operating menu via the operating tool	91	10.6.9	Petroleum application package	171
8.5.1	Connecting the operating tool	91	10.6.10	Heartbeat Technology application package	171
8.5.2	FieldCare	94	10.6.11	Configuration management	171
8.5.3	DeviceCare	96	10.6.12	Using parameters for device administration	172
8.5.4	SIMATIC PDM	96	10.7	Simulation	174
9	System integration	97	10.8	Protecting settings from unauthorized access	177
9.1	Overview of device description files	97	10.8.1	Write protection via access code ...	178
9.1.1	Current version data for the device ...	97	10.8.2	Write protection via write protection switch	179
9.1.2	Operating tools	97	11	Operation	182
9.2	Device master file (GSD)	97	11.1	Reading off the device locking status	182
9.2.1	File name of the manufacturer-specific device master file (GSD)	98	11.2	Adjusting the operating language	182
9.2.2	File name of the PA Profile device master file (GSD)	98	11.3	Configuring the display	182
9.3	Cyclic data transmission	99	11.4	Reading measured values	182
9.3.1	Overview of the modules	99	11.4.1	"Measured variables" submenu	183
9.3.2	Description of the modules	100	11.4.2	Totalizer	194
9.3.3	Status coding	109	11.4.3	"Input values" submenu	195
9.3.4	Factory setting	110	11.4.4	Output values	196
9.4	System redundancy S2	111	11.5	Adapting the measuring device to the process conditions	198
10	Commissioning	112	11.6	Performing a totalizer reset	198
10.1	Post-installation and post-connection check	112	11.6.1	Function scope of "Control Totalizer" parameter	199
10.2	Switching on the measuring device	112	11.6.2	Function scope of the "Reset all totalizers" parameter	199
10.3	Connecting via FieldCare	112			
10.4	Setting the operating language	112			

11.7	Show data logging	200	15	Accessories	294
11.8	Gas Fraction Handler	204	15.1	Device-specific accessories	294
11.8.1	"Measurement mode" submenu	204	15.1.1	For the transmitter	294
11.8.2	"Medium index" submenu	205	15.1.2	For the sensor	295
12	Diagnostics and troubleshooting ..	206	15.2	Communication-specific accessories	295
12.1	General troubleshooting	206	15.3	Service-specific accessories	296
12.2	Diagnostic information via light emitting diodes	208	15.4	System components	297
12.2.1	Transmitter	208	16	Technical data	298
12.2.2	Sensor connection housing	211	16.1	Application	298
12.3	Diagnostic information on local display	212	16.2	Function and system design	298
12.3.1	Diagnostic message	212	16.3	Input	299
12.3.2	Calling up remedial measures	214	16.4	Output	302
12.4	Diagnostic information in the Web browser .	214	16.5	Power supply	308
12.4.1	Diagnostic options	214	16.6	Performance characteristics	309
12.4.2	Calling up remedy information	215	16.7	Mounting	314
12.5	Diagnostic information in FieldCare or DeviceCare	215	16.8	Environment	314
12.5.1	Diagnostic options	215	16.9	Process	316
12.5.2	Calling up remedy information	216	16.10	Mechanical construction	319
12.6	Adapting the diagnostic information	217	16.11	Operability	322
12.6.1	Adapting the diagnostic behavior ...	217	16.12	Certificates and approvals	325
12.7	Overview of diagnostic information	218	16.13	Application packages	328
12.7.1	Diagnostic of sensor	219	16.14	Accessories	330
12.7.2	Diagnostic of electronic	231	16.15	Supplementary documentation	330
12.7.3	Diagnostic of configuration	259	Index	333	
12.7.4	Diagnostic of process	270			
12.8	Pending diagnostic events	284			
12.9	Diagnostic list	285			
12.10	Event logbook	285			
12.10.1	Reading out the event logbook	285			
12.10.2	Filtering the event logbook	286			
12.10.3	Overview of information events	286			
12.11	Resetting the measuring device	288			
12.11.1	Function scope of "Device reset" parameter	288			
12.12	Device information	288			
12.13	Firmware history	290			
13	Maintenance	291			
13.1	Maintenance tasks	291			
13.1.1	Exterior cleaning	291			
13.2	Measuring and test equipment	291			
13.3	Endress+Hauser services	291			
14	Repair	292			
14.1	General information	292			
14.1.1	Repair and conversion concept	292			
14.1.2	Notes for repair and conversion	292			
14.2	Spare parts	292			
14.3	Endress+Hauser services	292			
14.4	Return	292			
14.5	Disposal	293			
14.5.1	Removing the measuring device	293			
14.5.2	Disposing of the measuring device ..	293			

1 About this document

1.1 Document function

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

1.2 Symbols

1.2.1 Safety symbols

DANGER

This symbol alerts you to a dangerous situation. Failure to avoid this situation will result in serious or fatal injury.

WARNING

This symbol alerts you to a 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

This symbol contains information on procedures and other facts which do not result in personal injury.

1.2.2 Electrical symbols

Symbol	Meaning
	Direct current
	Alternating current
	Direct current and alternating current
	Ground connection A grounded terminal which, as far as the operator is concerned, is grounded via a grounding system.
	Potential equalization connection (PE: protective earth) Ground terminals that must be connected to ground prior to establishing any other connections. The ground terminals are located on the interior and exterior of the device: <ul style="list-style-type: none"> ■ Interior ground terminal: potential equalization is connected to the supply network. ■ Exterior ground terminal: device is connected to the plant grounding system.

1.2.3 Communication-specific symbols









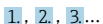



Symbol	Meaning
	Wireless Local Area Network (WLAN) Communication via a wireless, local network.
	LED Light emitting diode is off.

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

1.2.4 Tool symbols

Symbol	Meaning
	Torx screwdriver
	Phillips head screwdriver
	Open-ended wrench

1.2.5 Symbols for certain types of information

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

1.2.6 Symbols in graphics

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

- *Device Viewer* (www.endress.com/deviceviewer): Enter the serial number from the nameplate
- *Endress+Hauser Operations app*: Enter serial number from nameplate or scan matrix code on nameplate.

1.3.1 Document function

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

Document type	Purpose and content of the document
Technical Information (TI)	Planning aid for your device The document contains all the technical data on the device and provides an overview of the accessories and other products that can be ordered for the device.
Brief Operating Instructions (KA)	Guide that takes you quickly to the 1st measured value The Brief Operating Instructions contain all the essential information from incoming acceptance to initial commissioning.
Operating Instructions (BA)	Your reference document The Operating Instructions contain all the information that is required in the 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.
Description of Device Parameters (GP)	Reference for your parameters The document provides a detailed explanation of each individual parameter. The description is aimed at those who work with the device over the entire life cycle and perform specific configurations.
Safety Instructions (XA)	Depending on the approval, safety instructions for electrical equipment in hazardous areas are also supplied with the device. The Safety Instructions are an integral part of the Operating Instructions.  Information on the Safety Instructions (XA) relevant to the device is provided on the nameplate.
Supplementary device-dependent documentation (SD/FY)	Always comply strictly with the instructions in the relevant supplementary documentation. The supplementary documentation is an integral part of the device documentation.

1.4 Registered trademarks

Ethernet-APL™

Registered trademark of the PROFIBUS Nutzerorganisation e.V. (PROFIBUS User Organization), Karlsruhe, Germany

2 Safety instructions

2.1 Requirements for the personnel

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

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

The operating personnel must fulfill the following requirements:

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

2.2 Intended use


Application and media

The measuring device described in this manual is intended only for the flow measurement of liquids and gases.

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

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

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

- ▶ Keep within the specified pressure and temperature range.
- ▶ Only use the measuring device in full compliance with the data on the nameplate and the general conditions listed in the Operating Instructions and supplementary documentation.
- ▶ Based on the nameplate, check whether the ordered device is permitted for the intended use in the hazardous area (e.g. explosion protection, pressure vessel safety).
- ▶ Use the measuring device only for media to which the process-wetted materials are sufficiently resistant.
- ▶ If the ambient temperature of the measuring device is outside the atmospheric temperature, it is absolutely essential to comply with the relevant basic conditions as specified in the device documentation →  8.
- ▶ 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-intended 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**⚠ CAUTION**

The electronics and the medium may cause the surfaces to heat up or freeze. Risk of burns or frostbite!

- ▶ Mount suitable touch protection.

2.3 Workplace safety

When working on and with the device:

- ▶ Wear the required personal protective equipment as per national regulations.

2.4 Operational safety

Damage to the device!

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

Modifications to the device

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

- ▶ If modifications are nevertheless required, consult with the manufacturer.

Repair

To ensure continued operational safety and reliability:

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

2.5 Product safety

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

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






2.6 IT security

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

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

2.7 Device-specific IT security

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

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

2.7.1 Protecting access via hardware write protection

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


Hardware write protection is disabled when the device is delivered →  179.

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 (→  178).

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 (→  92), 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 (→  170).

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, for example, see the "Write protection via access code" section →  178


2.7.3 Access via Web server

The device can be operated and configured via a Web browser with the integrated Web server. The connection is via the service interface (CDI-RJ45), signal transmission connection for PROFINET with Ethernet-APL (IO1) 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.



For detailed information on device parameters, see:
"Description of Device Parameters" document →  331.

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.



Transmitters with an Ex de approval may not be connected via the service interface (CDI-RJ45)!

Order code for "Approval transmitter + sensor", options (Ex de): BA, BB, C1, C2, GA, GB, MA, MB, NA, NB

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

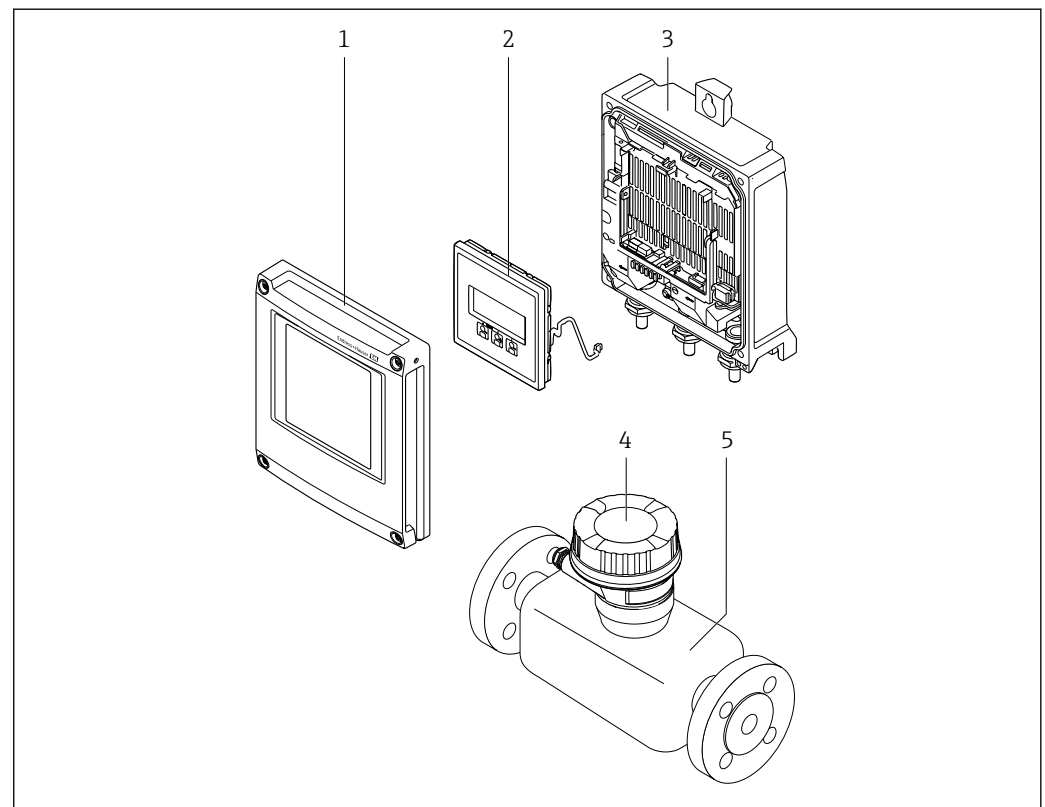
Order code for "Integrated ISEM electronics", option **A** "Sensor"

 The Proline 500 – digital transmitter is **not** available for devices with a nominal diameter of $DN \geq 150$ mm (6 in).

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.



A0029593

 1 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

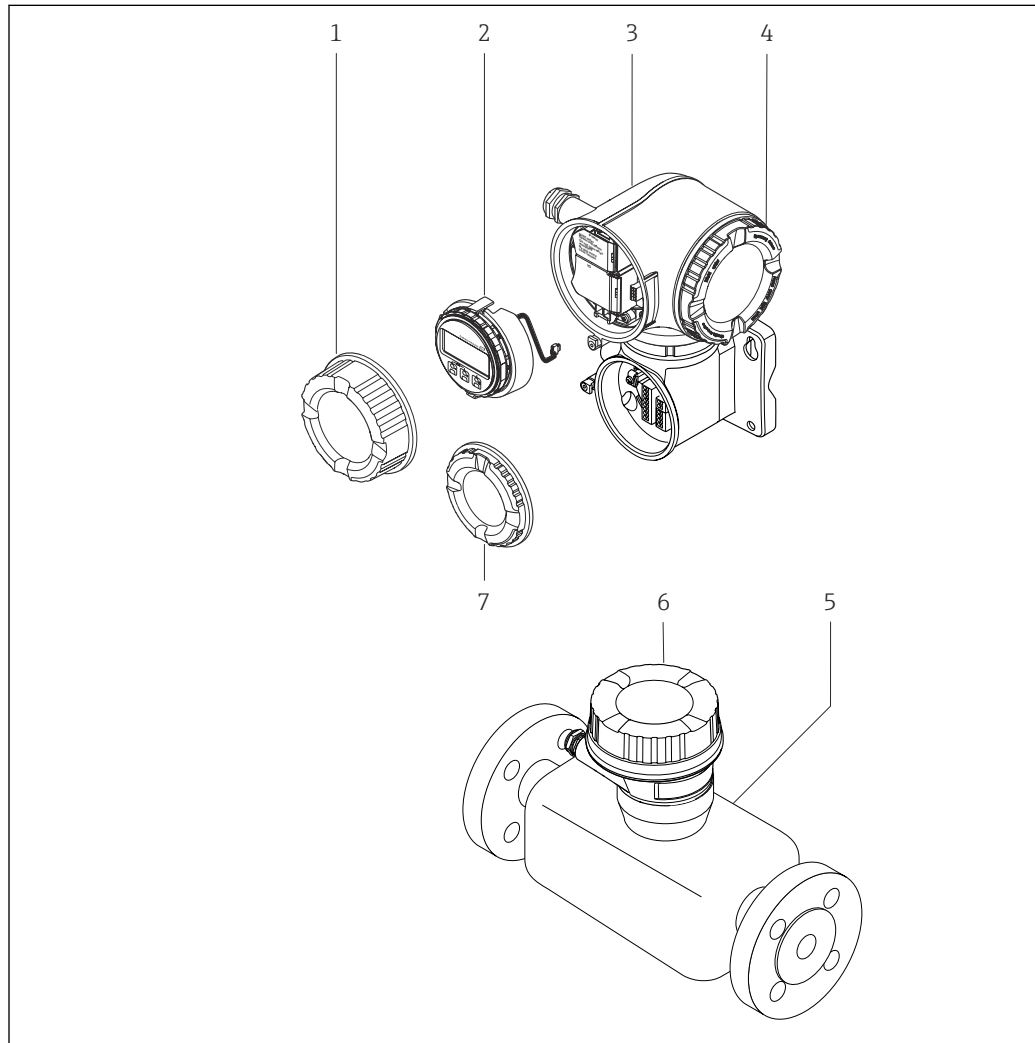
Signal transmission: analog

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:

- Strong vibrations at the sensor.
- Sensor operation in underground installations.
- Permanent sensor immersion in water.



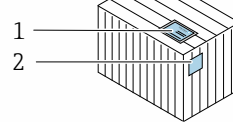
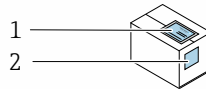
A0029589

2 Important components of a measuring device

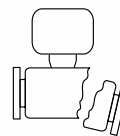
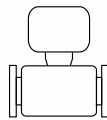
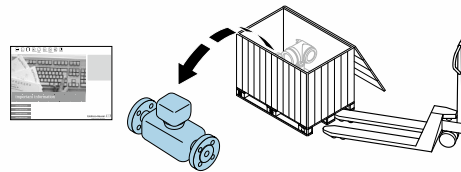
- 1 Connection compartment cover
- 2 Display module
- 3 Transmitter housing with integrated ISEM electronics
- 4 Electronics compartment cover
- 5 Sensor
- 6 Sensor connection housing: connecting cable connection
- 7 Connection compartment cover: connecting cable connection

4 Incoming acceptance and product identification

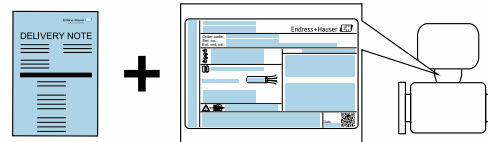
4.1 Incoming acceptance



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



Are the goods undamaged?



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



Is the envelope present with accompanying documents?



- If one of the conditions is not satisfied, contact your Endress+Hauser Sales Center.
- The Technical Documentation is available via the Internet or via the *Endress+Hauser Operations App*, see the "Product identification" section → 16.

4.2 Product identification

The following options are available for identification of the device:

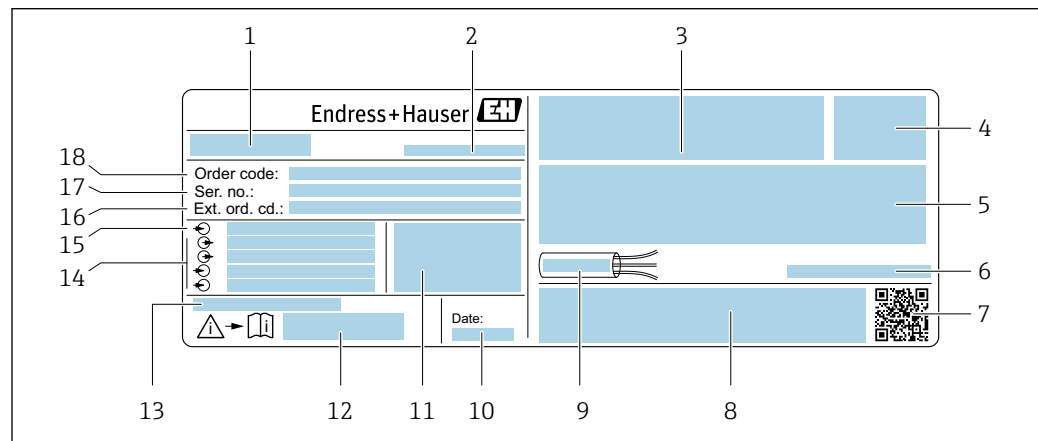
- Nameplate specifications
- Order code with breakdown of the device features on the delivery note
- Enter the serial numbers from the nameplates in the *Device Viewer* (www.endress.com/deviceviewer): all the information about the device is displayed.
- Enter the serial numbers from the nameplates into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

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


- The chapters "Additional standard documentation on the device" and "Supplementary device-dependent documentation"
- The *Device Viewer*: Enter the serial number from the nameplate (www.endress.com/deviceviewer)
- The *Endress+Hauser Operations App*: Enter the serial number from the nameplate or scan the DataMatrix code on the nameplate.

4.2.1 Transmitter nameplate

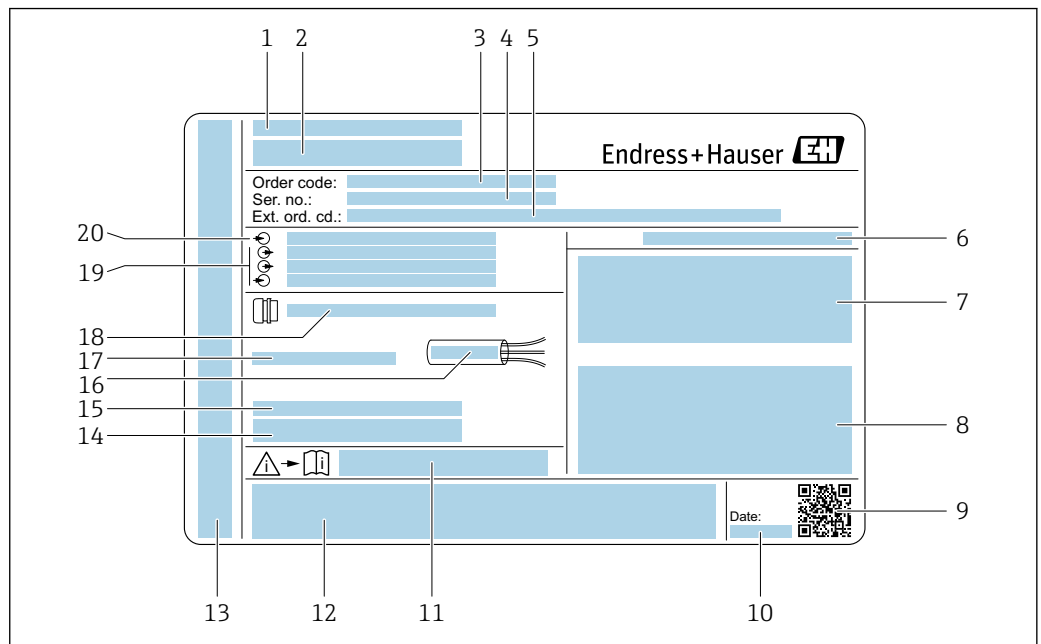
Proline 500 – digital




A0029194

 3 Example of a transmitter nameplate

- 1 Name of the transmitter
- 2 Place of manufacture
- 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, RCM tick
- 9 Permitted temperature range for cable
- 10 Date of manufacture: 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

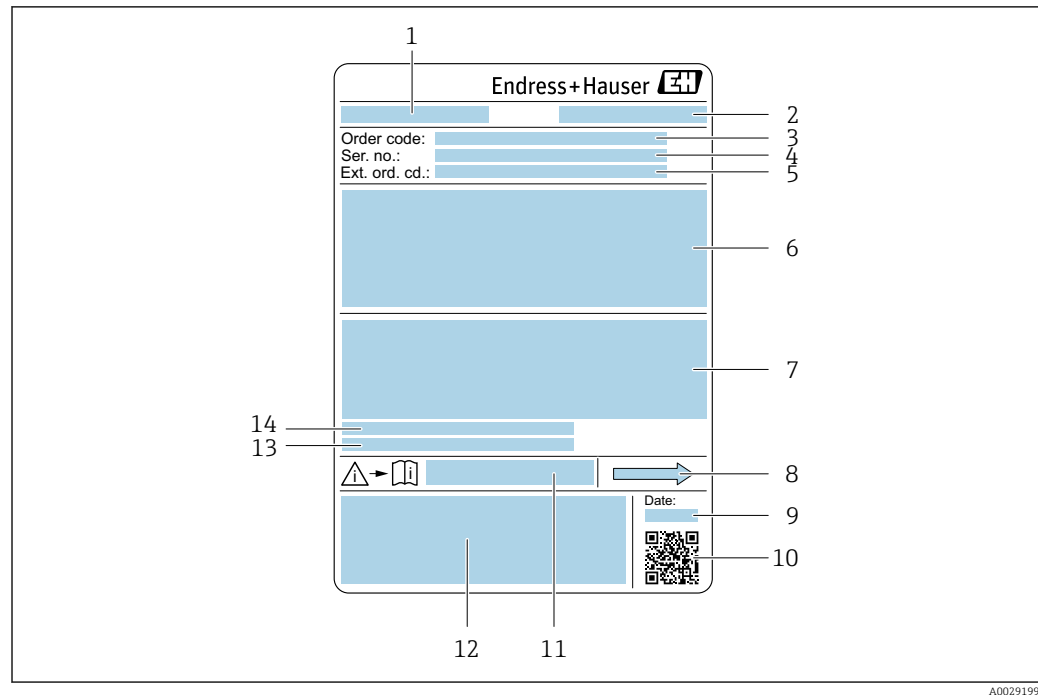
Proline 500

A0029192

 4 Example of a transmitter nameplate

- 1 Place of manufacture
- 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 Date of manufacture: year-month
- 11 Document number of safety-related supplementary documentation
- 12 Space for approvals and certificates: e.g. CE mark, RCM tick
- 13 Space for degree of protection of connection and electronics compartment when used in hazardous areas
- 14 Firmware version (FW) and device revision (Dev.Rev.) from the factory
- 15 Space for additional information in the case of special products
- 16 Permitted temperature range for cable
- 17 Permitted ambient temperature (T_a)
- 18 Information on cable gland
- 19 Available inputs and outputs, supply voltage
- 20 Electrical connection data: supply voltage

4.2.2 Sensor nameplate



A0029199

5 Example of a sensor nameplate

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






Order code

The measuring device is reordered using the order code.

Extended order code

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

4.2.3 Symbols on measuring device

Symbol	Meaning
	WARNING! This symbol alerts you to a dangerous situation. Failure to avoid this situation can result in serious or fatal injury. To determine the nature of the potential hazard and the measures required to avoid it, consult the documentation accompanying the measuring device.
	Reference to documentation Refers to the corresponding device documentation.
	Protective ground connection A terminal which must be connected to ground prior to establishing any other connections.

5 Storage and transport

5.1 Storage conditions

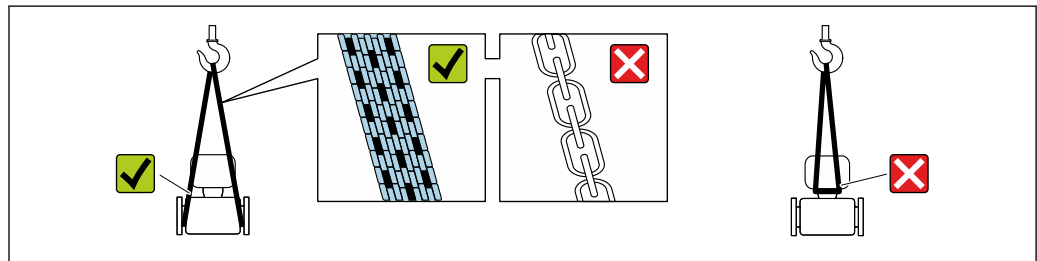
Observe the following notes for storage:

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


Storage temperature →  314

5.2 Transporting the product

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



A0029252

 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.

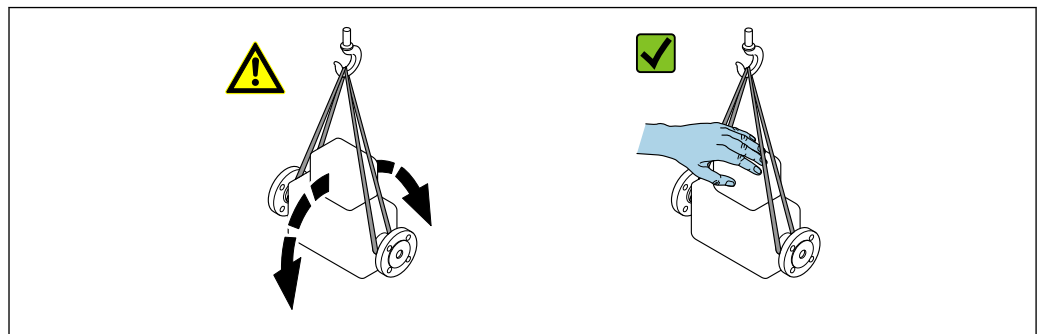
5.2.1 Measuring devices without lifting lugs

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).



A0029214

5.2.2 Measuring devices with lifting lugs

⚠ CAUTION

Special transportation instructions for devices with lifting lugs

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

5.2.3 Transporting with a fork lift

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

5.3 Packaging disposal

All packaging materials are environmentally friendly and 100 % recyclable:

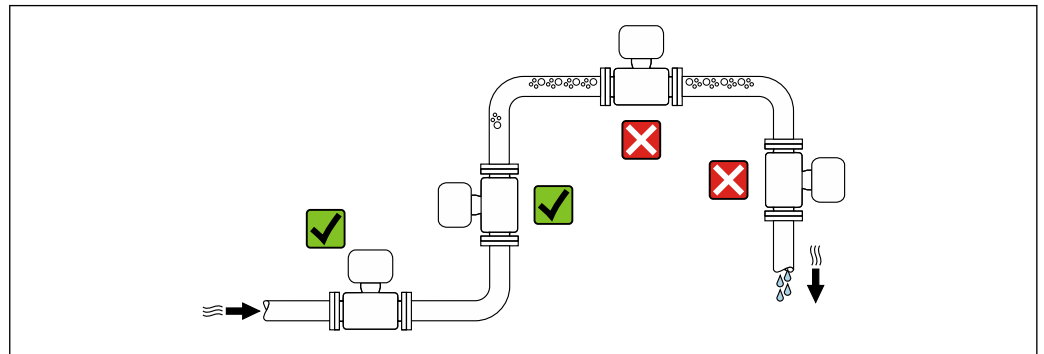
- Outer packaging of device
 - Polymer stretch wrap, complying with EU Directive 2002/95/EC (RoHS)
- Packaging
 - Wooden crate treated in accordance with ISPM 15 standard, confirmed by IPPC logo
 - Cardboard box in accordance with European packaging guideline 94/62EC, recyclability confirmed by Resy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

6 Mounting

6.1 Mounting requirements

6.1.1 Mounting position

Mounting location



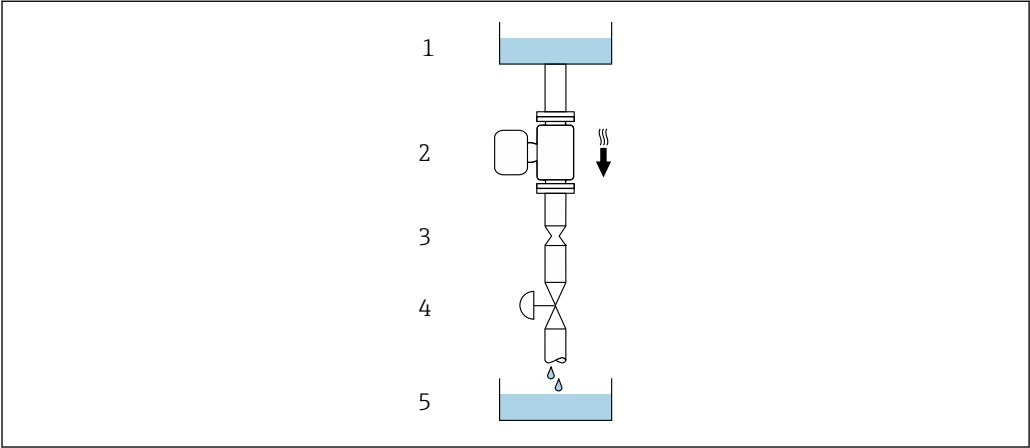
A0028772

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

- Highest point of a pipeline.
- Directly upstream of a free pipe outlet in a down pipe.

Installation in down pipes

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



A0028773

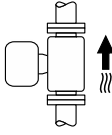
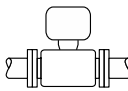
6 Installation in a down pipe (e.g. for batching applications)

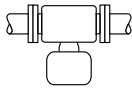

- 1 Supply tank
- 2 Sensor
- 3 Orifice plate, pipe restriction
- 4 Valve
- 5 Batching tank

DN		Ø orifice plate, pipe restriction	
[mm]	[in]	[mm]	[in]
25	1	14	0.55
50	2	28	1.10
80	3	50	1.97
100	4	65	2.60

Orientation

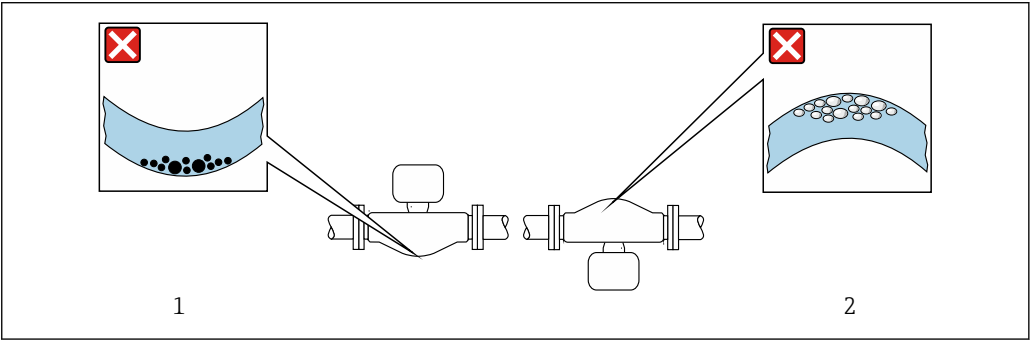
The direction of the arrow on the sensor nameplate helps you to install the sensor according to the flow direction (direction of medium flow through the piping).

Orientation			Recommendation
A	Vertical orientation	 A0015591	✓✓ ¹⁾
B	Horizontal orientation, transmitter at top	 A0015589	✓✓ ²⁾ Exception: → 7, 23

Orientation			Recommendation
C	Horizontal orientation, transmitter at bottom	 A0015590	✓✓ ³⁾ Exception: → ☒ 7, ☒ 23
D	Horizontal orientation, transmitter at side	 A0015592	✓✓ → ☒ 25 ⁴⁾

- 1) This orientation is recommended to ensure self-draining.
- 2) Applications with low process temperatures may reduce the ambient temperature. To maintain the minimum ambient temperature for the transmitter, this orientation is recommended.
- 3) Applications with high process temperatures may increase the ambient temperature. To maintain the maximum ambient temperature for the transmitter, this orientation is recommended.
- 4) Not recommended for inhomogeneous media.

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



☒ 7 Orientation of sensor with curved measuring tube

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

Inlet and outlet runs

No special precautions need to be taken for fittings that create turbulence, such as valves, elbows or T-pieces, as long as no cavitation occurs → ☒ 24.





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

Measuring device	<ul style="list-style-type: none">▪ -40 to +60 °C (-40 to +140 °F)▪ Order code for "Test, certificate", option JP: -50 to +60 °C (-58 to +140 °F)▪ Order code for "Test, certificate", option JQ:<ul style="list-style-type: none">▪ Sensor: -60 to +60 °C (-76 to +140 °F)▪ Transmitter: -50 to +60 °C (-58 to +140 °F)
Readability of the local display	-20 to +60 °C (-4 to +140 °F) The readability of the display may be impaired at temperatures outside the temperature range.

 Dependency of ambient temperature on medium temperature →  316

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

 You can order a weather protection cover from Endress+Hauser. →  294.

System pressure

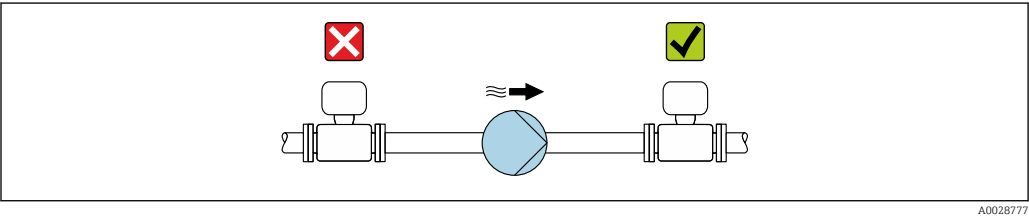
It is important that cavitation does not occur, or that gases entrained in the liquids do not outgas.

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

- In liquids that have a low boiling point (e.g. hydrocarbons, solvents, liquefied gases)
- In suction lines
- ▶ Ensure the system pressure is sufficiently high to prevent cavitation and outgassing.

For this reason, the following mounting locations are recommended:

- At the lowest point in a vertical pipe
- Downstream from pumps (no danger of vacuum)



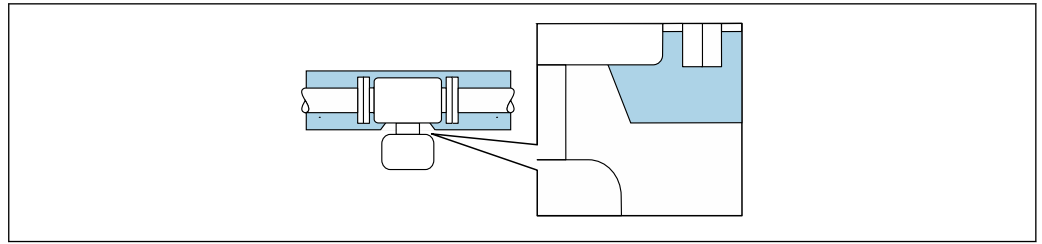
Thermal insulation


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


NOTICE

Electronics overheating on account of thermal insulation!

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



 8 Thermal insulation with not isolated extended neck

 Low-temperature version: It is generally not necessary to insulate the sensor connection housing. If insulation is provided, the rules that apply are the same as those for thermal insulation.

Heating

NOTICE

Electronics can overheat due to elevated ambient temperature!

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

NOTICE

Danger of overheating when heating

- ▶ Ensure that the temperature at the lower end of the transmitter housing does not exceed 80 °C (176 °F).
- ▶ Ensure that sufficient convection takes place at the transmitter neck.
- ▶ When using in potentially explosive atmospheres, observe the information in the device-specific Ex documentation. For detailed information on the temperature tables, see the separate document entitled "Safety Instructions" (XA) for the device.
- ▶ Take account of the behavior of process diagnostic "830 Ambient temperature too high" and "832 Electronics temperature too high" if it is not possible to avoid overheating with a suitable system layout.

Heating options

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

- Electrical heating, e.g. with electric band heaters ¹⁾
- Via pipes carrying hot water or steam
- Via heating jackets

Vibrations

The operational reliability of the measuring system is not affected by plant vibrations.



6.1.3 Special mounting instructions

Drainability

When installed vertically, the measuring tubes can be drained completely and protected against buildup.

1) The use of parallel electric band heaters is generally recommended (bidirectional electricity flow). Particular considerations must be made if a single-wire heating cable is to be used. Additional information is provided in the document EA01339D "Installation instructions for electrical trace heating systems".

Hygienic compatibility

 When installing in hygienic applications, please refer to the information in the "Certificates and approvals/hygienic compatibility" section →  326

Rupture disk

Process-related information: →  318.

WARNING

Danger from medium escaping!

Medium escaping under pressure can cause injury or material damage.

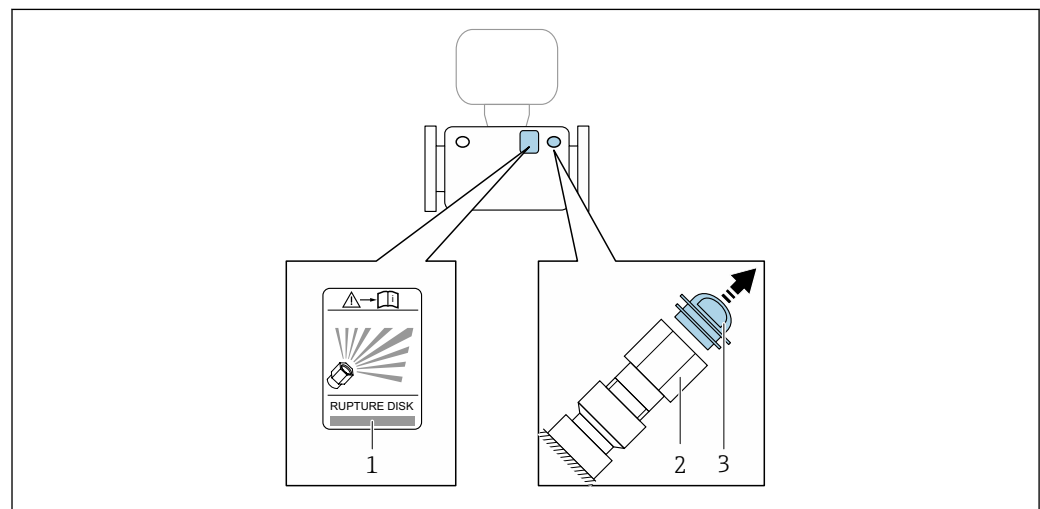
- ▶ Take precautions to prevent danger to persons and damage if the rupture disk is actuated.
- ▶ Observe the information on the rupture disk sticker.
- ▶ Make sure that the function and operation of the rupture disk is not impeded through the installation of the device.
- ▶ Do not use a heating jacket.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

The position of the rupture disk is indicated by a sticker affixed beside it.

The transportation guard must be removed.


The existing connecting nozzles are not intended for the purpose of rinsing or pressure monitoring, but instead serve as the mounting location for the rupture disk.

In the event of a failure of the rupture disk, a drain device can be screwed onto the female thread of the rupture disk in order to drain off any escaping medium.






A0030346



- 1 Rupture disk label
- 2 Rupture disk with 1/2" NPT female thread and 1" width across flats
- 3 Transport protection

 For information on the dimensions, see the "Technical Information" document, "Mechanical construction" section (accessories).

Pitch and roll angles

If the device is used to measure the density of liquids, the pitch and roll angles must be taken into account during installation.

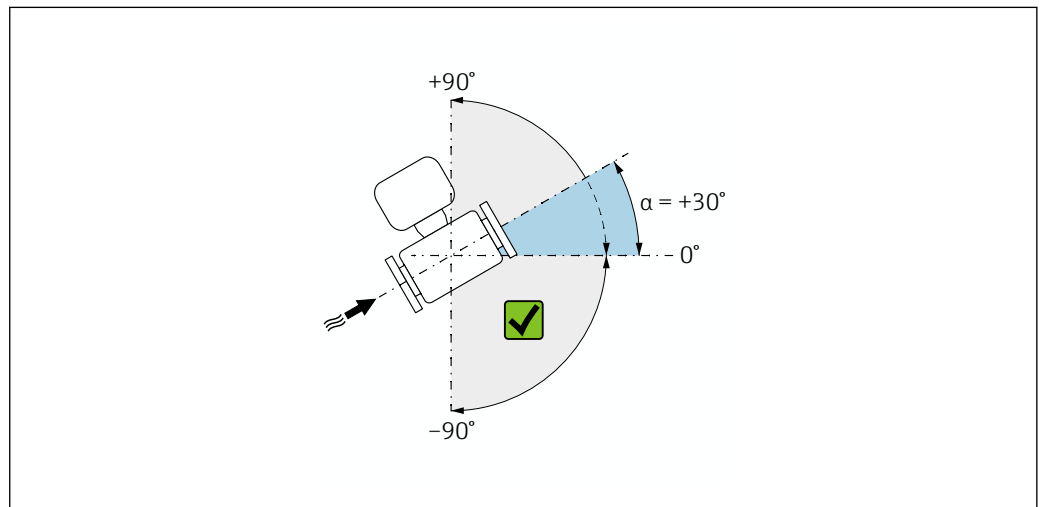
 For correct measurement, the pitch angle and roll angle must be determined during commissioning (with a tolerance of $\pm 10^\circ$) and entered: **Installation angle pitch** parameter (\rightarrow  154) and **Installation angle roll** parameter (\rightarrow  154)

 For detailed information on density measurement, see the Special Documentation for the device \rightarrow  331


Pitch angle

The technically relevant pitch angle is the angle shaded gray = -90 to $+90^\circ$.

Example (blue): Installation of the device with a pitch angle $\alpha = +30^\circ$



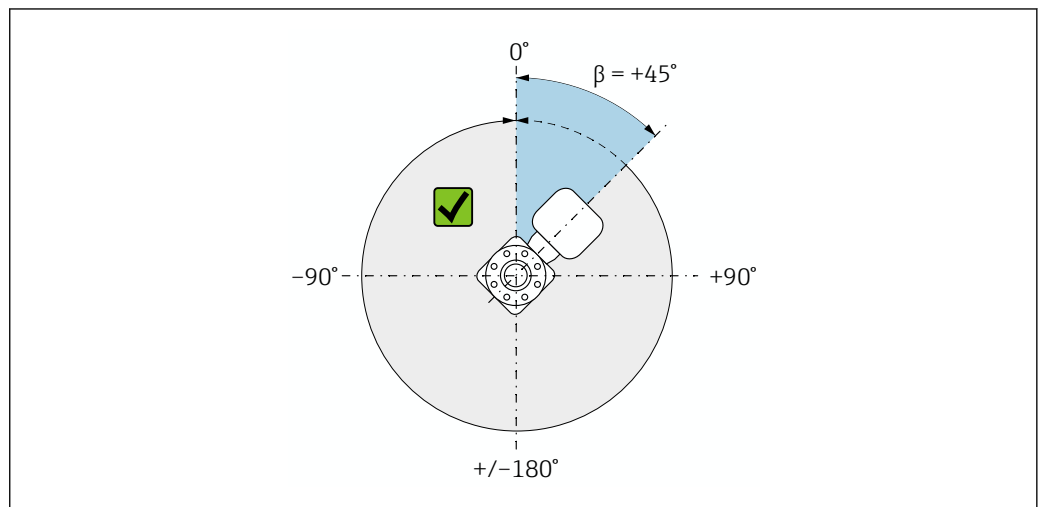
A0040032

 9 Side view with flow direction from left to right.


Roll angle

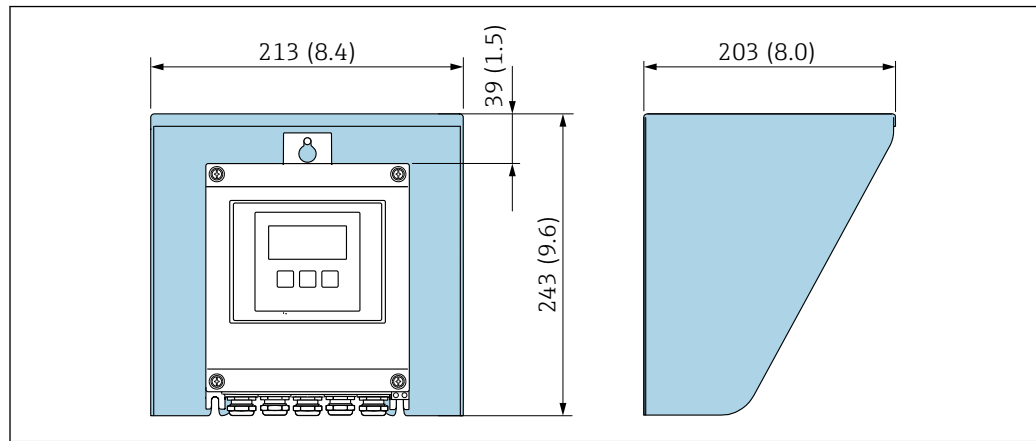
The technically relevant roll angle is the angle shaded gray = -180 to $+180^\circ$.

Example (blue): Installation of the device with a roll angle $\beta = +45^\circ$



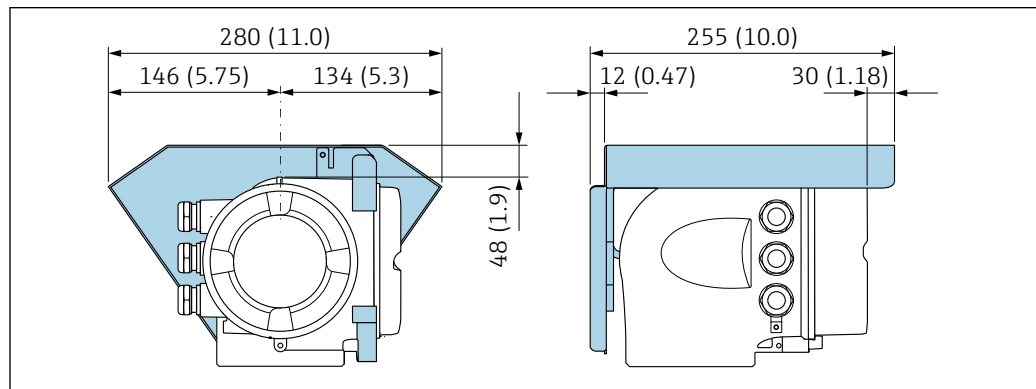
A0040033

 10 Top view in flow direction

Weather protection cover

A0029552

11 Weather protection cover for Proline 500 – digital; engineering unit mm (in)



A0029553

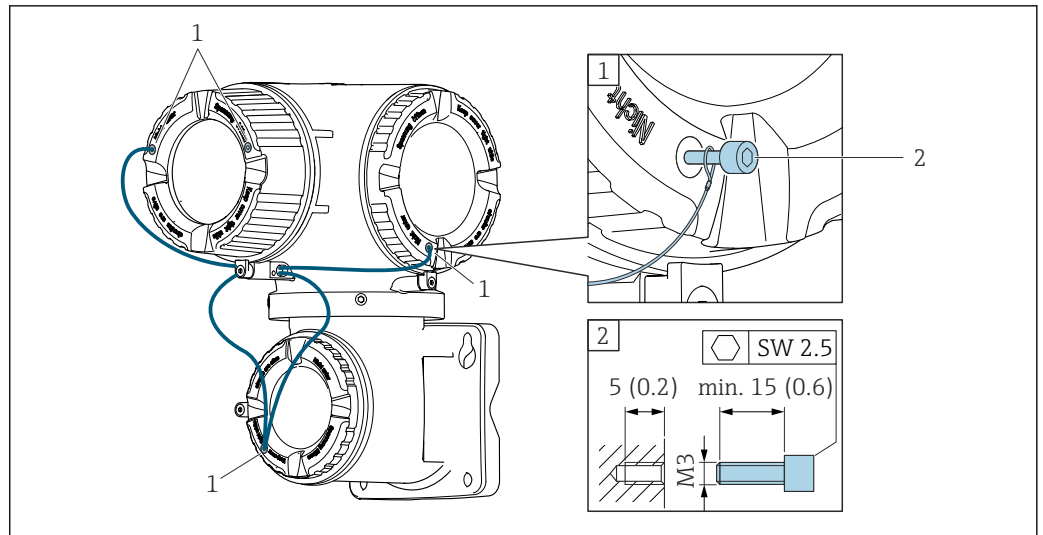
12 Weather protection cover for Proline 500; engineering unit mm (in)

Cover locking: Proline 500**NOTICE**

Order code "Transmitter housing", option L "Cast, stainless": The covers of the transmitter housing are provided with a borehole to lock the cover.

The cover can be locked using screws and a chain or cable provided by the customer on site.

- ▶ The use of stainless steel chains or cables is recommended.
- ▶ If a protective coating is applied, it is recommended to use a heat shrink tube to protect the housing paint.



A0029799

- 1 Cover borehole for the securing screw
2 Securing screw to lock the cover

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 \varnothing 6.0 mm

For sensor

For flanges and other process connections: use a suitable mounting tool

6.2.2 Preparing the measuring device

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

6.2.3 Mounting the measuring device

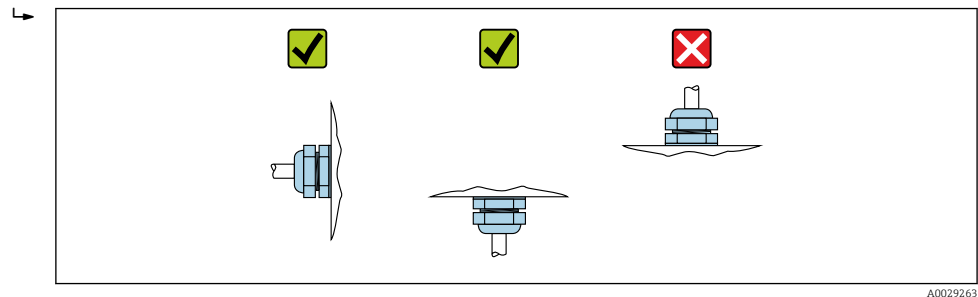
⚠ WARNING

Danger due to improper process sealing!

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

1. Ensure that the direction of the arrow on the nameplate of the sensor matches the flow direction of the medium.

2. Install the measuring device or turn the transmitter housing so that the cable entries do not point upwards.



A0029263

6.2.4 Mounting the transmitter housing: Proline 500 – digital

⚠ CAUTION

Ambient temperature too high!

Danger of electronics overheating and housing deformation.

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

⚠ CAUTION

Excessive force can damage the housing!

- ▶ Avoid excessive mechanical stress.

The transmitter can be mounted in the following ways:

- Post mounting
- Wall mounting

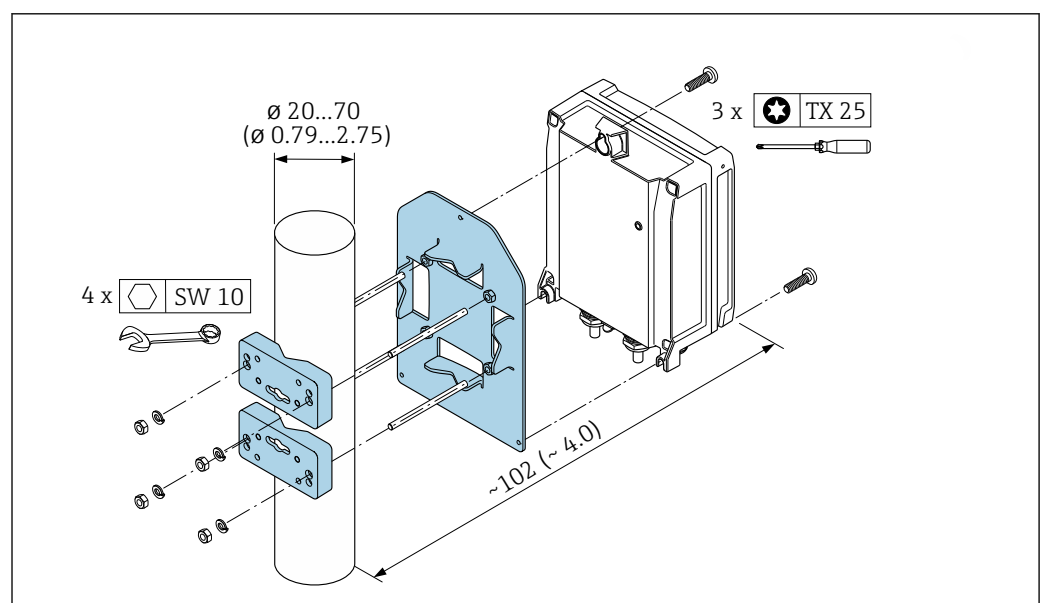
Pipe mounting

⚠ WARNING

Excessive tightening torque applied to the fixing screws!

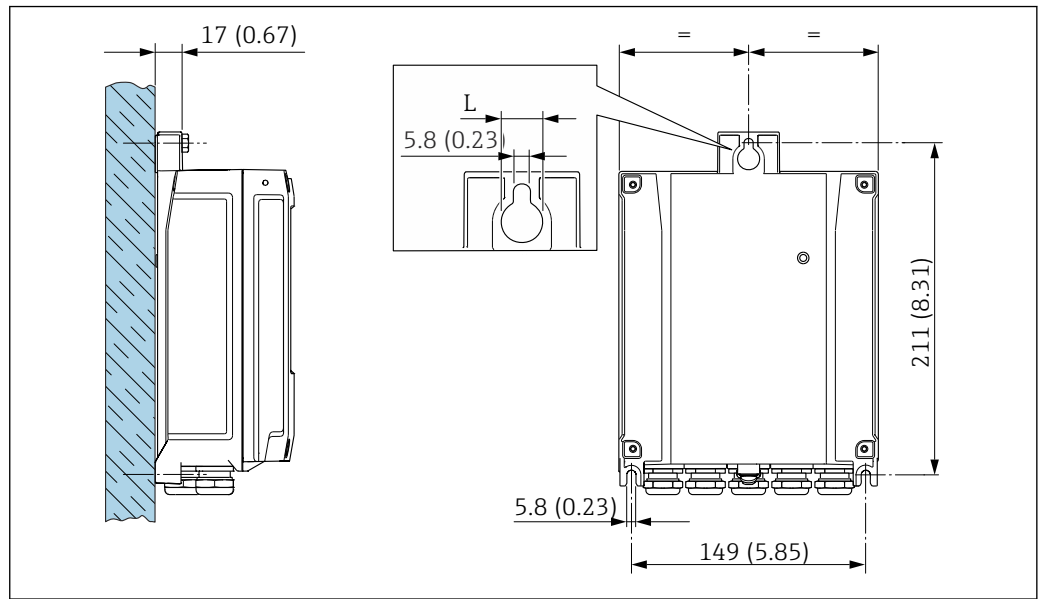
Risk of damaging the plastic transmitter.

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



A0029051

13 Engineering unit mm (in)

Wall mounting

14 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.
4. Fit the transmitter housing over the securing screws and hook into place.
5. Tighten the securing screws.

6.2.5 Mounting the transmitter housing: Proline 500**⚠ CAUTION****Ambient temperature too high!**

Danger of electronics overheating and housing deformation.

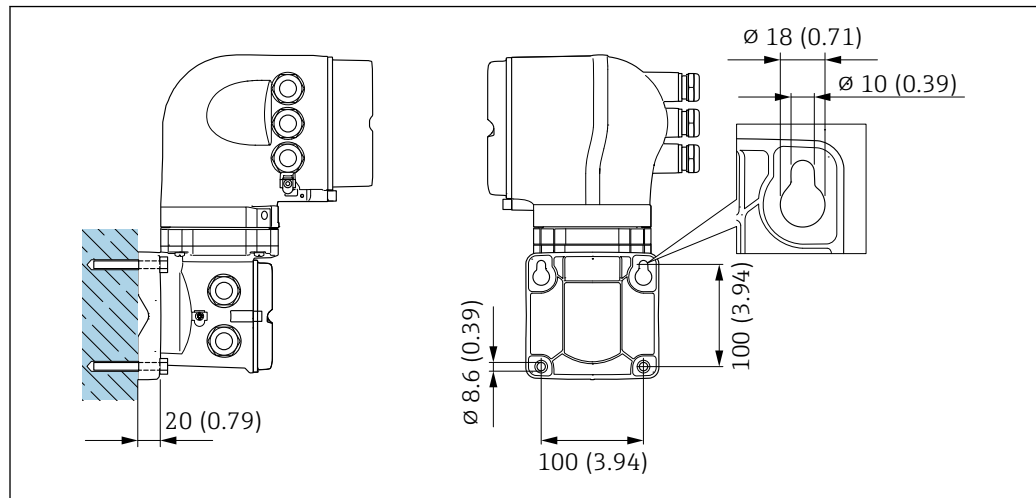
- ▶ Do not exceed the permitted maximum ambient temperature .
- ▶ If operating outdoors: Avoid direct sunlight and exposure to weathering, particularly in warm climatic regions.

⚠ CAUTION**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

A0029068

15 Engineering unit mm (in)

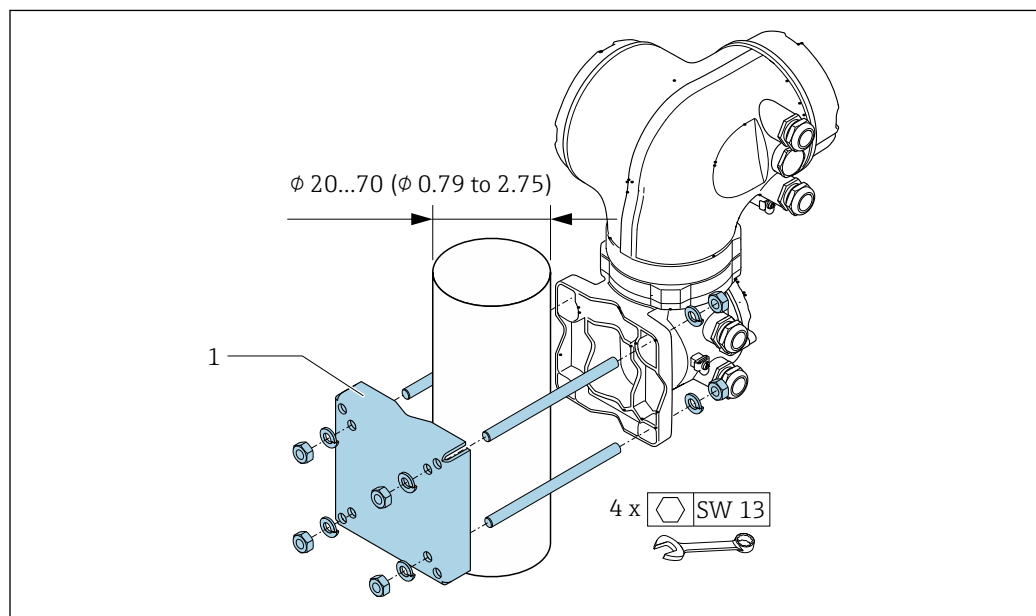
1. Drill the holes.
2. Insert wall plugs into the drilled holes.
3. Screw in the securing screws slightly.
4. Fit the transmitter housing over the securing screws and hook into place.
5. Tighten the securing screws.

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.

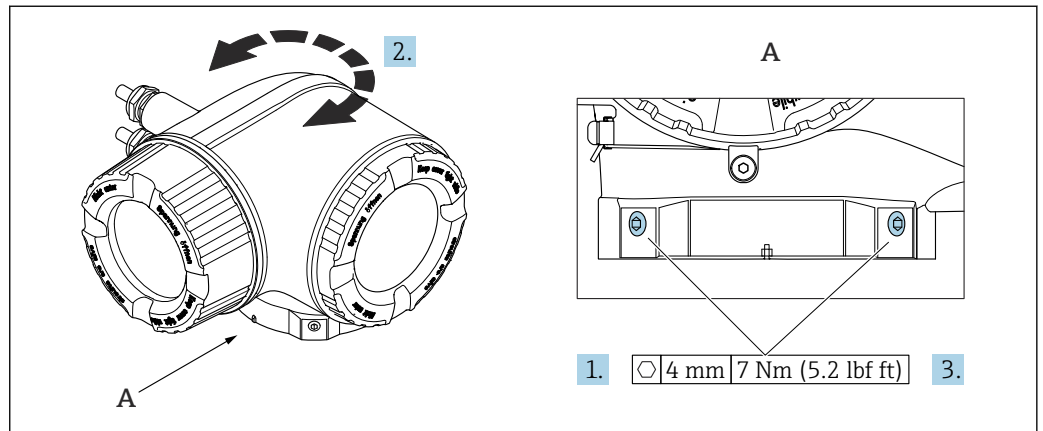


A0029057

16 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.



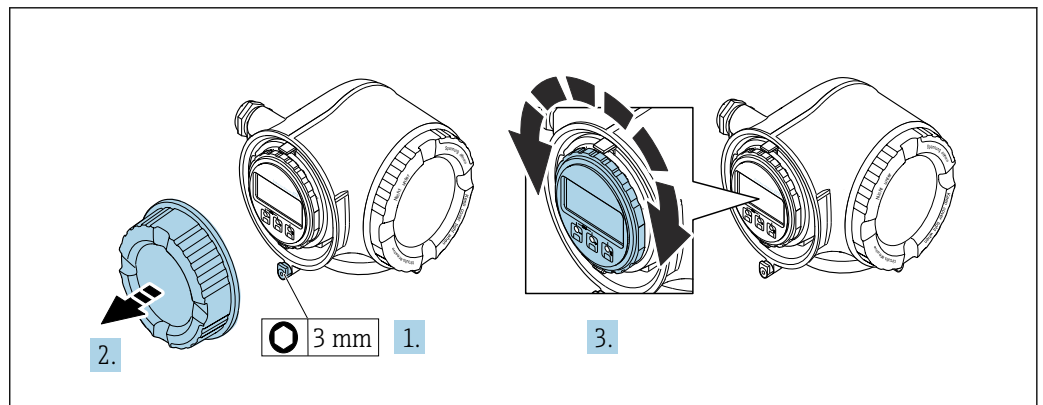
A0043150

17 Ex housing

1. Loosen the fixing screws.
2. Turn the housing to the desired position.
3. Tighten the securing screws.

6.2.7 Turning the display module: Proline 500

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



A0030035

1. Depending on the device version: Loosen the securing clamp of the connection compartment cover.
2. Unscrew the connection compartment cover.
3. Turn the display module to the desired position: max. $8 \times 45^\circ$ 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)?	<input type="checkbox"/>
Does the measuring device conform to the measuring point specifications? For example: <ul style="list-style-type: none"> ■ Process temperature → 316 ■ Process pressure (refer to the section on "Pressure-temperature ratings" in the "Technical Information" document) ■ Ambient temperature ■ Measuring range 	<input type="checkbox"/>
Has the correct orientation for the sensor been selected ? <ul style="list-style-type: none"> ■ According to sensor type ■ According to medium temperature ■ According to medium properties (outgassing, with entrained solids) 	<input type="checkbox"/>
Does the arrow on the sensor nameplate match the direction of flow of the fluid through the piping → 22?	<input type="checkbox"/>
Are the measuring point identification and labeling correct (visual inspection)?	<input type="checkbox"/>
Is the device adequately protected from precipitation and direct sunlight?	<input type="checkbox"/>
Are the securing screw and securing clamp tightened securely?	<input type="checkbox"/>

7 Electrical connection

WARNING

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

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

7.1 Electrical safety

In accordance with applicable national regulations.

7.2 Connecting requirements

7.2.1 Required tools

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

7.2.2 Requirements for connecting cable

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

Protective grounding cable for the outer ground terminal

Conductor cross-section $< 2.1 \text{ mm}^2$ (14 AWG)

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

The grounding impedance must be less than 2Ω .

Permitted temperature range

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

Power supply cable (incl. conductor for the inner ground terminal)

Standard installation cable is sufficient.

Signal cable

PROFINET with Ethernet-APL

The reference cable type for APL segments is fieldbus cable type A, MAU type 1 and 3 (specified in IEC 61158-2). This cable meets the requirements for intrinsically safe applications according to IEC TS 60079-47 and can also be used in non-intrinsically safe applications.

Cable type	A
Cable capacitance	45 to 200 nF/km

Loop resistance	15 to 150 Ω /km
Cable inductance	0.4 to 1 mH/km

Further details are provided in the Ethernet-APL Engineering Guideline (<https://www.ethernet-apl.org>).

Current output 0/4 to 20 mA

- Standard installation cable is sufficient
- For custody transfer measurement, use a shielded cable: tin-plated copper braid, optical cover $\geq 85\%$

Pulse /frequency /switch output

- Standard installation cable is sufficient
- For custody transfer measurement, use a shielded cable: tin-plated copper braid, optical cover $\geq 85\%$

Relay output

Standard installation cable is sufficient.

Current input 0/4 to 20 mA

- Standard installation cable is sufficient
- For custody transfer measurement, use a shielded cable: tin-plated copper braid, optical cover $\geq 85\%$

Status input

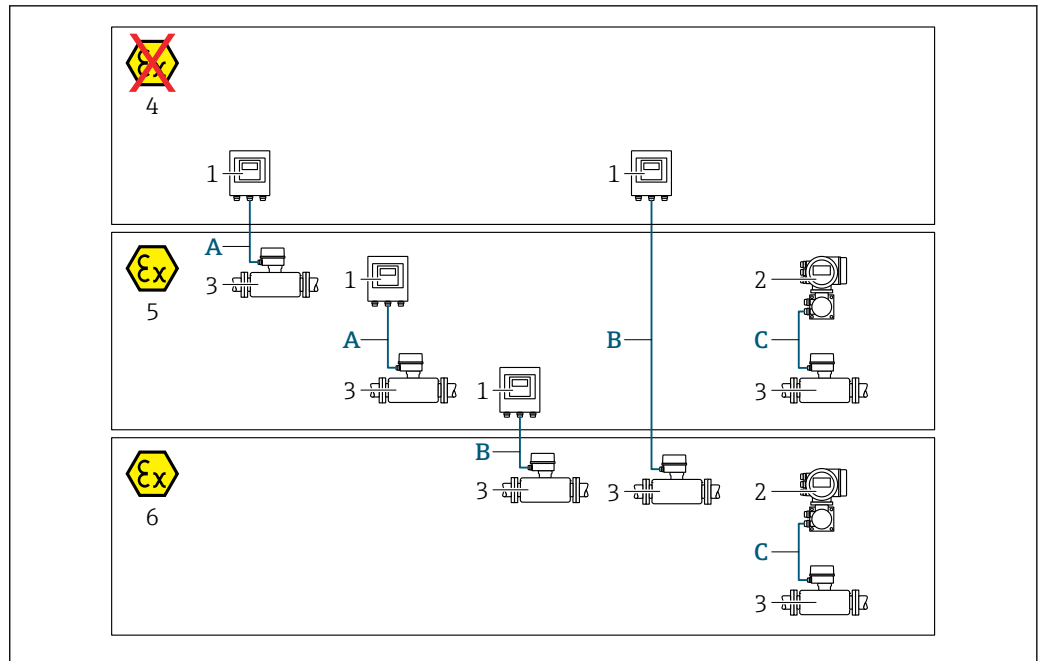
- Standard installation cable is sufficient
- For custody transfer measurement, use a shielded cable: tin-plated copper braid, optical cover $\geq 85\%$

Cable diameter

- Cable glands supplied:
M20 \times 1.5 with cable \varnothing 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



A0032476

- 1 Proline 500 digital transmitter
- 2 Proline 500 transmitter
- 3 Sensor Promass
- 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 → 37
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
- B Standard cable to 500 digital transmitter → 38
Transmitter installed in the hazardous area: Zone 2; Class I, Division 2 / sensor installed in the hazardous area: Zone 1; Class I, Division 1
- C Signal cable to 500 transmitter → 40
Transmitter and sensor installed in the hazardous area: Zone 2; Class I, Division 2 or 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 ≥ 85 %
Loop resistance	Power supply line (+, -): maximum 10 Ω
Cable length	Maximum 300 m (900 ft), see the following table.

Cross-section	Cable length [max.]
0.34 mm ² (AWG 22)	80 m (240 ft)
0.50 mm ² (AWG 20)	120 m (360 ft)
0.75 mm ² (AWG 18)	180 m (540 ft)
1.00 mm ² (AWG 17)	240 m (720 ft)
1.50 mm ² (AWG 15)	300 m (900 ft)

Optionally available connecting cable

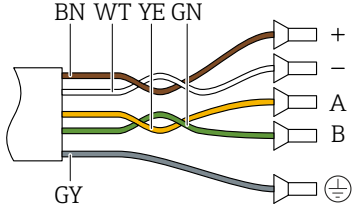
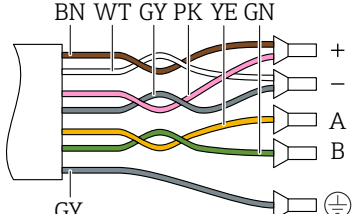
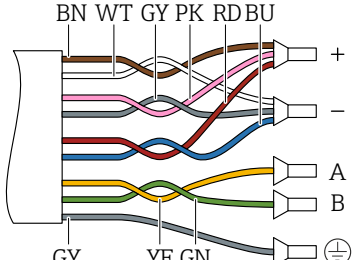
Design	2 × 2 × 0.34 mm ² (AWG 22) PVC cable ¹⁾ with common shield (2 pairs, uninsulated stranded CU wires; pair-stranded)
Flame resistance	According to DIN EN 60332-1-2
Oil-resistance	According to DIN EN 60811-2-1
Shielding	Tin-plated copper braid, optical cover ≥ 85 %
Operating temperature	When mounted in a fixed position: -50 to +105 °C (-58 to +221 °F); when cable can move freely: -25 to +105 °C (-13 to +221 °F)
Available cable length	Fixed: 20 m (60 ft); variable: up to maximum 50 m (150 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 - digital**Standard cable*

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

Design	4, 6, 8 cores (2, 3, 4 pairs); uninsulated stranded CU wires; pair-stranded with common shield
Shielding	Tin-plated copper braid, optical cover ≥ 85 %
Capacitance C	Maximum 760 nF IIC, maximum 4.2 µF IIB
Inductance L	Maximum 26 µH IIC, maximum 104 µH IIB
Inductance/resistance ratio (L/R)	Maximum 8.9 µH/Ω IIC, maximum 35.6 µH/Ω IIB (e.g. according to IEC 60079-25)
Loop resistance	Power supply line (+, -): maximum 5 Ω
Cable length	Maximum 150 m (450 ft), see the following table.

Cross-section	Cable length [max.]	Termination
2 x 2 x 0.50 mm ² (AWG 20)	50 m (150 ft)	2 x 2 x 0.50 mm ² (AWG 20)  <ul style="list-style-type: none"> ■ +, - = 0.5 mm² ■ A, B = 0.5 mm²
3 x 2 x 0.50 mm ² (AWG 20)	100 m (300 ft)	3 x 2 x 0.50 mm ² (AWG 20)  <ul style="list-style-type: none"> ■ +, - = 1.0 mm² ■ A, B = 0.5 mm²
4 x 2 x 0.50 mm ² (AWG 20)	150 m (450 ft)	4 x 2 x 0.50 mm ² (AWG 20)  <ul style="list-style-type: none"> ■ +, - = 1.5 mm² ■ A, B = 0.5 mm²

Optionally available connecting cable

Connecting cable for	Zone 1; Class I, Division 1
Standard cable	2 × 2 × 0.5 mm ² (AWG 20) PVC cable ¹⁾ with common shield (2 pairs, pair-stranded)
Flame resistance	According to DIN EN 60332-1-2
Oil-resistance	According to DIN EN 60811-2-1
Shielding	Tin-plated copper braid, optical cover ≥ 85 %
Operating temperature	When mounted in a fixed position: -50 to +105 °C (-58 to +221 °F); when cable can move freely: -25 to +105 °C (-13 to +221 °F)
Available cable length	Fixed: 20 m (60 ft); variable: up to maximum 50 m (150 ft)

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

C: Connecting cable between sensor and transmitter: Proline 500

Design	7 × 0.38 mm ² PUR cable ¹⁾ with individual shielded cores and common copper shield With order code for «Approval; transmitter; sensor», options AA, BS, CS, CZ, GR, GS, MS, NS, UR, US : 7 × 0.38 mm ² PVC cable ¹⁾ with individual shielded cores and common copper shield
Conductor resistance	≤ 50 Ω/km (0.015 Ω/ft)
Capacitance: core/shield	≤ 420 pF/m (128 pF/ft)
Cable length (max.)	20 m (60 ft)
Cable lengths (available for order)	5 m (15 ft), 10 m (30 ft), 20 m (60 ft)
Cable diameter	11 mm (0.43 in) ± 0.5 mm (0.02 in)
Operating temperature	Depends on the device version and how the cable is installed: <ul style="list-style-type: none">■ Standard version:<ul style="list-style-type: none">■ Cable - fixed installation: -40 to +105 °C (-40 to +221 °F)■ Cable - movable: -25 to +105 °C (-13 to +221 °F)■ Order code for "Test, certificate", option JP:<ul style="list-style-type: none">■ Cable - fixed installation: -50 to +105 °C (-58 to +221 °F)■ Cable - movable: -25 to +105 °C (-13 to +221 °F)■ Order code for "Test, certificate", option JQ:<ul style="list-style-type: none">■ Cable - fixed installation: -60 to +105 °C (-76 to +221 °F)■ Cable - movable: -25 to +105 °C (-13 to +221 °F)

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

7.2.3 Terminal assignment

Transmitter: supply voltage, input/outputs



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

Supply voltage		Input/output 1		Input/output 2		Input/output 3		Input/output 4	
1 (+)	2 (-)	26 (+)	27 (-)	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 →  43
- Proline 500 →  52

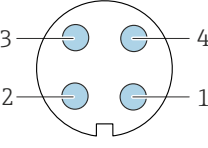
7.2.4 Available device plugs

 Device plugs may not be used in hazardous areas!

Order code for "Input; output 1", option RB "PROFINET with Ethernet-APL"

Order code "Electrical connection"	Cable entry/connection	
	2	3
L, N, P, U	M12 plug × 1	–

7.2.5 device plug pin assignment

	Pin	Assignment	Coding	Plug/socket
	1	APL signal -	A	Socket
	2	APL signal +		
	3	Cable shield ¹		
	4	Not assigned		
	Metal plug housing	Cable shield		
¹ If a cable shield is used				

7.2.6 Shielding and grounding

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

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.

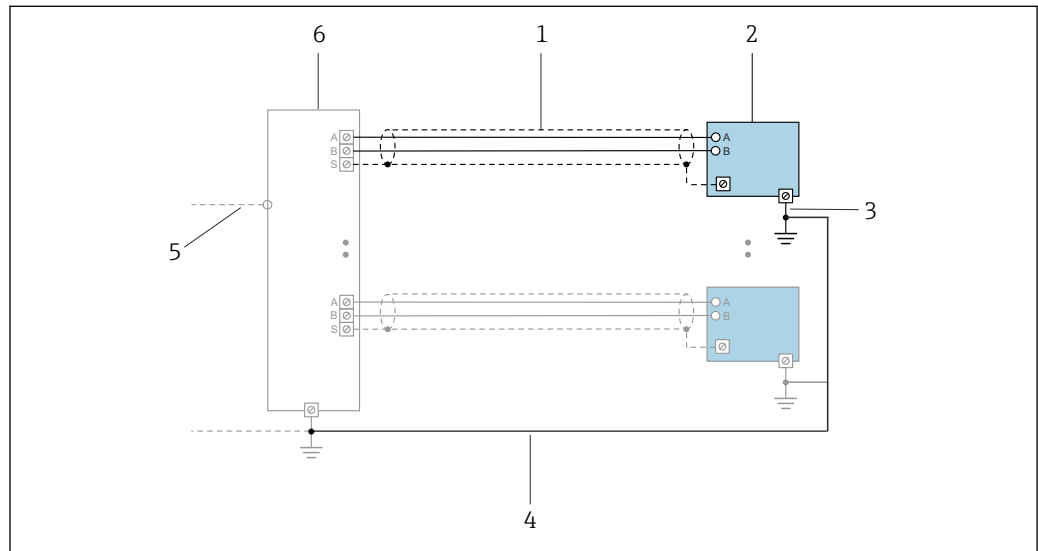
1. Observe national installation requirements and guidelines during installation.
2. Where there are large differences in potential between the individual grounding points, connect only one point of the shielding directly to the reference ground.
3. In systems without potential equalization, the cable 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.



 18 Connection example for PROFINET with Ethernet-APL

- 1 Cable shield
- 2 Measuring device
- 3 Local grounding
- 4 Potential equalization
- 5 Trunk or TCP
- 6 Field switch

7.2.7 Preparing the measuring device

Carry out the steps in the following order:


1. Mount the sensor and transmitter.
2. Sensor connection housing: 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.
2. If the measuring device is supplied without cable glands:
Provide suitable cable gland for corresponding connecting cable.
3. If the measuring device is supplied with cable glands:
Observe requirements for connecting cables →  35.

7.3 Connecting the measuring device: Proline 500 – digital

NOTICE

An incorrect connection compromises electrical safety!

- ▶ 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.
- ▶ When using in potentially explosive atmospheres, observe the information in the device-specific Ex documentation.

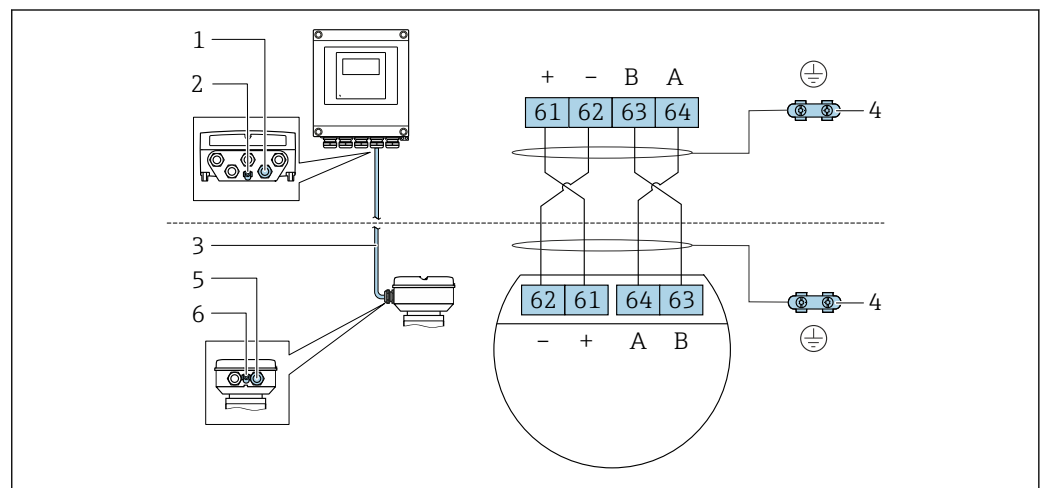
7.3.1 Connecting the connecting cable

⚠ WARNING

Risk of damaging electronic components!

- ▶ Connect the sensor and transmitter to the same potential equalization.
- ▶ Only connect the sensor to a transmitter with the same serial number.

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" → 44
 - Option B "Stainless" → 45
 - Option L "Cast, stainless" → 44
- Connection via connectors with order code for "Sensor connection housing":
 - Option C "Ultra-compact hygienic, stainless" → 46

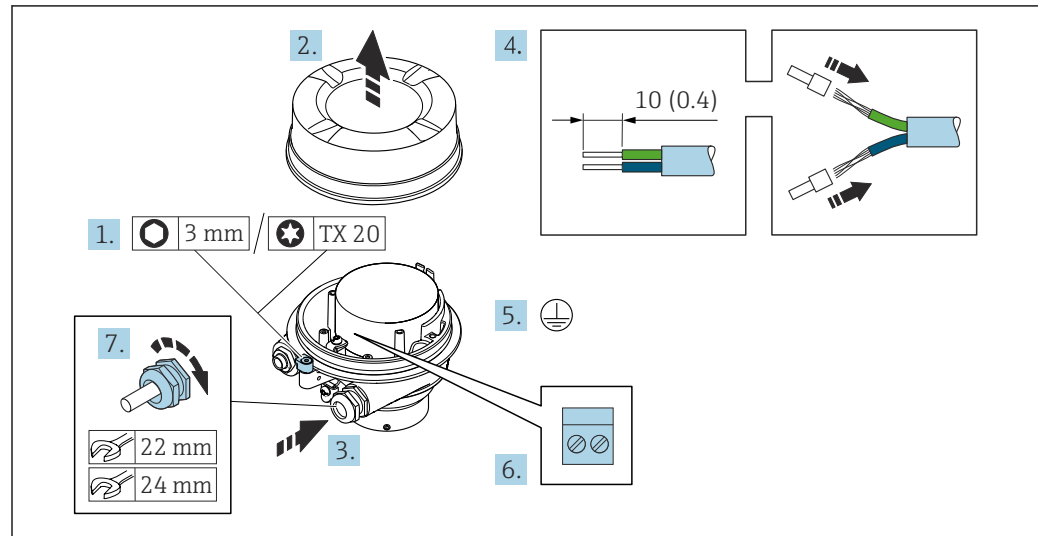
Connecting the connecting cable to the transmitter

The cable is connected to the transmitter via terminals → 47.

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"



A0029616

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.

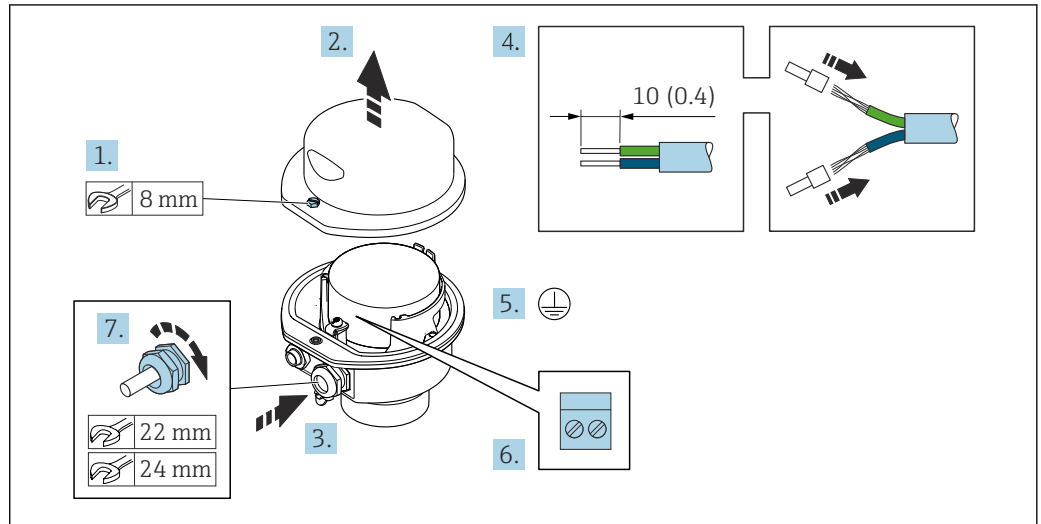
⚠ WARNING

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 sensor connection housing via terminals

For the device version with the order code for "Sensor connection housing":
Option **B** "Stainless"

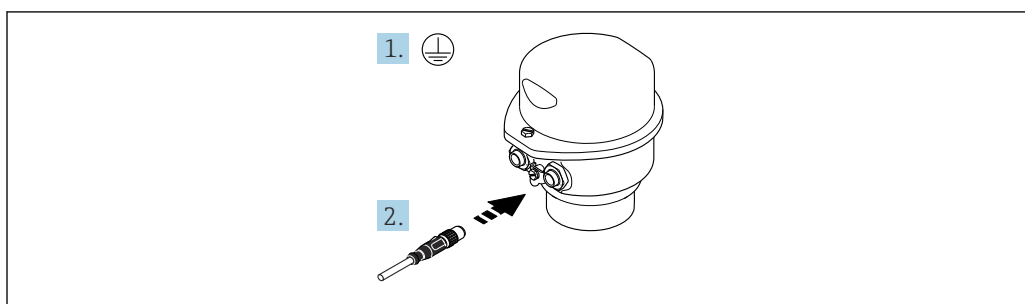


A0029613

1. Release the securing screw of the housing cover.
2. Open the housing cover.
3. Push the cable through the cable entry . To ensure tight sealing, do not remove the sealing ring from the cable entry.
4. Strip the cable and cable ends. In the case of stranded cables, 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.
8. Close the housing cover.
9. Tighten the securing screw of the housing cover.

Connecting the sensor connection housing via the connector

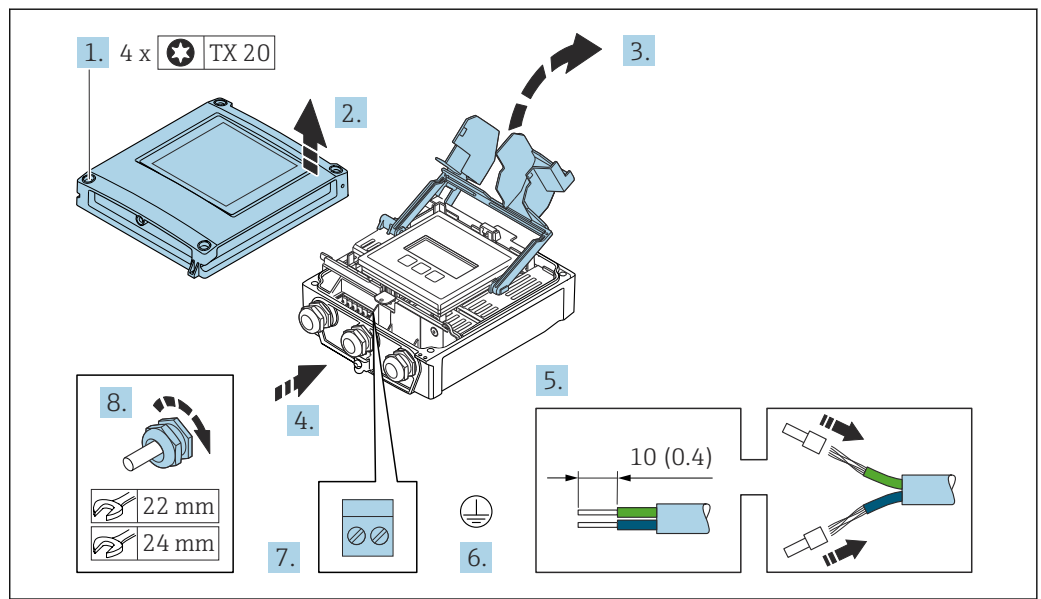
For the device version with the order code for "Sensor connection housing":
Option **C** "Ultra-compact hygienic, stainless"



A0029615

1. Connect the protective ground.
2. Connect the connector.

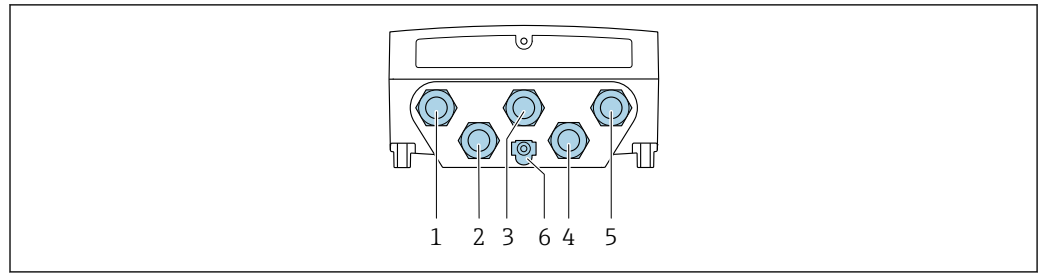
Connecting the connecting cable to the transmitter



A0029597

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 according to the terminal assignment for the connecting cable
→ 43.
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.
11. After connecting the connecting cable:
Connect the signal cable and the supply voltage cable .

7.3.2 Connecting the transmitter

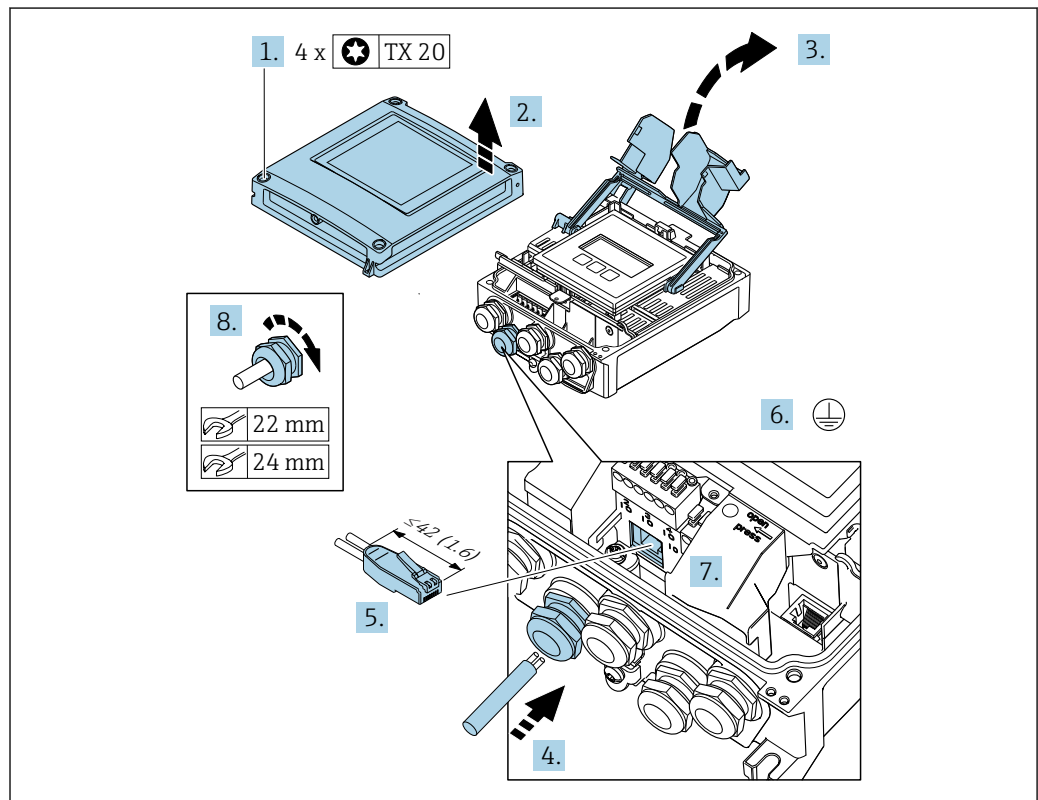


A0028200

- 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)

i In addition to connecting the device via and the available input/outputs, additional connection options are also available:
Integrate into a network via the service interface (CDI-RJ45) → 51.

Connecting the plug

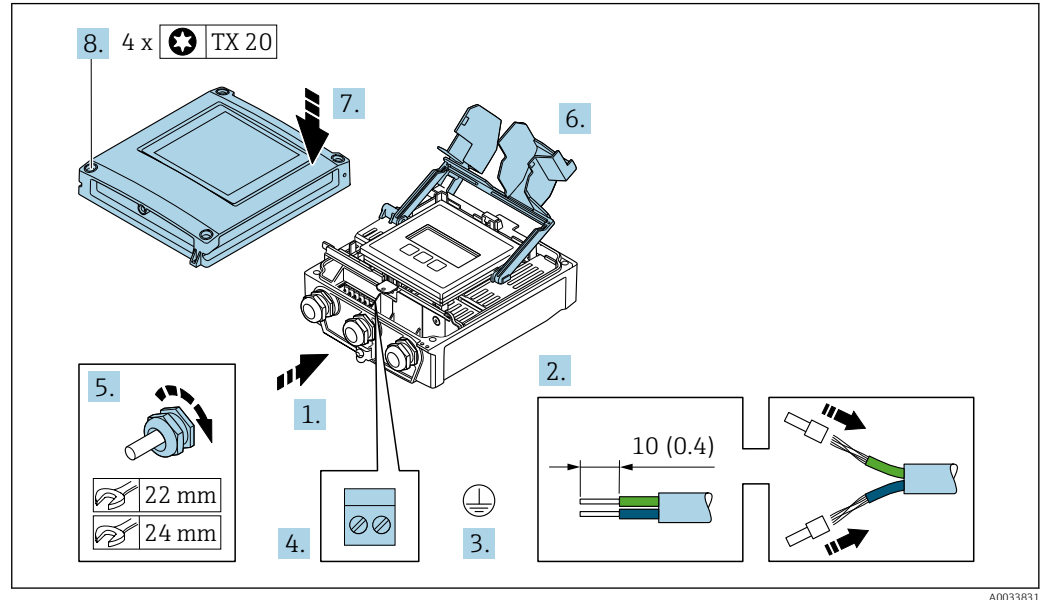


A0033987

- 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 and connect to the RJ45 connector.
- 6. Connect the protective ground.

7. Plug in the RJ45 connector.
8. Firmly tighten the cable glands.
 - ↳ This concludes the connection process.

Connecting the supply voltage and additional inputs/outputs



1. Push the cable through the cable entry. To ensure tight sealing, do not remove the sealing ring from the cable entry.
2. Strip the cable and cable ends. In the case of stranded cables, fit ferrules.
3. Connect the protective ground.
4. Connect the cable according to the terminal assignment.
 - ↳ **Signal cable terminal assignment:** The device-specific terminal assignment is documented on an adhesive label in the terminal cover.
 - Supply voltage terminal assignment:** Adhesive label in the terminal cover or → 40.
5. Firmly tighten the cable glands.
 - ↳ This concludes the cable connection process.
6. Close the terminal cover.
7. 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

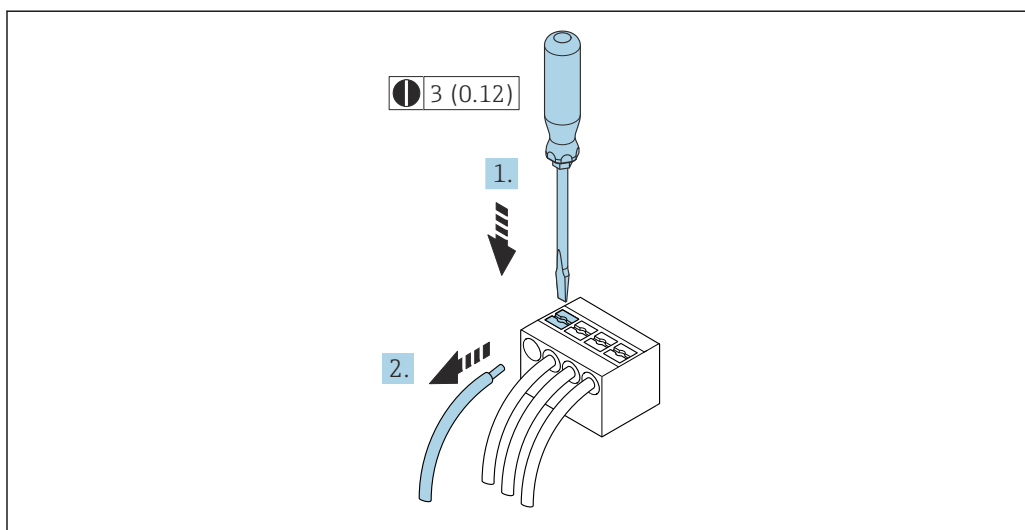
Excessive tightening torque applied to the fixing screws!

Risk of damaging the plastic transmitter.

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

8. Tighten the 4 fixing screws on the housing cover.

Removing a cable



A0029598

19 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.

7.3.3 Integrating the transmitter into a network

This section only presents the basic options for integrating the device into a network.

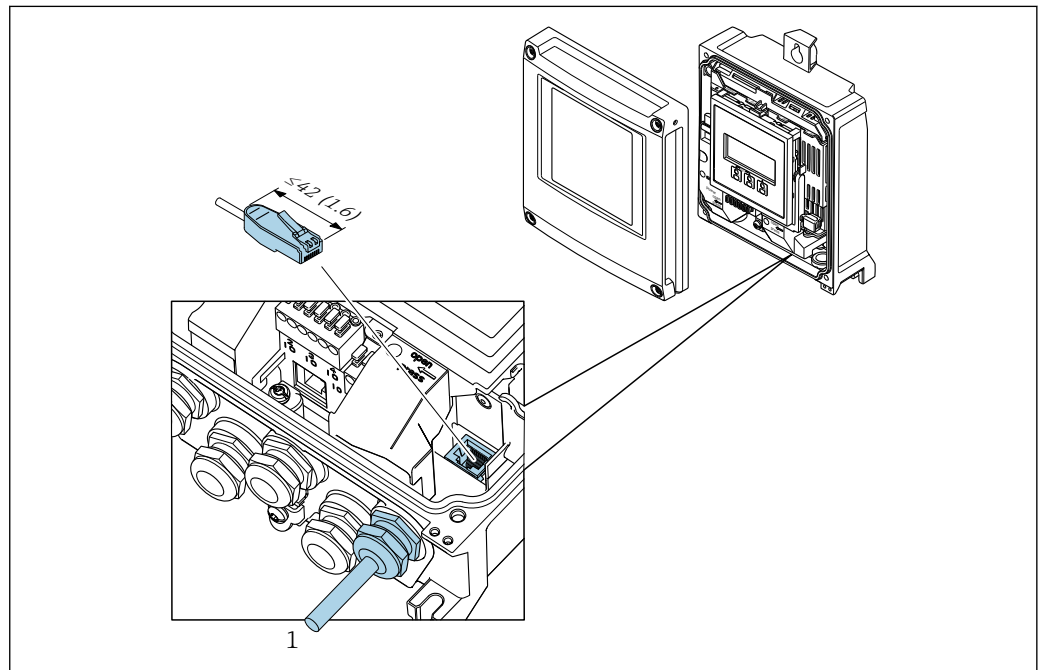
For information on the procedure to follow to connect the transmitter correctly → 43.

Integrating via the service interface

The device is integrated via the connection to the service interface (CDI-RJ45).

Note the following when connecting:

- Recommended cable: CAT5e, CAT6 or CAT7, with shielded connector (e.g. brand: YAMAICHI ; Part No Y-ConProfixPlug63 / Prod. ID: 82-006660)
- Maximum cable thickness: 6 mm
- Length of plug including anti-bend protection: 42 mm
- Bending radius: 5 x cable thickness



1 Service interface (CDI-RJ45)



An adapter for the RJ45 to the M12 plug is optionally available for the non-hazardous area:

Order code for "Accessories", option **NB**: "Adapter RJ45 M12 (service interface)"

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

7.4 Connecting the measuring device: Proline 500

NOTICE

An incorrect connection compromises electrical safety!

- ▶ 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 \oplus before connecting additional cables.
- ▶ When using in potentially explosive atmospheres, observe the information in the device-specific Ex documentation.

7.4.1 Connecting the connecting cable

WARNING

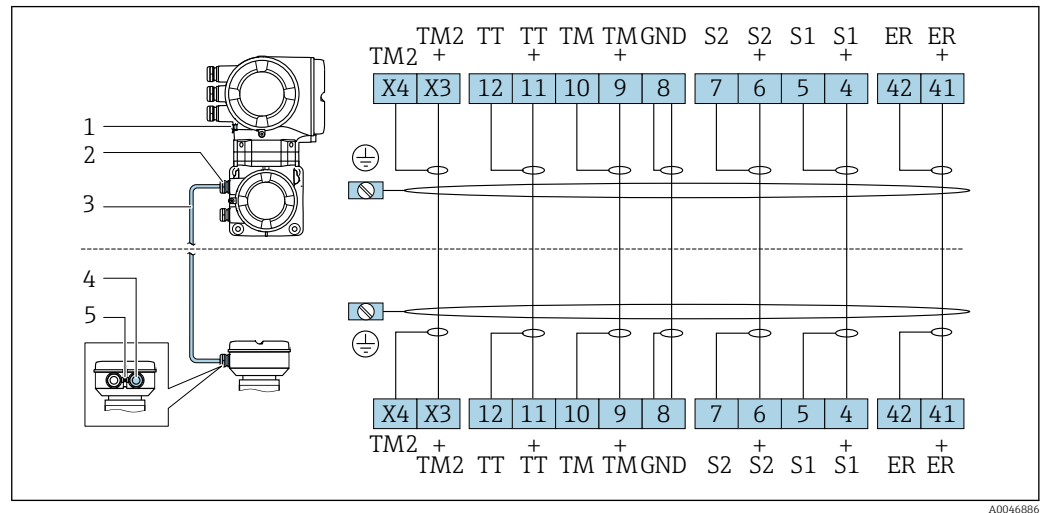
Risk of damaging electronic components!

- ▶ Connect the sensor and transmitter to the same potential equalization.
- ▶ Only connect the sensor to a transmitter with the same serial number.

Connecting cable terminal assignment

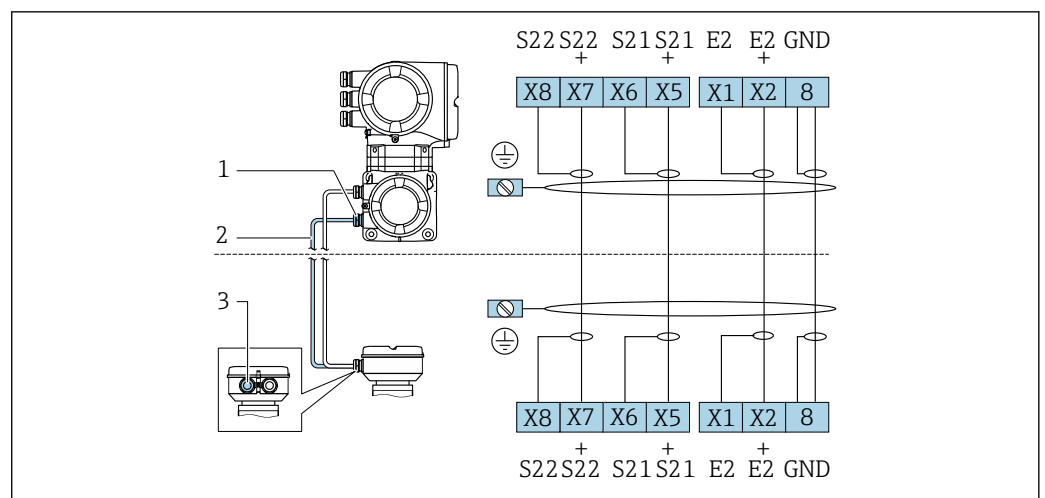
i The number of connecting cables depends on the nominal diameter of the device. For devices with nominal diameters $DN \geq 150$ mm (6 in), an additional, second connecting cable is required.

First connecting cable for all nominal diameters



- 1 Terminal connection for potential equalization (PE)
- 2 Cable entry for connecting cable on transmitter connection housing
- 3 Connecting cable
- 4 Cable entry for connecting cable on sensor connection housing
- 5 Terminal connection for potential equalization (PE)

Additional, second connecting cable for nominal diameters $DN \geq 150$ mm (6 in)



- 1 Cable entry for second connecting cable on transmitter connection housing
- 2 Second connecting cable
- 3 Cable entry for second connecting cable on sensor connection housing

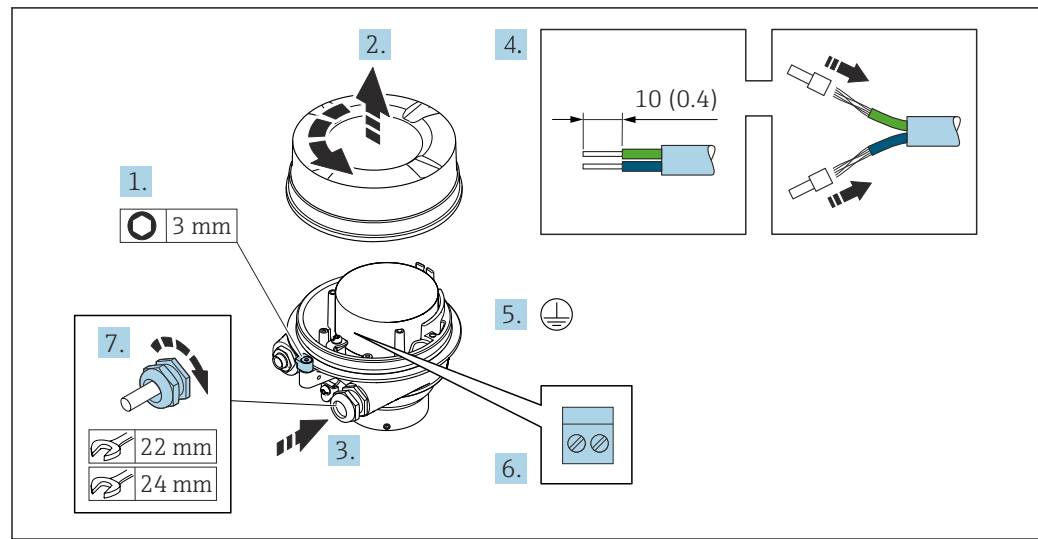
Connecting the connecting cable to the sensor connection housing

Connection via terminals with order code for "Housing":

- Option **B** "Stainless" → 55
- Option **L** "Cast, stainless" → 54

Connecting the sensor connection housing via terminals

For the device version with the order code for "Housing":
Option L "Cast, stainless"



A0029612

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.

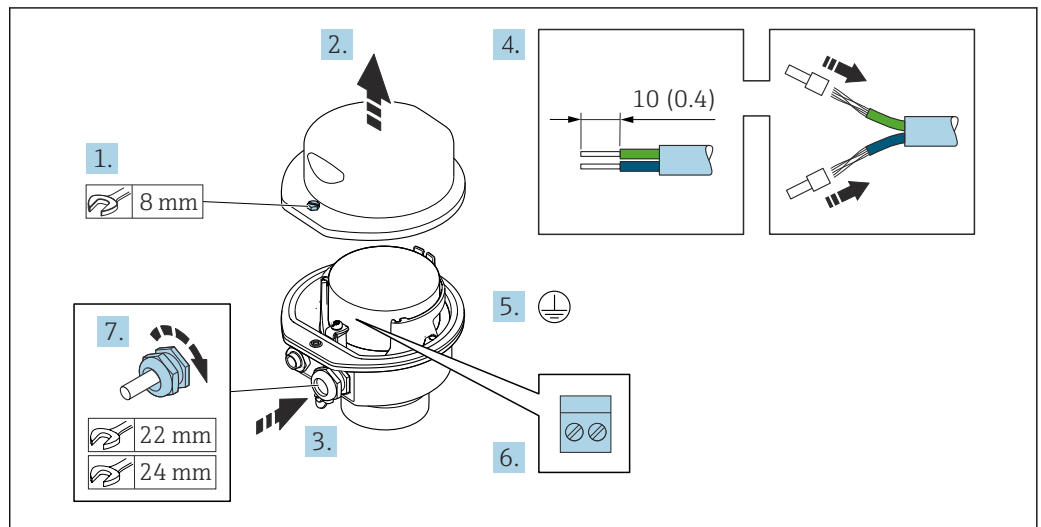
⚠ WARNING

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 sensor connection housing via terminals

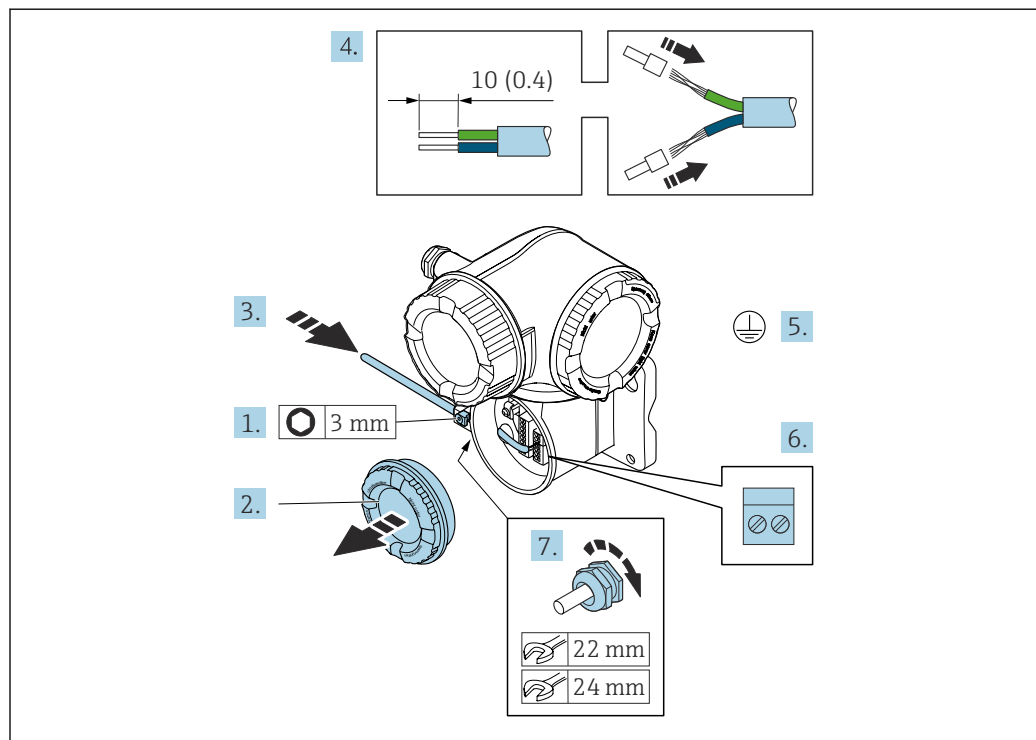
For the device version with the order code for "Housing":
Option B "Stainless"



A0029613

1. Release the securing screw of the housing cover.
2. Open the housing cover.
3. Push the cable through the cable entry . To ensure tight sealing, do not remove the sealing ring from the cable entry.
4. Strip the cable and cable ends. In the case of stranded cables, 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.
8. Close the housing cover.
9. Tighten the securing screw of the housing cover.

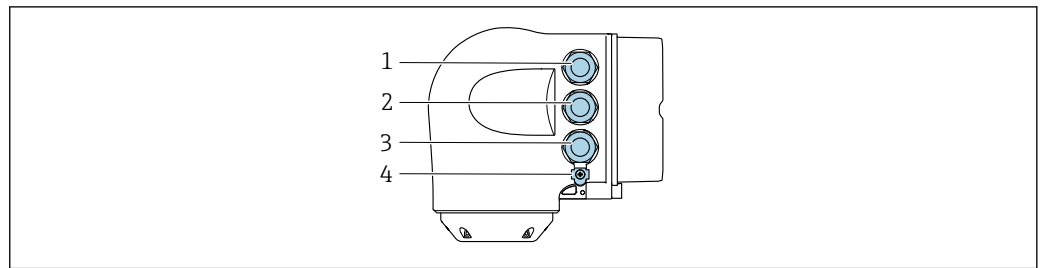
Attaching the connecting cable to the transmitter



A0029592

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 .
7. Firmly tighten the cable glands.
 ↳ This concludes the process for attaching the connecting cable.
8. Screw on the connection compartment cover.
9. Tighten the securing clamp of the connection compartment cover.
10. After connecting the connecting cable:
 Connect the signal cable and the supply voltage cable .

7.4.2 Connecting the transmitter



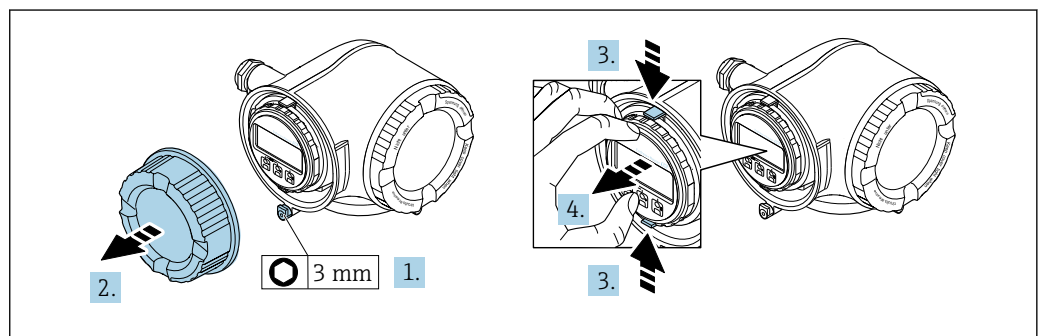
A0026781

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



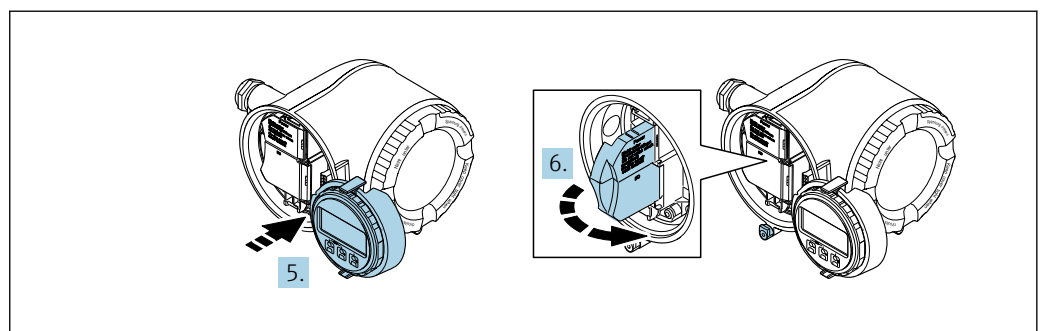
In addition to connecting the device via PROFINET with Ethernet-APL and the available inputs/outputs, an additional connection option is also available: Integrate into a network via the service interface (CDI-RJ45) → 60.

Connecting the plug



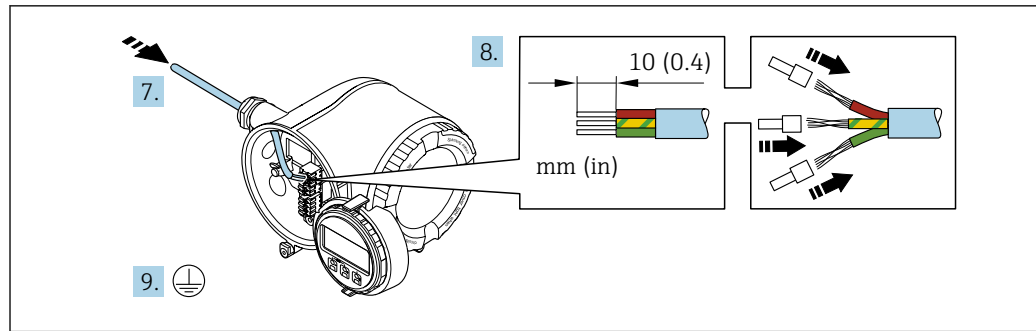
A0029813

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



A0029814

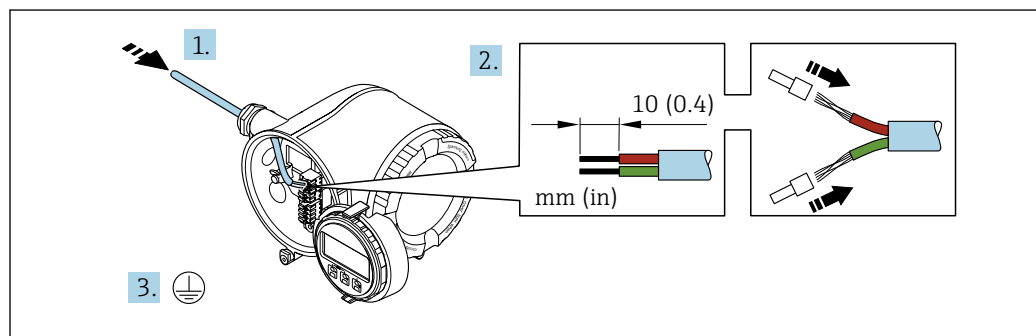
5. Attach the holder to the edge of the electronics compartment.
6. Open the terminal cover.



A0051111

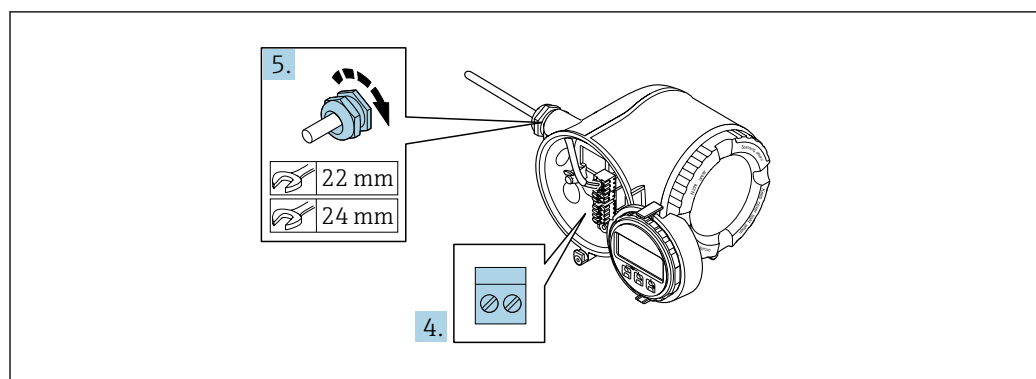
7. Push the cable through the cable entry. To ensure tight sealing, do not remove the sealing ring from the cable entry.
8. Strip the cable and cable ends and connect to terminals 26-27. In the case of stranded cables, also fit ferrules.
9. Connect protective earth (PE).
10. Firmly tighten the cable glands.
 ↳ This concludes the connection via the APL port.

Connecting the supply voltage and additional inputs/outputs



A0051128

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

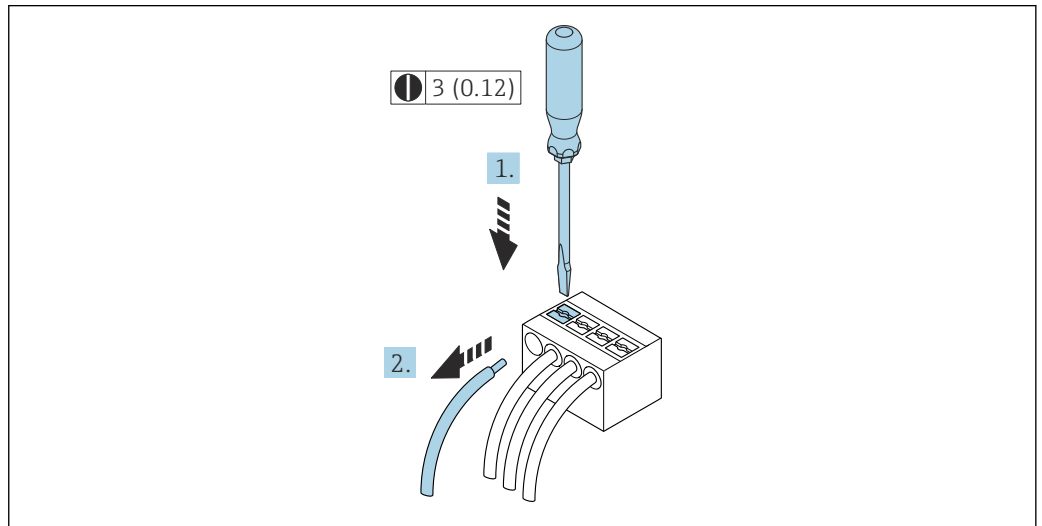


A0033984

4. Connect the cable according to the terminal assignment.
 ↳ **Signal cable terminal assignment:** The device-specific terminal assignment is documented on an adhesive label in the terminal cover.
Supply voltage terminal assignment: Adhesive label in the terminal cover or
 → 40.

5. Firmly tighten the cable glands.
↳ This concludes the cable connection process.
6. Close the terminal cover.
7. Fit the display module holder in the electronics compartment.
8. Screw on the connection compartment cover.
9. Secure the securing clamp of the connection compartment cover.

Removing a cable



20 Engineering unit mm (in)

A0029598

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.

7.4.3 Integrating the transmitter into a network

This section only presents the basic options for integrating the device into a network.

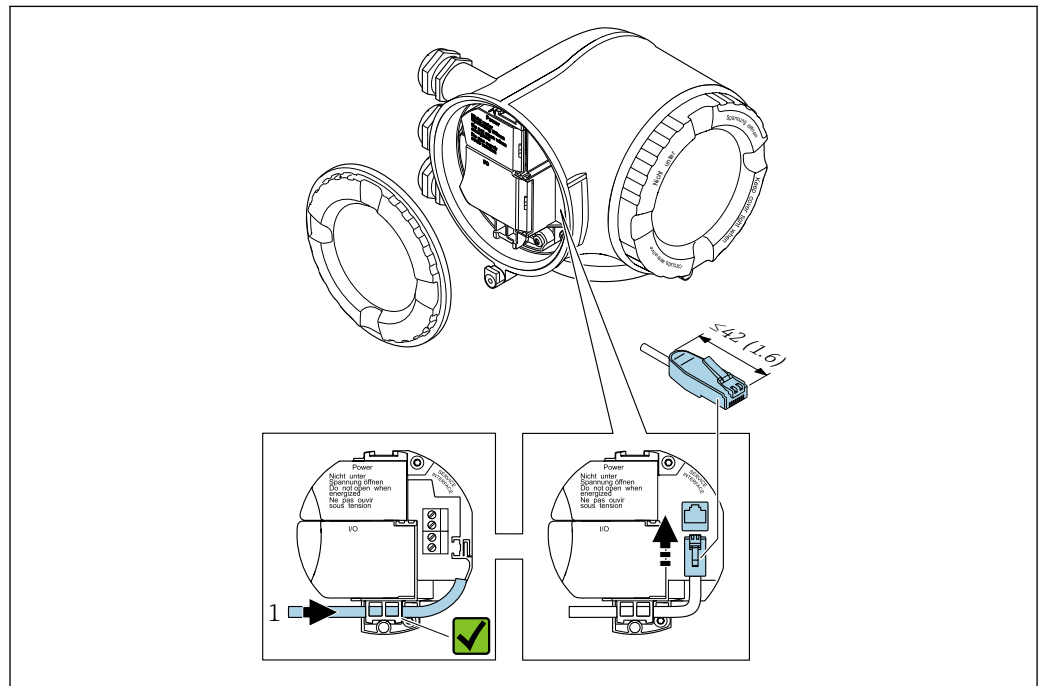
For information on the procedure to follow to connect the transmitter correctly → 52.

Integrating via the service interface

The device is integrated via the connection to the service interface (CDI-RJ45).

Note the following when connecting:

- Recommended cable: CAT 5e, CAT 6 or CAT 7, with shielded connector (e.g. brand: YAMAICHI ; Part No Y-ConProfixPlug63 / Prod. ID: 82-006660)
- Maximum cable thickness: 6 mm
- Length of plug including anti-bend protection: 42 mm
- Bending radius: 5 x cable thickness



A0033703

1 Service interface (CDI-RJ45)

- i** An adapter for the RJ45 to the M12 plug 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 plug mounted in the cable entry. The connection to the service interface can therefore be established via an M12 plug without opening the device.

7.5 Potential equalization

7.5.1 Requirements

For potential equalization:

- Pay attention to in-house grounding concepts
- Take account of operating conditions like the pipe material and grounding
- Connect the medium, sensor and transmitter to the same electrical potential
- Use a ground cable with a minimum cross-section of 6 mm² (0.0093 in²) and a cable lug for potential equalization connections

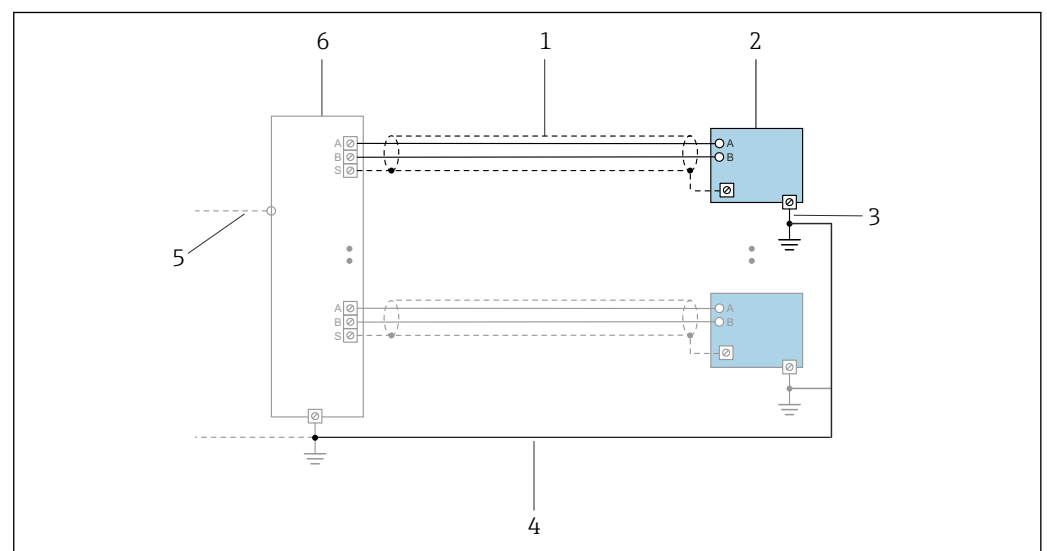


For devices intended for use in hazardous locations, please observe the guidelines in the Ex documentation (XA).

7.6 Special connection instructions

7.6.1 Connection examples

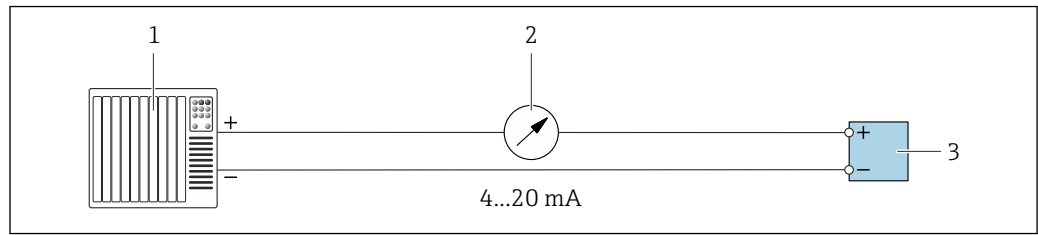
PROFINET with Ethernet-APL



A0047536

21 Connection example for PROFINET with Ethernet-APL

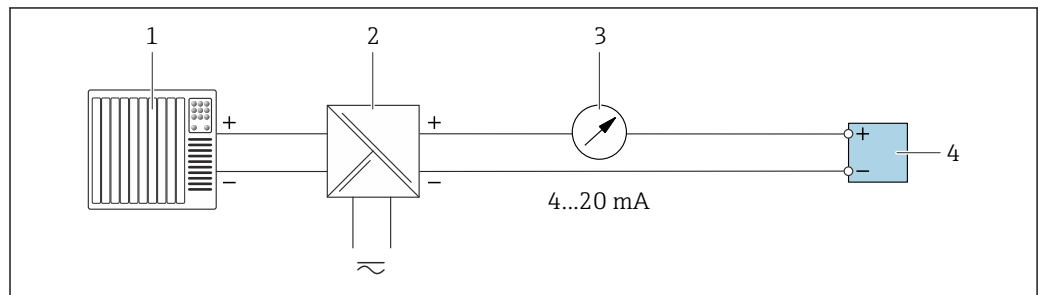
- 1 Cable shield
- 2 Measuring device
- 3 Local grounding
- 4 Potential equalization
- 5 Trunk or TCP
- 6 Field switch

Current output 4-20 mA

A0028758

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

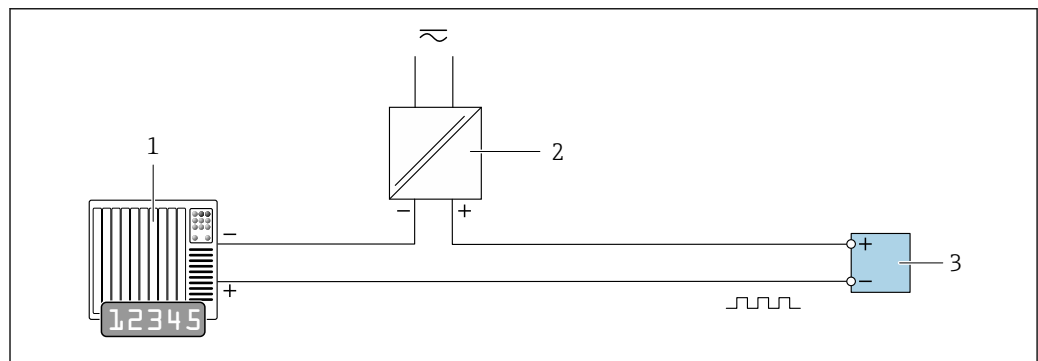
- 1 Automation system with current input (e.g. PLC)
- 2 Analog display unit: observe maximum load
- 3 Transmitter



A0028759

23 Connection example for 4-20 mA current output (passive)

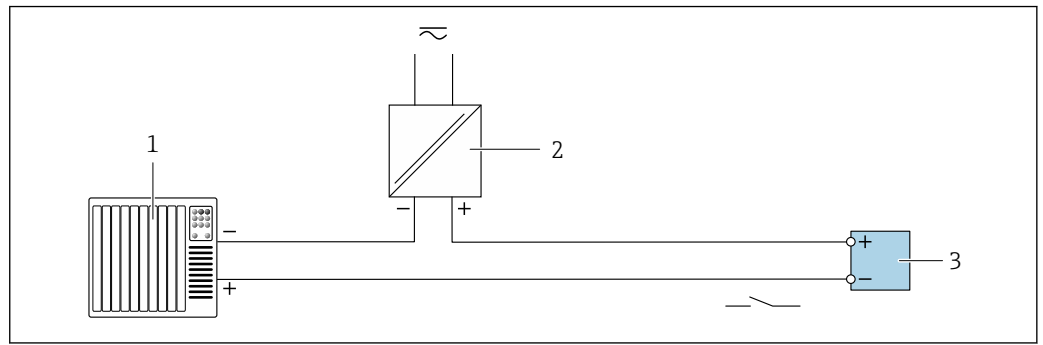
- 1 Automation system with current input (e.g. PLC)
- 2 Active barrier for power supply (e.g. RN221N)
- 3 Analog display unit: observe maximum load
- 4 Transmitter

Pulse/frequency output

A0028761

24 Connection example for pulse/frequency output (passive)

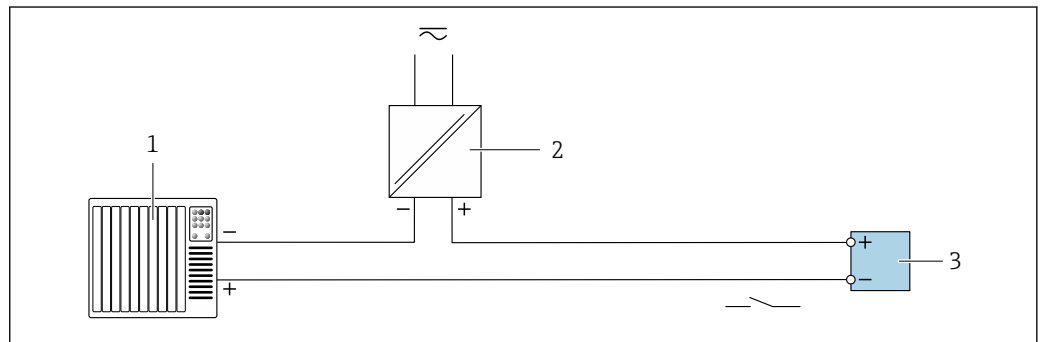
- 1 Automation system with pulse/frequency input (e.g. PLC with 10 kΩ pull-up or pull-down resistor)
- 2 Power supply
- 3 Transmitter: observe input values → 303

Switch output

A0028760

25 Connection example for switch output (passive)

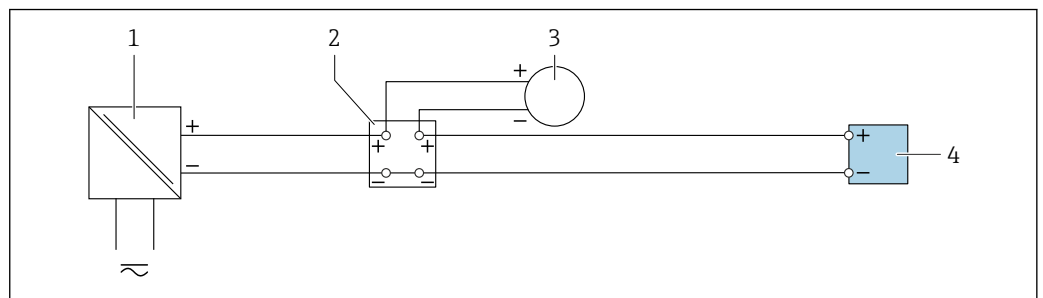
- 1 Automation system with switch input (e.g. PLC with a 10 kΩ pull-up or pull-down resistor)
- 2 Power supply
- 3 Transmitter: observe input values → 303

Relay output

A0028760

26 Connection example for relay output (passive)

- 1 Automation system with relay input (e.g. PLC)
- 2 Power supply
- 3 Transmitter: observe input values → 304

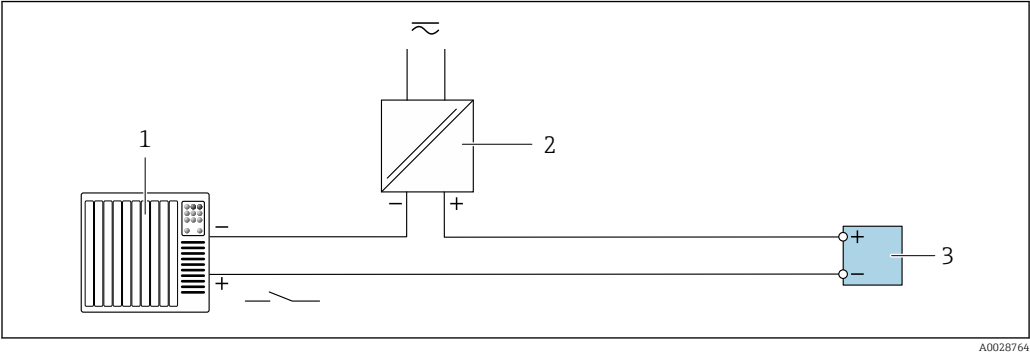
Current input

A0028915

27 Connection example for 4 to 20 mA current input

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

Status input



28 Connection example for status input

1 Automation system with status output (e.g. PLC)

2 Power supply

3 Transmitter

7.7 Hardware settings

7.7.1 Setting the device name

A measuring point can be quickly identified within a plant on the basis of the tag name. The factory-assigned device name can be changed using the DIP switches or the automation system.

Example: EH-Promass500-XXXX

EH	Endress+Hauser
Promass	Instrument family
500	Transmitter
XXXX	Serial number of the device

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

Setting the device name using the DIP switches

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

Overview of the DIP switches

DIP switch	Bit	Description
1	128	Configurable part of the device name
2	64	
3	32	
4	16	
5	8	
6	4	
7	2	
8	1	



Example: setting the device name EH-PROMASS500-065

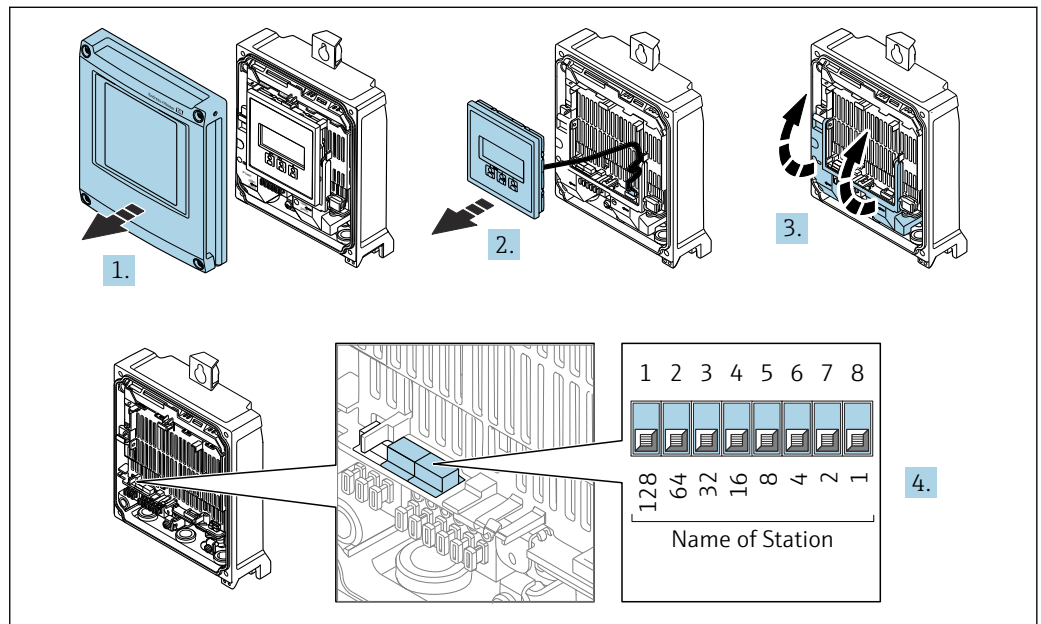
DIP switch	ON/OFF	Bit	Device name
1	OFF	–	EH-PROMASS500-065
2	ON	64	
3...7	OFF	–	
8	ON	1	
Serial number of the device:		065	

Setting the device name: Proline 500 - digital

Risk of electric shock when opening the transmitter housing.

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

 The default IP address may **not** be activated →  66.





A0034497

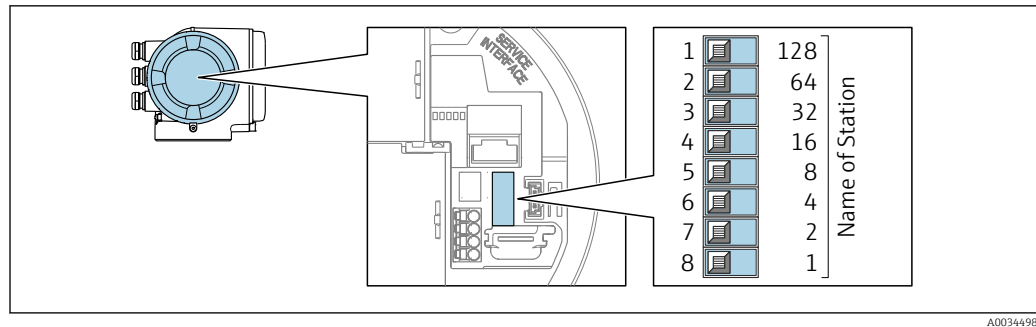
1. Loosen the 4 securing screws on the housing cover.
2. Open the housing cover.
3. Fold open the terminal cover.
4. Set the desired device name using the corresponding DIP switches on the I/O electronics module.
5. Reassemble the transmitter in the reverse order.
6. Reconnect the device to the power supply.
 - ↳ The configured device address is used once the device is restarted.

Setting the device name: Proline 500

Risk of electric shock when opening the transmitter housing.

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

 The default IP address may **not** be activated →  67.



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

Setting the device name via the automation system

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

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

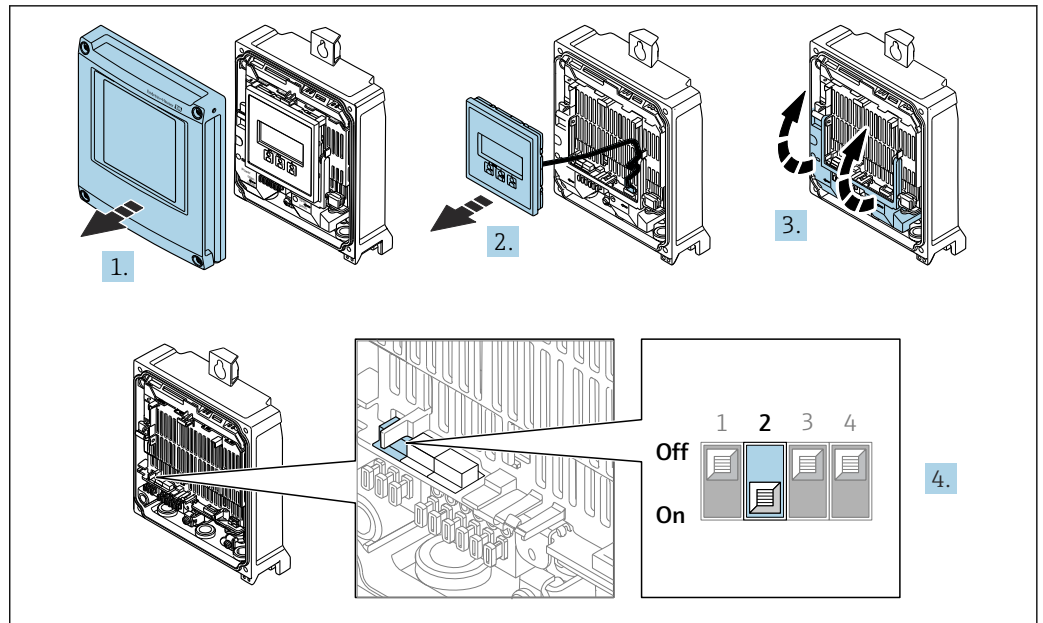
- i ■ The serial number used as part of the device name in the factory setting is not saved. It is not possible to reset the device name to the factory setting with the serial number. The device name is empty following the reset.
- When assigning the device name via the automation system: assign the device name in lower case letters.

7.7.2 Activating the default IP address

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.



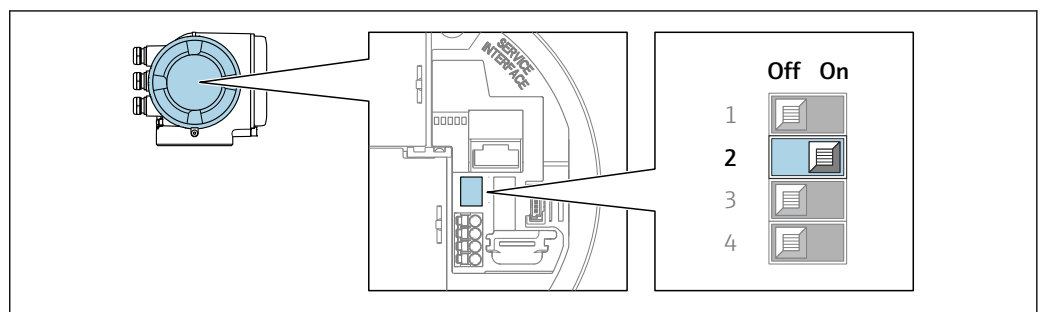
A0034500

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** → **ON**.
5. Reassemble the transmitter in the reverse order.
6. Reconnect the device to the power supply.
 - ↳ The default IP address is used once the device is restarted.

Activating the default IP address by 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.



A0034499

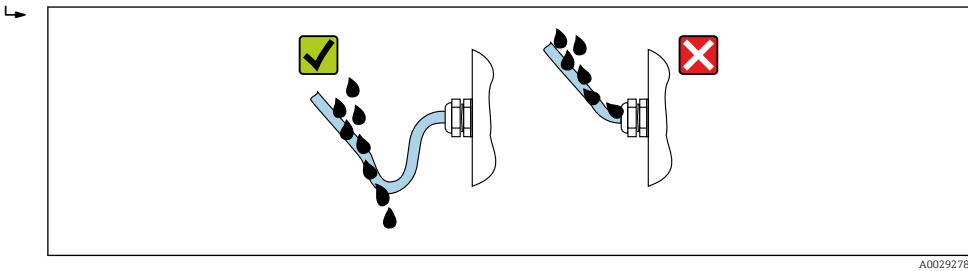
1. Depending on the housing version, loosen the securing clamp or fixing screw of the housing cover.
2. Depending on the housing version, unscrew or open the housing cover and disconnect the local display from the main electronics module where necessary .
3. Set DIP switch no. 2 on the I/O electronics module from **OFF** → **ON**.
4. Reassemble the transmitter in the reverse order.
5. Reconnect the device to the power supply.
 - ↳ The default IP address is used once the device is restarted.

7.8 Ensuring the degree of protection

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

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

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



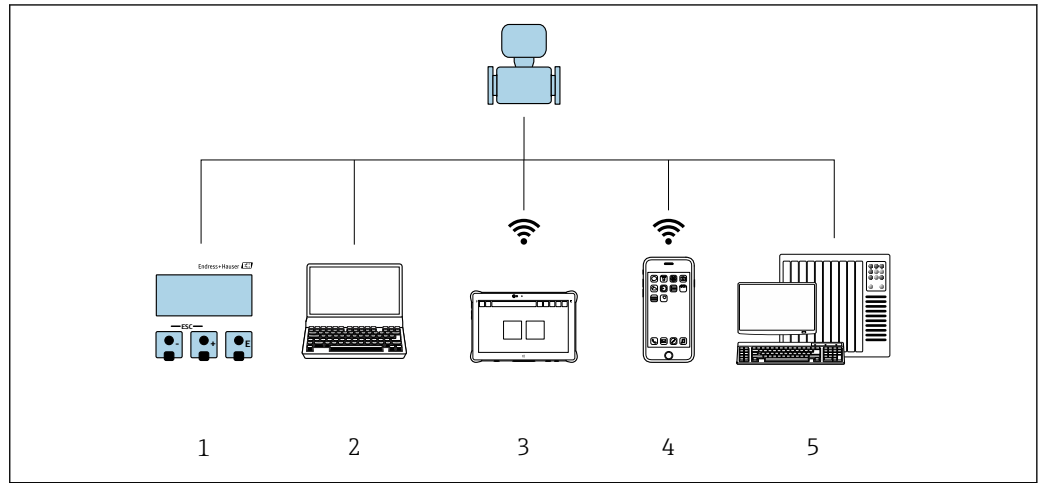
- 6. The cable glands supplied do not provide any housing protection if they are not used. Therefore, they must be replaced by dummy plugs that match the housing protection.

7.9 Post-connection check

Are cables or the device undamaged (visual inspection)?	<input type="checkbox"/>
Is the protective earthing established correctly?	
Do the cables used comply with the requirements ?	<input type="checkbox"/>
Do the mounted cables have adequate strain relief?	<input type="checkbox"/>
Are all cable glands installed, securely tightened and leak-tight? Cable run with "water trap" → 68?	<input type="checkbox"/>
Is the terminal assignment correct ?	<input type="checkbox"/>
Are dummy plugs inserted in unused cable entries and have transportation plugs been replaced with dummy plugs?	

8 Operation options



8.1 Overview of operation options

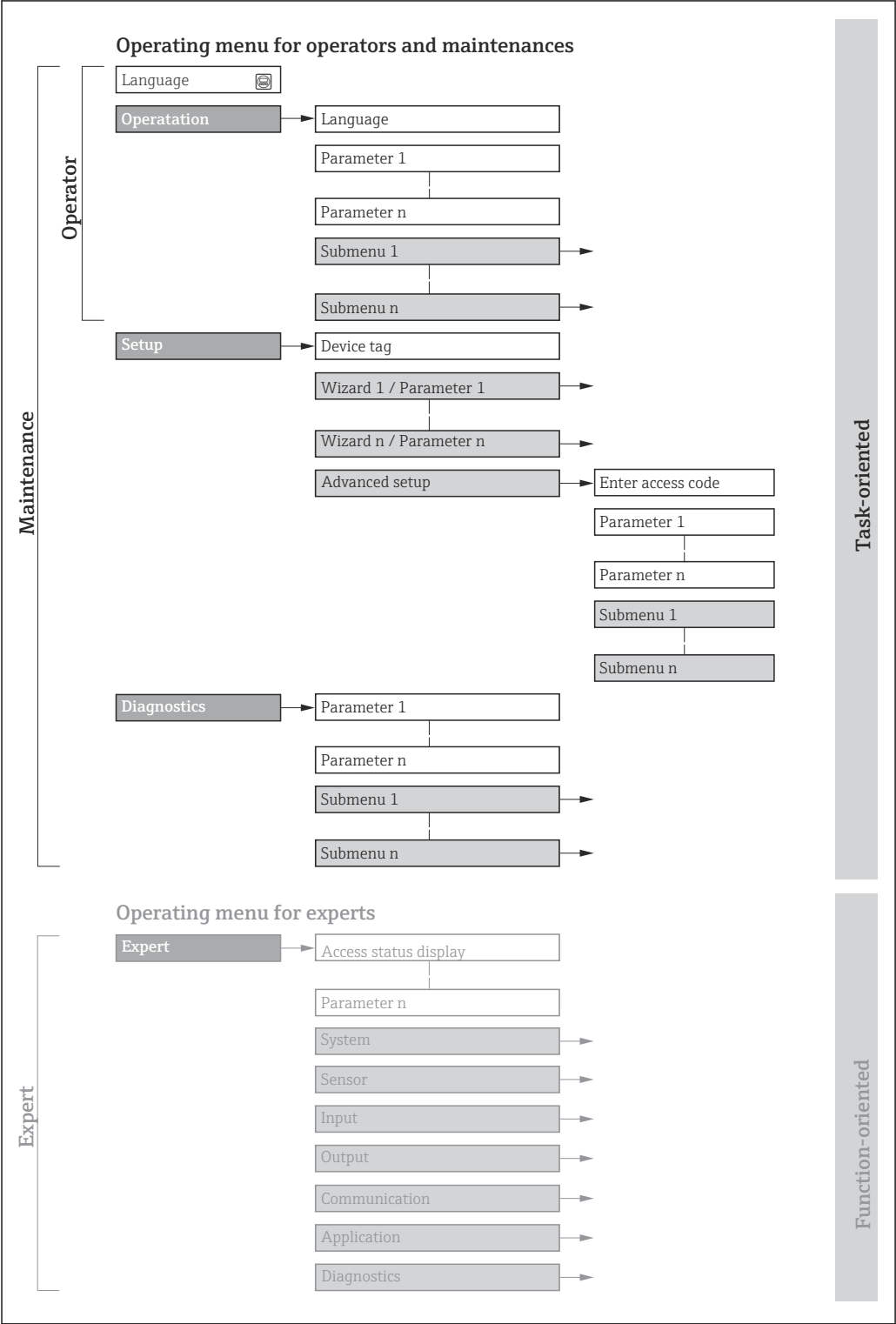



- 1 Local operation via display module
- 2 Computer with web browser (e.g. Internet Explorer) or with operating tool (e.g. FieldCare, SIMATIC PDM)
- 3 Field Xpert SMT70
- 4 Mobile handheld terminal
- 5 Control system (e.g. PLC)

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: see the "Description of Device Parameters" document supplied with the device →  331



 29 Schematic structure of the operating menu

A0018237-EN

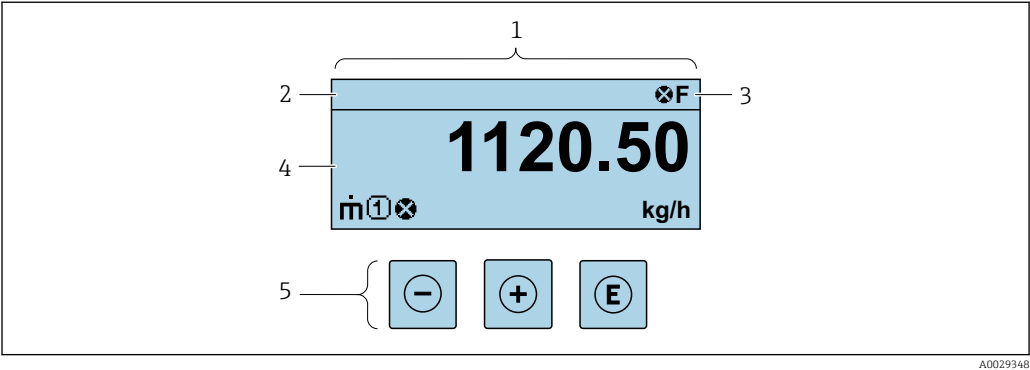
8.2.2 Operating philosophy

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: <ul style="list-style-type: none"> Configuration of the operational display Reading measured values 	<ul style="list-style-type: none"> Defining the operating language Defining the Web server operating language Resetting and controlling totalizers
Operation			<ul style="list-style-type: none"> Configuring the operational display (e.g. display format, display contrast) Resetting and controlling totalizers
Setup		"Maintenance" role Commissioning: <ul style="list-style-type: none"> Configuration of the measurement Configuration of the inputs and outputs Configuration of the communication interface 	Wizards for quick commissioning: <ul style="list-style-type: none"> Configuration of the system units Configuration of the communication interface Definition of the medium Display the I/O configuration Configuration of the inputs Configuration of the outputs Configuration of the operational display Configuration of the low flow cut off Configuration of the detection of partially filled and empty pipes Advanced setup <ul style="list-style-type: none"> For more customized configuration of the measurement (adaptation to special measuring conditions) Configuration of totalizers Configuration of WLAN settings Administration (define access code, reset measuring device)
Diagnostics		"Maintenance" role Troubleshooting: <ul style="list-style-type: none"> Diagnostics and elimination of process and device errors Measured value simulation 	Contains all parameters for error detection and analyzing process and device errors: <ul style="list-style-type: none"> Diagnostics 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. Data logging submenu with the "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.
Expert	Function-oriented	Tasks that require detailed knowledge of the function of the device: <ul style="list-style-type: none"> 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: <ul style="list-style-type: none"> System Contains all higher-level device parameters that do not pertain either to the measurement or to measured value communication. Sensor Configuration of the measurement. Input Configuration of the status input. Output Configuration of the analog current outputs as well as the pulse/frequency and switch output. Communication Configuration of the digital communication interface and the Web server. Application Configuration of the functions that go beyond the actual measurement (e.g. totalizer). Diagnostics Error detection and analysis of process and device errors and for device simulation and Heartbeat Technology.

8.3 Access to the operating menu via the local display

8.3.1 Operational display



- 1 Operational display
- 2 Tag name
- 3 Status area
- 4 Display area for measured values (4-line)
- 5 Operating elements → 78

Status area

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

- Status signals → 212
 - **F**: Failure
 - **C**: Function check
 - **S**: Out of specification
 - **M**: Maintenance required
- Diagnostic behavior → 213
 - : Alarm
 - : Warning
- : Locking (the device is locked via the hardware)
- : Communication (communication via remote operation is active)


Display area

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


Measured variables



Symbol	Meaning
	Mass flow
	<ul style="list-style-type: none">■ Volume flow■ Corrected volume flow
	<ul style="list-style-type: none">■ Density■ Reference density
	Temperature
	Totalizer The measurement channel number indicates which of the three totalizers is displayed.
	Status input

Measurement channel numbers

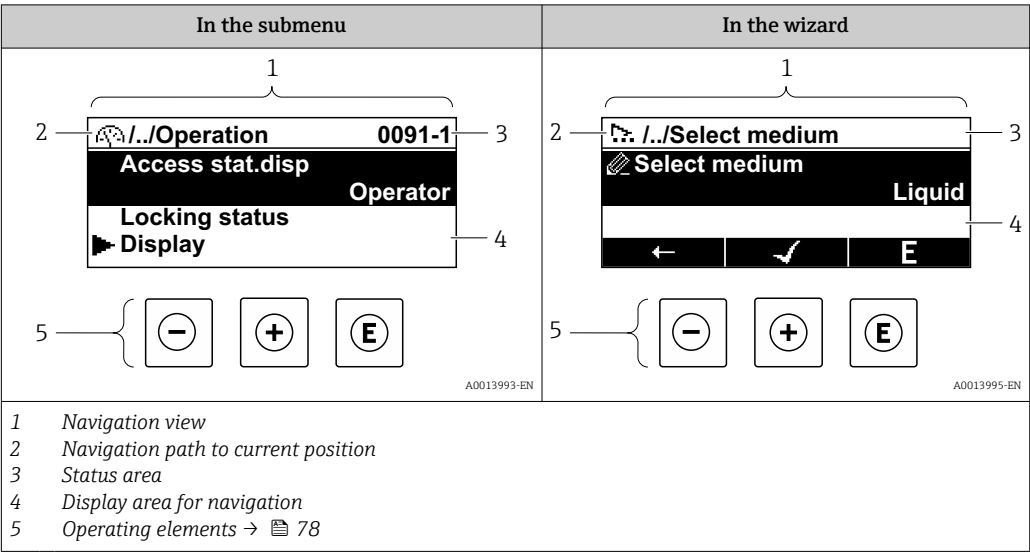
Symbol	Meaning
	Measurement channel 1 to 4
The measurement channel number is displayed only if more than one channel is present for the same measured variable type (e.g. totalizer 1 to 3).	

Diagnostic behavior

The diagnostic behavior pertains to a diagnostic event that is relevant to the displayed measured variable. For information on the symbols →  213

 The number and display format of the measured values can be configured via the **Format display** parameter (→  145).

8.3.2 Navigation view



Navigation path

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

	<div>■ In the submenu: Display symbol for menu</div> <div>■ In the wizard: Display symbol for wizard</div>	<div>Omission symbol for operating menu levels in between</div>	<div>Name of current</div> <div>■ Submenu</div> <div>■ Wizard</div> <div>■ Parameters</div>
	↓	↓	↓
Examples	<div></div>	<div>/ .. /</div>	<div>Display</div>
	<div></div>	<div>/ .. /</div>	<div>Display</div>

For more information about the icons in the menu, refer to the "Display area" section → 75





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
 - If a diagnostic event is present, the diagnostic behavior and status signal
- For information on the diagnostic behavior and status signal → 212
■ For information on the function and entry of the direct access code → 80

Display area


Menus

Symbol	Meaning
	Operation Appears: <ul style="list-style-type: none"> In the menu next to the "Operation" selection At the left in the navigation path in the Operation menu
	Setup Appears: <ul style="list-style-type: none"> In the menu next to the "Setup" selection At the left in the navigation path in the Setup menu
	Diagnostics Appears: <ul style="list-style-type: none"> In the menu next to the "Diagnostics" selection At the left in the navigation path in the Diagnostics menu
	Expert Appears: <ul style="list-style-type: none"> 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

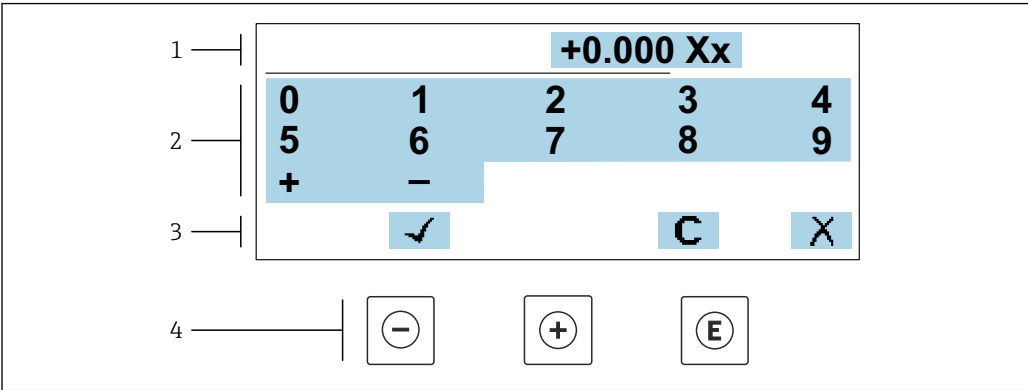
Symbol	Meaning
	Parameter locked When displayed in front of a parameter name, indicates that the parameter is locked. <ul style="list-style-type: none"> By a user-specific access code By the hardware write protection switch

Wizard operation

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

8.3.3 Editing view

Numeric editor

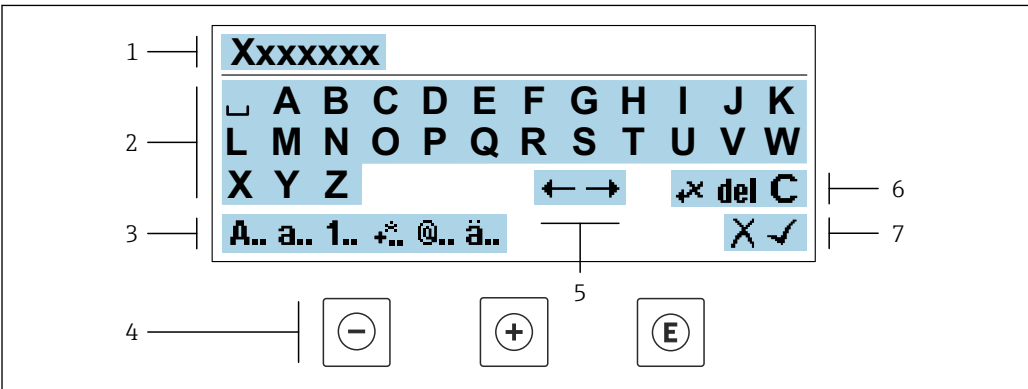


A0034250

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





A0034114

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





Key	Meaning
	Minus key Move the entry position to the left.
	Plus key Move the entry position to the right.

Key	Meaning
	Enter key <ul style="list-style-type: none"> Pressing the key briefly confirms the selection. Pressing the key for 2 s confirms your entry.
	Escape key combination (press keys simultaneously) Close the editing view without accepting a change.






Input screens

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

Controlling data entries

Symbol	Meaning
	Move entry position
	Reject entry
	Confirm entry
	Delete character immediately to the left of the entry position
del	Delete character immediately to the right of the entry position
C	Clear all the characters entered

8.3.4 Operating elements

Key	Meaning
	Minus key <i>In menu, submenu</i> Moves the selection bar upwards in a picklist. <i>With a wizard</i> Confirms the parameter value and goes to the previous parameter. <i>For text and numeric editor</i> Move the entry position to the left.
	Plus key <i>In menu, submenu</i> Moves the selection bar downwards in a picklist. <i>With a wizard</i> Confirms the parameter value and goes to the next parameter. <i>For text and numeric editor</i> Move the entry position to the right.
	Enter key <i>For operational display</i> Pressing the key briefly opens the operating menu. <i>In menu, submenu</i> <ul style="list-style-type: none"> Pressing the key briefly: <ul style="list-style-type: none"> Opens the selected menu, submenu or parameter. Starts the wizard. If help text is open, closes the help text of the parameter. Pressing the key for 2 s in a parameter: <ul style="list-style-type: none"> If present, opens the help text for the function of the parameter. <i>With a wizard</i> Opens the editing view of the parameter. <i>For text and numeric editor</i> <ul style="list-style-type: none"> Pressing the key briefly confirms the selection. Pressing the key for 2 s confirms your entry.
	Escape key combination (press keys simultaneously) <i>In menu, submenu</i> <ul style="list-style-type: none"> Pressing the key briefly: <ul style="list-style-type: none"> Exits the current menu level and takes you to the next level up. 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 level up. <i>For text and numeric editor</i> Closes the editing view without applying changes.
	Minus/Enter key combination (press and hold down the keys simultaneously) <ul style="list-style-type: none"> If the keypad lock is enabled: <ul style="list-style-type: none"> Pressing the key for 3 s disables the keypad lock. If the keypad lock is not enabled: <ul style="list-style-type: none"> Pressing the key for 3 s opens the context menu including the selection for activating the keypad lock.



8.3.5 Opening the context menu

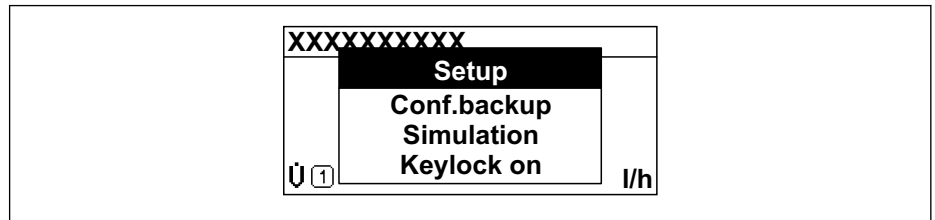
Using the context menu, the user can call up the following menus quickly and directly from the operational display:

- Setup
- Data backup
- Simulation



Calling up and closing the context menu

The user is in the operational display.



1. Press the  and  keys for longer than 3 seconds.
↳ The context menu opens.



A0034608-EN

2. Press  +  simultaneously.
↳ The context menu is closed and the operational display appears.

Calling up the menu via the context menu

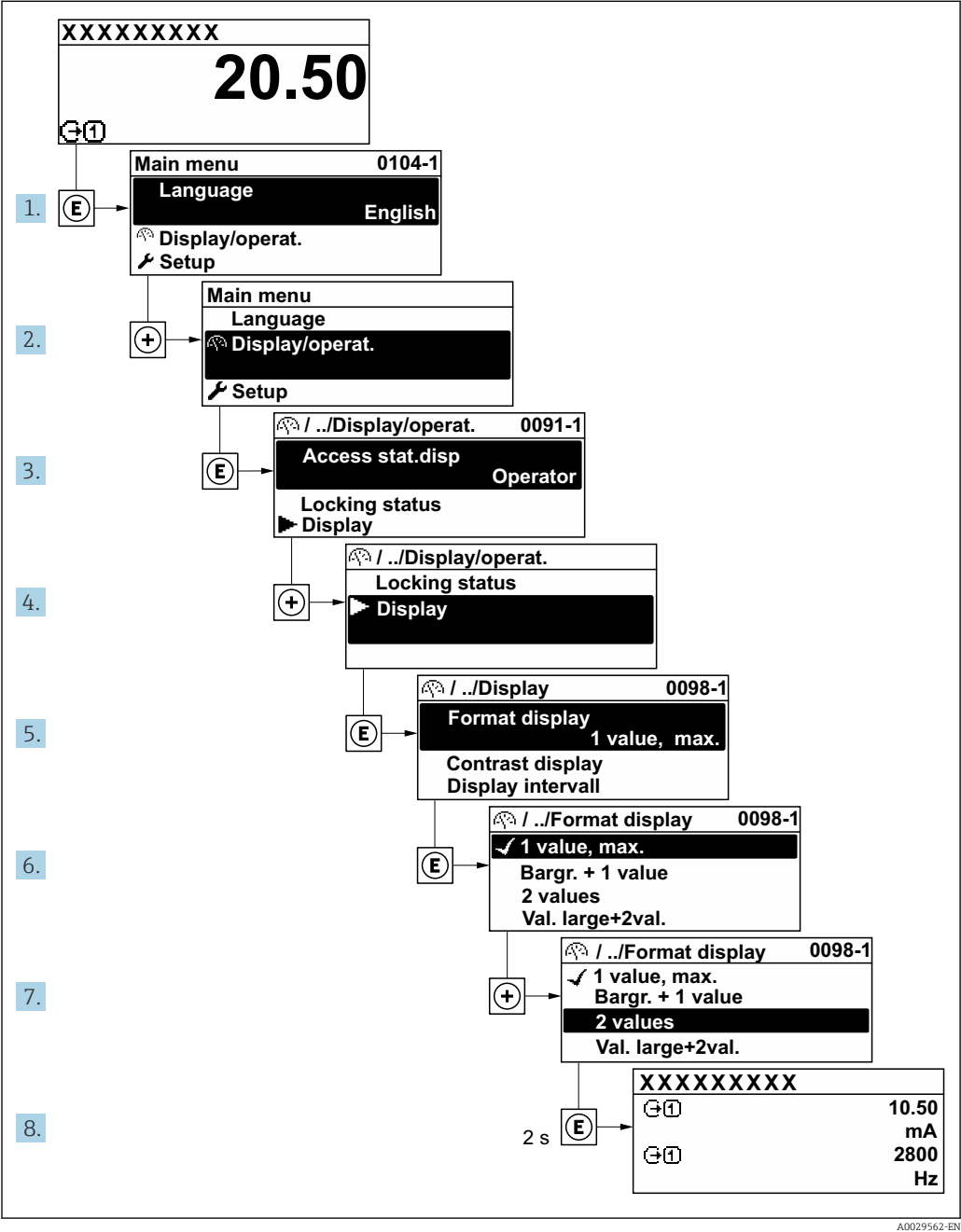
1. Open the context menu.
2. Press  to navigate to the desired menu.
3. Press  to confirm the selection.
↳ The selected menu opens.

8.3.6 Navigating and selecting from list

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

 For an explanation of the navigation view with symbols and operating elements
→  74

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



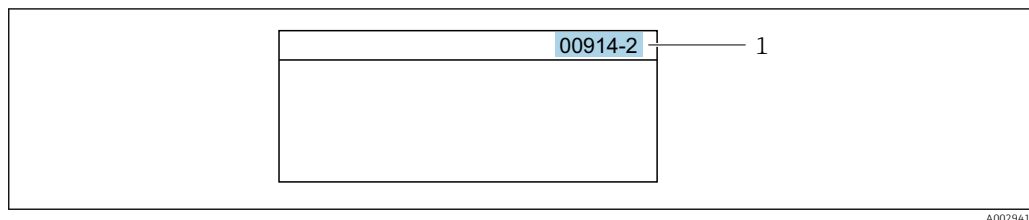
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8.3.7 Calling the parameter directly

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

Navigation path
Expert → Direct access

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



1 Direct access code

Note the following when entering the direct access code:

- The leading zeros in the direct access code do not have to be entered.
Example: Enter "914" instead of "00914"
- If no channel number is entered, channel 1 is opened automatically.
Example: Enter 00914 → **Assign process variable** parameter
- If a different channel is opened: Enter the direct access code with the corresponding channel number.
Example: Enter 00914-2 → **Assign process variable** parameter




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

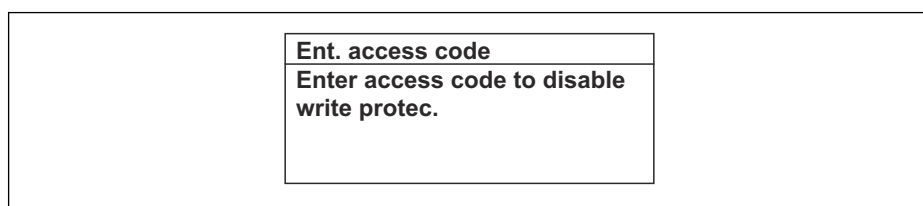
8.3.8 Calling up help text

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



Calling up and closing the help text

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

1. Press  for 2 s.
↳ The help text for the selected parameter opens.



32 Example: Help text for parameter "Enter access code"

2. Press  +  simultaneously.
↳ The help text is closed.

8.3.9 Changing the parameters

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

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

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




Ent. access code

Invalid or out of range input value


Min:0

Max:9999

A0014049-EN

 For a description of the editing view - consisting of the text editor and numeric editor - with symbols →  76, for a description of the operating elements →  78

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 →  178.

Defining access authorization for user roles

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

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

Access authorization to parameters: "Maintenance" user role


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

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



Access authorization to parameters: "Operator" user role


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


1) Despite the defined access code, certain parameters can always be modified and thus are excluded from the write protection, as they do not affect the measurement. 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 -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 →  178.

Parameter write protection via local operation can be disabled by entering the user-specific access code in the **Enter access code** parameter (→  152) via the respective access option.

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

2. Enter the access code.

- ↳ The -symbol in front of the parameters disappears; all previously write-protected parameters are now re-enabled.

8.3.12 Enabling and disabling the keypad lock

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

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



Switching on the keypad lock



The keypad lock is switched on automatically:

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



To activate the keylock manually:

1. The device is in the measured value display.
Press the  and  keys for 3 seconds.
 - ↳ A context menu appears.
2. In the context menu select the **Keylock on** option.
 - ↳ The keypad lock is switched on.



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

Switching off the keypad lock

- ▶ The keypad lock is switched on.
Press the  and  keys for 3 seconds.
 - ↳ The keypad lock is switched off.

8.4 Access to operating menu via Web browser

8.4.1 PROFINET with Ethernet-APL

Device use	<p>Device connection to an APL field switch</p> <p>The device may only be operated according to the following APL port classifications:</p> <ul style="list-style-type: none">■ If used in hazardous areas: SLAA or SLAC ¹⁾■ If used in non-hazardous areas: SLAX■ Connection values of APL field switch (for example corresponds to APL port classification SPCC or SPAA):■ Maximum input voltage: 15 V_{DC}■ Minimum output values: 0.54 W <p>Device connection to an SPE switch</p> <p>If used in non-hazardous areas: suitable SPE switch</p> <p>SPE switch prerequisite:</p> <ul style="list-style-type: none">■ Support of 10BASE-T1L standard■ Support of PoDL power class 10, 11 or 12■ Detection of SPE field devices without integrated PoDL module <p>Connection values of SPE switch:</p> <ul style="list-style-type: none">■ Maximum input voltage: 30 V_{DC}■ Minimum output values: 1.85 W
PROFINET	According to IEC 61158 and IEC 61784
Ethernet-APL	According to IEEE 802.3cg, APL port profile specification v1.0, galvanically isolated
Data transfer	10 Mbit/s
Current consumption	<p>Transmitter</p> <p>Max. 55.56 mA</p>
Permitted supply voltage	<ul style="list-style-type: none">■ Ex: 9 to 15 V■ Non-Ex: 9 to 32 V
Network connection	With integrated reverse polarity protection

1) For more information on using the device in the hazardous area, see the Ex-specific Safety Instructions


8.4.2 Prerequisites

Computer hardware



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

1) Recommended cable: CAT5e, CAT6 or CAT7, with shielded connector (e.g. brand YAMAICHI ; Part No Y-ConProfixPlug63 / Prod. ID: 82-006660)

Computer software



Software	Interface	
	CDI-RJ45	WLAN
Recommended operating systems	<ul style="list-style-type: none"> Microsoft Windows 8 or higher. Mobile operating systems: <ul style="list-style-type: none"> iOS Android  Microsoft Windows XP and Windows 7 is supported.	
Web browsers supported	<ul style="list-style-type: none"> 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 proxy server for LAN</i> must be disabled .	
JavaScript	JavaScript must be enabled.  If JavaScript cannot be enabled: Enter http://192.168.1.212/servlet/basic.html in the address bar of the web browser. A fully functional but simplified version of the operating menu structure starts in the web browser.  When installing a new firmware version: To enable correct data display, clear the temporary memory (cache) under Internet options in the web browser.	
Network connections	Only the active network connections to the measuring device should be used.	
	Switch off all other network connections such as WLAN.	Switch off all other network connections.

 In the event of connection problems: →  207

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 →  90

Measuring device: via WLAN interface

Device	WLAN interface
Measuring device	The measuring device has a WLAN antenna: <ul style="list-style-type: none"> Transmitter with integrated WLAN antenna Transmitter with external WLAN antenna
Web server	Web server and WLAN must be enabled; factory setting: ON  For information on enabling the Web server →  90

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 plug via the standard Ethernet cable .

Proline 500


1. Depending on the housing version:
Loosen the securing clamp or fixing screw of the housing cover.
2. Depending on the housing version:
Unscrew or open the housing cover.
3. Connect the computer to the RJ45 plug via the standard Ethernet 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)

The IP address can be assigned to the measuring device in a variety of ways:

- Software addressing:
The IP address is entered via the **IP address** parameter (→  116) .
- DIP switch for "Default IP address":
To establish the network connection via the service interface (CDI-RJ45): the fixed IP address 192.168.1.212 is used .

To establish a network connection via the service interface (CDI-RJ45): set the "Default IP address" DIP switch to **ON**. The measuring device then has the fixed IP address: 192.168.1.212. The fixed IP address 192.168.1.212 can now be used to establish the connection to the network.

1. Via DIP switch 2, activate the default IP address 192.168.1.212: .
2. Switch on the measuring device.
3. Connect the computer to the RJ45 plug via the standard Ethernet cable →  92.
4. 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.
5. Close any open Internet browsers.
6. Configure the properties of the Internet protocol (TCP/IP) as defined in the table:

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

Via WLAN interface

Configuring the Internet protocol of the mobile terminal

NOTICE

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

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

NOTICE

Note the following to avoid a network conflict:

- ▶ Avoid accessing the measuring device simultaneously from the same mobile terminal via the service interface (CDI-RJ45) and the WLAN interface.
- ▶ Only activate one service interface (CDI-RJ45 or WLAN interface).
- ▶ If simultaneous communication is necessary: configure different IP address ranges, e.g. 192.168.0.1 (WLAN interface) and 192.168.1.212 (CDI-RJ45 service interface).

Preparing the mobile terminal

- ▶ Enable WLAN on the mobile terminal.

Establishing a WLAN connection from the mobile terminal to the measuring device

1. In the WLAN settings of the mobile terminal:
Select the measuring device using the SSID (e.g. EH_Promass_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).
 - ↳ The LED on the display module flashes. It is now possible to operate the measuring device with the web browser, FieldCare or DeviceCare.



The serial number can be found on the nameplate.



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

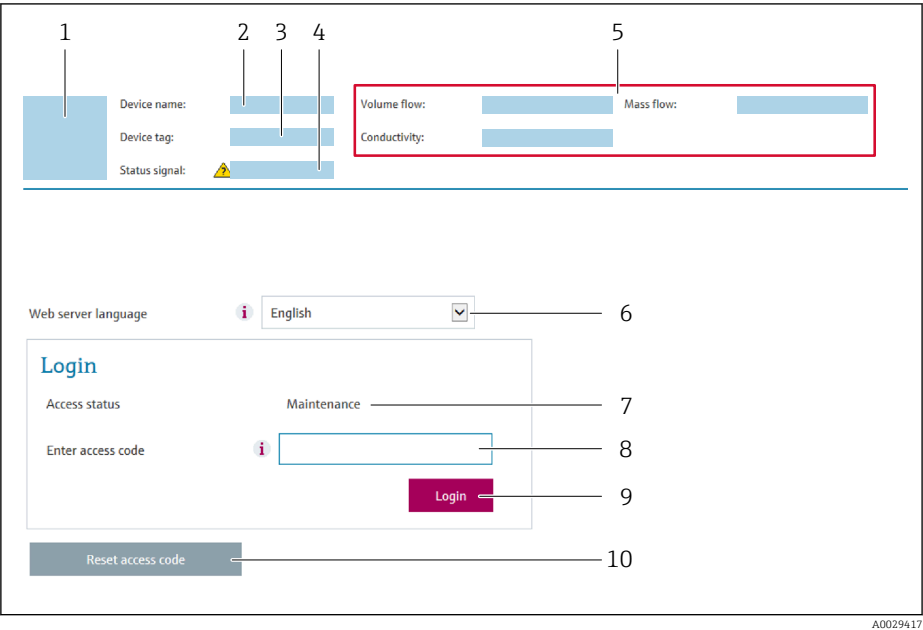
Terminating the WLAN connection

- ▶ After configuring the device:
Terminate the WLAN connection between the mobile terminal and measuring device.


Starting the Web browser

1. Start the Web browser on the computer.

2.
- Enter the IP address of the web server in the address line of the web browser:
192.168.1.212
- The login page appears.



- 1
- Picture of device
- 2
- Device name
- 3
- Device tag
- 4
- Status signal
- 5
- Current measured values
- 6
- Operating language
- 7
- User role
- 8
- Access code
- 9
- Login
- 10
- Reset access code (→ 173)




If a login page does not appear, or if the page is incomplete → 207

8.4.4 **Logging on**

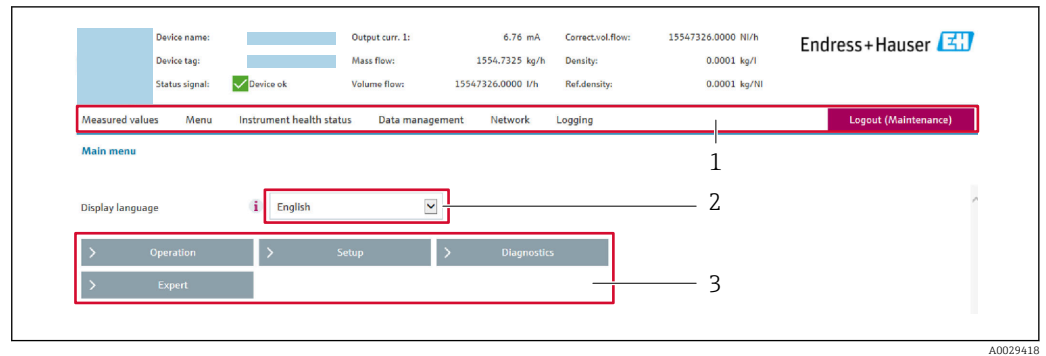
1.
- Select the preferred operating language for the Web browser.
2.
- Enter the user-specific access code.
3.
- Press **OK** to confirm your entry.

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



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

8.4.5 User interface



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- 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 → 215
- Current measured values

Function row

Functions	Meaning
Measured values	Displays the measured values of the device
Menu	<ul style="list-style-type: none"> ■ Access to the operating menu from the measuring device ■ The structure of the operating menu is the same as for the local display Detailed information on the structure of the operating menu: see the Description of Device Parameters
Device status	Displays the diagnostic messages currently pending, listed in order of priority
Data management	Data exchange between computer and measuring device: <ul style="list-style-type: none"> ■ Device configuration: <ul style="list-style-type: none"> ■ 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: <ul style="list-style-type: none"> ■ 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) ■ Firmware update - Flashing a firmware version
Network	Configuration and checking of all the parameters required for establishing the connection to the measuring device: <ul style="list-style-type: none"> ■ Network settings (e.g. IP address, MAC address) ■ Device information (e.g. serial number, firmware version)
Logout	End the operation and call up the login page

Navigation area

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

Working area

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

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

8.4.6 Disabling the Web server

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

Navigation

"Expert" menu → Communication → Web server

Parameter overview with brief description

Parameter	Description	Selection	Factory setting
Web server functionality	Switch the Web server on and off.	<ul style="list-style-type: none"> ■ Off ■ HTML Off ■ On 	On

Function scope of the "Web server functionality" parameter


Option	Description
Off	<ul style="list-style-type: none"> ■ The Web server is completely disabled. ■ Port 80 is locked.
HTML Off	The HTML version of the Web server is not available.
On	<ul style="list-style-type: none"> ■ The complete Web server functionality is available. ■ JavaScript is used. ■ The password is transferred in an encrypted state. ■ Any change to the password is also transferred in an encrypted state.

Enabling the Web server

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

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

8.4.7 Logging out

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

1. Select the **Logout** entry in the function row.
 - ↳ The home page with the Login box appears.
2. Close the Web browser.

3. If no longer needed:

Reset the modified properties of the Internet protocol (TCP/IP) → 86.



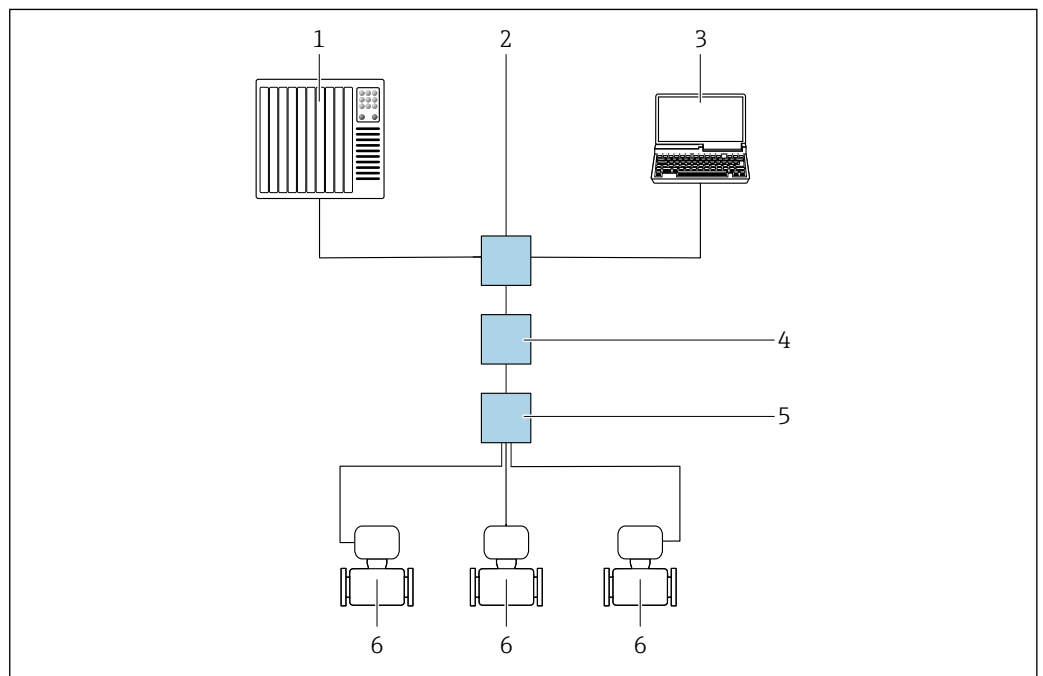
If communication with the web server was established via the default IP address 192.168.1.212, DIP switch no. 10 must be reset (from **ON** → **OFF**). Afterwards, the IP address of the device is active again for network communication.

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 APL network



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33 Options for remote operation via APL network

- 1 Automation system, e.g. Simatic S7 (Siemens)
- 2 Ethernet switch, e.g. Scalance X204 (Siemens)
- 3 Computer with Web browser (e.g. Internet Explorer) for access to integrated Web server or computer with operating tool (e.g. FieldCare, DeviceCare with PROFINET COM DTM or SIMATIC PDM with FDI-Package)
- 4 APL power switch (optional)
- 5 APL field switch
- 6 Measuring device

Service interface

Via service interface (CDI-RJ45)

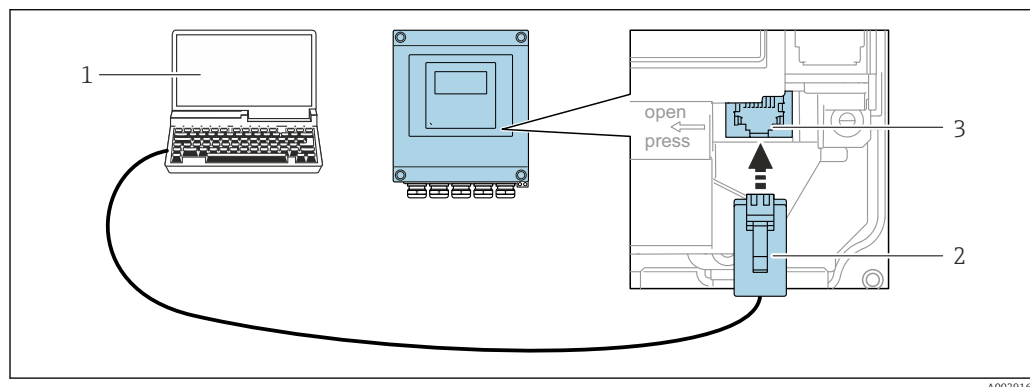
A point-to-point connection can be established via onsite device configuration. With the housing open, the connection is established directly via the service interface (CDI-RJ45) of the device.

 An adapter for the RJ45 to the M12 plug is optionally available for the non-hazardous area:


Order code for "Accessories", option **NB**: "Adapter RJ45 M12 (service interface)"

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

Proline 500 – digital transmitter

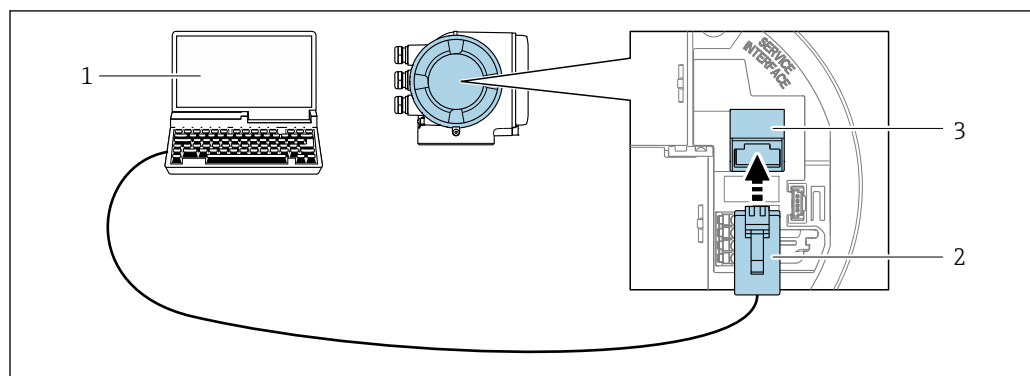


A0029163


 34 Connection via service interface (CDI-RJ45)

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

Proline 500 transmitter



A0027563

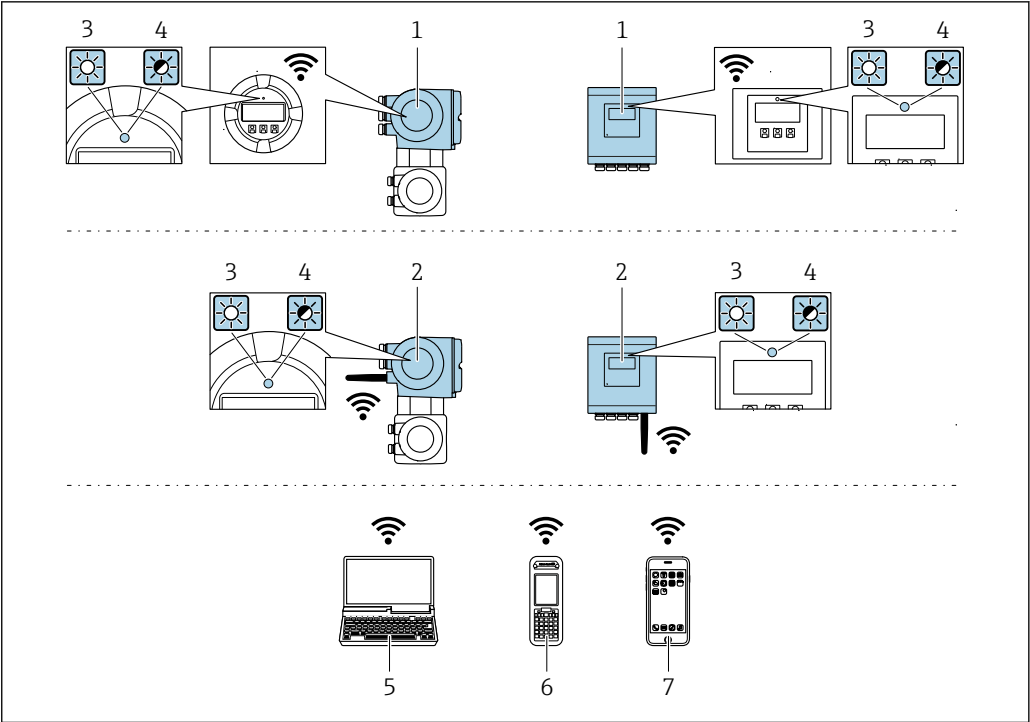
 35 Connection via service interface (CDI-RJ45)

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

Via WLAN interface


The optional WLAN interface is available on the following device version:

Order code for "Display; operation", option G "4-line, illuminated; touch control + WLAN"



A0034569

- 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	<ul style="list-style-type: none">Internal antennaExternal antenna (optional) In the event of poor transmission/reception conditions at the place of installation.  Only 1 antenna is active at any one time!
Range	<ul style="list-style-type: none">Internal antenna: typically 10 m (32 ft)External antenna: typically 50 m (164 ft)
Materials (external antenna)	<ul style="list-style-type: none">Antenna: ASA plastic (acrylonitrile styrene acrylate) and nickel-plated brassAdapter: Stainless steel and nickel-plated brassCable: PolyethylenePlug: Nickel-plated brassAngle bracket: Stainless steel

Configuring the Internet protocol of the mobile terminal

NOTICE

If the WLAN connection is lost during the configuration, settings made may be lost.
► Make sure that the WLAN connection is not disconnected while configuring the device.

NOTICE**Note the following to avoid a network conflict:**

- ▶ Avoid accessing the measuring device simultaneously from the same mobile terminal via the service interface (CDI-RJ45) and the WLAN interface.
- ▶ Only activate one service interface (CDI-RJ45 or WLAN interface).
- ▶ If simultaneous communication is necessary: configure different IP address ranges, e.g. 192.168.0.1 (WLAN interface) and 192.168.1.212 (CDI-RJ45 service interface).

Preparing the mobile terminal

- ▶ Enable WLAN on the mobile terminal.

Establishing a WLAN connection from the mobile terminal to the measuring device

1. In the WLAN settings of the mobile terminal:
Select the measuring device using the SSID (e.g. EH_Promass_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).
 - ↳ The LED on the display module flashes. It is now possible to operate the measuring device with the web browser, FieldCare or DeviceCare.



The serial number can be found on the nameplate.



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

Terminating the WLAN connection

- ▶ After configuring the device:
Terminate the WLAN connection between the mobile terminal and measuring device.

8.5.2 FieldCare

Function scope

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

Access is via:

- CDI-RJ45 service interface → 92
- WLAN interface → 92

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 → 97

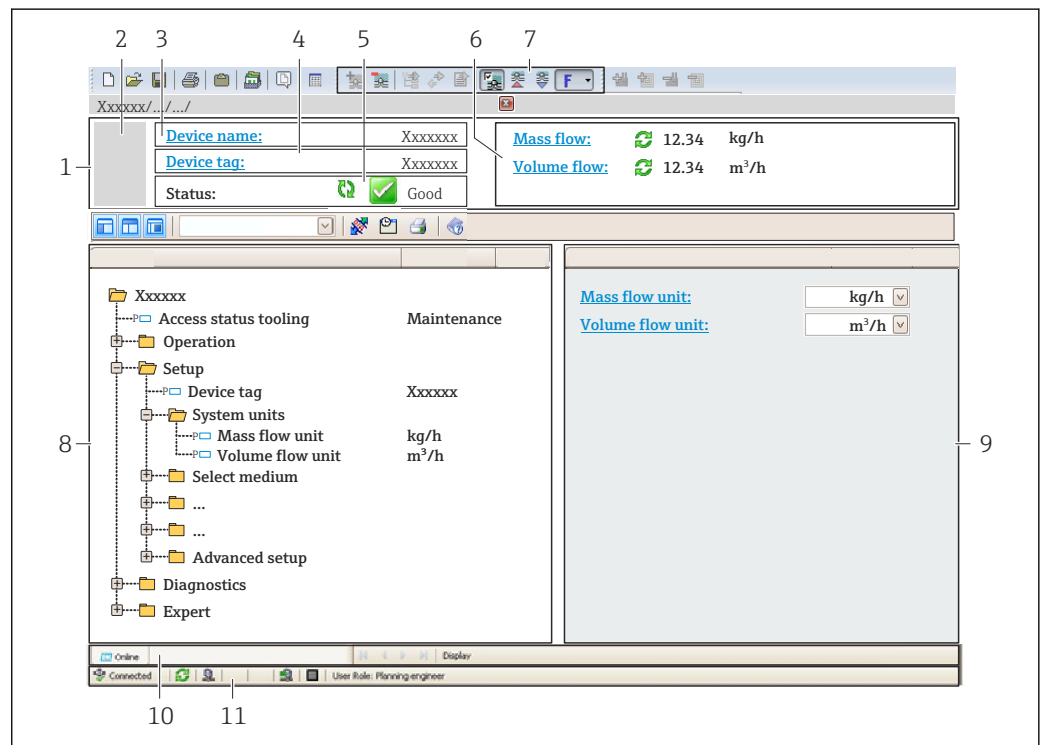
Establishing a connection

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.



For additional information, see Operating Instructions BA00027S and BA00059S

User interface



A0021051-EN

- 1 Header
- 2 Picture of device
- 3 Device name
- 4 Tag name
- 5 Status area with status signal → 215
- 6 Display area for current measured values
- 7 Edit toolbar with additional functions such as save/load, 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 →  97

8.5.4 SIMATIC PDM

Function scope

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

Source for device description files

See information →  97

9 System integration

9.1 Overview of device description files

9.1.1 Current version data for the device

Firmware version	01.00.zz	<ul style="list-style-type: none"> On the title page of the Operating Instructions On the transmitter nameplate Firmware version Diagnostics → Device information → Firmware version
Manufacturer	17	Manufacturer Expert → Communication → Physical block → Manufacturer
Device ID	0xA43B	–
Device type ID	Promass 500	Device type Expert → Communication → Physical block → Device type
Device revision	1	–
PROFINET with Ethernet-APL version	2.43	Version of the PROFINET specification



For an overview of the various firmware versions for the device → 290

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.

FieldCare	<ul style="list-style-type: none"> www.endress.com → Download Area USB stick (contact Endress+Hauser) DVD (contact Endress+Hauser)
DeviceCare	<ul style="list-style-type: none"> 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, PROFINET needs a description of the device parameters, such as output data, input data, data format and data volume.

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

The device master file (GSD) is in XML format, and the file is created in the GSDML description markup language.

With the PA Profile 4.02 device master file (GSD) it is possible to exchange field devices made by different manufacturers without having to reconfigure.

The use of two different device master files (GSDs) is possible: the manufacturer-specific GSD and the PA-Profile GSD.

9.2.1 File name of the manufacturer-specific device master file (GSD)

Example of the name of a device master file:

GSDML-V2.43-EH-PROMASS_300_500_APL_yyyymmdd.xml

GSDML	Description language
V2.43	Version of the PROFINET specification
EH	Endress+Hauser
PROMASS	Instrument family
300_500_APL	Transmitter
yyyymmdd	Date of issue (yyyy: year, mm: month, dd: day)
.xml	File name extension (XML file)

9.2.2 File name of the PA Profile device master file (GSD)

Example of the name of a PA Profile device master file:

GSDML-V2.43-PA_Profile_V4.02-B333-FLOW_CORIOLIS-yyyymmdd.xml

GSDML	Description language
V2.43	Version of the PROFINET specification
PA_Profile_V4.02	Version of the PA Profile specification
B333	PA Profile device identification
FLOW	Product family
CORIOLIS	Flow measuring principle
yyyymmdd	Date of issue (yyyy: year, mm: month, dd: day)
.xml	File name extension (XML file)

API	Supported modules	Input and output variables
0x9700	Analog input	Mass flow
	Analog input	Density
	Analog input	Temperature
	Totalizer	Totalizer value: mass/mass Totalizer control

Source for device master files (GSD):

Manufacturer-specific GSD:	www.endress.com → Download Area
PA Profile GSD:	https://www.profibus.com/products/gsd-files/gsd-library-profile-for-process-control-devices-version-40 → Download Area

9.3 Cyclic data transmission

9.3.1 Overview of the modules

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

API	Measuring device		Sub-slot	Direction Data flow	Control system
	Modules	Slot			
0x9700	Analog Input 1 (Mass flow)	1	1	→	PROFINET
	Analog Input 2 (Density)	2	1	→	
	Analog Input 3 (Temperature)	3	1	→	
	Analog Input 4	20	1	→	
	Analog Input 5	21	1	→	
	Analog Input 6	22	1	→	
	Analog Input 7	23	1	→	
	Analog Input 8	24	1	→	
	Analog Input 9	25	1	→	
	Analog Input 10	26	1	→	
	Analog Input 11	27	1	→	
	Analog Input 12	28	1	→	
	Analog Input 13	29	1	→	
	Analog Input 14	30	1	→	
	Analog Input 15	31	1	→	
	Analog Input 16	32	1	→	
	Totalizer 1 (Mass)	4	1	→ ←	
	Totalizer 2	70	1	→ →	
	Totalizer 3	71	1	→ ←	
	Binary Input 1 (Heartbeat)	80	1	→	
	Binary Input 2	81	1	→	
	Analog Output 1 (Pressure)	160	1	←	
	Analog Output 2 (Temperature)	161	1	←	
	Analog Output 3 (Ref. density)	162	1	←	
	Analog Output 4 (% Sediment and water)	163	1	←	
	Analog Output 5 (Water cut percentage)	164	1	←	
	Analog Output 6 (Appl. Spec. out 0)	165	1	←	
	Analog Output 7 (Appl. Spec. out 1)	166	1	←	
	Binary Output 1 (Heartbeat)	210	1	→	
	Binary Output 2	211	1	←	
	Enumerated Output	240	1	←	

9.3.2 Description of the modules

The data structure is described from the perspective of the automation system:

- Input data: Are sent from the measuring device to the automation system.
- Output data: Are sent from the automation system to the measuring device.

Analog Input module

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

Analog Input modules cyclically transmit the selected input variables, including the status, from the measuring device to the automation system. 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.


Selection: input variable

Slot	Sub-slot	Input variables
1	1	Mass flow
2	1	Density

Slot	Sub-slot	Input variables
3	1	Temperature
20 to 32	1	<ul style="list-style-type: none"> ■ Mass flow ■ Volume flow ■ Corrected volume flow ■ Density ■ Reference density ■ Temperature ■ Electronics temperature ■ Oscillation frequency ■ Frequency fluctuation ■ Oscillation damping ■ Tube damping fluctuation ■ Signal asymmetry ■ Exciter current ■ Application-specific output 0 ■ Application-specific output 1 ■ Index inhomogeneous medium ■ Index suspended bubbles ■ Index sensor asymmetry ■ Current output 1 ■ Current output 2 ■ Current output 3 <p>Additional input variables with the Heartbeat Verification application package</p> <ul style="list-style-type: none"> ■ Carrier pipe temperature ■ Oscillation damping 1 ■ Oscillation frequency 1 ■ Oscillation amplitude 0 ■ Oscillation amplitude 1 ■ Frequency fluctuation 1 ■ Tube damping fluctuation 1 ■ Exciter current 1 ■ HBSI <p>Additional input variables with the Concentration Measurement application package</p> <ul style="list-style-type: none"> ■ Concentration ■ Target mass flow ■ Carrier mass flow ■ Target volume flow ■ Carrier volume flow ■ Target corrected volume flow ■ Carrier corrected volume flow <p>Additional input variables with the Petroleum application package</p> <ul style="list-style-type: none"> ■ Alternative reference density ■ GSV flow ■ Alternative GSV flow ■ NSV flow ■ Alternative NSV flow ■ S&W volume flow ■ Water cut % ■ Oil density ■ Water density ■ Oil mass flow ■ Water mass flow ■ Oil volume flow ■ Water volume flow ■ Oil corrected volume flow ■ Water corrected volume flow

*Data structure**Output data of Analog Output*

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

1) Status coding →  109

Application-specific Input module

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

The Application-specific Input module cyclically transmits compensation values, including the status, from the measuring device to the automation system. 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.


Assigned compensation values

The configuration is performed via: Expert → Application → Application specific calculations → Process variables

Slot	Compensation value
20...32	Application-specific Input module 0
20...32	Application-specific Input module 1

*Data structure**Input data of Application-specific Input module*

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

1) Status coding →  109

Binary Input module

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

Binary input variables are used by the measuring device to transmit the state of device functions to the automation system.

Binary Input modules cyclically transmit discrete input variables, including the status, from the measuring device to the automation system. The discrete input variable is depicted in the first byte. The second byte contains standardized status information pertaining to the input variable.

Selection: Device function Binary Input Slot 80

Slot	Sub-slot	Bit	Device function	Status (meaning)
80	1	0	Verification has not been performed.	<ul style="list-style-type: none"> ■ 0 (device function not active) ■ 1 (device function active)
		1	Verification has failed.	
		2	Currently performing verification.	
		3	Verification completed.	
		4	Verification has failed.	

Slot	Sub-slot	Bit	Device function	Status (meaning)
		5	Verification performed successfully.	
		6	Verification has not been performed.	
		7	Reserved	

Selection: Device function Binary Input Slot 81

Slot	Sub-slot	Bit	Device function	Status (meaning)
81	1	0	Partially empty pipe detection	<ul style="list-style-type: none"> ■ 0 (device function not active) ■ 1 (device function active)
		1	Low flow cut off	
		2	Reserved	
		3	Reserved	
		4	Reserved	
		5	Reserved	
		6	Reserved	
		7	Reserved	

Data structure

Input data of Binary Input

Byte 1	Byte 2
Binary Input	Status ¹⁾

1) Status coding → 109

Mass module

Transmit mass counter value from the measuring device to the automation system.

The Mass module cyclically transmits the mass, including the status, from the measuring device to the automation system. 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 input variable.

Selection: input variable

Slot	Sub-slot	Input variables
4	1	Mass

Data structure

Volume input data

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

1) Status coding → 109

Mass Totalizer Control module

Transmit totalizer value from the measuring device to the automation system.

The Mass Totalizer Control module cyclically transmits a selected totalizer value, including the status, from the measuring device to the automation system. 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 input variable.

Selection: *input variable*

Slot	Sub-slot	Input variable
4	1	Mass

Data structure

Mass Totalizer Control input data

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

1) Status coding → 109

Selection: *output variable*

Transmit the control value from the automation system to the measuring device.

Slot	Sub-slot	Value	Input variable
70...71	1	1	Reset to "0"
		2	Preset value
		3	Stop
		4	Totalize

Data structure

Mass Totalizer Control output data

Byte 1
Control variable

Totalizer module

Transmit totalizer value from the measuring device to the automation system.

The Totalizer module cyclically transmits a selected totalizer value, including the status, from the measuring device to the automation system. 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 input variable.

Selection: input variable


Slot	Sub-slot	Input variable
70 to 71	1	<ul style="list-style-type: none"> ■ Mass flow ■ Volume flow ■ Corrected volume flow ■ Target mass flow ¹⁾ ■ Carrier mass flow ■ Target volume flow ■ Carrier volume flow ■ Target corrected volume flow ■ Carrier corrected volume flow ■ GSV flow ²⁾ ■ Alternative GSV flow ²⁾ ■ NSV flow ²⁾ ■ Alternative NSV flow ²⁾ ■ S&W volume flow ²⁾ ■ Oil mass flow ²⁾ ■ Water mass flow ²⁾ ■ Oil volume flow ²⁾ ■ Water volume flow ²⁾ ■ Oil corrected volume flow ²⁾ ■ Raw value mass flow ²⁾

1) Only available with the Concentration application package

2) Only available with the Petroleum application package

*Data structure**Totalizer input data*

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

1) Status coding →  109

Totalizer Control module

Transmit totalizer value from the measuring device to the automation system.

The Totalizer Control module cyclically transmits a selected totalizer value, including the status, from the measuring device to the automation system. 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 input variable.

Selection: input variable

Slot	Sub-slot	Input variable
70 to 71	1	<ul style="list-style-type: none"> ■ Mass flow ■ Volume flow ■ Corrected volume flow ■ Target mass flow ¹⁾ ■ Carrier mass flow ■ Target volume flow ■ Carrier volume flow ■ Target corrected volume flow ■ Carrier corrected volume flow ■ GSV flow ²⁾ ■ Alternative GSD flow ²⁾ ■ NSV flow ²⁾ ■ Alternative NSV flow ²⁾ ■ S&W volume flow ²⁾ ■ Oil mass flow ²⁾ ■ Water mass flow ²⁾ ■ Oil volume flow ²⁾ ■ Water volume flow ²⁾ ■ Oil corrected volume flow ²⁾ ■ Raw value mass flow ²⁾

1) Only available with the Concentration application package

2) Only available with the Petroleum application package

*Data structure**Totalizer Control input data*

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

1) Status coding → 109

Selection: output variable

Transmit the control value from the automation system to the measuring device.

Slot	Sub-slot	Value	Input variable
70 to 71	1	1	Reset to "0"
		2	Preset value
		3	Stop
		4	Totalize

*Data structure**Totalizer Control output data*

Byte 1
Control variable

Analog Output module

Transmit a compensation value from the automation system to the measuring device.

Analog Output modules cyclically transmit compensation values, including the status and associated unit, from the automation system to the measuring device. 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.

Assigned compensation values



The selection is made via: Expert → Sensor → External compensation

Slot	Sub-slot	Compensation value
160	1	Pressure
161		Temperature
162		Reference density
163		External value for % S&W (sediment and water) ¹⁾
164		External value for % Water cut ¹⁾
165		Appl. Spec. Outp. 0
166		Appl. Spec. Outp. 1

1) Only available with the Petroleum application package.

Data structure

Output data of Analog Output

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

1) Status coding → 109

Failsafe mode

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

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

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

Fail safe type parameter

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

Fail safe value parameter

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

Binary Output module

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

Binary output values are used by the automation system to enable and disable device functions.

Binary output values cyclically transmit discrete output values, including the status, from the automation system to the measuring device. The discrete output values are transmitted in the first byte. The second byte contains standardised status information pertaining to the output value.

Selection: Device function Binary Output Slot 210

Slot	Sub-slot	Bit	Device function	Status (meaning)
210	1	0	Start verification.	A change of status from 0 to 1 starts Heartbeat Verification ¹⁾
		1	Reserved	
		2	Reserved	
		3	Reserved	
		4	Reserved	
		5	Reserved	
		6	Reserved	
		7	Reserved	

1) Only available with the Heartbeat application package

Selection: Device function Binary Output Slot 211

Slot	Sub-slot	Bit	Device function	Status (meaning)
211	1	0	Flow override	▪ 0 (disable device function) ▪ 1 (enable device function)
		1	Zero adjust	
		2	Relay output	Relay output value: ▪ 0 ▪ 1
		3	Relay output	
		4	Relay output	
		5	Reserved	
		6	Reserved	
		7	Reserved	


Data structure

Binary Output input data

Byte 1	Byte 2
Binary Output	Status ^{1) 2)}

- 1) Status coding → ⓘ 109
2) If the status is BAD, the control variable is not adopted.

Concentration module

 Only available with the Concentration Measurement application package.

Assigned device functions

Slot	Input variables
240	Selection of the liquid type

*Data structure**Concentration output data*

Byte 1
Control variable

Liquid type	Enum code
Off	0
Sucrose in water	5
Glucose in water	2
Fructose in water	1
Invert sugar in water	6
Corn syrup HFCS42	15
Corn syrup HFCS55	16
Corn syrup HFCS90	17
Original wort	18
Ethanol in water	11
Methanol in water	12
Hydrogen peroxide in water	4
Hydrochloric acid	24
Sulfuric acid	25
Nitric acid	7
Phosphoric acid	8
Sodium hydroxide	10
Potassium hydroxide	9
Ammonium nitrate in water	13
Iron(III) chloride in water	14
% mass / % volume	19
User Profile Coef Set No. 1	21
User Profile Coef Set No. 2	22
User Profile Coef Set No. 3	23

9.3.3 Status coding

Status	Coding (hex)	Meaning
BAD - Maintenance alarm	0x24 to 0x27	A measured value is not available because a device error has occurred.
BAD - Process related	0x28 to 0x2B	A measured value is not available because the process conditions are not within the device's technical specification limits.
BAD - Function check	0x3C to 0x03F	A function check is active (e.g. cleaning or calibration)
UNCERTAIN - Initial value	0x4F to 0x4F	A predefined value is output until a correct measured value is available again or corrective measures have been performed that change this status.

Status	Coding (hex)	Meaning
UNCERTAIN - Maintenance demanded	0x68 to 0x6B	Signs of wear and tear have been detected on the measuring device. Short-term maintenance is needed to ensure that the measuring device remains operational. The measured value might be invalid. The use of the measured value depends on the application.
UNCERTAIN - Process related	0x78 to 0x7B	The process conditions are not within the device's technical specification limits. This could have a negative impact on the quality and accuracy of the measured value. The use of the measured value depends on the application.
GOOD - OK	0x80 to 0x83	No error has been diagnosed.
GOOD - Maintenance required	0xA4 to 0xA7	The measured value is valid. The device will require servicing in the near future.
GOOD - Maintenance demanded	0xA8 to 0xAB	The measured value is valid. It is highly advisable to service the device in the near future.
GOOD - Function check	0xBC to 0xBF	The measured value is valid. The measuring device is performing an internal function check. The function check does not have any noticeable effect on the process.

9.3.4 Factory setting

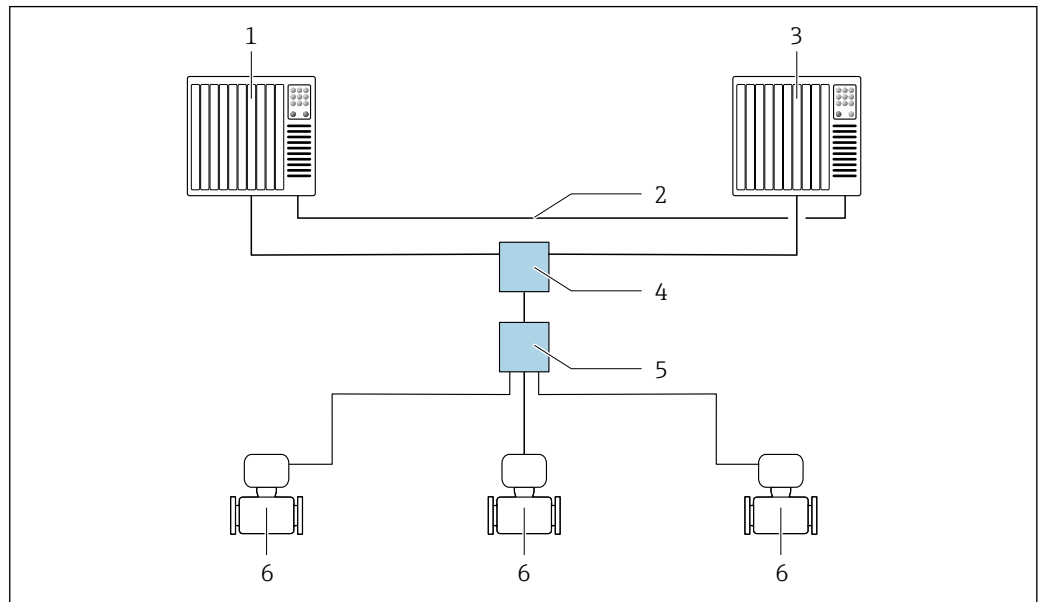
The slots are already assigned in the automation system for initial commissioning.

Assigned slots

Slot	Factory setting
1	Mass flow
2	Density
3	Temperature
4	Mass
20 to 32	–
70 to 71	–
80 to 81	–
160 to 166	–
210 to 211	–
240	–

9.4 System redundancy S2

A redundant layout with two automation systems is necessary for processes that are in continuous operation. If one system fails the second system guarantees continued, uninterrupted operation. The measuring device supports S2 system redundancy and can communicate with both automation systems simultaneously.



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36 Example of the layout of a redundant system (S2): star topology

- 1 Automation system 1
- 2 Synchronization of automation systems
- 3 Automation system 2
- 4 Industrial Ethernet Managed Switch
- 5 APL field switch
- 6 Measuring device



All the devices in the network must support S2 system redundancy.

10 Commissioning

10.1 Post-installation and post-connection check

Before commissioning the device:

- ▶ Make sure that the post-installation and post-connection checks have been performed successfully.
- "Post-installation check" checklist → 34
- "Post-connection check" checklist → 68

10.2 Switching on the measuring device

- ▶ After a successful post-installation and post-connection check, switch on the device.
 - ↳ After a successful startup, the local display switches automatically from the startup display to the operational display.

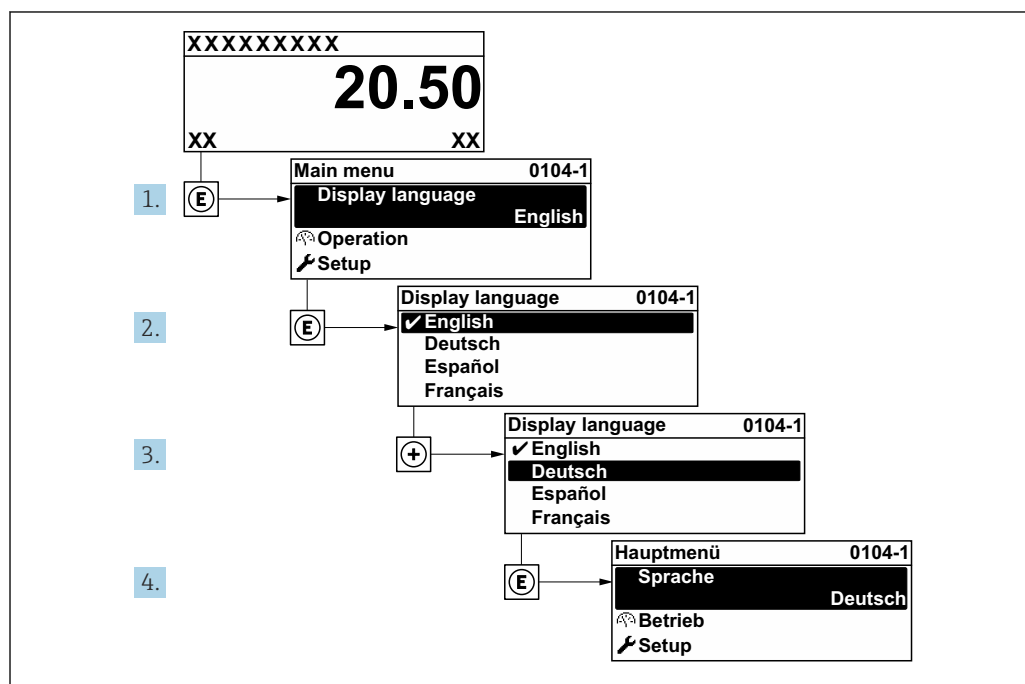
If the local display is blank or if a diagnostic message is displayed, refer to the section on "Diagnostics and troubleshooting" → 206.

10.3 Connecting via FieldCare

- For FieldCare → 92 connection
- For connecting via FieldCare → 95
- For the FieldCare → 95 user interface

10.4 Setting the operating language

Factory setting: English or ordered local language

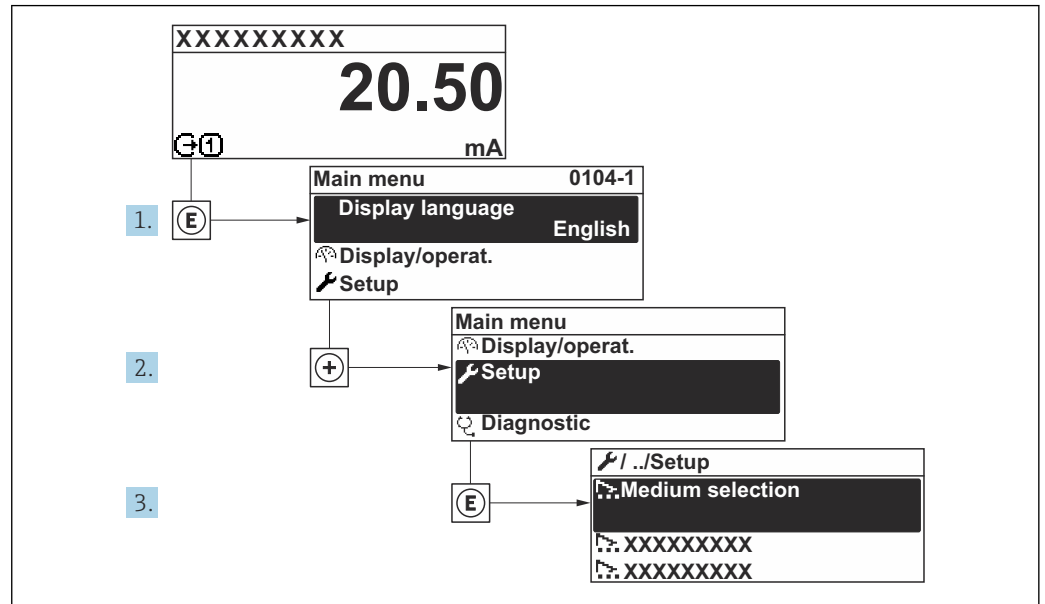


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37 Taking the example of the local display

10.5 Configuring the measuring device

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



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38 Taking the example of the local display

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

Setup		
PROFINET device name	→	114
► Communication	→	114
► System units	→	116
► Medium selection	→	119
► Analog inputs	→	121
► I/O configuration	→	124
► Current input 1 to n	→	125
► Status input 1 to n	→	126
► Current output 1 to n	→	127

► Pulse/frequency/switch output 1 to n	→ ⓘ 131
► Relay output 1 to n	→ ⓘ 140
► Display	→ ⓘ 143
► Low flow cut off	→ ⓘ 149
► Partially filled pipe detection	→ ⓘ 150
► Advanced setup	→ ⓘ 151

10.5.1 Defining the tag name

A measuring point can be quickly identified within a plant on the basis of the tag name. The tag name is equivalent to the device name (name of station) of the PROFINET specification (data length: 255 bytes)

The device name can be changed via DIP switches or the automation system .

The device name currently used is displayed in the **Name of station** parameter.

Navigation
"Setup" menu → PROFINET device name

Parameter overview with brief description

Parameter	Description	User interface	Factory setting
PROFINET device name	Name of the measuring point.	Max. 32 characters such as letters and numbers.	EH-PROMASS500 serial number of the device

10.5.2 Displaying the communication interface

The **Communication** submenu shows all the current parameter settings for selecting and configuring the communication interface.

Navigation
"Setup" menu → Communication

► Communication	
► APL port	→ ⓘ 115
► Service interface	→ ⓘ 115
► Network diagnostics	→ ⓘ 116

"APL port" submenu

Navigation

"Setup" menu → Communication → APL port

▶ APL port

IP address (7263)

Subnet mask (7265)

Default gateway (7264)

MAC address (7262)

→ 115

→ 115

→ 115

→ 115

Parameter overview with brief description

Parameter	Description	User entry / User interface	Factory setting
IP address	Enter the IP address of the measuring device.	Character string comprising numbers, letters and special characters (15)	0.0.0.0
Default gateway	Enter IP address for the default gateway of the measuring device.	Character string comprising numbers, letters and special characters (15)	0.0.0.0
Subnet mask	Enter subnet mask of the measuring device.	Character string comprising numbers, letters and special characters (15)	255.255.255.0
MAC address	Shows the MAC address of the measuring device.	Character string comprising numbers, letters and special characters	

"Service interface" submenu

Navigation

"Setup" menu → Communication → Service interface

▶ Service interface

IP address (7209)

Subnet mask (7211)

Default gateway (7210)

MAC address (7214)


→ 116

→ 116

→ 116

→ 116




Parameter overview with brief description

Parameter	Description	User entry / User interface	Factory setting
IP address	Enter the IP address of the measuring device.	4 octet: 0 to 255 (in the particular octet)	192.168.1.212
Subnet mask	Displays the subnet mask.	4 octet: 0 to 255 (in the particular octet)	255.255.255.0
Default gateway	Displays the default gateway.	4 octet: 0 to 255 (in the particular octet)	0.0.0.0
MAC address	Displays the MAC address of the measuring device.  MAC = Media Access Control	Unique 12-digit character string comprising letters and numbers, e.g.: 00:07:05:10:01:5F	Each measuring device is given an individual address.

"Network diagnostics" submenu

Navigation

"Setup" menu → Communication → Network diagnostics


 Network diagnostics	
Mean squared error (7258)	→  116
Number of failed received packets (7257)	→  116

Parameter overview with brief description

Parameter	Description	User interface	Factory setting
Mean squared error	Provides an indication of the link signal quality.	Signed floating-point number	0 dB
Number of failed received packets	Shows the number of failed received packets.	0 to 65 535	0




10.5.3 Setting the system units










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

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


Navigation



"Setup" menu → System units

 System units	
Mass flow unit	→  117
Mass unit	→  117

Volume flow unit	→  117
Volume unit	→  117
Corrected volume flow unit	→  117
Corrected volume unit	→  117
Density unit	→  117
Reference density unit	→  118
Density 2 unit	→  118
Temperature unit	→  118
Pressure unit	→  118

Parameter overview with brief description

Parameter	Description	Selection	Factory setting
Mass flow unit	Select mass flow unit. <i>Effect</i> The selected unit applies for: <ul style="list-style-type: none"> Output Low flow cut off Simulation process variable 	Unit choose list	Country-specific: <ul style="list-style-type: none"> kg/h lb/min
Mass unit	Select mass unit.	Unit choose list	Country-specific: <ul style="list-style-type: none"> kg lb
Volume flow unit	Select volume flow unit. <i>Effect</i> The selected unit applies for: <ul style="list-style-type: none"> Output Low flow cut off Simulation process variable 	Unit choose list	Depends on country: <ul style="list-style-type: none"> l/h gal/min (us)
Volume unit	Select volume unit.	Unit choose list	Country-specific: <ul style="list-style-type: none"> l (DN > 150 (6"): m³ option) gal (us)
Corrected volume flow unit	Select corrected volume flow unit. <i>Result</i> The selected unit applies for: Corrected volume flow parameter (→  185)	Unit choose list	Country-specific: <ul style="list-style-type: none"> NI/h Sft³/min
Corrected volume unit	Select corrected volume unit.	Unit choose list	Country-specific: <ul style="list-style-type: none"> NI Sft³
Density unit	Select density unit. <i>Effect</i> The selected unit applies for: <ul style="list-style-type: none"> Output Simulation process variable Density adjustment (Expert menu) 	Unit choose list	Country-specific: <ul style="list-style-type: none"> kg/l lb/ft³

Parameter	Description	Selection	Factory setting
Reference density unit	Select reference density unit.	Unit choose list	Country-dependent <ul style="list-style-type: none"> ■ kg/Nl ■ lb/Sft³
Density 2 unit	Select second density unit.	Unit choose list	Depends on country: <ul style="list-style-type: none"> ■ kg/l ■ lb/ft³
Temperature unit	Select temperature unit. <i>Effect</i> The selected unit applies for: <ul style="list-style-type: none"> ■ Electronic temperature parameter (6053) ■ Maximum value parameter (6051) ■ Minimum value parameter (6052) ■ Maximum value parameter (6108) ■ Minimum value parameter (6109) ■ Carrier pipe temperature parameter (6027) ■ Maximum value parameter (6029) ■ Minimum value parameter (6030) ■ Reference temperature parameter (1816) ■ Temperature parameter 	Unit choose list	Country-specific: <ul style="list-style-type: none"> ■ °C ■ °F
Pressure unit	Select process pressure unit. <i>Result</i> The unit is taken from: <ul style="list-style-type: none"> ■ Pressure value parameter (→  120) ■ External pressure parameter (→  120) ■ Pressure value 	Unit choose list	Country-specific: <ul style="list-style-type: none"> ■ bar a ■ psi a

10.5.4 Selecting and setting the medium

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

Navigation

"Setup" menu → Medium selection

▶ Medium selection

MFT (Multi-Frequency Technology)	→ 119
Select medium type	→ 119
Select gas type	→ 120
Reference sound velocity	→ 120
Reference sound velocity	→ 120
Temperature coefficient sound velocity	→ 120
Temperature coefficient sound velocity	→ 120
Pressure compensation	→ 120
Pressure value	→ 120
External pressure	→ 120

Parameter overview with brief description

Parameter	Prerequisite	Description	Selection / User entry / User interface	Factory setting
MFT (Multi-Frequency Technology)	–	Enable/disable multi-frequency technology to increase the measuring accuracy in the event of microbubbles in the medium.	<ul style="list-style-type: none"> ■ No ■ Yes 	Yes
Select medium type	–	Use this function to select the type of medium: "Gas" or "Liquid". Select the "Other" option in exceptional cases in order to enter the properties of the medium manually (e.g. for highly compressive liquids such as sulfuric acid).	<ul style="list-style-type: none"> ■ Liquid ■ Gas ■ Other 	Liquid

Parameter	Prerequisite	Description	Selection / User entry / User interface	Factory setting
Select gas type	In the Medium selection submenu, the Gas option is selected.	Select measured gas type.	<ul style="list-style-type: none"> ■ Air ■ Ammonia NH₃ ■ Argon Ar ■ Sulfur hexafluoride SF₆ ■ Oxygen O₂ ■ Ozone O₃ ■ Nitrogen oxide NO_x ■ Nitrogen N₂ ■ Nitrous oxide N₂O ■ Methane CH₄ ■ Methane CH₄ + 10% Hydrogen H₂ ■ Methane CH₄ + 20% Hydrogen H₂ ■ Methane CH₄ + 30% Hydrogen H₂ ■ Hydrogen H₂ ■ Helium He ■ Hydrogen chloride HCl ■ Hydrogen sulfide H₂S ■ Ethylene C₂H₄ ■ Carbon dioxide CO₂ ■ Carbon monoxide CO ■ Chlorine Cl₂ ■ Butane C₄H₁₀ ■ Propane C₃H₈ ■ Propylene C₃H₆ ■ Ethane C₂H₆ ■ Other 	Methane CH ₄
Reference sound velocity	In the Select gas type parameter, the Other option is selected.	Enter sound velocity of the gas at 0 °C (32 °F).	1 to 99 999.9999 m/s	415.0 m/s
Reference sound velocity	In the Select medium type parameter, the Other option is selected.	Enter sound velocity of the medium at 0 °C (32 °F).	Signed floating-point number	1 456 m/s
Temperature coefficient sound velocity	In the Select gas type parameter, the Other option is selected.	Enter the temperature coefficient for the gas sound velocity.	Positive floating point number	0.87 (m/s)/K
Temperature coefficient sound velocity	In the Select medium type parameter, the Other option is selected.	Enter temperature coefficient for the medium sound velocity.	Signed floating-point number	1.3 (m/s)/K
Pressure compensation	–	Select pressure compensation type.	<ul style="list-style-type: none"> ■ Off ■ Fixed value ■ External value ■ Current input 1 * ■ Current input 2 * ■ Current input 3 * 	Off
Pressure value	In the Pressure compensation parameter, the Fixed value option is selected.	Enter process pressure to be used for pressure correction.	Positive floating-point number	1.01325 bar
External pressure	In the Pressure compensation parameter, the External value option or the Current input 1...n option is selected.	Shows the external process pressure value.		–

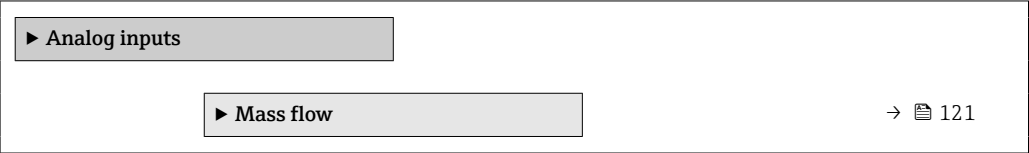
* Visibility depends on order options or device settings

10.5.5 Configuration of the Analog Inputs

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

Navigation

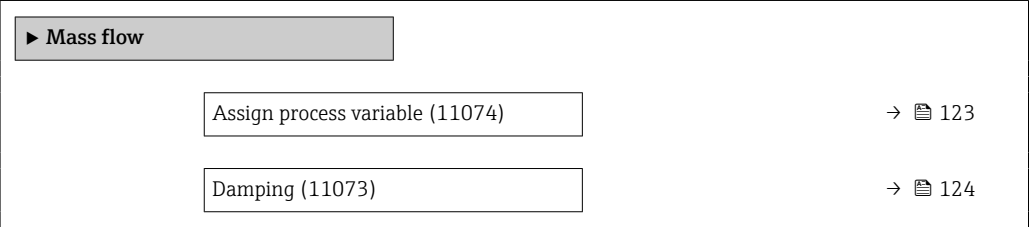
"Setup" menu → Analog inputs



"Analog inputs" submenu

Navigation

"Setup" menu → Analog inputs → Mass flow



Parameter overview with brief description

Parameter	Description	User interface / User entry	Factory setting
Parent class		0 to 255	70

Parameter	Description	User interface / User entry	Factory setting
Assign process variable	Select a process variable.	<ul style="list-style-type: none"> ■ Mass flow ■ Volume flow ■ Density ■ Temperature ■ Carrier pipe temperature ■ Electronics temperature ■ Oscillation frequency 0 ■ Oscillation frequency 1 ■ Oscillation amplitude 0 ■ Oscillation amplitude 1 ■ Frequency fluctuation 0 ■ Frequency fluctuation 1 ■ Oscillation damping 0 ■ Oscillation damping 1 ■ Oscillation damping fluctuation 0 ■ Oscillation damping fluctuation 1 ■ Signal asymmetry ■ Torsion signal asymmetry * ■ Exciter current 0 ■ Exciter current 1 ■ HBSI ■ Current input 1 ■ Current input 2 ■ Current input 3 ■ Application specific output 0 ■ Application specific output 1 ■ Inhomogeneous medium index ■ Suspended bubbles index ■ Test point 0 ■ Test point 1 ■ Sensor index coil asymmetry ■ Raw value mass flow ■ Corrected volume flow ■ Target mass flow ■ Carrier mass flow ■ Target volume flow ■ Carrier volume flow ■ Target corrected volume flow ■ Carrier corrected volume flow ■ Reference density ■ Reference density alternative ■ GSV flow ■ GSV flow alternative ■ NSV flow ■ NSV flow alternative * ■ S&W volume flow ■ Water cut * ■ Oil density ■ Water density ■ Oil mass flow ■ Water mass flow ■ Oil volume flow ■ Water volume flow ■ Oil corrected volume flow ■ Water corrected volume flow ■ Concentration ■ Dynamic viscosity ■ Kinematic viscosity ■ Temp. compensated dynamic viscosity ■ Temp. compensated kinematic viscosity 	Mass flow

Parameter	Description	User interface / User entry	Factory setting
Damping	Enter time constant for input damping (PT1 element). Damping reduces the effect of fluctuations in the measured value on the output signal.	Positive floating-point number	1.0 s

* Visibility depends on order options or device settings

10.5.6 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 → I/O configuration

► I/O configuration

I/O module 1 to n terminal numbers

I/O module 1 to n information

I/O module 1 to n type

Apply I/O configuration

I/O alteration code

→ 124

→ 124

→ 124

→ 124

→ 124

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.	<ul style="list-style-type: none">Not used26-27 (I/O 1)24-25 (I/O 2)22-23 (I/O 3)20-21 (I/O 4)	–
I/O module 1 to n information	Shows information of the plugged I/O module.	<ul style="list-style-type: none">Not pluggedInvalidNot configurableConfigurablePROFINET	–
I/O module 1 to n type	Shows the I/O module type.	<ul style="list-style-type: none">OffCurrent output *Current input *Status input *Pulse/frequency/switch output *Double pulse output *Relay output *	Off
Apply I/O configuration	Apply parameterization of the freely configurable I/O module.	<ul style="list-style-type: none">NoYes	No
I/O alteration code	Enter the code in order to change the I/O configuration.	Positive integer	0

* Visibility depends on order options or device settings

10.5.7 Configuring the current input

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

Navigation

"Setup" menu → Current input

► Current input 1 to n	
Terminal number	→ 125
Signal mode	→ 125
0/4 mA value	→ 125
20 mA value	→ 125
Current span	→ 125
Failure mode	→ 126
Failure value	→ 126

Parameter overview with brief description

Parameter	Prerequisite	Description	User interface / Selection / User entry	Factory setting
Terminal number	–	Shows the terminal numbers used by the current input module.	<ul style="list-style-type: none"> Not used 24-25 (I/O 2) 22-23 (I/O 3) 20-21 (I/O 4) * 	–
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.	<ul style="list-style-type: none"> 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.	<ul style="list-style-type: none"> 4...20 mA (4...20.5 mA) 4...20 mA NE (3.8...20.5 mA) 4...20 mA US (3.9...20.8 mA) 0...20 mA (0...20.5 mA) 	Country-specific: <ul style="list-style-type: none"> 4...20 mA NE (3.8...20.5 mA) 4...20 mA US (3.9...20.8 mA)

Parameter	Prerequisite	Description	User interface / Selection / User entry	Factory setting
Failure mode	–	Define input behavior in alarm condition.	<div>■ Alarm</div> <div>■ Last valid value</div> <div>■ Defined value</div>	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

10.5.8 Configuring the status input

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

Navigation

"Setup" menu → Status input 1 to n

► Status input 1 to n

Assign status input

→ 126

Terminal number

→ 126

Active level

→ 127

Terminal number

→ 126

Response time status input

→ 127

Terminal number

→ 126

Parameter overview with brief description

Parameter	Description	Selection / User interface / User entry	Factory setting
Assign status input	Select function for the status input.	<div>■ Off</div> <div>■ Reset totalizer 1</div> <div>■ Reset totalizer 2</div> <div>■ Reset totalizer 3</div> <div>■ Reset all totalizers</div> <div>■ Flow override</div> <div>■ Zero adjustment</div> <div>■ Reset weighted averages *</div> <div>■ Reset weighted averages + totalizer 3 *</div>	Off
Terminal number	Shows the terminal numbers used by the status input module.	<div>■ Not used</div> <div>■ 24-25 (I/O 2)</div> <div>■ 22-23 (I/O 3)</div> <div>■ 20-21 (I/O 4) *</div>	–

Parameter	Description	Selection / User interface / User entry	Factory setting
Active level	Define input signal level at which the assigned function is triggered.	<ul style="list-style-type: none"> ■ High ■ Low 	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

* Visibility depends on order options or device settings

10.5.9 Configuring the current output

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

Navigation

"Setup" menu → Current output

▶ Current output 1 to n

Terminal number

Signal mode

Process variable current output

Current range output

Lower range value output

Upper range value output

Fixed current

Damping current output

Failure behavior current output

Failure current

→ 127

→ 127

→ 128

→ 129

→ 129

→ 129

→ 129

→ 129






→ 130

→ 130

Parameter overview with brief description

Parameter	Prerequisite	Description	User interface / Selection / User entry	Factory setting
Terminal number	–	Shows the terminal numbers used by the current output module.	<ul style="list-style-type: none"> ■ Not used ■ 26-27 (I/O 1) ■ 24-25 (I/O 2) ■ 22-23 (I/O 3) ■ 20-21 (I/O 4) * 	–
Signal mode	–	Select the signal mode for the current output.	<ul style="list-style-type: none"> ■ Active * ■ Passive * 	Active

Parameter	Prerequisite	Description	User interface / Selection / User entry	Factory setting
Process variable current output	–	Select the process variable for the current output.	<ul style="list-style-type: none"> ■ Off * ■ Mass flow ■ Volume flow ■ Corrected volume flow * ■ Density ■ Reference density * ■ Temperature ■ Target mass flow * ■ Carrier mass flow * ■ Target volume flow * ■ Carrier volume flow * ■ Target corrected volume flow * ■ Carrier corrected volume flow * ■ Reference density alternative * ■ GSV flow * ■ GSV flow alternative * ■ NSV flow * ■ NSV flow alternative * ■ S&W volume flow * ■ Water cut * ■ Oil density * ■ Water density * ■ Oil mass flow * ■ Water mass flow * ■ Oil volume flow * ■ Water volume flow * ■ Oil corrected volume flow * ■ Water corrected volume flow * ■ Concentration * ■ Application specific output 0 * ■ Application specific output 1 * ■ Inhomogeneous medium index ■ Suspended bubbles index * ■ Raw value mass flow ■ Exciter current 0 ■ Oscillation damping 0 ■ Oscillation damping fluctuation 0 * ■ Oscillation frequency 0 ■ Frequency fluctuation 0 * ■ Signal asymmetry ■ Torsion signal asymmetry * ■ Carrier pipe temperature * ■ Frequency fluctuation 0 * 	Mass flow

Parameter	Prerequisite	Description	User interface / Selection / User entry	Factory setting
			<ul style="list-style-type: none"> ■ Oscillation amplitude 0 * ■ Oscillation damping fluctuation 0 * ■ HBSI * ■ Pressure * ■ Electronics temperature ■ Sensor index coil asymmetry ■ Test point 0 ■ Test point 1 	
Current range output	–	Select current range for process value output and upper/lower level for alarm signal.	<ul style="list-style-type: none"> ■ 4...20 mA NE (3.8...20.5 mA) ■ 4...20 mA US (3.9...20.8 mA) ■ 4...20 mA (4... 20.5 mA) ■ 0...20 mA (0... 20.5 mA) ■ Fixed value 	Depends on country: <ul style="list-style-type: none"> ■ 4...20 mA NE (3.8...20.5 mA) ■ 4...20 mA US (3.9...20.8 mA)
Lower range value output	One of the following options is selected in the Current span parameter (→  129): <ul style="list-style-type: none"> ■ 4...20 mA NE (3.8...20.5 mA) ■ 4...20 mA US (3.9...20.8 mA) ■ 4...20 mA (4... 20.5 mA) ■ 0...20 mA (0... 20.5 mA) 	Enter lower range value for the measured value range.	Signed floating-point number	Depends on country: <ul style="list-style-type: none"> ■ 0 kg/h ■ 0 lb/min
Upper range value output	One of the following options is selected in the Current span parameter (→  129): <ul style="list-style-type: none"> ■ 4...20 mA NE (3.8...20.5 mA) ■ 4...20 mA US (3.9...20.8 mA) ■ 4...20 mA (4... 20.5 mA) ■ 0...20 mA (0... 20.5 mA) 	Enter upper range value for the measured value range.	Signed floating-point number	Depends on country and nominal diameter
Fixed current	The Fixed current option is selected in the Current span parameter (→  129).	Defines the fixed output current.	0 to 22.5 mA	22.5 mA
Damping current output	A process variable is selected in the Assign current output parameter (→  128) and one of the following options is selected in the Current span parameter (→  129): <ul style="list-style-type: none"> ■ 4...20 mA NE (3.8...20.5 mA) ■ 4...20 mA US (3.9...20.8 mA) ■ 4...20 mA (4... 20.5 mA) ■ 0...20 mA (0... 20.5 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 behavior current output	A process variable is selected in the Assign current output parameter (→ 128) and one of the following options is selected in the Current span parameter (→ 129): <ul style="list-style-type: none"> ■ 4...20 mA NE (3.8...20.5 mA) ■ 4...20 mA US (3.9...20.8 mA) ■ 4...20 mA (4... 20.5 mA) ■ 0...20 mA (0... 20.5 mA) 	Define output behavior in alarm condition.	<ul style="list-style-type: none"> ■ Min. ■ Max. ■ Last valid value ■ Actual value ■ Fixed 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

10.5.10 Configuring the pulse/frequency/switch output

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

Navigation

"Setup" menu → Advanced setup → Pulse/frequency/switch output

► Pulse/frequency/switch output
1 to n

Operating mode

→ 131

Parameter overview with brief description

Parameter	Description	Selection	Factory setting
Operating mode	Define the output as a pulse, frequency or switch output.	<div>■ Pulse</div> <div>■ Frequency</div> <div>■ Switch</div>	Pulse

Configuring the pulse output

Navigation

"Setup" menu → Pulse/frequency/switch output

► Pulse/frequency/switch output
1 to n

Operating mode

Terminal number

Signal mode

Assign pulse output

Pulse scaling

Pulse width

Failure mode

Invert output signal

→ 132

→ 132

→ 132

→ 132

→ 132

→ 132

→ 133

→ 133

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.	<ul style="list-style-type: none"> ■ Pulse ■ Frequency ■ Switch 	Pulse
Terminal number	–	Shows the terminal numbers used by the PFS output module.	<ul style="list-style-type: none"> ■ Not used ■ 24-25 (I/O 2) ■ 22-23 (I/O 3) ■ 20-21 (I/O 4) * 	–
Signal mode	–	Select the signal mode for the PFS output.	<ul style="list-style-type: none"> ■ Passive ■ Active * ■ Passive NE 	Passive
Assign pulse output	The Pulse option is selected in the Operating mode parameter.	Select process variable for pulse output.	<ul style="list-style-type: none"> ■ Off ■ Mass flow ■ Volume flow ■ Corrected volume flow * ■ Target mass flow * ■ Carrier mass flow * ■ Target volume flow * ■ Carrier volume flow * ■ Target corrected volume flow * ■ Carrier corrected volume flow * ■ GSV flow * ■ GSV flow alternative * ■ NSV flow * ■ NSV flow alternative * ■ S&W volume flow * ■ Oil mass flow * ■ Water mass flow * ■ Oil volume flow * ■ Water volume flow * ■ Oil corrected volume flow * ■ Water corrected volume flow * 	Off
Pulse scaling	The Pulse option is selected in the Operating mode parameter (→ 131) and a process variable is selected in the Assign pulse output parameter (→ 132).	Enter quantity for measured value at which a pulse is output.	Positive floating point number	Depends on country and nominal diameter
Pulse width	The Pulse option is selected in the Operating mode parameter (→ 131) and a process variable is selected in the Assign pulse output parameter (→ 132).	Define time width of the output pulse.	0.05 to 2 000 ms	100 ms

Parameter	Prerequisite	Description	Selection / User interface / User entry	Factory setting
Failure mode	The Pulse option is selected in the Operating mode parameter (→ 131) and a process variable is selected in the Assign pulse output parameter (→ 132).	Define output behavior in alarm condition.	<ul style="list-style-type: none">Actual valueNo pulses	No pulses
Invert output signal	–	Invert the output signal.	<ul style="list-style-type: none">NoYes	No

* Visibility depends on order options or device settings

Configuring the frequency output

Navigation

"Setup" menu → Pulse/frequency/switch output

► Pulse/frequency/switch output
1 to n

Operating mode

→ 134

Terminal number

→ 134

Signal mode

→ 134

Assign frequency output

→ 135

Minimum frequency value

→ 136

Maximum frequency value

→ 136

Measuring value at minimum frequency

→ 136

Measuring value at maximum frequency

→ 136

Failure mode

→ 136

Failure frequency

→ 136

Invert output signal

→ 136

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.	<ul style="list-style-type: none"> ■ Pulse ■ Frequency ■ Switch 	Pulse
Terminal number	–	Shows the terminal numbers used by the PFS output module.	<ul style="list-style-type: none"> ■ Not used ■ 24-25 (I/O 2) ■ 22-23 (I/O 3) ■ 20-21 (I/O 4) * 	–
Signal mode	–	Select the signal mode for the PFS output.	<ul style="list-style-type: none"> ■ Passive ■ Active * ■ Passive NE 	Passive

Parameter	Prerequisite	Description	Selection / User interface / User entry	Factory setting
Assign frequency output	In the Operating mode parameter (→ 131), the Frequency option is selected.	Select process variable for frequency output.	<ul style="list-style-type: none"> ■ Off * ■ Mass flow * ■ Volume flow * ■ Corrected volume flow * ■ Density * ■ Reference density * ■ Time period signal frequency (TPS) * ■ Temperature * ■ Pressure * ■ GSV flow * ■ GSV flow alternative * ■ NSV flow * ■ NSV flow alternative * ■ S&W volume flow * ■ Reference density alternative * ■ Water cut * ■ Oil density * ■ Water density * ■ Oil mass flow * ■ Water mass flow * ■ Oil volume flow * ■ Water volume flow * ■ Oil corrected volume flow * ■ Water corrected volume flow * ■ Concentration * ■ Target mass flow * ■ Carrier mass flow * ■ Target volume flow * ■ Carrier volume flow * ■ Target corrected volume flow * ■ Carrier corrected volume flow * ■ Application specific output 0 * ■ Application specific output 1 * ■ Inhomogeneous medium index * ■ Suspended bubbles index * ■ HBSI * ■ Raw value mass flow * ■ Exciter current 0 * ■ Oscillation damping 0 * ■ Oscillation damping fluctuation 0 * ■ Oscillation frequency 0 * ■ Frequency fluctuation 0 * ■ Oscillation amplitude 0 * ■ Signal asymmetry * 	Off















Parameter	Prerequisite	Description	Selection / User interface / User entry	Factory setting
			<ul style="list-style-type: none"> ▪ Torsion signal asymmetry * ▪ Carrier pipe temperature * ▪ Electronics temperature ▪ Sensor index coil asymmetry ▪ Test point 0 ▪ Test point 1 	
Minimum frequency value	The Frequency option is selected in the Operating mode parameter (→ 131) and a process variable is selected in the Assign frequency output parameter (→ 135).	Enter minimum frequency.	0.0 to 10 000.0 Hz	0.0 Hz
Maximum frequency value	The Frequency option is selected in the Operating mode parameter (→ 131) and a process variable is selected in the Assign frequency output parameter (→ 135).	Enter maximum frequency.	0.0 to 10 000.0 Hz	10 000.0 Hz
Measuring value at minimum frequency	The Frequency option is selected in the Operating mode parameter (→ 131) and a process variable is selected in the Assign frequency output parameter (→ 135).	Enter measured value for minimum frequency.	Signed floating-point number	Depends on country and nominal diameter
Measuring value at maximum frequency	The Frequency option is selected in the Operating mode parameter (→ 131) and a process variable is selected in the Assign frequency output parameter (→ 135).	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 (→ 131) and a process variable is selected in the Assign frequency output parameter (→ 135).	Define output behavior in alarm condition.	<ul style="list-style-type: none"> ▪ Actual value ▪ Defined value ▪ 0 Hz 	0 Hz
Failure frequency	In the Operating mode parameter (→ 131), the Frequency option is selected, in the Assign frequency output parameter (→ 135) a process variable is selected, and in the Failure mode parameter, the Defined value option is selected.	Enter frequency output value in alarm condition.	0.0 to 12 500.0 Hz	0.0 Hz
Invert output signal	–	Invert the output signal.	<ul style="list-style-type: none"> ▪ No ▪ Yes 	No

* Visibility depends on order options or device settings

Configuring the switch output

Navigation

"Setup" menu → Pulse/frequency/switch output

► Pulse/frequency/switch output 1 to n		
Operating mode	→ 	137
Terminal number	→ 	137
Signal mode	→ 	137
Switch output function	→ 	138
Assign diagnostic behavior	→ 	138
Assign limit	→ 	139
Assign flow direction check	→ 	139
Assign status	→ 	140
Switch-on value	→ 	140
Switch-off value	→ 	140
Switch-on delay	→ 	140
Switch-off delay	→ 	140
Failure mode	→ 	140
Invert output signal	→ 	140

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.	<ul style="list-style-type: none"> ■ Pulse ■ Frequency ■ Switch 	Pulse
Terminal number	–	Shows the terminal numbers used by the PFS output module.	<ul style="list-style-type: none"> ■ Not used ■ 24-25 (I/O 2) ■ 22-23 (I/O 3) ■ 20-21 (I/O 4) * 	–
Signal mode	–	Select the signal mode for the PFS output.	<ul style="list-style-type: none"> ■ Passive ■ Active * ■ Passive NE 	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.	<ul style="list-style-type: none"> ■ Off ■ On ■ Diagnostic behavior ■ Limit ■ Flow direction check ■ Status 	Off
Assign diagnostic behavior	<ul style="list-style-type: none"> ■ 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.	<ul style="list-style-type: none"> ■ Alarm ■ Alarm or warning ■ Warning 	Alarm

Parameter	Prerequisite	Description	Selection / User interface / User entry	Factory setting
Assign limit	<ul style="list-style-type: none"> In the Operating mode parameter, the Switch option is selected. In the Switch output function parameter, the Limit option is selected. 	Select process variable for limit function.	<ul style="list-style-type: none"> Mass flow Volume flow Corrected volume flow[*] Target mass flow[*] Carrier mass flow[*] Target volume flow[*] Carrier volume flow[*] Target corrected volume flow[*] Carrier corrected volume flow[*] Density Reference density[*] Reference density alternative[*] GSV flow[*] GSV flow alternative[*] NSV flow[*] NSV flow alternative[*] S&W volume flow[*] Water cut[*] Oil density[*] Water density[*] Oil mass flow[*] Water mass flow[*] Oil volume flow[*] Water volume flow[*] Oil corrected volume flow[*] Water corrected volume flow[*] Concentration[*] Temperature Totalizer 1 Totalizer 2 Totalizer 3 Oscillation damping Pressure Application specific output 0[*] Application specific output 1[*] Inhomogeneous medium index Suspended bubbles index[*] 	Volume flow
Assign flow direction check	<ul style="list-style-type: none"> 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.	<ul style="list-style-type: none"> Off Volume flow Mass flow Corrected volume flow[*] 	Mass flow

Parameter	Prerequisite	Description	Selection / User interface / User entry	Factory setting
Assign status	<ul style="list-style-type: none"> 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.	<ul style="list-style-type: none"> Partially filled pipe detection Low flow cut off Binary output * Binary output * Binary output * 	Partially filled pipe detection
Switch-on value	<ul style="list-style-type: none"> The Switch option is selected in the Operating mode parameter. The Limit option is selected in the Switch output function parameter. 	Enter measured value for the switch-on point.	Signed floating-point number	Country-specific: <ul style="list-style-type: none"> 0 kg/h 0 lb/min
Switch-off value	<ul style="list-style-type: none"> The Switch option is selected in the Operating mode parameter. The Limit option is selected in the Switch output function parameter. 	Enter measured value for the switch-off point.	Signed floating-point number	Country-specific: <ul style="list-style-type: none"> 0 kg/h 0 lb/min
Switch-on delay	<ul style="list-style-type: none"> 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
Switch-off delay	<ul style="list-style-type: none"> 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.	<ul style="list-style-type: none"> Actual status Open Closed 	Open
Invert output signal	–	Invert the output signal.	<ul style="list-style-type: none"> No Yes 	No

* Visibility depends on order options or device settings

10.5.11 Configuring the relay output

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

Navigation

"Setup" menu → Relay output 1 to n

► Relay output 1 to n

Terminal number

→ 141

Relay output function








→ 141

Assign flow direction check

→ 141

Assign limit

→ 142

Assign diagnostic behavior	→  142
Assign status	→  142
Switch-off value	→  142
Switch-off delay	→  143
Switch-on value	→  143
Switch-on delay	→  143
Failure mode	→  143

Parameter overview with brief description

Parameter	Prerequisite	Description	User interface / Selection / User entry	Factory setting
Terminal number	–	Shows the terminal numbers used by the relay output module.	<ul style="list-style-type: none"> ■ Not used ■ 24-25 (I/O 2) ■ 22-23 (I/O 3) ■ 20-21 (I/O 4) 	–
Relay output function	–	Select the function for the relay output.	<ul style="list-style-type: none"> ■ Closed ■ Open ■ Diagnostic behavior ■ Limit ■ Flow direction check ■ Status 	Closed
Assign flow direction check	The Flow direction check option is selected in the Relay output function parameter.	Select process variable for flow direction monitoring.	<ul style="list-style-type: none"> ■ Off ■ Volume flow ■ Mass flow ■ Corrected volume flow[*] 	Mass flow

Parameter	Prerequisite	Description	User interface / Selection / User entry	Factory setting
Assign limit	The Limit option is selected in the Relay output function parameter.	Select process variable for limit function.	<ul style="list-style-type: none"> ■ Mass flow ■ Volume flow ■ Corrected volume flow * ■ Target mass flow * ■ Carrier mass flow * ■ Target volume flow * ■ Carrier volume flow * ■ Target corrected volume flow * ■ Carrier corrected volume flow * ■ Density ■ Reference density * ■ Reference density alternative * ■ GSV flow * ■ GSV flow alternative * ■ NSV flow * ■ NSV flow alternative * ■ S&W volume flow * ■ Water cut * ■ Oil density * ■ Water density * ■ Oil mass flow * ■ Water mass flow * ■ Oil volume flow * ■ Water volume flow * ■ Oil corrected volume flow * ■ Water corrected volume flow * ■ Concentration * ■ Temperature ■ Totalizer 1 ■ Totalizer 2 ■ Totalizer 3 ■ Oscillation damping ■ Pressure ■ Application specific output 0 * ■ Application specific output 1 * ■ Inhomogeneous medium index ■ Suspended bubbles index * 	Mass flow
Assign diagnostic behavior	In the Relay output function parameter, the Diagnostic behavior option is selected.	Select diagnostic behavior for switch output.	<ul style="list-style-type: none"> ■ 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.	<ul style="list-style-type: none"> ■ Partially filled pipe detection ■ Low flow cut off * ■ Binary output * ■ Binary output * ■ Binary output * 	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: <ul style="list-style-type: none"> ■ 0 kg/h ■ 0 lb/min

Parameter	Prerequisite	Description	User interface / Selection / User entry	Factory setting
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	The Limit option is selected in the Relay output function parameter.	Enter measured value for the switch-on point.	Signed floating-point number	Country-specific: ■ 0 kg/h ■ 0 lb/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 status ■ Open ■ Closed	Open

* Visibility depends on order options or device settings



10.5.12 Configuring the local display

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

Navigation

"Setup" menu → Display

► Display		
Format display	→	📖 145
Value 1 display	→	📖 146
0% bargraph value 1	→	📖 147
100% bargraph value 1	→	📖 147
Value 2 display	→	📖 147
Value 3 display	→	📖 147
0% bargraph value 3	→	📖 147
100% bargraph value 3	→	📖 147
Value 4 display	→	📖 147
Value 5 display	→	📖 147
Value 6 display	→	📖 147



Value 7 display	→  148
Value 8 display	→  148

Parameter overview with brief description

Parameter	Prerequisite	Description	Selection / User entry	Factory setting
Format display	A local display is provided.	Select how measured values are shown on the display.	<ul style="list-style-type: none">■ 1 value, max. size■ 1 bargraph + 1 value■ 2 values■ 1 value large + 2 values■ 4 values	1 value, max. size

Parameter	Prerequisite	Description	Selection / User entry	Factory setting
Value 1 display	A local display is provided.	Select the measured value that is shown on the local display.	<ul style="list-style-type: none"> ■ Mass flow ■ Volume flow ■ Corrected volume flow * ■ Density ■ Reference density * ■ Density 2 * ■ Time period signal frequency (TPS) * ■ Time period signal (TPS) * ■ Temperature ■ Pressure ■ Totalizer 1 ■ Totalizer 2 ■ Totalizer 3 ■ GSV flow * ■ GSV flow alternative * ■ NSV flow * ■ NSV flow alternative * ■ S&W volume flow * ■ Reference density alternative * ■ Weighted density average * ■ Weighted temperature average * ■ Water cut * ■ Oil density * ■ Water density * ■ Oil mass flow * ■ Water mass flow * ■ Oil volume flow * ■ Water volume flow * ■ Oil corrected volume flow * ■ Water corrected volume flow * ■ Concentration * ■ Target mass flow * ■ Carrier mass flow * ■ Target volume flow * ■ Carrier volume flow * ■ Target corrected volume flow * ■ Carrier corrected volume flow * ■ Application specific output 0 * ■ Application specific output 1 * ■ Inhomogeneous medium index ■ Suspended bubbles index * ■ HBSI * ■ Raw value mass flow ■ Exciter current 0 ■ Oscillation damping 0 	Mass flow

Parameter	Prerequisite	Description	Selection / User entry	Factory setting
			<ul style="list-style-type: none"> ■ Oscillation damping fluctuation 0 * ■ Oscillation frequency 0 ■ Frequency fluctuation 0 * ■ Oscillation amplitude 0 * ■ Signal asymmetry ■ Torsion signal asymmetry * ■ Carrier pipe temperature * ■ Electronics temperature ■ Sensor index coil asymmetry ■ Test point 0 ■ Test point 1 ■ Current output 1 ■ Current output 2 * ■ Current output 3 * ■ Current output 4 * 	
0% bargraph value 1	A local display is provided.	Enter 0% value for bar graph display.	Signed floating-point number	Country-specific: <ul style="list-style-type: none"> ■ 0 kg/h ■ 0 lb/min
100% bargraph value 1	A local display is provided.	Enter 100% value for bar graph display.	Signed floating-point number	Depends on country and nominal diameter
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 (→ 146)	None
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 (→ 146)	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: <ul style="list-style-type: none"> ■ 0 kg/h ■ 0 lb/min
100% bargraph value 3	A selection was made in the Value 3 display parameter.	Enter 100% value for bar graph display.	Signed floating-point number	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 (→ 146)	None
Value 5 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 (→ 146)	None
Value 6 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 (→ 146)	None

Parameter	Prerequisite	Description	Selection / User entry	Factory setting
Value 7 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 (→  146)	None
Value 8 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 (→  146)	None

* Visibility depends on order options or device settings

10.5.13 Configuring the low flow cut off

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

Navigation

"Setup" menu → Low flow cut off

► Low flow cut off	
Assign process variable	→ 149
On value low flow cutoff	→ 149
Off value low flow cutoff	→ 149
Pressure shock suppression	→ 149

Parameter overview with brief description

Parameter	Prerequisite	Description	Selection / User entry	Factory setting
Assign process variable	–	Select process variable for low flow cut off.	<ul style="list-style-type: none"> ■ Off ■ Mass flow ■ Volume flow ■ Corrected volume flow[*] 	Mass flow
On value low flow cutoff	A process variable is selected in the Assign process variable parameter (→ 149).	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 (→ 149).	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 (→ 149).	Enter time frame for signal suppression (= active pressure shock suppression).	0 to 100 s	0 s

* Visibility depends on order options or device settings

10.5.14 Configuring partially filled pipe detection

The **Partial filled pipe detection** wizard guides you systematically through all parameters that have to be set for configuring the monitoring of the pipe filling.

Navigation

"Setup" menu → Partially filled pipe detection

▶ Partially filled pipe detection

Assign process variable

→ 150

Low value partial filled pipe detection

→ 150

High value partial filled pipe detection

→ 150

Response time part. filled pipe detect.

→ 150

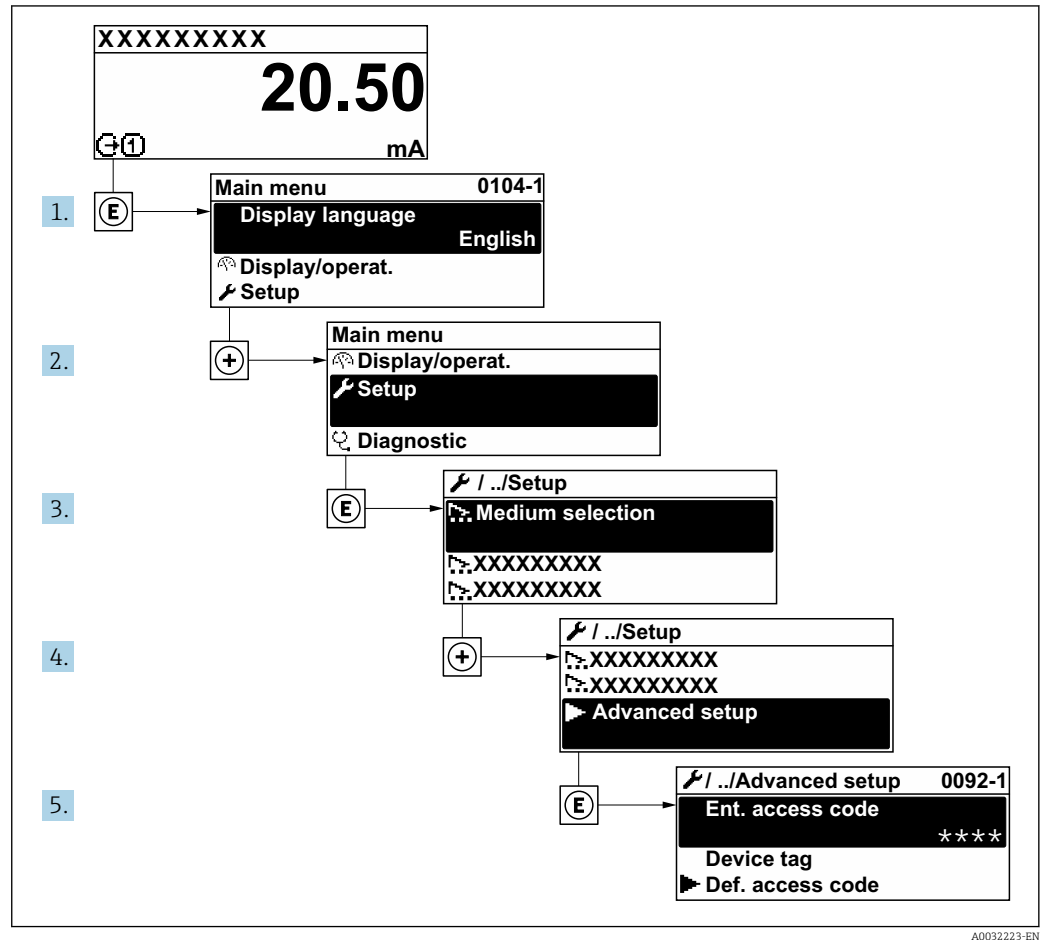
Parameter overview with brief description

Parameter	Prerequisite	Description	Selection / User entry	Factory setting
Assign process variable	–	Select process variable for partially filled pipe detection.	<ul style="list-style-type: none"> ■ Off ■ Density ■ Calculated reference density 	Off
Low value partial filled pipe detection	A process variable is selected in the Assign process variable parameter (→ 150).	Enter lower limit value for deactivating partially filled pipe detection.	Signed floating-point number	Depends on country: <ul style="list-style-type: none"> ■ 200 kg/m³ ■ 12.5 lb/ft³
High value partial filled pipe detection	A process variable is selected in the Assign process variable parameter (→ 150).	Enter upper limit value for deactivating partially filled pipe detection.	Signed floating-point number	Depends on country: <ul style="list-style-type: none"> ■ 6 000 kg/m³ ■ 374.6 lb/ft³
Response time part. filled pipe detect.	A process variable is selected in the Assign process variable parameter (→ 150).	Use this function to enter the minimum time (hold time) the signal must be present before diagnostic message S962 "Pipe only partly filled" is triggered in the event of a partially filled or empty measuring pipe.	0 to 100 s	1 s

10.6 Advanced settings

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

Navigation to the "Advanced setup" submenu



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i 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 → Advanced setup

► Advanced setup		
Enter access code (0003)	→	📖 152
► Calculated values	→	📖 152
► Sensor adjustment	→	📖 154
► Totalizer 1 to n	→	📖 160
► Display	→	📖 162

▶ WLAN settings	→ ⓘ 169
▶ Viscosity	→ ⓘ 170
▶ Concentration	→ ⓘ 171
▶ Petroleum	→ ⓘ 171
▶ Heartbeat setup	→ ⓘ 171
▶ Configuration backup	→ ⓘ 171
▶ Administration	→ ⓘ 172

10.6.1 Using the parameter to enter the access code

Navigation


"Setup" menu → Advanced setup

Parameter overview with brief description

Parameter	Description	User entry
Enter access code	Enter access code to disable write protection of parameters.	Max. 16-digit character string comprising numbers, letters and special characters

10.6.2 Calculated process variables

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

 The **Calculated values** submenu is **not** available if one of the following options was selected in the **Petroleum mode** parameter in the "Application package", option **EJ "Petroleum"**: **API referenced correction** option, **Net oil & water cut** option or **ASTM D4311** option







Navigation

"Setup" menu → Advanced setup → Calculated values

▶ Calculated values
▶ Corrected volume flow calculation → ⓘ 153

"Corrected volume flow calculation" submenu**Navigation**

"Setup" menu → Advanced setup → Calculated values → Corrected volume flow calculation

► Corrected volume flow calculation		
Select reference density (1812)	→ 	153
External reference density (6198)	→ 	153
Fixed reference density (1814)	→ 	153
Reference temperature (1816)	→ 	153
Linear expansion coefficient (1817)	→ 	154
Square expansion coefficient (1818)	→ 	154

Parameter overview with brief description

Parameter	Prerequisite	Description	Selection / User interface / User entry	Factory setting
Select reference density	–	Select reference density for calculating the corrected volume flow.	<ul style="list-style-type: none"> ■ Fixed reference density ■ Calculated reference density ■ External reference density ■ Current input 1 * ■ Current input 2 * ■ Current input 3 * 	Calculated reference density
External reference density	–	Shows external reference density.	Floating point number with sign	–
Fixed reference density	The Fixed reference density option is selected in the Corrected volume flow calculation parameter parameter.	Enter fixed value for reference density.	Positive floating-point number	1 kg/Nl
Reference temperature	The Calculated reference density option is selected in the Corrected volume flow calculation parameter parameter.	Enter reference temperature for calculating the reference density.	–273.15 to 99 999 °C	Country-specific: <ul style="list-style-type: none"> ■ +20 °C ■ +68 °F

Parameter	Prerequisite	Description	Selection / User interface / User entry	Factory setting
Linear expansion coefficient	The Calculated reference density option is selected in the Corrected volume flow calculation parameter parameter.	Enter linear, medium-specific expansion coefficient for calculating the reference density.	Signed floating-point number	0.0 1/K
Square expansion coefficient	The Calculated reference density option is selected in the Corrected volume flow calculation parameter parameter.	For media with a non-linear expansion pattern: enter the quadratic, medium-specific expansion coefficient for calculating the reference density.	Signed floating-point number	0.0 1/K ²

* Visibility depends on order options or device settings

10.6.3 Carrying out a sensor adjustment

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

Navigation

"Setup" menu → Advanced setup → Sensor adjustment

► Sensor adjustment	
Installation direction	→ 154
Installation angle pitch	→ 154
Installation angle roll	→ 154
► Zero verification	→ 157
► Zero adjustment	→ 159

Parameter overview with brief description

Parameter	Description	Selection / User entry	Factory setting
Installation direction	Select sign of flow direction.	<ul style="list-style-type: none"> ■ Forward flow ■ Reverse flow 	Forward flow
Installation angle pitch	Enter the installation angle in degree.	–90 to +90 °	0 °
Installation angle roll	Enter the installation angle in degree.	–180 to 180 °	0 °

Density adjustment



With density adjustment, a high level of accuracy is achieved only at the point of adjustment and at the relevant density and temperature. However, the accuracy of a density adjustment is only ever as good as the quality of the reference measuring data provided. Therefore it is not a substitute for special density calibration.

Performing density adjustment

Note the following before performing the adjustment:

- A density adjustment only makes sense if there is little variation in the operating conditions and the density adjustment is performed under the operating conditions.
- The density adjustment scales the internally computed density value with a user-specific slope and offset.
- A 1-point or 2-point density adjustment can be performed.
- For a 2-point density adjustment, there must be a difference of at least 0.2 kg/l between the two target density values.
- The reference media must be gas-free or pressurized so that any gas they contain is compressed.
- The reference density measurements must be performed at the same medium temperature that prevails in the process, as otherwise the density adjustment will not be accurate.
- The correction resulting from the density adjustment can be deleted with the **Restore original** option.

"1 point adjustment" option

1. In the **Density adjustment mode** parameter, select the **1 point adjustment** option and confirm.
2. In the **Density setpoint 1** parameter, enter the density value and confirm.
 - ↳ In the **Execute density adjustment** parameter the following options are now available:
 - Ok
 - Measure density 1** option
 - Restore original
3. Select the **Measure density 1** option and confirm.
4. If 100% was reached in the **Progress** parameter on the display and the **Ok** option is displayed in the **Execute density adjustment** parameter, then confirm.
 - ↳ In the **Execute density adjustment** parameter the following options are now available:
 - Ok
 - Calculate
 - Cancel
5. Select the **Calculate** option and confirm.

If the adjustment was completed successfully, the **Density adjustment factor** parameter and the **Density adjustment offset** parameter and the values calculated for them are shown on the display.

"2 point adjustment" option

1. In the **Density adjustment mode** parameter, select the **2 point adjustment** option and confirm.
2. In the **Density setpoint 1** parameter, enter the density value and confirm.
3. In the **Density setpoint 2** parameter, enter the density value and confirm.
 - ↳ In the **Execute density adjustment** parameter the following options are now available:
 - Ok
 - Measure density 1
 - Restore original

4. Select the **Measure density 1** option and confirm.
↳ In the **Execute density adjustment** parameter the following options are now available:
Ok
Measure density 2
Restore original
5. Select the **Measure density 2** option and confirm.
↳ In the **Execute density adjustment** parameter the following options are now available:
Ok
Calculate
Cancel
6. Select the **Calculate** option and confirm.

If the **Density adjust failure** option is displayed in the **Execute density adjustment** parameter, call up the options and select the **Cancel** option. The density adjustment is canceled and can be repeated.

If the adjustment was completed successfully, the **Density adjustment factor** parameter and the **Density adjustment offset** parameter and the values calculated for them are shown on the display.

Navigation

"Expert" menu → Sensor → Sensor adjustment → Density adjustment

► Density adjustment

Density adjustment mode

Density setpoint 1

Density setpoint 2

Execute density adjustment

Progress

Density adjustment factor

Density adjustment offset

→ ⓘ 156

→ ⓘ 156

→ ⓘ 157

→ ⓘ 157

→ ⓘ 157

→ ⓘ 157

→ ⓘ 157


Parameter overview with brief description

Parameter	Prerequisite	Description	Selection / User entry / User interface	Factory setting
Density adjustment mode	–	Select the method for field density adjustment to correct the factory setting.	■ 1 point adjustment ■ 2 point adjustment	1 point adjustment
Density setpoint 1	–	Enter density for the first reference media.	The entry depends on the unit selected in the Density unit parameter (0555).	1 kg/l

Parameter	Prerequisite	Description	Selection / User entry / User interface	Factory setting
Density setpoint 2	In the Density adjustment mode parameter, the 2 point adjustment option is selected.	Enter density for the second reference media.	The entry depends on the unit selected in the Density unit parameter (0555).	1 kg/l
Execute density adjustment	–	Select the next step to be performed for the density adjustment.	<ul style="list-style-type: none"> ■ Cancel * ■ Busy * ■ Ok * ■ Density adjust failure * ■ Measure density 1 * ■ Measure density 2 * ■ Calculate * ■ Restore original * 	Ok
Progress	–	Shows the progress of the process.	0 to 100 %	–
Density adjustment factor	–	Shows the calculated correction factor for the density.	Signed floating-point number	1
Density adjustment offset	–	Shows the calculated correction offset for the density.	Signed floating-point number	0

* Visibility depends on order options or device settings

Zero point verification and zero adjustment

All measuring devices are calibrated in accordance with state-of-the-art technology. Calibration takes place under reference conditions →  309. Therefore, a zero adjustment in the field is generally not required.

Experience shows that zero adjustment is advisable only in special cases:

- To achieve maximum measuring accuracy even with low flow rates.
- Under extreme process or operating conditions (e.g. very high process temperatures or very high-viscosity fluids).

To get a representative zero point, ensure that:

- any flow in the device is prevented during the adjustment
- the process conditions (e.g. pressure, temperature) are stable and representative

Zero point verification and zero adjustment cannot be performed if the following process conditions are present:

- Gas pockets

Ensure that the system has been sufficiently flushed with the medium. Repeat flushing can help to eliminate gas pockets

- Thermal circulation

In the event of temperature differences (e.g. between the measuring tube inlet and outlet section), induced flow can occur even if the valves are closed due to thermal circulation in the device

- Leaks at the valves

If the valves are not leak-tight, flow is not sufficiently prevented when determining the zero point

If these conditions cannot be avoided, it is advisable to keep the factory setting for the zero point.

Zero point verification

The zero point can be verified with the **Zero verification** wizard.

Navigation

"Setup" menu → Advanced setup → Sensor adjustment → Zero verification

► Zero verification		
Process conditions	→	📄 158
Progress	→	📄 158
Status	→	📄 158
Additional information	→	📄 158
Recommendation:	→	📄 158
Root cause	→	📄 158
Abort cause	→	📄 158
Zero point measured	→	📄 159
Zero point standard deviation	→	📄 159

Parameter overview with brief description

Parameter	Description	Selection / User interface	Factory setting
Process conditions	Ensure process conditions as follows.	<ul style="list-style-type: none"> ▪ Tubes are completely filled ▪ Process operational pressure applied ▪ No-flow conditions (closed valves) ▪ Process and ambient temperatures stable 	–
Progress	Shows the progress of the process.	0 to 100 %	–
Status	Shows the status of the process.	<ul style="list-style-type: none"> ▪ Busy ▪ Failed ▪ Done 	–
Additional information	Indicate whether to display additional information.	<ul style="list-style-type: none"> ▪ Hide ▪ Show 	Hide
Recommendation:	Indicates whether an adjustment is recommended. Only recommended if the measured zero point deviates significantly from the current zero point.	<ul style="list-style-type: none"> ▪ Do not adjust zero point ▪ Adjust zero point 	–
Abort cause	Indicates why the wizard was aborted.	<ul style="list-style-type: none"> ▪ Check process conditions! ▪ A technical issue has occurred 	–
Root cause	Shows the diagnostic and remedy.	<ul style="list-style-type: none"> ▪ Zero point too high. Ensure no-flow. ▪ Zero point is unstable. Ensure no-flow. ▪ Fluctuation high. Avoid 2-phase medium. 	–

Parameter	Description	Selection / User interface	Factory setting
Zero point measured	Shows the zero point measured for the adjustment.	Signed floating-point number	–
Zero point standard deviation	Shows the standard deviation of the zero point measured.	Positive floating-point number	–

Zero adjust

The zero point can be adjusted with the **Zero adjustment** wizard.



- A zero point verification should be performed before a zero adjustment.
- The zero point can also be adjusted manually: Expert → Sensor → Calibration

Navigation

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

► Zero adjustment

Process conditions	→ 160
Progress	→ 160
Status	→ 160
Root cause	→ 160
Abort cause	→ 160
Root cause	→ 160
Reliability of measured zero point	→ 160
Additional information	→ 160
Reliability of measured zero point	→ 160
Zero point measured	→ 160
Zero point standard deviation	→ 160
Select action	→ 160

Parameter overview with brief description

Parameter	Description	Selection / User interface	Factory setting
Process conditions	Ensure process conditions as follows.	<ul style="list-style-type: none">■ Tubes are completely filled■ Process operational pressure applied■ No-flow conditions (closed valves)■ Process and ambient temperatures stable	–
Progress	Shows the progress of the process.	0 to 100 %	–
Status	Shows the status of the process.	<ul style="list-style-type: none">■ Busy■ Failed■ Done	–
Abort cause	Indicates why the wizard was aborted.	<ul style="list-style-type: none">■ Check process conditions!■ A technical issue has occurred	–
Root cause	Shows the diagnostic and remedy.	<ul style="list-style-type: none">■ Zero point too high. Ensure no-flow.■ Zero point is unstable. Ensure no-flow.■ Fluctuation high. Avoid 2-phase medium.	–
Reliability of measured zero point	Indicates the reliability of the zero point measured.	<ul style="list-style-type: none">■ Not done■ Good■ Uncertain	–
Additional information	Indicate whether to display additional information.	<ul style="list-style-type: none">■ Hide■ Show	Hide
Zero point measured	Shows the zero point measured for the adjustment.	Signed floating-point number	–
Zero point standard deviation	Shows the standard deviation of the zero point measured.	Positive floating-point number	–
Select action	Select the zero point value to apply.	<ul style="list-style-type: none">■ Restore■ Keep current zero point■ Apply zero point measured■ Apply factory zero point *	Keep current zero point

* Visibility depends on order options or device settings

10.6.4 Configuring the totalizer

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

Navigation

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

► Totalizer 1 to n

Assign process variable 1 to n
(11104-1 to n)

→ ⓘ 161

Process variable unit 1 to n
(11107-1 to n)

→ ⓘ 161

Totalizer 1 to n operation mode
(11102-1 to n)

→ ⓘ 161

Totalizer 1 to n control (11101-1 to n)	→ 161
Totalizer 1 to n failure behavior (11103-1 to n)	→ 161

Parameter overview with brief description

Parameter	Description	Selection	Factory setting
Assign process variable 1 to n	Select process variable for totalizer.	<ul style="list-style-type: none"> ■ Mass flow ■ Volume flow ■ Corrected volume flow * ■ Target mass flow * ■ Carrier mass flow * ■ Target volume flow * ■ Carrier volume flow * ■ Target corrected volume flow * ■ Carrier corrected volume flow * ■ GSV flow * ■ GSV flow alternative * ■ NSV flow * ■ NSV flow alternative * ■ S&W volume flow * ■ Oil mass flow * ■ Water mass flow * ■ Oil volume flow * ■ Water volume flow * ■ Oil corrected volume flow * ■ Water corrected volume flow * ■ Raw value mass flow 	Mass flow
Process variable unit 1 to n	Select the unit for the process variable of the totalizer.	Unit choose list	kg
Totalizer 1 to n operation mode	Select totalizer operation mode, e.g. only totalize forward flow or only totalize reverse flow.	<ul style="list-style-type: none"> ■ Net ■ Forward ■ Reverse 	Forward
Totalizer 1 to n control	Operate the totalizer.	<ul style="list-style-type: none"> ■ Reset + hold ■ Preset + hold ■ Hold ■ Totalize 	Totalize
Totalizer 1 to n failure behavior	Select totalizer behavior in the event of a device alarm.	<ul style="list-style-type: none"> ■ Hold ■ Continue ■ Last valid value + continue 	Continue





















* Visibility depends on order options or device settings




10.6.5 Carrying out additional display configurations

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

Navigation

"Setup" menu → Advanced setup → Display

► Display		
Format display	→	 164
Value 1 display	→	 165
0% bargraph value 1	→	 166
100% bargraph value 1	→	 166
Decimal places 1	→	 166
Value 2 display	→	 166
Decimal places 2	→	 166
Value 3 display	→	 166
0% bargraph value 3	→	 166
100% bargraph value 3	→	 166
Decimal places 3	→	 167
Value 4 display	→	 167
Decimal places 4	→	 167
Value 5 display	→	 167
0% bargraph value 5	→	 167
100% bargraph value 5	→	 167
Decimal places 5	→	 167
Value 6 display	→	 167
Decimal places 6	→	 167
Value 7 display	→	 167

0% bargraph value 7	→  167
100% bargraph value 7	→  167
Decimal places 7	→  168
Value 8 display	→  168
Decimal places 8	→  168
Display language	→  168
Display interval	→  168
Display damping	→  168
Header	→  168
Header text	→  168
Separator	→  168
Backlight	→  168

Parameter overview with brief description

Parameter	Prerequisite	Description	Selection / User entry	Factory setting
Format display	A local display is provided.	Select how measured values are shown on the display.	<ul style="list-style-type: none">■ 1 value, max. size■ 1 bargraph + 1 value■ 2 values■ 1 value large + 2 values■ 4 values	1 value, max. size

Parameter	Prerequisite	Description	Selection / User entry	Factory setting
Value 1 display	A local display is provided.	Select the measured value that is shown on the local display.	<ul style="list-style-type: none"> ■ Mass flow ■ Volume flow ■ Corrected volume flow * ■ Density ■ Reference density * ■ Density 2 * ■ Time period signal frequency (TPS) * ■ Time period signal (TPS) * ■ Temperature ■ Pressure ■ Totalizer 1 ■ Totalizer 2 ■ Totalizer 3 ■ GSV flow * ■ GSV flow alternative * ■ NSV flow * ■ NSV flow alternative * ■ S&W volume flow * ■ Reference density alternative * ■ Weighted density average * ■ Weighted temperature average * ■ Water cut * ■ Oil density * ■ Water density * ■ Oil mass flow * ■ Water mass flow * ■ Oil volume flow * ■ Water volume flow * ■ Oil corrected volume flow * ■ Water corrected volume flow * ■ Concentration * ■ Target mass flow * ■ Carrier mass flow * ■ Target volume flow * ■ Carrier volume flow * ■ Target corrected volume flow * ■ Carrier corrected volume flow * ■ Application specific output 0 * ■ Application specific output 1 * ■ Inhomogeneous medium index ■ Suspended bubbles index * ■ HBSI * ■ Raw value mass flow ■ Exciter current 0 ■ Oscillation damping 0 	Mass flow

Parameter	Prerequisite	Description	Selection / User entry	Factory setting
			<ul style="list-style-type: none"> ■ Oscillation damping fluctuation 0 * ■ Oscillation frequency 0 ■ Frequency fluctuation 0 * ■ Oscillation amplitude 0 * ■ Signal asymmetry ■ Torsion signal asymmetry * ■ Carrier pipe temperature * ■ Electronics temperature ■ Sensor index coil asymmetry ■ Test point 0 ■ Test point 1 ■ Current output 1 ■ Current output 2 * ■ Current output 3 * ■ Current output 4 * 	
0% bargraph value 1	A local display is provided.	Enter 0% value for bar graph display.	Signed floating-point number	Country-specific: <ul style="list-style-type: none"> ■ 0 kg/h ■ 0 lb/min
100% bargraph value 1	A local display is provided.	Enter 100% value for bar graph display.	Signed floating-point number	Depends on country and nominal diameter
Decimal places 1	A measured value is specified in the Value 1 display parameter.	Select the number of decimal places for the display value.	<ul style="list-style-type: none"> ■ x ■ x.x ■ x.xx ■ x.xxx ■ x.xxxx ■ x.xxxxx ■ x.xxxxxx 	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 (→ 146)	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.	<ul style="list-style-type: none"> ■ x ■ x.x ■ x.xx ■ x.xxx ■ x.xxxx ■ x.xxxxx ■ x.xxxxxx 	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 (→ 146)	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: <ul style="list-style-type: none"> ■ 0 kg/h ■ 0 lb/min
100% bargraph value 3	A selection was made in the Value 3 display parameter.	Enter 100% value for bar graph display.	Signed floating-point number	0

Parameter	Prerequisite	Description	Selection / User entry	Factory setting
Decimal places 3	A measured value is specified in the Value 3 display parameter.	Select the number of decimal places for the display value.	<ul style="list-style-type: none"> ■ x ■ x.x ■ x.xx ■ x.xxx ■ x.xxxx ■ x.xxxxx ■ x.xxxxxx 	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 (→ 146)	None
Decimal places 4	A measured value is specified in the Value 4 display parameter.	Select the number of decimal places for the display value.	<ul style="list-style-type: none"> ■ x ■ x.x ■ x.xx ■ x.xxx ■ x.xxxx ■ x.xxxxx ■ x.xxxxxx 	x.xx
Value 5 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 (→ 146)	None
0% bargraph value 5	An option was selected in the Value 5 display parameter.	Enter 0% value for bar graph display.	Signed floating-point number	Depends on country: <ul style="list-style-type: none"> ■ 0 kg/h ■ 0 lb/min
100% bargraph value 5	An option was selected in the Value 5 display parameter.	Enter 100% value for bar graph display.	Signed floating-point number	0
Decimal places 5	A measured value is specified in the Value 5 display parameter.	Select the number of decimal places for the display value.	<ul style="list-style-type: none"> ■ x ■ x.x ■ x.xx ■ x.xxx ■ x.xxxx ■ x.xxxxx ■ x.xxxxxx 	x.xx
Value 6 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 (→ 146)	None
Decimal places 6	A measured value is specified in the Value 6 display parameter.	Select the number of decimal places for the display value.	<ul style="list-style-type: none"> ■ x ■ x.x ■ x.xx ■ x.xxx ■ x.xxxx ■ x.xxxxx ■ x.xxxxxx 	x.xx
Value 7 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 (→ 146)	None
0% bargraph value 7	An option was selected in the Value 7 display parameter.	Enter 0% value for bar graph display.	Signed floating-point number	Depends on country: <ul style="list-style-type: none"> ■ 0 kg/h ■ 0 lb/min
100% bargraph value 7	An option was selected in the Value 7 display parameter.	Enter 100% value for bar graph display.	Signed floating-point number	0

Parameter	Prerequisite	Description	Selection / User entry	Factory setting
Decimal places 7	A measured value is specified in the Value 7 display parameter.	Select the number of decimal places for the display value.	<ul style="list-style-type: none"> ■ x ■ x.x ■ x.xx ■ x.xxx ■ x.xxxx ■ x.xxxxx ■ x.xxxxxx 	x.xx
Value 8 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 (→ 146)	None
Decimal places 8	A measured value is specified in the Value 8 display parameter.	Select the number of decimal places for the display value.	<ul style="list-style-type: none"> ■ x ■ x.x ■ x.xx ■ x.xxx ■ x.xxxx ■ x.xxxxx ■ x.xxxxxx 	x.xx
Display language	A local display is provided.	Set display language.	<ul style="list-style-type: none"> ■ English ■ Deutsch ■ Français ■ Español ■ Italiano ■ Nederlands ■ Portuguesa ■ Polski ■ русский язык (Russian) ■ Svenska ■ Türkçe ■ 中文 (Chinese) ■ 日本語 (Japanese) ■ 한국어 (Korean) ■ tiếng Việt (Vietnamese) ■ čeština (Czech) 	English (alternatively, the ordered language is preset in the device)
Display interval	A local display is provided.	Set time measured values are shown on display if display alternates between values.	1 to 10 s	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.	<ul style="list-style-type: none"> ■ Device tag ■ Free text 	Device tag
Header text	The Free text option is selected in the Header parameter.	Enter display header text.	Max. 12 characters, such as letters, numbers or special characters (e.g. @, %, /)	-----
Separator	A local display is provided.	Select decimal separator for displaying numerical values.	<ul style="list-style-type: none"> ■ . (point) ■ , (comma) 	. (point)
Backlight	One of the following conditions is met: <ul style="list-style-type: none"> ■ 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.	<ul style="list-style-type: none"> ■ Disable ■ Enable 	Enable

* Visibility depends on order options or device settings

10.6.6 WLAN configuration

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

Navigation

"Setup" menu → Advanced setup → WLAN settings

► WLAN settings

WLAN

→ 169

WLAN mode

→ 169

SSID name

→ 170

Network security

→ 170

Security identification

→ 170

User name

→ 170

WLAN password

→ 170

WLAN IP address

→ 170

WLAN MAC address

→ 170

WLAN passphrase

→ 170

WLAN MAC address

→ 170

Assign SSID name

→ 170

SSID name

→ 170

Connection state



→ 170

Received signal strength

→ 170

Parameter overview with brief description

Parameter	Prerequisite	Description	Selection / User entry / User interface	Factory setting
WLAN	–	Switch WLAN on and off.	<div><div>■ Disable</div><div>■ Enable</div></div>	Enable
WLAN mode	–	Select WLAN mode.	<div><div>■ WLAN access point</div><div>■ WLAN Client</div></div>	WLAN access point

Parameter	Prerequisite	Description	Selection / User entry / User interface	Factory setting
SSID name	The client is activated.	Enter the user-defined SSID name (max. 32 characters).	–	–
Network security	–	Select the security type of the WLAN network.	<ul style="list-style-type: none"> ■ Unsecured ■ WPA2-PSK ■ EAP-PEAP with MSCHAPv2 * ■ EAP-PEAP MSCHAPv2 no server authentic. * ■ EAP-TLS * 	WPA2-PSK
Security identification	–	Select security settings and download these settings via menu Data management > Security > WLAN.	<ul style="list-style-type: none"> ■ Trusted issuer certificate ■ Device certificate ■ Device private key 	–
User name	–	Enter user name.	–	–
WLAN password	–	Enter WLAN password.	–	–
WLAN IP address	–	Enter IP address of the WLAN interface of the device.	4 octet: 0 to 255 (in the particular octet)	192.168.1.212
WLAN MAC address	–	Enter MAC address of the WLAN interface of the device.	Unique 12-digit character string comprising letters and numbers	Each measuring device is given an individual address.
WLAN passphrase	The WPA2-PSK option is selected in the Security type parameter.	Enter the network key (8 to 32 characters).  The network key supplied with the device should be changed during commissioning for security reasons.	8 to 32-digit character string comprising numbers, letters and special characters (without spaces)	Serial number of the measuring device (e.g. L100A802000)
Assign SSID name	–	Select which name will be used for SSID: device tag or user-defined name.	<ul style="list-style-type: none"> ■ Device tag ■ User-defined 	User-defined
SSID name	<ul style="list-style-type: none"> ■ The User-defined option is selected in the Assign SSID name parameter. ■ The WLAN access point option is selected in the WLAN mode parameter. 	Enter the user-defined SSID name (max. 32 characters).  The user-defined SSID name may only be assigned once. If the SSID name is assigned more than once, the devices can interfere with one another.	Max. 32-digit character string comprising numbers, letters and special characters	EH_device designation_last 7 digits of the serial number (e.g. EH_Promass_500_A 802000)
Connection state	–	Displays the connection status.	<ul style="list-style-type: none"> ■ Connected ■ Not connected 	Not connected
Received signal strength	–	Shows the received signal strength.	<ul style="list-style-type: none"> ■ Low ■ Medium ■ High 	High

* Visibility depends on order options or device settings

10.6.7 Viscosity application package





For detailed information on the parameter descriptions for the Viscosity application package, see the Special Documentation for the device → 331

Navigation



"Setup" menu → Advanced setup → Viscosity

10.6.8 Concentration Measurement application package

 For detailed information on the parameter descriptions for the Concentration application package, see the Special Documentation for the device →  331



Navigation
"Setup" menu → Advanced setup → Concentration

10.6.9 Petroleum application package

 For detailed information on the parameter descriptions for the Petroleum application package, see the Special Documentation for the device →  331

Navigation
"Setup" menu → Advanced setup → Petroleum

10.6.10 Heartbeat Technology application package

 For detailed information on the parameter descriptions for the Heartbeat setup application package, see the Special Documentation for the device →  331

Navigation
"Setup" menu → Advanced setup → Heartbeat setup


10.6.11 Configuration management

After commissioning, you can save the current device configuration or restore the previous device configuration. The device configuration is managed via the **Configuration management** parameter.


Navigation
"Setup" menu → Advanced setup → Configuration backup

► Configuration backup


Operating time

→  171


Last backup

→  171


Configuration management

→  172

Backup state

→  172

Comparison result

→  172

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)	–

Parameter	Description	User interface / Selection	Factory setting
Configuration management	Select action for managing the device data in the HistoROM backup.	<ul style="list-style-type: none"> ■ Cancel ■ Execute backup ■ Restore * ■ Compare * ■ Clear backup data 	Cancel
Backup state	Shows the current status of data saving or restoring.	<ul style="list-style-type: none"> ■ 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.	<ul style="list-style-type: none"> ■ 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.
Compare	The device configuration saved in the device memory is compared with the current device configuration of the HistoROM backup.
Clear backup data	The backup copy of the device configuration is deleted from the memory of the device.



HistoROM backup

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



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

10.6.12 Using parameters for device administration

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

Navigation

"Setup" menu → Advanced setup → Administration

<div>► Administration</div> <div>► Define access code</div>	→ 173
---	-------

► Reset access code

→ 173

Device reset

→ 174

Using the parameter to define the access code

Complete this wizard to specify an access code for the Maintenance role.

Navigation

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

► Define access code

Define access code

→ 173

Confirm access code

→ 173

Parameter overview with brief description

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

Using the parameter to reset the access code

Navigation

"Setup" menu → Advanced setup → Administration → Reset access code

► Reset access code


Operating time

→ 173

Reset access code

→ 173

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: <ul style="list-style-type: none">Web browserDeviceCare, FieldCare (via CDI-RJ45 service interface)Fieldbus	Character string comprising numbers, letters and special characters	0x00

Using the parameter to reset the device

Navigation

"Setup" menu → Advanced setup → 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.	<ul style="list-style-type: none">■ Cancel■ To delivery settings■ Restart device■ Restore S-DAT backup *	Cancel

* Visibility depends on order options or device settings

10.7 Simulation

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

Navigation

"Diagnostics" menu → Simulation

► Simulation

Assign simulation process variable

→ 176

Process variable value

→ 176

Current input 1 to n simulation

→ 177

Value current input 1 to n

→ 177

Status input 1 to n simulation

→ 177

Input signal level 1 to n

→ 177

Current output 1 to n simulation

→ 176

Current output value

→ 176

Frequency output 1 to n simulation

→ 176

Frequency output 1 to n value








→ 176

Pulse output simulation 1 to n

→ 177



Pulse value 1 to n

→ 177

Switch output simulation 1 to n	→  177
Switch state 1 to n	→  177
Relay output 1 to n simulation	→  177
Switch state 1 to n	→  177
Device alarm simulation	→  177
Diagnostic event category	→  177
Diagnostic event simulation	→  177

Parameter overview with brief description




Parameter	Prerequisite	Description	Selection / User entry	Factory setting
Assign simulation process variable	–	Select a process variable for the simulation process that is activated.	<ul style="list-style-type: none"> ■ Off ■ Mass flow ■ Volume flow ■ Corrected volume flow[*] ■ Target mass flow[*] ■ Carrier mass flow[*] ■ Target volume flow[*] ■ Carrier volume flow[*] ■ Target corrected volume flow[*] ■ Carrier corrected volume flow[*] ■ Density ■ Reference density[*] ■ Reference density alternative[*] ■ GSV flow[*] ■ GSV flow alternative[*] ■ NSV flow[*] ■ NSV flow alternative[*] ■ S&W volume flow[*] ■ Water cut[*] ■ Oil density[*] ■ Water density[*] ■ Oil mass flow[*] ■ Water mass flow[*] ■ Oil volume flow[*] ■ Water volume flow[*] ■ Oil corrected volume flow[*] ■ Water corrected volume flow[*] ■ Temperature[*] ■ Concentration[*] ■ Time period signal frequency (TPS)[*] 	Off
Process variable value	A process variable is selected in the Assign simulation process variable parameter (→ 176).	Enter the simulation value for the selected process variable.	Depends on the process variable selected	0
Current output 1 to n simulation	–	Switch the simulation of the current output on and off.	<ul style="list-style-type: none"> ■ Off ■ On 	Off
Current output value	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 1 to n simulation	In the Operating mode parameter, the Frequency option is selected.	Switch the simulation of the frequency output on and off.	<ul style="list-style-type: none"> ■ Off ■ On 	Off
Frequency output 1 to n value	In the Frequency 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

Parameter	Prerequisite	Description	Selection / User entry	Factory setting
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 (→  132) defines the pulse width of the pulses output.	<ul style="list-style-type: none"> 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 65535	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.	<ul style="list-style-type: none"> Off On 	Off
Switch state 1 to n	–	Select the status of the status output for the simulation.	<ul style="list-style-type: none"> Open Closed 	Open
Relay output 1 to n simulation	–	Switch simulation of the relay output on and off.	<ul style="list-style-type: none"> Off On 	Off
Switch state 1 to n	The On option is selected in the Switch output simulation 1 to n parameter.	Select status of the relay output for the simulation.	<ul style="list-style-type: none"> Open Closed 	Open
Device alarm simulation	–	Switch the device alarm on and off.	<ul style="list-style-type: none"> Off On 	Off
Diagnostic event category	–	Select a diagnostic event category.	<ul style="list-style-type: none"> Sensor Electronics Configuration Process 	Process
Diagnostic event simulation	–	Select a diagnostic event to simulate this event.	<ul style="list-style-type: none"> Off Diagnostic event picklist (depends on the category selected) 	Off
Current input 1 to n simulation	–	Switch simulation of the current input on and off.	<ul style="list-style-type: none"> Off On 	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
Status input 1 to n simulation	–	Switch simulation of the status input on and off.	<ul style="list-style-type: none"> Off On 	Off
Input signal level 1 to n	In the Status input simulation parameter, the On option is selected.	Select the signal level for the simulation of the status input.	<ul style="list-style-type: none"> High Low 	High

* Visibility depends on order options or device settings

10.8 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 →  178
- Protect access to local operation via key locking →  83
- Protect access to measuring device via write protection switch →  179

10.8.1 Write protection via access code

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

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

Defining the access code via local display

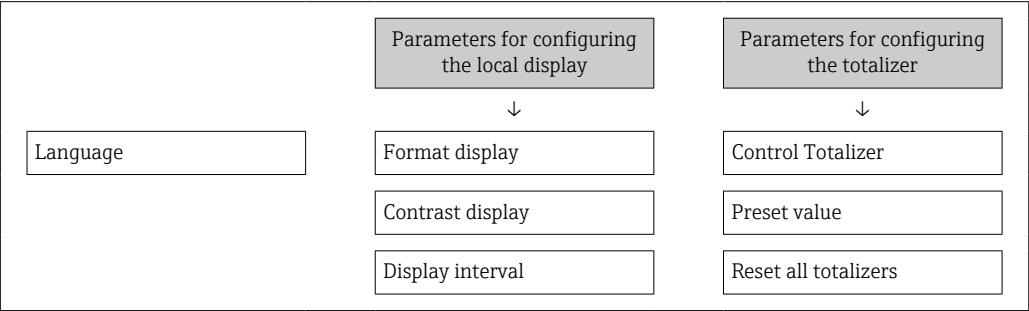
1. Navigate to the **Define access code** parameter (→ ⓘ 173).
2. Define a max. 16-digit character string comprising numbers, letters and special characters as the access code.
3. Enter the access code again in the **Confirm access code** parameter (→ ⓘ 173) to confirm the code.
 - ↳ The ⓘ-symbol appears in front of all write-protected parameters.

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 → ⓘ 82.
- The user role with which the user is currently logged on via the local display → ⓘ 82 is indicated by the **Access status** parameter. Navigation path: Operation → 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.



Defining the access code via the Web browser





1. Navigate to the **Define access code** parameter (→ ⓘ 173).
2. Define a max. 16-digit numeric code as an access code.

3. Enter the access code again in the **Confirm access code** parameter (→  173) 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 →  82.
 - The user role with which the user is currently logged on via Web browser is indicated by the **Access status** parameter. Navigation path: Operation → 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

-  You can only obtain a reset code from your local Endress+Hauser service organization. The code must be calculated explicitly for every device.
1. Note down the serial number of the device.
 2. Read off the **Operating time** parameter.
 3. Contact the local Endress+Hauser service organization and tell them the serial number and the operating time.
 - ↳ Get the calculated reset code.
 4. Enter the reset code in the **Reset access code** parameter (→  173).
 - ↳ The access code has been reset to the factory setting **0000**. It can be redefined →  178.
-  For IT security reasons, the calculated reset code is only valid for 96 hours from the specified operating time and for the specific serial number. If you cannot return to the device within 96 hours, you should either increase the operating time you read out by a few days or switch off the device.

10.8.2 Write protection via write protection switch

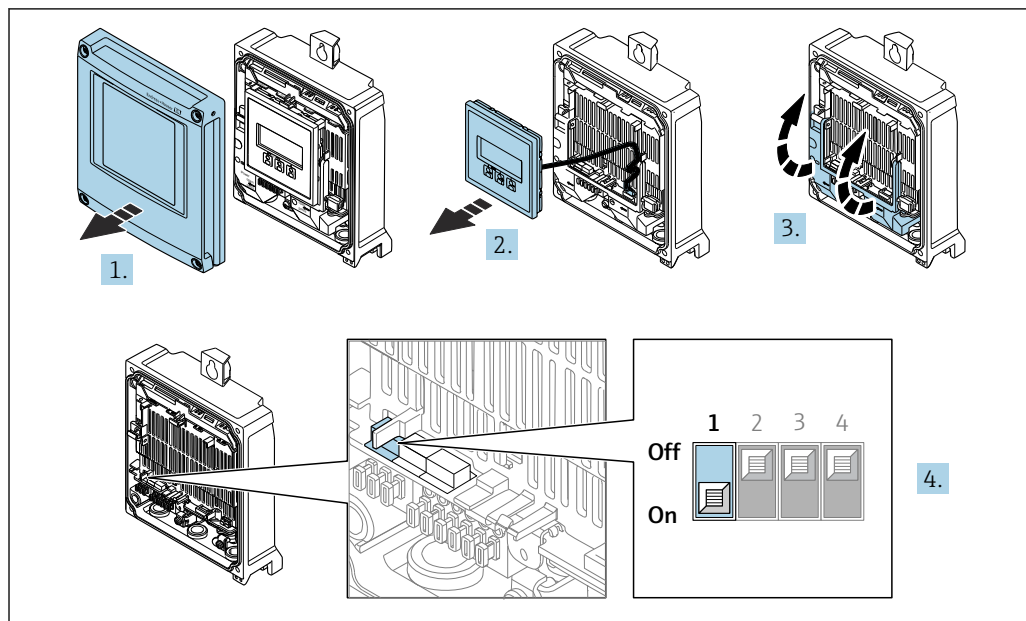
Unlike parameter write protection via a user-specific access code, this allows the user to lock write access to the entire operating menu - apart from the **"Contrast display" parameter**.

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


- Via local display
- Via PROFINET protocol

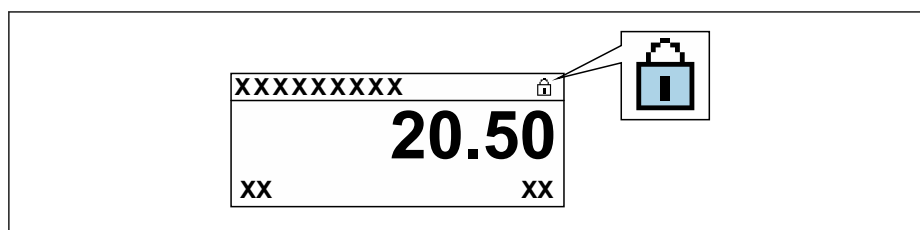
Proline 500 – digital

Enabling/disabling write protection



A0029673

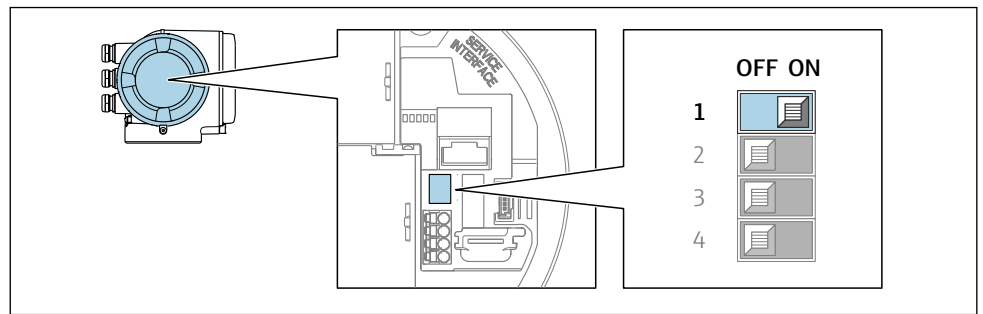
1. Open the housing cover.
2. Remove the display module.
3. Fold open the terminal cover.
4. **Enable or disable write protection:**
 Setting the write protection (WP) switch on the main electronics module to the **ON** position enables hardware write protection/to the **OFF** position (factory setting) disables hardware write protection.
 ↳ In the **Locking status** parameter, the **Hardware locked** option is displayed → 182. When hardware write protection is active, the  symbol appears in the header of the measured value display and in the navigation view in front of the parameters.



A0029425


5. Insert the display module.
6. Close the housing cover.
7. **⚠ 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)

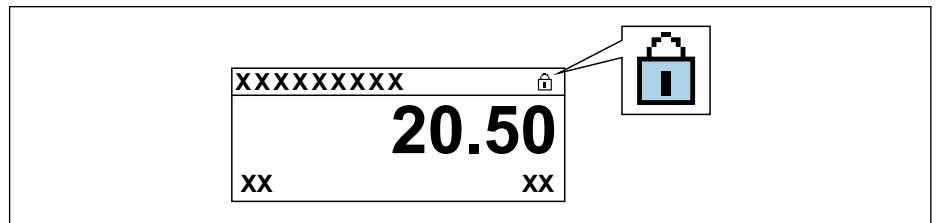
Tighten the securing screws.

Proline 500**1.**

A0029630


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

- ↳ In the **Locking status** parameter, the **Hardware locked** option is displayed → 182. 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.



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

- ↳ No option is displayed in the **Locking status** parameter → 182. On the local display, the  symbol disappears from in front of the parameters in the header of the operational display and in the navigation view.

11 Operation

11.1 Reading off the device locking status


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

Operation → Locking status

Function scope of the "Locking status" parameter

Options	Description
None	The access authorization displayed in the Access status parameter applies → 82. 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) → 179.
Temporarily locked	Write access to the parameters is temporarily locked on account of internal processes running in the device (e.g. data upload/download, reset, etc.). Once the internal processing has been completed, the parameters can be changed once again.

11.2 Adjusting the operating language

-  Detailed information:
- To configure the operating language → 112
 - For information on the operating languages supported by the measuring device → 322

11.3 Configuring the display

- Detailed information:
- On the basic settings for the local display → 143
 - On the advanced settings for the local display → 162

11.4 Reading measured values

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

Navigation
"Diagnostics" menu → Measured values





















► Measured values	
► Measured variables	→ 183
► Totalizer	→ 194
► Input values	→ 195
► Output values	→ 196


























11.4.1 "Measured variables" submenu

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

Navigation

"Diagnostics" menu → Measured values → Measured variables










► Measured variables		
Mass flow	→ 	185
Volume flow	→ 	185
Corrected volume flow	→ 	185
Density	→ 	185
Reference density	→ 	185
Temperature	→ 	185
Pressure	→ 	185
Concentration	→ 	186
Target mass flow	→ 	186
Carrier mass flow	→ 	186
Target corrected volume flow	→ 	186
Carrier corrected volume flow	→ 	186
Target volume flow	→ 	187
Carrier volume flow	→ 	187
CTL	→ 	187
CPL	→ 	187
CTPL	→ 	188
S&W volume flow	→ 	188
S&W correction value	→ 	188
Reference density alternative	→ 	188







GSV flow	→  188
GSV flow alternative	→  189
NSV flow	→  189
NSV flow alternative	→  189
Oil CTL	→  189
Oil CPL	→  189
Oil CTPL	→  190
Water CTL	→  190
CTL alternative	→  190
CPL alternative	→  190
CTPL alternative	→  190
Oil reference density	→  191
Water reference density	→  191
Oil density	→  191
Water density	→  191
Density 2	→  191
Water cut	→  192
Oil volume flow	→  192
Oil corrected volume flow	→  192
Oil mass flow	→  192
Water volume flow	→  192
Water corrected volume flow	→  193
Water mass flow	→  193
Weighted density average	→  193
Weighted temperature average	→  193






Time period signal (TPS)	→ 194
Time period signal frequency (TPS)	→ 194






Parameter overview with brief description






Parameter	Prerequisite	Description	User interface	Factory setting
Mass flow	–	Displays the mass flow that is currently measured. <i>Dependency</i> The unit is taken from: Mass flow unit parameter (→ 117)	Signed floating-point number	–
Volume flow	–	Displays the volume flow that is currently calculated. <i>Dependency</i> The unit is taken from the Volume flow unit parameter (→ 117).	Signed floating-point number	–
Corrected volume flow	–	Displays the corrected volume flow that is currently calculated. <i>Dependency</i> The unit is taken from: Corrected volume flow unit parameter (→ 117)	Signed floating-point number	–
Density	–	Shows the density currently measured. <i>Dependency</i> The unit is taken from the Density unit parameter (→ 117).	Signed floating-point number	–
Reference density	–	Displays the reference density that is currently calculated. <i>Dependency</i> The unit is taken from: Reference density unit parameter (→ 118)	Signed floating-point number	–
Temperature	–	Shows the medium temperature currently measured. <i>Dependency</i> The unit is taken from: Temperature unit parameter (→ 118)	Signed floating-point number	–
Pressure	–	Displays either a fixed or external pressure value. <i>Dependency</i> The unit is taken from the Pressure unit parameter (→ 118).	Signed floating-point number	–






Parameter	Prerequisite	Description	User interface	Factory setting
Concentration	<p>For the following order code: Order code for "Application package", option ED "Concentration"</p> <p> The software options currently enabled are displayed in the Software option overview parameter.</p>	<p>Displays the concentration that is currently calculated.</p> <p><i>Dependency</i> The unit is taken from the Concentration unit parameter.</p>	Signed floating-point number	–
Target mass flow	<p>With the following conditions: Order code for "Application package", option ED "Concentration"</p> <p> The software options currently enabled are displayed in the Software option overview parameter.</p>	<p>Displays the mass flow that is currently measured for the target medium.</p> <p><i>Dependency</i> The unit is taken from the Mass flow unit parameter (→  117).</p>	Signed floating-point number	–
Carrier mass flow	<p>With the following conditions: Order code for "Application package", option ED "Concentration"</p> <p> The software options currently enabled are displayed in the Software option overview parameter.</p>	<p>Displays the mass flow of the carrier medium that is currently measured.</p> <p><i>Dependency</i> The unit is taken from: Mass flow unit parameter (→  117)</p>	Signed floating-point number	–
Target corrected volume flow	<p>With the following conditions:</p> <ul style="list-style-type: none"> Order code for "Application package", option ED "Concentration" The Ethanol in water option or %mass / %volume option is selected in the Liquid type parameter. <p> The software options currently enabled are displayed in the Software option overview parameter.</p>	<p>Displays the corrected volume flow that is currently measured for the target fluid.</p> <p><i>Dependency</i> The unit is taken from the Volume flow unit parameter (→  117).</p>	Signed floating-point number	–
Carrier corrected volume flow	<p>With the following conditions:</p> <ul style="list-style-type: none"> Order code for "Application package", option ED "Concentration" In the Liquid type parameter, the Ethanol in water option or %mass / %volume option is selected. <p> The software options currently enabled are displayed in the Software option overview parameter.</p>	<p>Displays the corrected volume flow currently measured for the carrier fluid.</p> <p><i>Dependency</i> The unit is taken from the Volume flow unit parameter (→  117).</p>	Signed floating-point number	–






Parameter	Prerequisite	Description	User interface	Factory setting
Target volume flow	<p>With the following conditions:</p> <ul style="list-style-type: none"> Order code for "Application package", option ED "Concentration" The Ethanol in water option or %mass / %volume option is selected in the Liquid type parameter. The %vol option is selected in the Concentration unit parameter. <p> The software options currently enabled are displayed in the Software option overview parameter.</p>	<p>Displays the volume flow currently measured for the target medium.</p> <p><i>Dependency</i> The unit is taken from the Volume flow unit parameter (→  117).</p>	Signed floating-point number	–
Carrier volume flow	<p>With the following conditions:</p> <ul style="list-style-type: none"> Order code for "Application package", option ED "Concentration" The Ethanol in water option or %mass / %volume option is selected in the Liquid type parameter. The %vol option is selected in the Concentration unit parameter. <p> The software options currently enabled are displayed in the Software option overview parameter.</p>	<p>Displays the volume flow currently measured for the carrier medium.</p> <p><i>Dependency</i> The unit is taken from the Volume flow unit parameter (→  117).</p>	Signed floating-point number	–
CTL	<p>For the following order code:</p> <ul style="list-style-type: none"> "Application package", option EJ "Petroleum" In the Petroleum mode parameter, the API referenced correction option is selected. <p> The software options currently enabled are displayed in the Software option overview parameter.</p>	Displays the correction factor which represents the effect of temperature on the fluid. This is used to convert the measured volume flow and the measured density to values at reference temperature.	Positive floating-point number	–
CPL	<p>For the following order code:</p> <ul style="list-style-type: none"> "Application package", option EJ "Petroleum" In the Petroleum mode parameter, the API referenced correction option is selected. <p> The software options currently enabled are displayed in the Software option overview parameter.</p>	Displays the correction factor which represents the effect of pressure on the fluid. This is used to convert the measured volume flow and the measured density to values at reference pressure.	Positive floating-point number	–





Parameter	Prerequisite	Description	User interface	Factory setting
CTPL	<p>For the following order code:</p> <ul style="list-style-type: none"> ▪ "Application package", option EJ "Petroleum" ▪ In the Petroleum mode parameter, the API referenced correction option is selected. <p> The software options currently enabled are displayed in the Software option overview parameter.</p>	<p>Displays the combined correction factor which represents the effect of temperature and pressure on the fluid. This is used to convert the measured volume flow and the measured density to values at reference temperature and reference pressure.</p>	Positive floating-point number	–
S&W volume flow	<p>For the following order code:</p> <ul style="list-style-type: none"> ▪ "Application package", option EJ "Petroleum" ▪ In the Petroleum mode parameter, the API referenced correction option is selected. <p> The software options currently enabled are displayed in the Software option overview parameter.</p>	<p>Displays the S&W volume flow which is calculated from the measured total volume flow minus the net volume flow.</p> <p><i>Dependency</i> The unit is taken from: Volume flow unit parameter</p>	Signed floating-point number	–
S&W correction value	<p>For the following order code:</p> <ul style="list-style-type: none"> ▪ "Application package", option EJ "Petroleum" ▪ In the S&W input mode parameter, the External value option or the Current input 1...n option is selected. <p> The software options currently enabled are displayed in the Software option overview parameter.</p>	Shows the correction value for sediment and water.	Positive floating-point number	–
Reference density alternative	<p>For the following order code:</p> <ul style="list-style-type: none"> ▪ "Application package", option EJ "Petroleum" ▪ In the Petroleum mode parameter, the API referenced correction option is selected. <p> The software options currently enabled are displayed in the Software option overview parameter.</p>	<p>Displays the fluid density at the alternative reference temperature.</p> <p><i>Dependency</i> The unit is taken from: Reference density unit parameter</p>	Signed floating-point number	–
GSV flow	<p>For the following order code:</p> <ul style="list-style-type: none"> ▪ "Application package", option EJ "Petroleum" ▪ In the Petroleum mode parameter, the API referenced correction option is selected. <p> The software options currently enabled are displayed in the Software option overview parameter.</p>	<p>Displays the measured total volume flow, corrected to the reference temperature and the reference pressure.</p> <p><i>Dependency</i> The unit is taken from: Corrected volume flow unit parameter</p>	Signed floating-point number	–



Parameter	Prerequisite	Description	User interface	Factory setting
GSV flow alternative	<p>For the following order code:</p> <ul style="list-style-type: none"> ▪ "Application package", option EJ "Petroleum" ▪ In the Petroleum mode parameter, the API referenced correction option is selected. <p> The software options currently enabled are displayed in the Software option overview parameter.</p>	<p>Displays the measured total volume flow, corrected to the alternative reference temperature and the alternative reference pressure.</p> <p><i>Dependency</i> The unit is taken from: Corrected volume flow unit parameter</p>	Signed floating-point number	–
NSV flow	<p>For the following order code:</p> <ul style="list-style-type: none"> ▪ "Application package", option EJ "Petroleum" ▪ In the Petroleum mode parameter, the API referenced correction option is selected. <p> The software options currently enabled are displayed in the Software option overview parameter.</p>	<p>Displays the net volume flow which is calculated from the measured total volume flow minus the value for sediment & water and minus the shrinkage.</p> <p><i>Dependency</i> The unit is taken from: Corrected volume flow unit parameter</p>	Signed floating-point number	–
NSV flow alternative	<p>For the following order code:</p> <ul style="list-style-type: none"> ▪ "Application package", option EJ "Petroleum" ▪ In the Petroleum mode parameter, the API referenced correction option is selected. <p> The software options currently enabled are displayed in the Software option overview parameter.</p>	<p>Displays the net volume flow which is calculated from the measured alternative total volume minus the value for sediment & water and minus the shrinkage.</p> <p><i>Dependency</i> The unit is taken from: Corrected volume flow unit parameter</p>	Signed floating-point number	–
Oil CTL	<p>For the following order code:</p> <ul style="list-style-type: none"> ▪ "Application package", option EJ "Petroleum" ▪ In the Petroleum mode parameter, the Net oil & water cut option is selected. <p> The software options currently enabled are displayed in the Software option overview parameter.</p>	<p>Displays the correction factor which represents the effect of temperature on the oil. This is used to convert the measured oil volume flow and the measured oil density to values at reference temperature.</p>	Positive floating-point number	–
Oil CPL	<p>For the following order code:</p> <ul style="list-style-type: none"> ▪ "Application package", option EJ "Petroleum" ▪ In the Petroleum mode parameter, the Net oil & water cut option is selected. <p> The software options currently enabled are displayed in the Software option overview parameter.</p>	<p>Displays the correction factor which represents the effect of pressure on the oil. This is used to convert the measured oil volume flow and the measured oil density to values at reference pressure.</p>	Positive floating-point number	–

Parameter	Prerequisite	Description	User interface	Factory setting
Oil CTPL	<p>For the following order code:</p> <ul style="list-style-type: none"> ▪ "Application package", option EJ "Petroleum" ▪ In the Petroleum mode parameter, the Net oil & water cut option is selected. <p> The software options currently enabled are displayed in the Software option overview parameter.</p>	Displays the combined correction factor which represents the effect of temperature and pressure on the oil. This is used to convert the measured oil volume flow and the measured oil density to values at reference temperature and reference pressure.	Positive floating-point number	–
Water CTL	<p>For the following order code:</p> <ul style="list-style-type: none"> ▪ "Application package", option EJ "Petroleum" ▪ In the Petroleum mode parameter, the Net oil & water cut option is selected. <p> The software options currently enabled are displayed in the Software option overview parameter.</p>	Displays the correction factor which represents the effect of temperature on the water. This is used to convert the measured water volume flow and the measured water density to values at reference temperature.	Positive floating-point number	–
CTL alternative	<p>For the following order code:</p> <ul style="list-style-type: none"> ▪ "Application package", option EJ "Petroleum" ▪ In the Petroleum mode parameter, the API referenced correction option is selected. <p> The software options currently enabled are displayed in the Software option overview parameter.</p>	Displays the correction factor which represents the effect of temperature on the fluid. This is used to convert the measured volume flow and the measured density to values at the alternative reference temperature.	Positive floating-point number	–
CPL alternative	<p>For the following order code:</p> <ul style="list-style-type: none"> ▪ "Application package", option EJ "Petroleum" ▪ In the Petroleum mode parameter, the API referenced correction option is selected. <p> The software options currently enabled are displayed in the Software option overview parameter.</p>	Displays the correction factor which represents the effect of pressure on the fluid. This is used to convert the measured volume flow and the measured density to values at the alternative reference pressure.	Positive floating-point number	–
CTPL alternative	<p>For the following order code:</p> <ul style="list-style-type: none"> ▪ "Application package", option EJ "Petroleum" ▪ In the Petroleum mode parameter, the API referenced correction option is selected. <p> The software options currently enabled are displayed in the Software option overview parameter.</p>	Displays the combined correction factor which represents the effect of temperature and pressure on the fluid. This is used to convert the measured volume flow and the measured density to values at the alternative reference temperature and the alternative reference pressure.	Positive floating-point number	1

Parameter	Prerequisite	Description	User interface	Factory setting
Oil reference density	<p>For the following order code:</p> <ul style="list-style-type: none"> ▪ "Application package", option EJ "Petroleum" ▪ In the Petroleum mode parameter, the Net oil & water cut option is selected. <p> The software options currently enabled are displayed in the Software option overview parameter.</p>	Shows the oil density at the reference temperature.	Signed floating-point number	–
Water reference density	<p>For the following order code:</p> <ul style="list-style-type: none"> ▪ "Application package", option EJ "Petroleum" ▪ In the Petroleum mode parameter, the Net oil & water cut option is selected. <p> The software options currently enabled are displayed in the Software option overview parameter.</p>	Shows the water density at the reference temperature.	Signed floating-point number	–
Oil density	<p>For the following order code:</p> <ul style="list-style-type: none"> ▪ "Application package", option EJ "Petroleum" ▪ In the Petroleum mode parameter, the Net oil & water cut option is selected. <p> The software options currently enabled are displayed in the Software option overview parameter.</p>	Displays the density of the oil currently measured.	Signed floating-point number	–
Water density	<p>For the following order code:</p> <ul style="list-style-type: none"> ▪ "Application package", option EJ "Petroleum" ▪ In the Petroleum mode parameter, the Net oil & water cut option is selected. <p> The software options currently enabled are displayed in the Software option overview parameter.</p>	Displays the density of the water currently measured.	Signed floating-point number	–
Density 2	<p>For the following order code:</p> <ul style="list-style-type: none"> ▪ "Application package", option EH "Extended density function" ▪ "Application package", option EI "Premium density" <p> The software options currently enabled are displayed in the Software option overview parameter.</p>	Shows the density currently measured in the second density unit specified.	Signed floating-point number	–

Parameter	Prerequisite	Description	User interface	Factory setting
Water cut	<p>For the following order code:</p> <ul style="list-style-type: none"> ▪ "Application package", option EJ "Petroleum" ▪ In the Petroleum mode parameter, the API referenced correction option is selected. <p> The software options currently enabled are displayed in the Software option overview parameter.</p>	Displays the percentage water volume flow in relation to the total volume flow of the fluid.	0 to 100 %	–
Oil volume flow	<p>For the following order code:</p> <ul style="list-style-type: none"> ▪ "Application package", option EJ "Petroleum" ▪ In the Petroleum mode parameter, the Net oil & water cut option is selected. <p> The software options currently enabled are displayed in the Software option overview parameter.</p>	<p>Displays the currently calculated volume flow of the oil.</p> <p>Dependency:</p> <ul style="list-style-type: none"> ▪ Based on the value displayed in the Water cut parameter ▪ The unit is taken from: Volume flow unit parameter 	Signed floating-point number	–
Oil corrected volume flow	<p>For the following order code:</p> <ul style="list-style-type: none"> ▪ "Application package", option EJ "Petroleum" ▪ In the Petroleum mode parameter, the Net oil & water cut option is selected. <p> The software options currently enabled are displayed in the Software option overview parameter.</p>	<p>Displays the currently calculated volume flow of the oil, calculated to values at reference temperature and reference pressure.</p> <p>Dependency:</p> <ul style="list-style-type: none"> ▪ Based on the value displayed in the Water cut parameter ▪ The unit is taken from: Corrected volume flow unit parameter 	Signed floating-point number	–
Oil mass flow	<p>For the following order code:</p> <ul style="list-style-type: none"> ▪ "Application package", option EJ "Petroleum" ▪ In the Petroleum mode parameter, the Net oil & water cut option is selected. <p> The software options currently enabled are displayed in the Software option overview parameter.</p>	<p>Displays the currently calculated mass flow of the oil.</p> <p>Dependency:</p> <ul style="list-style-type: none"> ▪ Based on the value displayed in the Water cut parameter ▪ The unit is taken from: Mass flow unit parameter 	Signed floating-point number	–
Water volume flow	<p>For the following order code:</p> <ul style="list-style-type: none"> ▪ "Application package", option EJ "Petroleum" ▪ In the Petroleum mode parameter, the Net oil & water cut option is selected. <p> The software options currently enabled are displayed in the Software option overview parameter.</p>	<p>Displays the currently calculated volume flow of the water.</p> <p>Dependency:</p> <ul style="list-style-type: none"> ▪ Based on the value displayed in the Water cut parameter ▪ The unit is taken from: Volume flow unit parameter 	Signed floating-point number	–

Parameter	Prerequisite	Description	User interface	Factory setting
Water corrected volume flow	<p>For the following order code:</p> <ul style="list-style-type: none"> ▪ "Application package", option EJ "Petroleum" ▪ In the Petroleum mode parameter, the Net oil & water cut option is selected. <p> The software options currently enabled are displayed in the Software option overview parameter.</p>	<p>Displays the currently calculated volume flow of the water, calculated to values at reference temperature and reference pressure.</p> <p>Dependency:</p> <ul style="list-style-type: none"> ▪ Based on the value displayed in the Water cut parameter ▪ The unit is taken from: Corrected volume flow unit parameter 	Signed floating-point number	–
Water mass flow	<p>For the following order code:</p> <ul style="list-style-type: none"> ▪ "Application package", option EJ "Petroleum" ▪ In the Petroleum mode parameter, the Net oil & water cut option is selected. <p> The software options currently enabled are displayed in the Software option overview parameter.</p>	<p>Displays the currently calculated mass flow of the water.</p> <p>Dependency:</p> <ul style="list-style-type: none"> ▪ Based on the value displayed in the Water cut parameter ▪ The unit is taken from: Mass flow unit parameter 	Signed floating-point number	–
Weighted density average	<p>For the following order code:</p> <ul style="list-style-type: none"> ▪ "Application package", option EJ "Petroleum" ▪ "Application package", option EM "Petroleum + Locking function" <p> The software options currently enabled are displayed in the Software option overview parameter.</p>	<p>Displays the weighted average for the density since the last time the density averages were reset.</p> <p>Dependency:</p> <ul style="list-style-type: none"> ▪ The unit is taken from: Density unit parameter ▪ The value is reset to NaN (Not a Number) via the Reset weighted averages parameter 	Signed floating-point number	–
Weighted temperature average	<p>For the following order code:</p> <ul style="list-style-type: none"> ▪ "Application package", option EJ "Petroleum" ▪ "Application package", option EM "Petroleum + Locking function" <p> The software options currently enabled are displayed in the Software option overview parameter.</p>	<p>Displays the weighted average for the temperature since the last time the temperature averages were reset.</p> <p>Dependency:</p> <ul style="list-style-type: none"> ▪ The unit is taken from: Temperature unit parameter ▪ The value is reset to NaN (Not a Number) via the Reset weighted averages parameter 	Signed floating-point number	–

Parameter	Prerequisite	Description	User interface	Factory setting
Time period signal (TPS)	For the following order code: <ul style="list-style-type: none">▪ "Application package", option EH "Extended density function"▪ "Application package", option EI "Premium density"  The software options currently enabled are displayed in the Software option overview parameter.	Shows the time period signal (TPS) currently calculated. Corresponds to the measured density.	Positive floating-point number	–
Time period signal frequency (TPS)	For the following order code: <ul style="list-style-type: none">▪ "Application package", option EH "Extended density function"▪ "Application package", option EI "Premium density"  The software options currently enabled are displayed in the Software option overview parameter.	Shows the frequency of the time period signal (TPS) currently calculated. Corresponds to the measured density.	0 to 10 000 Hz	–

11.4.2 Totalizer


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

Navigation


"Diagnostics" menu → Measured values → Totalizer

► Totalizer


Assign process variable 1 to n

→  195


Totalizer 1 to n value

→  195

Totalizer 1 to n status

→  195

Totalizer 1 to n status (Hex)

→  195

Parameter overview with brief description

Parameter	Description	Selection / User interface	Factory setting
Assign process variable 1 to n	Select process variable for totalizer.	<ul style="list-style-type: none"> ■ Mass flow ■ Volume flow ■ Corrected volume flow * ■ Target mass flow * ■ Carrier mass flow * ■ Target volume flow * ■ Carrier volume flow * ■ Target corrected volume flow * ■ Carrier corrected volume flow * ■ GSV flow * ■ GSV flow alternative * ■ NSV flow * ■ NSV flow alternative * ■ S&W volume flow * ■ Oil mass flow * ■ Water mass flow * ■ Oil volume flow * ■ Water volume flow * ■ Oil corrected volume flow * ■ Water corrected volume flow * ■ Raw value mass flow 	Mass flow
Totalizer 1 to n value	Shows the totalizer value reported to the controller for further processing.	Signed floating-point number	0 kg
Totalizer 1 to n status	Shows the status of the totalizer value reported to the controller for further processing ('Good', 'Uncertain', 'Bad').	<ul style="list-style-type: none"> ■ Good ■ Uncertain ■ Bad 	Good
Totalizer 1 to n status (Hex)	Shows the status of the totalizer value reported to the controller for further processing (Hex).	0 to 255	128

* Visibility depends on order options or device settings

11.4.3 "Input values" submenu

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

Navigation

"Diagnostics" menu → Measured values → Input values

► Input values	
► Current input 1 to n	→ 195
► Status input 1 to n	→ 196

Input values of current input

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

Navigation

"Diagnostics" menu → Measured values → Input values → Current input 1 to n

► Current input 1 to n

Measured values 1 to n

Measured current 1 to n

→ 196

→ 196

Parameter overview with brief description

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

Input values of status input

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

Navigation

"Diagnostics" menu → Measured values → Input values → Status input 1 to n

► Status input 1 to n

Value status input

→ 196

Parameter overview with brief description

Parameter	Description	User interface
Value status input	Shows the current input signal level.	<div>■ High</div> <div>■ Low</div>

11.4.4 Output values

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

Navigation

"Diagnostics" menu → Measured values → Output values

► Output values

► Current output 1 to n

→ 197

► Pulse/frequency/switch output 1 to n	→ 197
► Relay output 1 to n	→ 198

Output values of current output

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

Navigation

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

► Current output 1 to n	
Output current	→ 197
Measured current	→ 197

Parameter overview with brief description

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

Output values for pulse/frequency/switch output

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

Navigation

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

► Pulse/frequency/switch output 1 to n	
Output frequency	→ 198
Pulse output 1 to n	→ 198
Switch state	→ 198

Parameter overview with brief description

Parameter	Prerequisite	Description	User interface
Output frequency	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 state	The Switch option is selected in the Operating mode parameter.	Displays the current switch output status.	<div>■ Open</div> <div>■ Closed</div>

Output values for relay output

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

Navigation

"Diagnostics" menu → Measured values → Output values → Relay output 1 to n

► Relay output 1 to n

Switch state

→ ⓘ 198

Switch cycles

→ ⓘ 198

Max. switch cycles number

→ ⓘ 198

Parameter overview with brief description

Parameter	Description	User interface
Switch state	Shows the current relay switch status.	<div>■ Open</div> <div>■ Closed</div>
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 (→ ⓘ 113)
- Advanced settings using the**Advanced setup** submenu (→ ⓘ 151)

11.6 Performing a totalizer reset

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

- Control Totalizer
- Reset all totalizers

Navigation

"Operation" menu → Totalizer handling

► Totalizer handling	
Totalizer 1 to n control (11101-1 to n)	→ 199
Preset value 1 to n (11108-1 to n)	→ 199
Reset all totalizers (2806)	→ 199

Parameter overview with brief description

Parameter	Description	Selection / User entry	Factory setting
Totalizer 1 to n control	Operate the totalizer.	<ul style="list-style-type: none"> ■ Reset + hold ■ Preset + hold ■ Hold ■ Totalize 	Totalize
Preset value 1 to n	Specify start value for totalizer.	Signed floating-point number	0 kg
Reset all totalizers	Reset all totalizers to 0 and start.	<ul style="list-style-type: none"> ■ Cancel ■ Reset + totalize 	Cancel

11.6.1 Function scope of "Control Totalizer" parameter

Options	Description
Totalize	The totalizer is started or continues running.
Reset + hold	The totaling process is stopped and the totalizer is reset to 0.
Preset + hold ¹⁾	The totaling process is stopped and the totalizer is set to its defined start value from the Preset value parameter.
Reset + totalize	The totalizer is reset to 0 and the totaling process is restarted.
Preset + totalize ¹⁾	The totalizer is set to the defined start value in the Preset value parameter and the totaling process is restarted.
Hold	Totalizing is stopped.



1) Visible depending on the order options or device settings

11.6.2 Function scope of the "Reset all totalizers" parameter

Options	Description
Cancel	No action is executed and the user exits the parameter.
Reset + totalize	Resets all totalizers to 0 and restarts the totaling process. This deletes all the flow values previously totalized.

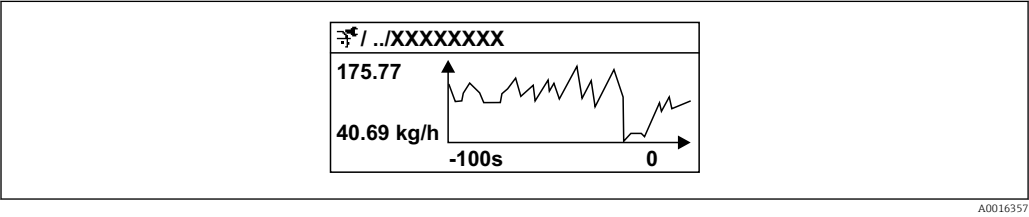
11.7 Show data logging


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.

-  Data logging is also available via:
- Plant Asset Management Tool FieldCare →  94.
 - Web browser


Function scope

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












 39 Chart of a measured value trend



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

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

Navigation







"Diagnostics" menu → Data logging

► Data logging		
Assign channel 1	→	 202
Assign channel 2	→	 203
Assign channel 3	→	 203
Assign channel 4	→	 203
Logging interval	→	 203
Clear logging data	→	 203
Data logging	→	 203
Logging delay	→	 203
Data logging control	→	 203

Data logging status	→  204
Entire logging duration	→  204

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.	<ul style="list-style-type: none"> ■ Off ■ Mass flow ■ Volume flow ■ Corrected volume flow * ■ Density ■ Reference density * ■ Temperature ■ Pressure ■ GSV flow * ■ GSV flow alternative * ■ NSV flow * ■ NSV flow alternative * ■ S&W volume flow * ■ Reference density alternative * ■ Water cut * ■ Oil density * ■ Water density * ■ Oil mass flow * ■ Water mass flow * ■ Oil volume flow * ■ Water volume flow * ■ Oil corrected volume flow * ■ Water corrected volume flow * ■ Concentration * ■ Target mass flow * ■ Carrier mass flow * ■ Target volume flow * ■ Carrier volume flow * ■ Target corrected volume flow * ■ Carrier corrected volume flow * ■ Application specific output 0 * ■ Application specific output 1 * ■ Inhomogeneous medium index ■ Suspended bubbles index * ■ HBSI * ■ Raw value mass flow ■ Exciter current 0 ■ Oscillation damping 0 ■ Oscillation damping fluctuation 0 * ■ Oscillation frequency 0 ■ Frequency fluctuation 0 * ■ Oscillation amplitude * 	Off

Parameter	Prerequisite	Description	Selection / User entry / User interface	Factory setting
			<ul style="list-style-type: none"> ■ Oscillation amplitude 1 * ■ Signal asymmetry ■ Torsion signal asymmetry * ■ Carrier pipe temperature * ■ Electronics temperature ■ Sensor index coil asymmetry ■ Test point 0 ■ Test point 1 ■ Current output 1 ■ Current output 2 * ■ Current output 3 * ■ Current output 4 * 	
Assign channel 2	<p>The Extended HistoROM application package is available.</p> <p> The software options currently enabled are displayed in the Software option overview parameter.</p>	Assign a process variable to logging channel.	For the picklist, see the Assign channel 1 parameter (→  202)	Off
Assign channel 3	<p>The Extended HistoROM application package is available.</p> <p> The software options currently enabled are displayed in the Software option overview parameter.</p>	Assign a process variable to logging channel.	For the picklist, see the Assign channel 1 parameter (→  202)	Off
Assign channel 4	<p>The Extended HistoROM application package is available.</p> <p> The software options currently enabled are displayed in the Software option overview parameter.</p>	Assign a process variable to logging channel.	For the picklist, see the Assign channel 1 parameter (→  202)	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.	<ul style="list-style-type: none"> ■ Cancel ■ Clear data 	Cancel
Data logging	–	Select the type of data logging.	<ul style="list-style-type: none"> ■ 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.	<ul style="list-style-type: none"> ■ 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.	<div><div>■ Done</div><div>■ Delay active</div><div>■ Active</div><div>■ Stopped</div></div>	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

11.8 Gas Fraction Handler

The Gas Fraction Handler improves measurement stability and repeatability in the event of two-phase media and provides valuable diagnostic information for the process.



The function continuously checks for the presence of gas bubbles in liquids or droplets in gases, as this second phase influences the output values for flow and density.

In the case of two-phase media, the Gas Fraction Handler stabilizes the output values and enables better readability for operators and easier interpretation by the distributed control system. The level of smoothing is adjusted according to the severity of the disturbances introduced by the second phase. In the case of single-phase media, the Gas Fraction Handler does not have any influence on the output values.

Possible options in the Gas Fraction Handler parameter:

- Off: Disables the Gas Fraction Handler. When a second phase is present, large fluctuations in the values output for flow and density will occur.
- Moderate: Use for applications with low levels or intermittent levels of second phase.
- Powerful: Use for applications with very significant levels of second phase.


The Gas Fraction Handler is cumulative to any fixed damping constants applied to flow and density that are set elsewhere in the instrument parameterization.

 For detailed information on the parameter descriptions of the Gas Fraction Handler, see the Special Documentation for the device →  331

11.8.1 "Measurement mode" submenu

Navigation

"Expert" menu → Sensor → Measurement mode

<div>► Measurement mode</div>
<div>Gas Fraction Handler (6377)</div>
<div>→  204</div>

Parameter overview with brief description

Parameter	Description	Selection	Factory setting
Gas Fraction Handler	Activates the Gas Fraction Handler function for two phase media.	<div><div>■ Off</div><div>■ Moderate</div><div>■ Powerful</div></div>	Moderate

11.8.2 "Medium index" submenu

Navigation

"Expert" menu → Application → Medium index

► Medium index		
Inhomogeneous medium index (6368)	→	📄 205
Cut off inhomogeneous wet gas (6375)	→	📄 205
Cut off inhomogeneous liquid (6374)	→	📄 205
Suspended bubbles index (6376)	→	📄 205
Cut off suspended bubbles (6370)	→	📄 205

Parameter overview with brief description

Parameter	Prerequisite	Description	User interface / User entry	Factory setting
Inhomogeneous medium index	–	Shows the degree of inhomogeneity of the medium.	Signed floating-point number	–
Cut off inhomogeneous wet gas	–	Enter cut off value for wet gas applications. Below this value the 'Inhomogeneous medium index' is set to 0.	Positive floating-point number	0.25
Cut off inhomogeneous liquid	–	Enter cut off value for liquid applications. Below this value the 'Inhomogeneous medium index' is set to 0.	Positive floating-point number	0.05
Suspended bubbles index	The diagnostic index is only available for Promass Q.	Shows the relative amount of suspended bubbles in the medium.	Signed floating-point number	–
Cut off suspended bubbles	The parameter is only available for Promass Q.	Enter the cut off value for suspended bubbles. Below this value the 'Index for suspended bubbles' is set to 0.	Positive floating-point number	0.05

12 Diagnostics and troubleshooting

12.1 General troubleshooting

For local display

Error	Possible causes	Remedy
Local display dark and no output signals	Supply voltage does not match that specified 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 → 292.
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.	1. Check the connection of the electrode cable and correct if necessary. 2. 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.	<ul style="list-style-type: none"> Set the display brighter by simultaneously pressing + . Set the display darker by simultaneously pressing + .
Local display is dark, but signal output is within the valid range	The cable of the display module is not plugged in correctly.	Insert the plug correctly into the main electronics module and display module.
Local display is dark, but signal output is within the valid range	Display module is defective.	Order spare part → 292.
Backlighting of local display is red	Diagnostic event with "Alarm" diagnostic behavior has occurred.	Take remedial measures → 218
Text on local display appears in a foreign language and cannot be understood.	Incorrect operating language is configured.	<ol style="list-style-type: none"> Press 2 s + ("home position"). Press . Set the desired language in the Display language parameter (→ 168).
Message on local display: "Communication Error" "Check Electronics"	Communication between the display module and the electronics is interrupted.	<ul style="list-style-type: none"> Check the cable and the connector between the main electronics module and display module. Order spare part → 292.

For output signals

Error	Possible causes	Remedial action
Signal output outside the valid range	Main electronics module is defective.	Order spare part → 292.
Device shows correct value on local display, but signal output is incorrect, though in the valid range.	Parametrization errors	Check parameterization and correct it.
Device measures incorrectly.	Configuration error or device is operated outside the application.	1. Check and correct parameter configuration. 2. Observe limit values specified in the "Technical Data".

For access

Problem	Possible causes	Remedy
No write access to parameters.	Hardware write protection is enabled.	Set the write protection switch on the main electronics module to the OFF position → 179.
No write access to parameters.	Current user role has limited access authorization.	1. Check user role → 82. 2. Enter correct customer-specific access code → 82.
No connection to web server.	Web server is disabled.	Using the "FieldCare" or "DeviceCare" operating tool, check whether the Web server of the measuring device is enabled, and enable it if necessary → 90.
	Incorrect settings for the Ethernet interface of the computer.	1. Check the properties of the Internet protocol (TCP/IP) → 86 → 86. 2. Check the network settings with the IT manager.
No connection to web server.	Incorrect WLAN access data.	<ul style="list-style-type: none"> Check WLAN network status. Log on to the device again using WLAN access data. Check that WLAN is enabled on the measuring device and operating device → 86.
	WLAN communication is disabled.	–
Not connecting to web server, FieldCare or DeviceCare.	No WLAN network available.	<ul style="list-style-type: none"> 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.	<ul style="list-style-type: none"> 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.	<ul style="list-style-type: none"> Check network settings. Temporarily enable only the WLAN as an interface.
Web browser is frozen and operation no longer possible.	Data transfer is active.	Wait until data transfer or current action is finished.
	Connection lost	1. Check cable connection and power supply. 2. Refresh the Web browser and restart if necessary.
Content of web browser is incomplete or difficult to read.	Not using optimum version of Web server.	1. Use the correct Web browser version → 84. 2. Clear the Web browser cache and restart the Web browser.

Problem	Possible causes	Remedy
	Unsuitable view settings.	Change the font size/display ratio of the Web browser.
No or incomplete display of contents in the web browser.	<ul style="list-style-type: none"> JavaScript is not enabled JavaScript cannot be enabled 	<ol style="list-style-type: none"> 1. Enable JavaScript. 2. Enter <code>http://XXX.XXX.X.X.XX/servlet/basic.html</code> as the IP address.
Operation with FieldCare or DeviceCare is not possible 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) is not possible.	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.

For system integration

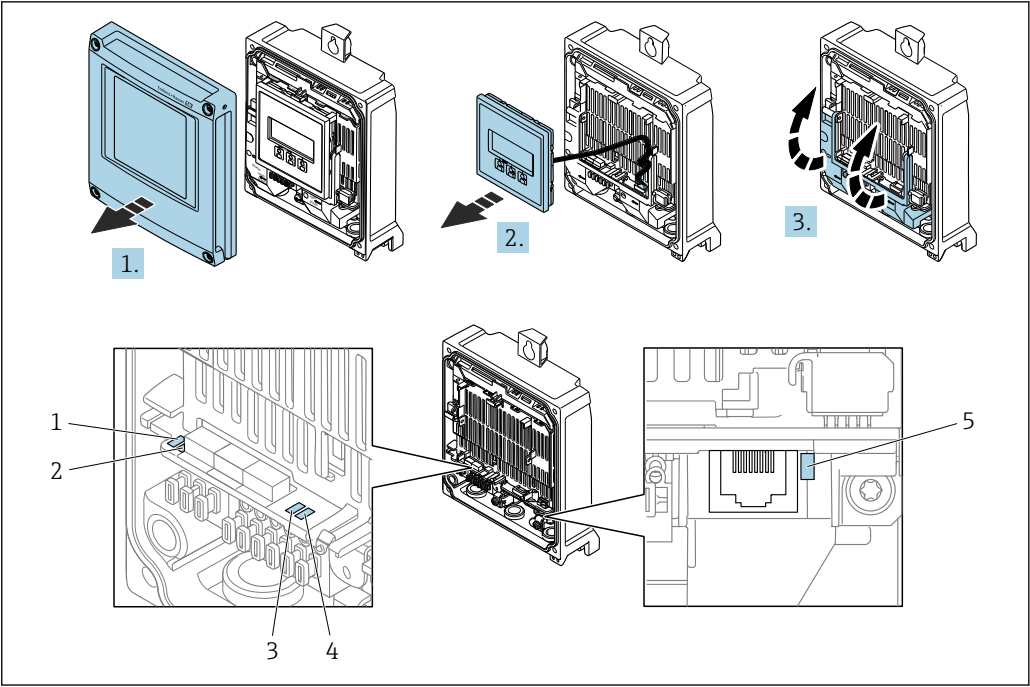
Error	Possible causes	Remedy
The PROFINET device name is not displayed correctly and contains coding.	A device name containing one or more underscores has been specified via the automation system.	Specify a correct device name (without underscores) via the automation system.

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.



A0029689

- 1 Supply voltage
- 2 Device status
- 3 Flashing/network status
- 4 Port 1 active: PROFINET with Ethernet-APL
- 5 Port 2 active: service interface (CDI)

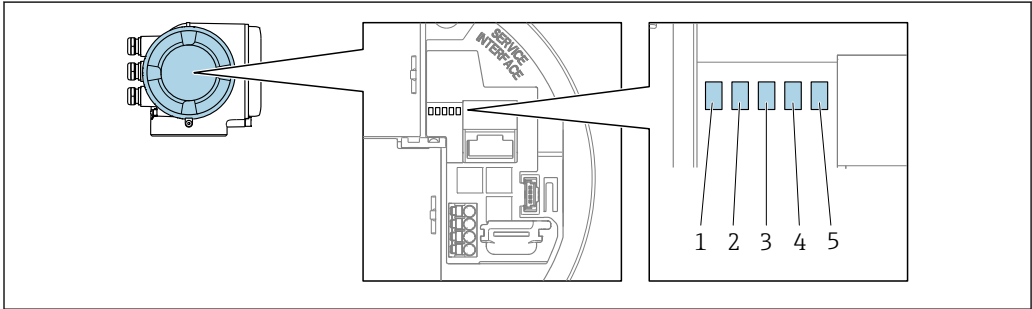
- 1. Open the housing cover.
- 2. Remove the display module.
- 3. Fold open the terminal cover.

LED	Color	Meaning
1 Supply voltage	Off	Supply voltage is off or too low.
	Green	Supply voltage is ok.
2 Device status/module status (normal operation)	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/self-test.
3 Flashing/network status	Green	Cyclic data exchange is active.
	Flashing green	Following request from automation system: Flash frequency: 1 Hz (flash functionality: 500 ms on, 500 ms off) Cyclic data exchange is not active, no IP address is available: Flash frequency: 4 Hz
	Red	IP address is available but there is no connection to the automation system
	Flashing red	Cyclic data exchange was active but the connection was disconnected: Flash frequency: 3 Hz

LED	Color	Meaning
4 Port 1 active: PROFINET with Ethernet-APL	Off	Not connected or no connection established.
	Green	Connection available, no active communication
	Flashing green	Connection with active communication
5 Port 2 active: Service interface (CDI)	Off	Not connected or no connection established.
	Amber	Connection available but no activity.
	Flashing amber	Activity present.

Proline 500

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



A0029629

- 1 Supply voltage
- 2 Device status
- 3 Flashing/network status
- 4 Port 1 active: PROFINET with Ethernet-APL
- 5 Port 2 active: service interface (CDI)

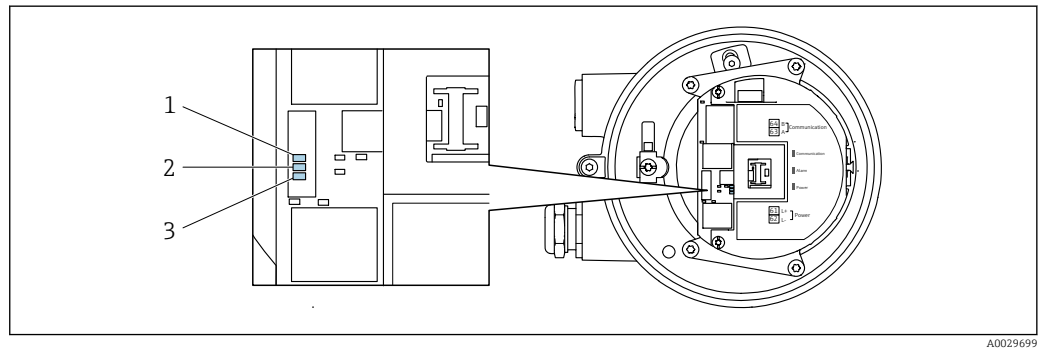
LED	Color	Meaning
1 Supply voltage	Off	Supply voltage is off or too low.
	Green	Supply voltage is ok.
2 Device status/module status (normal operation)	Off	Firmware error
	Green	Device status is ok.
	Flashing green	Device is not configured.
	Flashing red	A diagnostic event with "Warning" diagnostic behavior has occurred.
	Red	A diagnostic event with "Alarm" diagnostic behavior has occurred.
	Flashing red/green	The device restarts/self-test.
3 Flashing/network status	Green	Cyclic data exchange is active.
	Flashing green	Following request from automation system: Flash frequency: 1 Hz (flash functionality: 500 ms on, 500 ms off) If no "Name of Station" is defined: ■ Flash frequency: 4 Hz ■ Display: no "Name of Station" available.
	Red	IP address is available but there is no connection to the automation system
	Flashing red	Cyclic data exchange was active but the connection was disconnected: Flash frequency: 3 Hz

LED	Color	Meaning
4 Port 1 active: PROFINET with Ethernet-APL	Off	Not connected or no connection established.
	White	Connection available, no active communication
	Flashing white	Connection with active communication
5 Port 2 active: Service interface (CDI- RJ45)	Off	Not connected or no connection established.
	Amber	Connection available but no activity.
	Flashing amber	Activity present.

12.2.2 Sensor connection housing

Proline 500 – digital

Various light emitting diodes (LED) on the ISEM electronics unit (intelligent sensor electronics module) in the sensor connection housing provide information about the device status.



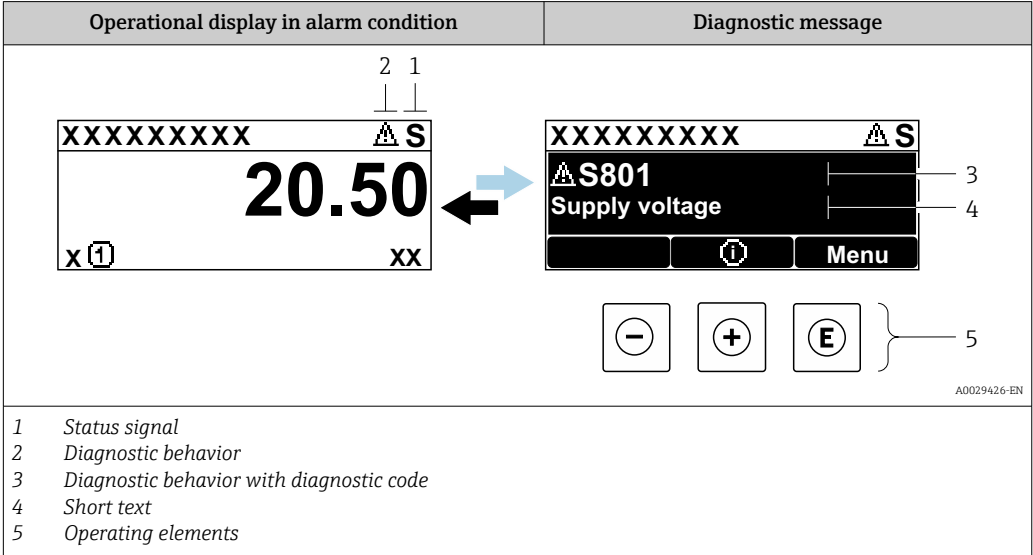
- 1 Communication
- 2 Device status
- 3 Supply voltage

LED	Color	Meaning
1 Communication	White	Communication active.
2 Device status (normal operation)	Red	Error
	Flashing red	Warning
2 Device status (during start-up)	Flashes red slowly	If > 30 seconds: problem with the boot loader.
	Flashes red quickly	If > 30 seconds: compatibility problem when reading the firmware.
3 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 → 284
 - Via submenus → 285



Status signals

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

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

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



Diagnostic behavior

Symbol	Meaning
	Alarm <ul style="list-style-type: none"> ■ Measurement is interrupted. ■ Signal outputs and totalizers assume the defined alarm condition. ■ A diagnostic message is generated.
	Warning Measurement is resumed. The signal outputs and totalizers are not affected. A diagnostic message is generated.

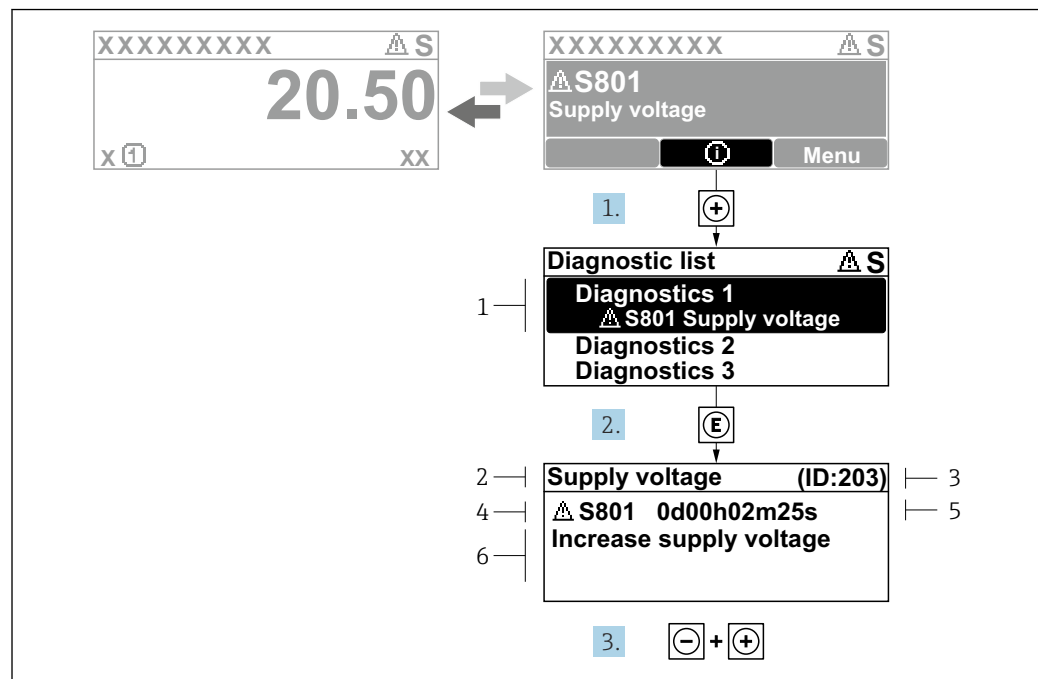
Diagnostic information

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

Operating elements

Key	Meaning
	Plus key <i>In a menu, submenu</i> Opens the message about remedy information.
	Enter key <i>In a menu, submenu</i> Opens the operating menu.

12.3.2 Calling up remedial measures



A0029431-EN

40 Message for remedial measures

- 1 Diagnostic information
- 2 Short text
- 3 Service ID
- 4 Diagnostic behavior with diagnostic code
- 5 Operation time when error occurred
- 6 Remedial measures

1. The user is in the diagnostic message.
Press \oplus (ⓘ symbol).
↳ The **Diagnostic list** submenu opens.
2. Select the desired diagnostic event with \oplus or \ominus and press \boxplus .
↳ The message about the remedial measures opens.
3. Press $\ominus + \oplus$ simultaneously.
↳ The message about the remedial measures closes.

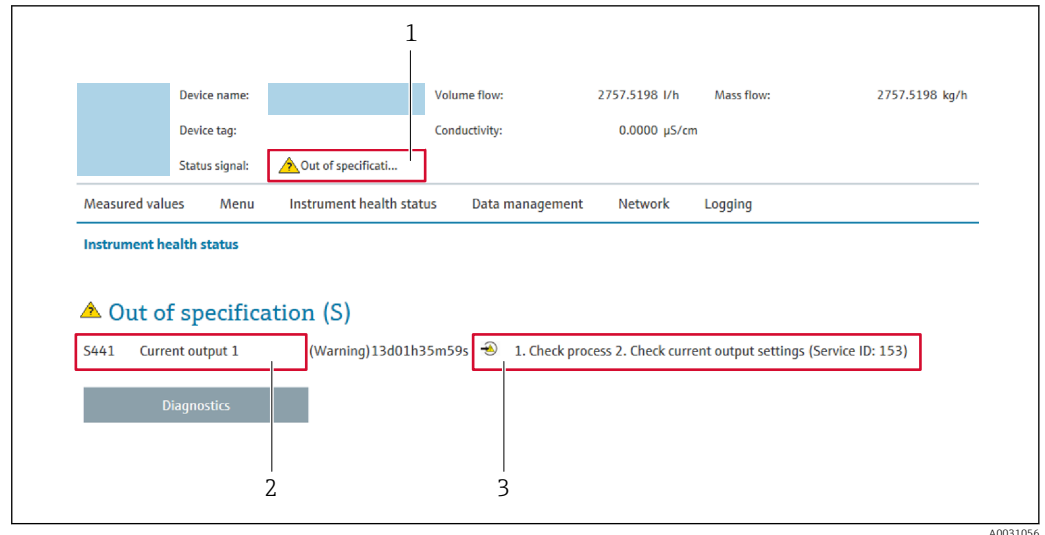
The user is in the **Diagnostics** menu at an entry for a diagnostics event, e.g. in the **Diagnostic list** submenu or **Previous diagnostics** parameter.

1. Press \boxplus .
↳ The message for the remedial measures for the selected diagnostic event opens.
2. Press $\ominus + \oplus$ simultaneously.
↳ The message for the remedial measures closes.

12.4 Diagnostic information in the Web browser

12.4.1 Diagnostic options

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



- 1 Status area with status signal
- 2 Diagnostic information
- 3 Remedial measures with service ID

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

- Via parameter → 284
- Via submenu → 285

Status signals

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

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

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

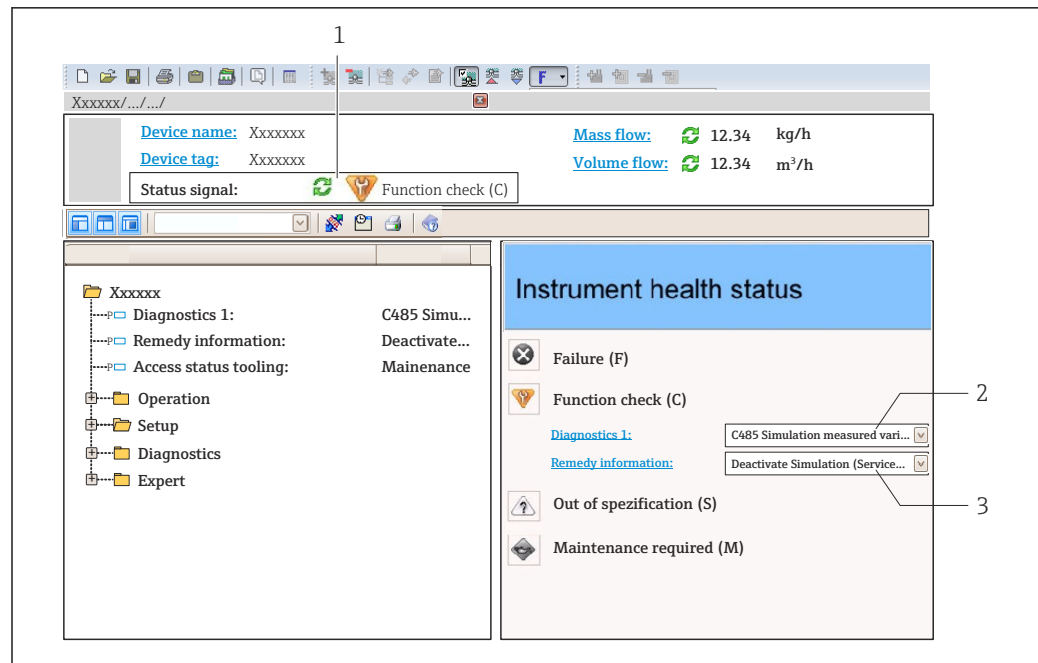
12.4.2 Calling up remedy information

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.



A0021799-EN

- 1 Status area with status signal → 212
- 2 Diagnostics information → 213
- 3 Remedial measures with service ID

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

- Via parameter → 284
- Via submenu → 285

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.

Expert → System → Diagnostic handling → Diagnostic behavior

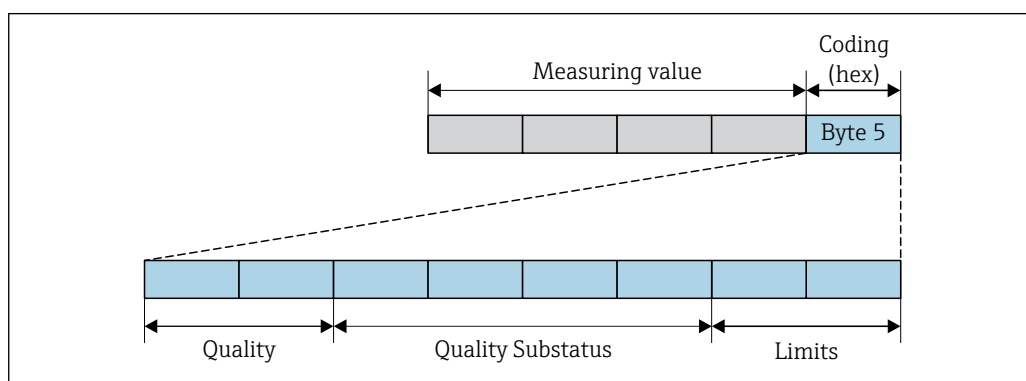
Available diagnostic behaviors

The following diagnostic behaviors can be assigned:

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

Displaying the measured value status

If modules with input data (e.g. Analog Input module, Discrete Input module, Totalizer module, Heartbeat module) are configured for cyclic data transmission, the measured value status is coded as per PROFINET PA Profile 4 Specification and transmitted along with the measured value to the PROFINET Controller via the status byte. The status byte is split into three segments: Quality, Quality Substatus and Limits.



A0032228-EN




41 Structure of the status byte

The content of the status byte depends on the configured failure mode in the individual function block. Depending on which failure mode has been configured, status information in accordance with PROFINET PA Profile Specification 4 is transmitted to the the PROFINET with Ethernet-APL controller via the status byte status information. The two bits for the limits always have the value 0.

Supported status information

Status	Coding (hex)
BAD - Maintenance alarm	0x24 to 0x27
BAD - Process related	0x28 to 0x2B
BAD - Function check	0x3C to 0x3F
UNCERTAIN - Initial value	0x4C to 0x4F
UNCERTAIN - Maintenance demanded	0x68 to 0x6B
UNCERTAIN - Process related	0x78 to 0x7B
GOOD - OK	0x80 to 0x83
GOOD - Maintenance required	0xA4 to 0xA7
GOOD - Maintenance demanded	0xA8 to 0xAB
GOOD - Function check	0xBC to 0xBF

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.
- All of the measured variables affected in the entire Promass instrument family are always listed under "Measured variables affected". The measured variables available for the device in question depend on the device version. When assigning the measured variables to the device functions, for example to the individual outputs, all of the measured variables available for the device version in question are available for selection.
-  In the case of some items of diagnostic information, the diagnostic behavior can be changed. Adapting the diagnostic information →  217

12.7.1 Diagnostic of sensor

Diagnostic information			Remedy instructions
No.	Short text		
002	Sensor unknown		1. Check if the correct sensor is mounted 2. Check if the 2-D matrix code on the sensor is undamaged
	Measured variable status		
	Quality	Good	
	Quality substatus	Ok	
	Coding (hex)	0x80 to 0x83	
	Status signal	F	
	Diagnostic behavior	Alarm	
	Influenced measured variables		
	<div><div><ul style="list-style-type: none">■ Oscillation amplitude 1■ Oscillation amplitude 2■ Application specific output■ Application specific output■ Signal asymmetry■ Carrier mass flow■ Carrier pipe temperature■ Target corrected volume flow■ Carrier corrected volume flow■ Sensor index coil asymmetry■ Concentration■ Measured values■ Oscillation damping 1■ Oscillation damping 2■ Density■ Oil density■ Water density■ Test point■ Test point■ Dynamic viscosity</div><div><ul style="list-style-type: none">■ Sensor electronics temperature (ISEM)■ GSV flow■ GSV flow alternative■ Kinematic viscosity■ Mass flow■ Oil mass flow■ Water mass flow■ Inhomogeneous medium index■ Suspended bubbles index■ HBSI■ NSV flow■ NSV flow alternative■ External pressure■ Exciter current 1■ Exciter current 2■ Oscillation frequency 1■ Oscillation frequency 2■ Raw value mass flow■ S&W volume flow■ Torsion signal asymmetry</div><div><ul style="list-style-type: none">■ Reference density■ Reference density alternative■ Corrected volume flow■ Oil corrected volume flow■ Water corrected volume flow■ Oscillation damping fluctuation 1■ Oscillation damping fluctuation 2■ Frequency fluctuation 1■ Frequency fluctuation 2■ Target mass flow■ Carrier volume flow■ Target volume flow■ Temp. compensated dynamic viscosity■ Temp. compensated kinematic viscosity■ Temperature■ Volume flow■ Oil volume flow■ Water volume flow■ Water cut</div></div>		

Diagnostic information			Remedy instructions
No.	Short text		
022	Temperature sensor defective		1. If available: Check connection cable between sensor and transmitter 2. Check or replace sensor electronic module (ISEM) 3. Replace sensor
	Measured variable status		
	Quality	Good	
	Quality substatus	Ok	
	Coding (hex)	0x80 to 0x83	
	Status signal	F	
	Diagnostic behavior	Alarm	
	Influenced measured variables		
<div><div><div>■ Oscillation amplitude 1</div><div>■ Oscillation amplitude 2</div><div>■ Application specific output</div><div>■ Application specific output</div><div>■ Signal asymmetry</div><div>■ Carrier mass flow</div><div>■ Carrier pipe temperature</div><div>■ Target corrected volume flow</div><div>■ Carrier corrected volume flow</div><div>■ Sensor index coil asymmetry</div><div>■ Concentration</div><div>■ Oscillation damping 1</div><div>■ Oscillation damping 2</div><div>■ Density</div><div>■ Oil density</div><div>■ Water density</div><div>■ Test point</div><div>■ Test point</div><div>■ Dynamic viscosity</div><div>■ Sensor electronics temperature (ISEM)</div></div><div><div>■ GSV flow</div><div>■ GSV flow alternative</div><div>■ Kinematic viscosity</div><div>■ Mass flow</div><div>■ Oil mass flow</div><div>■ Water mass flow</div><div>■ Inhomogeneous medium index</div><div>■ Suspended bubbles index</div><div>■ HBSI</div><div>■ NSV flow</div><div>■ NSV flow alternative</div><div>■ External pressure</div><div>■ Exciter current 1</div><div>■ Exciter current 2</div><div>■ Oscillation frequency 1</div><div>■ Oscillation frequency 2</div><div>■ Raw value mass flow</div><div>■ S&W volume flow</div><div>■ Torsion signal asymmetry</div><div>■ Reference density</div></div><div><div>■ Reference density alternative</div><div>■ Corrected volume flow</div><div>■ Oil corrected volume flow</div><div>■ Water corrected volume flow</div><div>■ Oscillation damping fluctuation 1</div><div>■ Oscillation damping fluctuation 2</div><div>■ Frequency fluctuation 1</div><div>■ Frequency fluctuation 2</div><div>■ Target mass flow</div><div>■ Carrier volume flow</div><div>■ Target volume flow</div><div>■ Temp. compensated dynamic viscosity</div><div>■ Temp. compensated kinematic viscosity</div><div>■ Temperature</div><div>■ Volume flow</div><div>■ Oil volume flow</div><div>■ Water volume flow</div><div>■ Water cut</div></div></div>			

Diagnostic information		Remedy instructions
No.	Short text	
046	Sensor limit exceeded	1. Check process conditions 2. Check sensor
	Measured variable status [from the factory] ¹⁾	
	Quality	
	Good	
	Quality substatus	
	Ok	
	Coding (hex)	
	0x80 to 0x83	
	Status signal	
	S	
	Diagnostic behavior	
	Warning	
Influenced measured variables		
<ul style="list-style-type: none"> ▪ Oscillation amplitude 1 ▪ Oscillation amplitude 2 ▪ Application specific output ▪ Application specific output ▪ Signal asymmetry ▪ Carrier mass flow ▪ Carrier pipe temperature ▪ Target corrected volume flow ▪ Carrier corrected volume flow ▪ Sensor index coil asymmetry ▪ Concentration ▪ Oscillation damping 1 ▪ Oscillation damping 2 ▪ Density ▪ Oil density ▪ Water density ▪ Test point ▪ Test point ▪ Dynamic viscosity ▪ Sensor electronics temperature (ISEM) 		<ul style="list-style-type: none"> ▪ GSV flow ▪ GSV flow alternative ▪ Kinematic viscosity ▪ Mass flow ▪ Oil mass flow ▪ Water mass flow ▪ Inhomogeneous medium index ▪ Suspended bubbles index ▪ HBSI ▪ NSV flow ▪ NSV flow alternative ▪ External pressure ▪ Exciter current 1 ▪ Exciter current 2 ▪ Oscillation frequency 1 ▪ Oscillation frequency 2 ▪ Raw value mass flow ▪ S&W volume flow ▪ Torsion signal asymmetry ▪ Reference density
		<ul style="list-style-type: none"> ▪ Reference density alternative ▪ Corrected volume flow ▪ Oil corrected volume flow ▪ Water corrected volume flow ▪ Oscillation damping fluctuation 1 ▪ Oscillation damping fluctuation 2 ▪ Frequency fluctuation 1 ▪ Frequency fluctuation 2 ▪ Target mass flow ▪ Carrier volume flow ▪ Target volume flow ▪ Temp. compensated dynamic viscosity ▪ Temp. compensated kinematic viscosity ▪ Temperature ▪ Volume flow ▪ Oil volume flow ▪ Water volume flow ▪ Water cut

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

Diagnostic information			Remedy instructions
No.	Short text		
062	Sensor connection faulty		1. If available: Check connection cable between sensor and transmitter 2. Check or replace sensor electronic module (ISEM) 3. Replace sensor
	Measured variable status		
	Quality	Good	
	Quality substatus	Ok	
	Coding (hex)	0x80 to 0x83	
	Status signal	F	
	Diagnostic behavior	Alarm	
	Influenced measured variables		
<div><div><div>■ Oscillation amplitude 1</div><div>■ Oscillation amplitude 2</div><div>■ Application specific output</div><div>■ Application specific output</div><div>■ Signal asymmetry</div><div>■ Carrier mass flow</div><div>■ Carrier pipe temperature</div><div>■ Target corrected volume flow</div><div>■ Carrier corrected volume flow</div><div>■ Sensor index coil asymmetry</div><div>■ Concentration</div><div>■ Oscillation damping 1</div><div>■ Oscillation damping 2</div><div>■ Density</div><div>■ Oil density</div><div>■ Water density</div><div>■ Test point</div><div>■ Test point</div><div>■ Dynamic viscosity</div><div>■ Sensor electronics temperature (ISEM)</div></div><div><div>■ GSV flow</div><div>■ GSV flow alternative</div><div>■ Kinematic viscosity</div><div>■ Mass flow</div><div>■ Oil mass flow</div><div>■ Water mass flow</div><div>■ Inhomogeneous medium index</div><div>■ Suspended bubbles index</div><div>■ HBSI</div><div>■ NSV flow</div><div>■ NSV flow alternative</div><div>■ External pressure</div><div>■ Exciter current 1</div><div>■ Exciter current 2</div><div>■ Oscillation frequency 1</div><div>■ Oscillation frequency 2</div><div>■ Raw value mass flow</div><div>■ S&W volume flow</div><div>■ Torsion signal asymmetry</div><div>■ Reference density</div></div><div><div>■ Reference density alternative</div><div>■ Corrected volume flow</div><div>■ Oil corrected volume flow</div><div>■ Water corrected volume flow</div><div>■ Oscillation damping fluctuation 1</div><div>■ Oscillation damping fluctuation 2</div><div>■ Frequency fluctuation 1</div><div>■ Frequency fluctuation 2</div><div>■ Target mass flow</div><div>■ Carrier volume flow</div><div>■ Target volume flow</div><div>■ Temp. compensated dynamic viscosity</div><div>■ Temp. compensated kinematic viscosity</div><div>■ Temperature</div><div>■ Volume flow</div><div>■ Oil volume flow</div><div>■ Water volume flow</div><div>■ Water cut</div></div></div>			

Diagnostic information			Remedy instructions
No.	Short text		
063	Exciter current faulty		1. If available: Check connection cable between sensor and transmitter 2. Check or replace sensor electronic module (ISEM) 3. Replace sensor
	Measured variable status		
	Quality	Good	
	Quality substatus	Ok	
	Coding (hex)	0x80 to 0x83	
	Status signal	F	
	Diagnostic behavior	Alarm	
	Influenced measured variables		
<div><div><div>▪ Oscillation amplitude 1</div><div>▪ Oscillation amplitude 2</div><div>▪ Application specific output</div><div>▪ Application specific output</div><div>▪ Signal asymmetry</div><div>▪ Carrier mass flow</div><div>▪ Carrier pipe temperature</div><div>▪ Target corrected volume flow</div><div>▪ Carrier corrected volume flow</div><div>▪ Sensor index coil asymmetry</div><div>▪ Concentration</div><div>▪ Oscillation damping 1</div><div>▪ Oscillation damping 2</div><div>▪ Density</div><div>▪ Oil density</div><div>▪ Water density</div><div>▪ Test point</div><div>▪ Test point</div><div>▪ Dynamic viscosity</div><div>▪ Sensor electronics temperature (ISEM)</div></div><div><div>▪ GSV flow</div><div>▪ GSV flow alternative</div><div>▪ Kinematic viscosity</div><div>▪ Mass flow</div><div>▪ Oil mass flow</div><div>▪ Water mass flow</div><div>▪ Inhomogeneous medium index</div><div>▪ Suspended bubbles index</div><div>▪ HBSI</div><div>▪ NSV flow</div><div>▪ NSV flow alternative</div><div>▪ External pressure</div><div>▪ Exciter current 1</div><div>▪ Exciter current 2</div><div>▪ Oscillation frequency 1</div><div>▪ Oscillation frequency 2</div><div>▪ Raw value mass flow</div><div>▪ S&W volume flow</div><div>▪ Torsion signal asymmetry</div><div>▪ Reference density</div></div><div><div>▪ Reference density alternative</div><div>▪ Corrected volume flow</div><div>▪ Oil corrected volume flow</div><div>▪ Water corrected volume flow</div><div>▪ Oscillation damping fluctuation 1</div><div>▪ Oscillation damping fluctuation 2</div><div>▪ Frequency fluctuation 1</div><div>▪ Frequency fluctuation 2</div><div>▪ Target mass flow</div><div>▪ Carrier volume flow</div><div>▪ Target volume flow</div><div>▪ Temp. compensated dynamic viscosity</div><div>▪ Temp. compensated kinematic viscosity</div><div>▪ Temperature</div><div>▪ Volume flow</div><div>▪ Oil volume flow</div><div>▪ Water volume flow</div><div>▪ Water cut</div></div></div>			

Diagnostic information			Remedy instructions
No.	Short text		
082	Data storage inconsistent		Check module connections
	Measured variable status		
	Quality	Good	
	Quality substatus	Ok	
	Coding (hex)	0x80 to 0x83	
	Status signal	F	
	Diagnostic behavior	Alarm	
	Influenced measured variables		
<div><div><ul style="list-style-type: none">■ Oscillation amplitude 1■ Oscillation amplitude 2■ Application specific output■ Application specific output■ Signal asymmetry■ Carrier mass flow■ Carrier pipe temperature■ Target corrected volume flow■ Carrier corrected volume flow■ Sensor index coil asymmetry■ Concentration■ Measured values■ Oscillation damping 1■ Oscillation damping 2■ Density■ Oil density■ Water density■ Test point■ Test point■ Dynamic viscosity</div><div><ul style="list-style-type: none">■ Sensor electronics temperature (ISEM)■ GSV flow■ GSV flow alternative■ Kinematic viscosity■ Mass flow■ Oil mass flow■ Water mass flow■ Inhomogeneous medium index■ Suspended bubbles index■ HBSI■ NSV flow■ NSV flow alternative■ External pressure■ Exciter current 1■ Exciter current 2■ Oscillation frequency 1■ Oscillation frequency 2■ Raw value mass flow■ S&W volume flow■ Torsion signal asymmetry</div><div><ul style="list-style-type: none">■ Reference density■ Reference density alternative■ Corrected volume flow■ Oil corrected volume flow■ Water corrected volume flow■ Oscillation damping fluctuation 1■ Oscillation damping fluctuation 2■ Frequency fluctuation 1■ Frequency fluctuation 2■ Target mass flow■ Carrier volume flow■ Target volume flow■ Temp. compensated dynamic viscosity■ Temp. compensated kinematic viscosity■ Temperature■ Volume flow■ Oil volume flow■ Water volume flow■ Water cut</div></div>			

Diagnostic information			Remedy instructions
No.	Short text		
083	Memory content inconsistent		1. Restart device 2. Restore S-DAT data 3. Replace S-DAT
	Measured variable status		
	Quality	Good	
	Quality substatus	Ok	
	Coding (hex)	0x80 to 0x83	
	Status signal	F	
	Diagnostic behavior	Alarm	
	Influenced measured variables		
<div><div><div>▪ Oscillation amplitude 1</div><div>▪ Oscillation amplitude 2</div><div>▪ Application specific output</div><div>▪ Application specific output</div><div>▪ Signal asymmetry</div><div>▪ Carrier mass flow</div><div>▪ Carrier pipe temperature</div><div>▪ Target corrected volume flow</div><div>▪ Carrier corrected volume flow</div><div>▪ Sensor index coil asymmetry</div><div>▪ Concentration</div><div>▪ Measured values</div><div>▪ Oscillation damping 1</div><div>▪ Oscillation damping 2</div><div>▪ Density</div><div>▪ Oil density</div><div>▪ Water density</div><div>▪ Test point</div><div>▪ Test point</div><div>▪ Dynamic viscosity</div></div><div><div>▪ Sensor electronics temperature (ISEM)</div><div>▪ GSV flow</div><div>▪ GSV flow alternative</div><div>▪ Kinematic viscosity</div><div>▪ Mass flow</div><div>▪ Oil mass flow</div><div>▪ Water mass flow</div><div>▪ Inhomogeneous medium index</div><div>▪ Suspended bubbles index</div><div>▪ HBSI</div><div>▪ NSV flow</div><div>▪ NSV flow alternative</div><div>▪ External pressure</div><div>▪ Exciter current 1</div><div>▪ Exciter current 2</div><div>▪ Oscillation frequency 1</div><div>▪ Oscillation frequency 2</div><div>▪ Raw value mass flow</div><div>▪ S&W volume flow</div><div>▪ Torsion signal asymmetry</div></div><div><div>▪ Reference density</div><div>▪ Reference density alternative</div><div>▪ Corrected volume flow</div><div>▪ Oil corrected volume flow</div><div>▪ Water corrected volume flow</div><div>▪ Oscillation damping fluctuation 1</div><div>▪ Oscillation damping fluctuation 2</div><div>▪ Frequency fluctuation 1</div><div>▪ Frequency fluctuation 2</div><div>▪ Target mass flow</div><div>▪ Carrier volume flow</div><div>▪ Target volume flow</div><div>▪ Temp. compensated dynamic viscosity</div><div>▪ Temp. compensated kinematic viscosity</div><div>▪ Temperature</div><div>▪ Volume flow</div><div>▪ Oil volume flow</div><div>▪ Water volume flow</div><div>▪ Water cut</div></div></div>			

Diagnostic information			Remedy instructions
No.	Short text		
119	Sensor initialization active		Sensor initialization in progress, please wait
	Measured variable status		
	Quality	Good	
	Quality substatus	Ok	
	Coding (hex)	0x80 to 0x83	
	Status signal	C	
	Diagnostic behavior	Warning	
	Influenced measured variables		
<div><div><div>■ Oscillation amplitude 1</div><div>■ Oscillation amplitude 2</div><div>■ Application specific output</div><div>■ Application specific output</div><div>■ Signal asymmetry</div><div>■ Carrier mass flow</div><div>■ Carrier pipe temperature</div><div>■ Target corrected volume flow</div><div>■ Carrier corrected volume flow</div><div>■ Sensor index coil asymmetry</div><div>■ Concentration</div><div>■ Measured values</div><div>■ Oscillation damping 1</div><div>■ Oscillation damping 2</div><div>■ Density</div><div>■ Oil density</div><div>■ Water density</div><div>■ Test point</div><div>■ Test point</div><div>■ Dynamic viscosity</div></div><div><div>■ Sensor electronics temperature (ISEM)</div><div>■ GSV flow</div><div>■ GSV flow alternative</div><div>■ Kinematic viscosity</div><div>■ Mass flow</div><div>■ Oil mass flow</div><div>■ Water mass flow</div><div>■ Inhomogeneous medium index</div><div>■ Suspended bubbles index</div><div>■ HBSI</div><div>■ NSV flow</div><div>■ NSV flow alternative</div><div>■ External pressure</div><div>■ Exciter current 1</div><div>■ Exciter current 2</div><div>■ Oscillation frequency 1</div><div>■ Oscillation frequency 2</div><div>■ Raw value mass flow</div><div>■ S&W volume flow</div><div>■ Torsion signal asymmetry</div></div><div><div>■ Reference density</div><div>■ Reference density alternative</div><div>■ Corrected volume flow</div><div>■ Oil corrected volume flow</div><div>■ Water corrected volume flow</div><div>■ Oscillation damping fluctuation 1</div><div>■ Oscillation damping fluctuation 2</div><div>■ Frequency fluctuation 1</div><div>■ Frequency fluctuation 2</div><div>■ Target mass flow</div><div>■ Carrier volume flow</div><div>■ Target volume flow</div><div>■ Temp. compensated dynamic viscosity</div><div>■ Temp. compensated kinematic viscosity</div><div>■ Temperature</div><div>■ Volume flow</div><div>■ Oil volume flow</div><div>■ Water volume flow</div><div>■ Water cut</div></div></div>			

Diagnostic information			Remedy instructions
No.	Short text		
140	Sensor signal asymmetrical		1. If available: Check connection cable between sensor and transmitter 2. Check or replace sensor electronic module (ISEM) 3. Replace sensor
	Measured variable status [from the factory] ¹⁾		
	Quality	Good	
	Quality substatus	Ok	
	Coding (hex)	0x80 to 0x83	
	Status signal	S	
	Diagnostic behavior	Alarm	
	Influenced measured variables		
<div><div><div>▪ Oscillation amplitude 1</div><div>▪ Oscillation amplitude 2</div><div>▪ Application specific output</div><div>▪ Application specific output</div><div>▪ Signal asymmetry</div><div>▪ Carrier mass flow</div><div>▪ Carrier pipe temperature</div><div>▪ Target corrected volume flow</div><div>▪ Carrier corrected volume flow</div><div>▪ Sensor index coil asymmetry</div><div>▪ Concentration</div><div>▪ Measured values</div><div>▪ Oscillation damping 1</div><div>▪ Oscillation damping 2</div><div>▪ Density</div><div>▪ Oil density</div><div>▪ Water density</div><div>▪ Test point</div><div>▪ Test point</div><div>▪ Dynamic viscosity</div></div><div><div>▪ Sensor electronics temperature (ISEM)</div><div>▪ GSV flow</div><div>▪ GSV flow alternative</div><div>▪ Kinematic viscosity</div><div>▪ Mass flow</div><div>▪ Oil mass flow</div><div>▪ Water mass flow</div><div>▪ Inhomogeneous medium index</div><div>▪ Suspended bubbles index</div><div>▪ HBSI</div><div>▪ NSV flow</div><div>▪ NSV flow alternative</div><div>▪ External pressure</div><div>▪ Exciter current 1</div><div>▪ Exciter current 2</div><div>▪ Oscillation frequency 1</div><div>▪ Oscillation frequency 2</div><div>▪ Raw value mass flow</div><div>▪ S&W volume flow</div><div>▪ Torsion signal asymmetry</div></div><div><div>▪ Reference density</div><div>▪ Reference density alternative</div><div>▪ Corrected volume flow</div><div>▪ Oil corrected volume flow</div><div>▪ Water corrected volume flow</div><div>▪ Oscillation damping fluctuation 1</div><div>▪ Oscillation damping fluctuation 2</div><div>▪ Frequency fluctuation 1</div><div>▪ Frequency fluctuation 2</div><div>▪ Target mass flow</div><div>▪ Carrier volume flow</div><div>▪ Target volume flow</div><div>▪ Temp. compensated dynamic viscosity</div><div>▪ Temp. compensated kinematic viscosity</div><div>▪ Temperature</div><div>▪ Volume flow</div><div>▪ Oil volume flow</div><div>▪ Water volume flow</div><div>▪ Water cut</div></div></div>			

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

Diagnostic information			Remedy instructions
No.	Short text		
141	Zero adjustment failed		1. Check process conditions 2. Repeat commissioning procedure 3. Check sensor
	Measured variable status		
	Quality	Good	
	Quality substatus	Ok	
	Coding (hex)	0x80 to 0x83	
	Status signal	F	
	Diagnostic behavior	Alarm	
	Influenced measured variables		
<div><div><ul style="list-style-type: none">■ Oscillation amplitude 1■ Oscillation amplitude 2■ Application specific output■ Application specific output■ Signal asymmetry■ Carrier mass flow■ Carrier pipe temperature■ Target corrected volume flow■ Carrier corrected volume flow■ Sensor index coil asymmetry■ Concentration■ Measured values■ Oscillation damping 1■ Oscillation damping 2■ Density■ Oil density■ Water density■ Test point■ Test point■ Dynamic viscosity</div><div><ul style="list-style-type: none">■ Sensor electronics temperature (ISEM)■ GSV flow■ GSV flow alternative■ Kinematic viscosity■ Mass flow■ Oil mass flow■ Water mass flow■ Inhomogeneous medium index■ Suspended bubbles index■ HBSI■ NSV flow■ NSV flow alternative■ External pressure■ Exciter current 1■ Exciter current 2■ Oscillation frequency 1■ Oscillation frequency 2■ Raw value mass flow■ S&W volume flow■ Torsion signal asymmetry</div><div><ul style="list-style-type: none">■ Reference density■ Reference density alternative■ Corrected volume flow■ Oil corrected volume flow■ Water corrected volume flow■ Oscillation damping fluctuation 1■ Oscillation damping fluctuation 2■ Frequency fluctuation 1■ Frequency fluctuation 2■ Target mass flow■ Carrier volume flow■ Target volume flow■ Temp. compensated dynamic viscosity■ Temp. compensated kinematic viscosity■ Temperature■ Volume flow■ Oil volume flow■ Water volume flow■ Water cut</div></div>			

Diagnostic information		Remedy instructions
No.	Short text	
142	Sensor index coil asymmetry too high	Check sensor
	Measured variable status [from the factory] ¹⁾	
	Quality	
	Good	
	Quality substatus	
	Ok	
	Coding (hex)	
	0x80 to 0x83	
	Status signal	
	S	
	Diagnostic behavior	
	Warning	
Influenced measured variables		
<ul style="list-style-type: none"> ▪ Oscillation amplitude 1 ▪ Oscillation amplitude 2 ▪ Application specific output ▪ Application specific output ▪ Signal asymmetry ▪ Carrier mass flow ▪ Carrier pipe temperature ▪ Target corrected volume flow ▪ Carrier corrected volume flow ▪ Sensor index coil asymmetry ▪ Concentration ▪ Measured values ▪ Oscillation damping 1 ▪ Oscillation damping 2 ▪ Density ▪ Oil density ▪ Water density ▪ Test point ▪ Test point ▪ Dynamic viscosity 		<ul style="list-style-type: none"> ▪ Sensor electronics temperature (ISEM) ▪ GSV flow ▪ GSV flow alternative ▪ Kinematic viscosity ▪ Mass flow ▪ Oil mass flow ▪ Water mass flow ▪ Inhomogeneous medium index ▪ Suspended bubbles index ▪ HBSI ▪ NSV flow ▪ NSV flow alternative ▪ External pressure ▪ Exciter current 1 ▪ Exciter current 2 ▪ Oscillation frequency 1 ▪ Oscillation frequency 2 ▪ Raw value mass flow ▪ S&W volume flow ▪ Torsion signal asymmetry
		<ul style="list-style-type: none"> ▪ Reference density ▪ Reference density alternative ▪ Corrected volume flow ▪ Oil corrected volume flow ▪ Water corrected volume flow ▪ Oscillation damping fluctuation 1 ▪ Oscillation damping fluctuation 2 ▪ Frequency fluctuation 1 ▪ Frequency fluctuation 2 ▪ Target mass flow ▪ Carrier volume flow ▪ Target volume flow ▪ Temp. compensated dynamic viscosity ▪ Temp. compensated kinematic viscosity ▪ Temperature ▪ Volume flow ▪ Oil volume flow ▪ Water volume flow ▪ Water cut

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

Diagnostic information		Remedy instructions
No.	Short text	
144	Measurement error too high	1. Check process conditions 2. Check or change sensor
	Measured variable status [from the factory] ¹⁾	
	Quality	
	Quality substatus	
	Coding (hex)	
	Status signal	
	Diagnostic behavior	
	Influenced measured variables	
	<ul style="list-style-type: none"> ■ Oscillation amplitude 1 ■ Oscillation amplitude 2 ■ Application specific output ■ Application specific output ■ Signal asymmetry ■ Carrier mass flow ■ Carrier pipe temperature ■ Target corrected volume flow ■ Carrier corrected volume flow ■ Sensor index coil asymmetry ■ Concentration ■ Oscillation damping 1 ■ Oscillation damping 2 ■ Density ■ Oil density ■ Water density ■ Test point ■ Test point ■ Dynamic viscosity ■ Sensor electronics temperature (ISEM) 	
		<ul style="list-style-type: none"> ■ GSV flow ■ GSV flow alternative ■ Kinematic viscosity ■ Mass flow ■ Oil mass flow ■ Water mass flow ■ Inhomogeneous medium index ■ Suspended bubbles index ■ HBSI ■ NSV flow ■ NSV flow alternative ■ External pressure ■ Exciter current 1 ■ Exciter current 2 ■ Oscillation frequency 1 ■ Oscillation frequency 2 ■ Raw value mass flow ■ S&W volume flow ■ Torsion signal asymmetry ■ Reference density
		<ul style="list-style-type: none"> ■ Reference density alternative ■ Corrected volume flow ■ Oil corrected volume flow ■ Water corrected volume flow ■ Oscillation damping fluctuation 1 ■ Oscillation damping fluctuation 2 ■ Frequency fluctuation 1 ■ Frequency fluctuation 2 ■ Target mass flow ■ Carrier volume flow ■ Target volume flow ■ Temp. compensated dynamic viscosity ■ Temp. compensated kinematic viscosity ■ Temperature ■ Volume flow ■ Oil volume flow ■ Water volume flow ■ Water cut

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

12.7.2 Diagnostic of electronic

Diagnostic information			Remedy instructions
No.	Short text		
201	Electronics faulty		1. Restart device 2. Replace electronics
	Measured variable status		
	Quality	Good	
	Quality substatus	Ok	
	Coding (hex)	0x80 to 0x83	
	Status signal	F	
	Diagnostic behavior	Alarm	
	Influenced measured variables		
	<div><div><ul style="list-style-type: none">▪ Oscillation amplitude 1▪ Oscillation amplitude 2▪ Application specific output▪ Application specific output▪ Signal asymmetry▪ Carrier mass flow▪ Carrier pipe temperature▪ Target corrected volume flow▪ Carrier corrected volume flow▪ Sensor index coil asymmetry▪ Concentration▪ Measured values▪ Oscillation damping 1▪ Oscillation damping 2▪ Density▪ Oil density▪ Water density▪ Test point▪ Test point▪ Dynamic viscosity</div><div><ul style="list-style-type: none">▪ Sensor electronics temperature (ISEM)▪ GSV flow▪ GSV flow alternative▪ Kinematic viscosity▪ Mass flow▪ Oil mass flow▪ Water mass flow▪ Inhomogeneous medium index▪ Suspended bubbles index▪ HBSI▪ NSV flow▪ NSV flow alternative▪ External pressure▪ Exciter current 1▪ Exciter current 2▪ Oscillation frequency 1▪ Oscillation frequency 2▪ Raw value mass flow▪ S&W volume flow▪ Torsion signal asymmetry</div><div><ul style="list-style-type: none">▪ Reference density▪ Reference density alternative▪ Corrected volume flow▪ Oil corrected volume flow▪ Water corrected volume flow▪ Oscillation damping fluctuation 1▪ Oscillation damping fluctuation 2▪ Frequency fluctuation 1▪ Frequency fluctuation 2▪ Target mass flow▪ Carrier volume flow▪ Target volume flow▪ Temp. compensated dynamic viscosity▪ Temp. compensated kinematic viscosity▪ Temperature▪ Volume flow▪ Oil volume flow▪ Water volume flow▪ Water cut</div></div>		

Diagnostic information		Remedy instructions
No.	Short text	
242	Firmware incompatible	1. Check firmware version 2. Flash or replace electronic module
	Measured variable status	
	Quality	
	Quality substatus	
	Coding (hex)	
	Status signal	
	Diagnostic behavior	
	Influenced measured variables	
	<ul style="list-style-type: none"> ■ Oscillation amplitude 1 ■ Oscillation amplitude 2 ■ Application specific output ■ Application specific output ■ Signal asymmetry ■ Carrier mass flow ■ Carrier pipe temperature ■ Target corrected volume flow ■ Carrier corrected volume flow ■ Sensor index coil asymmetry ■ Concentration ■ Measured values ■ Oscillation damping 1 ■ Oscillation damping 2 ■ Density ■ Oil density ■ Water density ■ Test point ■ Test point ■ Dynamic viscosity 	<ul style="list-style-type: none"> ■ Sensor electronics temperature (ISEM) ■ GSV flow ■ GSV flow alternative ■ Kinematic viscosity ■ Mass flow ■ Oil mass flow ■ Water mass flow ■ Inhomogeneous medium index ■ Suspended bubbles index ■ HBSI ■ NSV flow ■ NSV flow alternative ■ External pressure ■ Exciter current 1 ■ Exciter current 2 ■ Oscillation frequency 1 ■ Oscillation frequency 2 ■ Raw value mass flow ■ S&W volume flow ■ Torsion signal asymmetry
		<ul style="list-style-type: none"> ■ Reference density ■ Reference density alternative ■ Corrected volume flow ■ Oil corrected volume flow ■ Water corrected volume flow ■ Oscillation damping fluctuation 1 ■ Oscillation damping fluctuation 2 ■ Frequency fluctuation 1 ■ Frequency fluctuation 2 ■ Target mass flow ■ Carrier volume flow ■ Target volume flow ■ Temp. compensated dynamic viscosity ■ Temp. compensated kinematic viscosity ■ Temperature ■ Volume flow ■ Oil volume flow ■ Water volume flow ■ Water cut

Diagnostic information			Remedy instructions
No.	Short text		
252	Module incompatible		1. Check electronic modules 2. Check if correct modules are available (e.g. NEx, Ex) 3. Replace electronic modules
	Measured variable status		
	Quality	Good	
	Quality substatus	Ok	
	Coding (hex)	0x80 to 0x83	
	Status signal	F	
	Diagnostic behavior	Alarm	
	Influenced measured variables		
<div><div><ul style="list-style-type: none">▪ Oscillation amplitude 1▪ Oscillation amplitude 2▪ Application specific output▪ Application specific output▪ Signal asymmetry▪ Carrier mass flow▪ Carrier pipe temperature▪ Target corrected volume flow▪ Carrier corrected volume flow▪ Sensor index coil asymmetry▪ Concentration▪ Measured values▪ Oscillation damping 1▪ Oscillation damping 2▪ Density▪ Oil density▪ Water density▪ Test point▪ Test point▪ Dynamic viscosity</div><div><ul style="list-style-type: none">▪ Sensor electronics temperature (ISEM)▪ GSV flow▪ GSV flow alternative▪ Kinematic viscosity▪ Mass flow▪ Oil mass flow▪ Water mass flow▪ Inhomogeneous medium index▪ Suspended bubbles index▪ HBSI▪ NSV flow▪ NSV flow alternative▪ External pressure▪ Exciter current 1▪ Exciter current 2▪ Oscillation frequency 1▪ Oscillation frequency 2▪ Raw value mass flow▪ S&W volume flow▪ Torsion signal asymmetry</div><div><ul style="list-style-type: none">▪ Reference density▪ Reference density alternative▪ Corrected volume flow▪ Oil corrected volume flow▪ Water corrected volume flow▪ Oscillation damping fluctuation 1▪ Oscillation damping fluctuation 2▪ Frequency fluctuation 1▪ Frequency fluctuation 2▪ Target mass flow▪ Carrier volume flow▪ Target volume flow▪ Temp. compensated dynamic viscosity▪ Temp. compensated kinematic viscosity▪ Temperature▪ Volume flow▪ Oil volume flow▪ Water volume flow▪ Water cut</div></div>			

Diagnostic information			Remedy instructions
No.	Short text		
262	Module connection interrupted		1. Check or replace connection cable between sensor electronic module (ISEM) and main electronics 2. Check or replace ISEM or main electronics
	Measured variable status		
	Quality	Good	
	Quality substatus	Ok	
	Coding (hex)	0x80 to 0x83	
	Status signal	F	
	Diagnostic behavior	Alarm	
	Influenced measured variables		
<div><div><div><div>■ Oscillation amplitude 1</div><div>■ Oscillation amplitude 2</div><div>■ Application specific output</div><div>■ Application specific output</div><div>■ Signal asymmetry</div><div>■ Carrier mass flow</div><div>■ Carrier pipe temperature</div><div>■ Target corrected volume flow</div><div>■ Carrier corrected volume flow</div><div>■ Sensor index coil asymmetry</div><div>■ Concentration</div><div>■ Measured values</div><div>■ Oscillation damping 1</div><div>■ Oscillation damping 2</div><div>■ Density</div><div>■ Oil density</div><div>■ Water density</div><div>■ Test point</div><div>■ Test point</div><div>■ Dynamic viscosity</div></div><div><div>■ Sensor electronics temperature (ISEM)</div><div>■ GSV flow</div><div>■ GSV flow alternative</div><div>■ Kinematic viscosity</div><div>■ Mass flow</div><div>■ Oil mass flow</div><div>■ Water mass flow</div><div>■ Inhomogeneous medium index</div><div>■ Suspended bubbles index</div><div>■ HBSI</div><div>■ NSV flow</div><div>■ NSV flow alternative</div><div>■ External pressure</div><div>■ Exciter current 1</div><div>■ Exciter current 2</div><div>■ Oscillation frequency 1</div><div>■ Oscillation frequency 2</div><div>■ Raw value mass flow</div><div>■ S&W volume flow</div><div>■ Torsion signal asymmetry</div></div><div><div>■ Reference density</div><div>■ Reference density alternative</div><div>■ Corrected volume flow</div><div>■ Oil corrected volume flow</div><div>■ Water corrected volume flow</div><div>■ Oscillation damping fluctuation 1</div><div>■ Oscillation damping fluctuation 2</div><div>■ Frequency fluctuation 1</div><div>■ Frequency fluctuation 2</div><div>■ Target mass flow</div><div>■ Carrier volume flow</div><div>■ Target volume flow</div><div>■ Temp. compensated dynamic viscosity</div><div>■ Temp. compensated kinematic viscosity</div><div>■ Temperature</div><div>■ Volume flow</div><div>■ Oil volume flow</div><div>■ Water volume flow</div><div>■ Water cut</div></div></div></div>			

Diagnostic information		Remedy instructions
No.	Short text	
270	Main electronics defective	1. Restart device 2. Replace main electronic module
	Measured variable status	
	Quality	
	Quality substatus	
	Coding (hex)	
	Status signal	
	Diagnostic behavior	
Influenced measured variables		
<ul style="list-style-type: none"> ▪ Oscillation amplitude 1 ▪ Oscillation amplitude 2 ▪ Application specific output ▪ Application specific output ▪ Signal asymmetry ▪ Carrier mass flow ▪ Carrier pipe temperature ▪ Target corrected volume flow ▪ Carrier corrected volume flow ▪ Sensor index coil asymmetry ▪ Concentration ▪ Measured values ▪ Oscillation damping 1 ▪ Oscillation damping 2 ▪ Density ▪ Oil density ▪ Water density ▪ Test point ▪ Test point ▪ Dynamic viscosity 		<ul style="list-style-type: none"> ▪ Sensor electronics temperature (ISEM) ▪ GSV flow ▪ GSV flow alternative ▪ Kinematic viscosity ▪ Mass flow ▪ Oil mass flow ▪ Water mass flow ▪ Inhomogeneous medium index ▪ Suspended bubbles index ▪ HBSI ▪ NSV flow ▪ NSV flow alternative ▪ External pressure ▪ Exciter current 1 ▪ Exciter current 2 ▪ Oscillation frequency 1 ▪ Oscillation frequency 2 ▪ Raw value mass flow ▪ S&W volume flow ▪ Torsion signal asymmetry
		<ul style="list-style-type: none"> ▪ Reference density ▪ Reference density alternative ▪ Corrected volume flow ▪ Oil corrected volume flow ▪ Water corrected volume flow ▪ Oscillation damping fluctuation 1 ▪ Oscillation damping fluctuation 2 ▪ Frequency fluctuation 1 ▪ Frequency fluctuation 2 ▪ Target mass flow ▪ Carrier volume flow ▪ Target volume flow ▪ Temp. compensated dynamic viscosity ▪ Temp. compensated kinematic viscosity ▪ Temperature ▪ Volume flow ▪ Oil volume flow ▪ Water volume flow ▪ Water cut

Diagnostic information			Remedy instructions
No.	Short text		
271	Main electronics faulty		1. Restart device 2. Replace main electronic module
	Measured variable status		
	Quality	Good	
	Quality substatus	Ok	
	Coding (hex)	0x80 to 0x83	
	Status signal	F	
	Diagnostic behavior	Alarm	
	Influenced measured variables		
<div><div><div>■ Oscillation amplitude 1</div><div>■ Oscillation amplitude 2</div><div>■ Application specific output</div><div>■ Application specific output</div><div>■ Signal asymmetry</div><div>■ Carrier mass flow</div><div>■ Carrier pipe temperature</div><div>■ Target corrected volume flow</div><div>■ Carrier corrected volume flow</div><div>■ Sensor index coil asymmetry</div><div>■ Concentration</div><div>■ Measured values</div><div>■ Oscillation damping 1</div><div>■ Oscillation damping 2</div><div>■ Density</div><div>■ Oil density</div><div>■ Water density</div><div>■ Test point</div><div>■ Test point</div><div>■ Dynamic viscosity</div></div><div><div>■ Sensor electronics temperature (ISEM)</div><div>■ GSV flow</div><div>■ GSV flow alternative</div><div>■ Kinematic viscosity</div><div>■ Mass flow</div><div>■ Oil mass flow</div><div>■ Water mass flow</div><div>■ Inhomogeneous medium index</div><div>■ Suspended bubbles index</div><div>■ HBSI</div><div>■ NSV flow</div><div>■ NSV flow alternative</div><div>■ External pressure</div><div>■ Exciter current 1</div><div>■ Exciter current 2</div><div>■ Oscillation frequency 1</div><div>■ Oscillation frequency 2</div><div>■ Raw value mass flow</div><div>■ S&W volume flow</div><div>■ Torsion signal asymmetry</div></div><div><div>■ Reference density</div><div>■ Reference density alternative</div><div>■ Corrected volume flow</div><div>■ Oil corrected volume flow</div><div>■ Water corrected volume flow</div><div>■ Oscillation damping fluctuation 1</div><div>■ Oscillation damping fluctuation 2</div><div>■ Frequency fluctuation 1</div><div>■ Frequency fluctuation 2</div><div>■ Target mass flow</div><div>■ Carrier volume flow</div><div>■ Target volume flow</div><div>■ Temp. compensated dynamic viscosity</div><div>■ Temp. compensated kinematic viscosity</div><div>■ Temperature</div><div>■ Volume flow</div><div>■ Oil volume flow</div><div>■ Water volume flow</div><div>■ Water cut</div></div></div>			

Diagnostic information			Remedy instructions
No.	Short text		
272	Main electronics faulty		Restart device
	Measured variable status		
	Quality	Good	
	Quality substatus	Ok	
	Coding (hex)	0x80 to 0x83	
	Status signal	F	
	Diagnostic behavior	Alarm	
	Influenced measured variables		
	<div><div><div>▪ Oscillation amplitude 1</div><div>▪ Oscillation amplitude 2</div><div>▪ Application specific output</div><div>▪ Application specific output</div><div>▪ Signal asymmetry</div><div>▪ Carrier mass flow</div><div>▪ Carrier pipe temperature</div><div>▪ Target corrected volume flow</div><div>▪ Carrier corrected volume flow</div><div>▪ Sensor index coil asymmetry</div><div>▪ Concentration</div><div>▪ Measured values</div><div>▪ Oscillation damping 1</div><div>▪ Oscillation damping 2</div><div>▪ Density</div><div>▪ Oil density</div><div>▪ Water density</div><div>▪ Test point</div><div>▪ Test point</div><div>▪ Dynamic viscosity</div></div><div><div>▪ Sensor electronics temperature (ISEM)</div><div>▪ GSV flow</div><div>▪ GSV flow alternative</div><div>▪ Kinematic viscosity</div><div>▪ Mass flow</div><div>▪ Oil mass flow</div><div>▪ Water mass flow</div><div>▪ Inhomogeneous medium index</div><div>▪ Suspended bubbles index</div><div>▪ HBSI</div><div>▪ NSV flow</div><div>▪ NSV flow alternative</div><div>▪ External pressure</div><div>▪ Exciter current 1</div><div>▪ Exciter current 2</div><div>▪ Oscillation frequency 1</div><div>▪ Oscillation frequency 2</div><div>▪ Raw value mass flow</div><div>▪ S&W volume flow</div><div>▪ Torsion signal asymmetry</div></div><div><div>▪ Reference density</div><div>▪ Reference density alternative</div><div>▪ Corrected volume flow</div><div>▪ Oil corrected volume flow</div><div>▪ Water corrected volume flow</div><div>▪ Oscillation damping fluctuation 1</div><div>▪ Oscillation damping fluctuation 2</div><div>▪ Frequency fluctuation 1</div><div>▪ Frequency fluctuation 2</div><div>▪ Target mass flow</div><div>▪ Carrier volume flow</div><div>▪ Target volume flow</div><div>▪ Temp. compensated dynamic viscosity</div><div>▪ Temp. compensated kinematic viscosity</div><div>▪ Temperature</div><div>▪ Volume flow</div><div>▪ Oil volume flow</div><div>▪ Water volume flow</div><div>▪ Water cut</div></div></div>		

Diagnostic information		Remedy instructions	
No.	Short text		
273	Main electronics defective	1. Pay attention to display emergency operation 2. Replace main electronics	
	Measured variable status		
	Quality		Good
	Quality substatus		Ok
	Coding (hex)		0x80 to 0x83
	Status signal		F
	Diagnostic behavior		Alarm
	Influenced measured variables		
<div><div><div>■ Oscillation amplitude 1</div><div>■ Oscillation amplitude 2</div><div>■ Application specific output</div><div>■ Application specific output</div><div>■ Signal asymmetry</div><div>■ Carrier mass flow</div><div>■ Carrier pipe temperature</div><div>■ Target corrected volume flow</div><div>■ Carrier corrected volume flow</div><div>■ Sensor index coil asymmetry</div><div>■ Concentration</div><div>■ Measured values</div><div>■ Oscillation damping 1</div><div>■ Oscillation damping 2</div><div>■ Density</div><div>■ Oil density</div><div>■ Water density</div><div>■ Test point</div><div>■ Test point</div><div>■ Dynamic viscosity</div></div><div><div>■ Sensor electronics temperature (ISEM)</div><div>■ GSV flow</div><div>■ GSV flow alternative</div><div>■ Kinematic viscosity</div><div>■ Mass flow</div><div>■ Oil mass flow</div><div>■ Water mass flow</div><div>■ Inhomogeneous medium index</div><div>■ Suspended bubbles index</div><div>■ HBSI</div><div>■ NSV flow</div><div>■ NSV flow alternative</div><div>■ External pressure</div><div>■ Exciter current 1</div><div>■ Exciter current 2</div><div>■ Oscillation frequency 1</div><div>■ Oscillation frequency 2</div><div>■ Raw value mass flow</div><div>■ S&W volume flow</div><div>■ Torsion signal asymmetry</div></div><div><div>■ Reference density</div><div>■ Reference density alternative</div><div>■ Corrected volume flow</div><div>■ Oil corrected volume flow</div><div>■ Water corrected volume flow</div><div>■ Oscillation damping fluctuation 1</div><div>■ Oscillation damping fluctuation 2</div><div>■ Frequency fluctuation 1</div><div>■ Frequency fluctuation 2</div><div>■ Target mass flow</div><div>■ Carrier volume flow</div><div>■ Target volume flow</div><div>■ Temp. compensated dynamic viscosity</div><div>■ Temp. compensated kinematic viscosity</div><div>■ Temperature</div><div>■ Volume flow</div><div>■ Oil volume flow</div><div>■ Water volume flow</div><div>■ Water cut</div></div></div>			

Diagnostic information			Remedy instructions
No.	Short text		
275	I/O module defective		Change I/O module
	Measured variable status		
	Quality	Good	
	Quality substatus	Ok	
	Coding (hex)	0x80 to 0x83	
	Status signal	F	
	Diagnostic behavior	Alarm	
	Influenced measured variables		
<div><div><div>▪ Oscillation amplitude 1</div><div>▪ Oscillation amplitude 2</div><div>▪ Application specific output</div><div>▪ Application specific output</div><div>▪ Signal asymmetry</div><div>▪ Carrier mass flow</div><div>▪ Carrier pipe temperature</div><div>▪ Target corrected volume flow</div><div>▪ Carrier corrected volume flow</div><div>▪ Sensor index coil asymmetry</div><div>▪ Concentration</div><div>▪ Measured values</div><div>▪ Oscillation damping 1</div><div>▪ Oscillation damping 2</div><div>▪ Density</div><div>▪ Oil density</div><div>▪ Water density</div><div>▪ Test point</div><div>▪ Test point</div><div>▪ Dynamic viscosity</div></div><div><div>▪ Sensor electronics temperature (ISEM)</div><div>▪ GSV flow</div><div>▪ GSV flow alternative</div><div>▪ Kinematic viscosity</div><div>▪ Mass flow</div><div>▪ Oil mass flow</div><div>▪ Water mass flow</div><div>▪ Inhomogeneous medium index</div><div>▪ Suspended bubbles index</div><div>▪ HBSI</div><div>▪ NSV flow</div><div>▪ NSV flow alternative</div><div>▪ External pressure</div><div>▪ Exciter current 1</div><div>▪ Exciter current 2</div><div>▪ Oscillation frequency 1</div><div>▪ Oscillation frequency 2</div><div>▪ Raw value mass flow</div><div>▪ S&W volume flow</div><div>▪ Torsion signal asymmetry</div></div><div><div>▪ Reference density</div><div>▪ Reference density alternative</div><div>▪ Corrected volume flow</div><div>▪ Oil corrected volume flow</div><div>▪ Water corrected volume flow</div><div>▪ Oscillation damping fluctuation 1</div><div>▪ Oscillation damping fluctuation 2</div><div>▪ Frequency fluctuation 1</div><div>▪ Frequency fluctuation 2</div><div>▪ Target mass flow</div><div>▪ Carrier volume flow</div><div>▪ Target volume flow</div><div>▪ Temp. compensated dynamic viscosity</div><div>▪ Temp. compensated kinematic viscosity</div><div>▪ Temperature</div><div>▪ Volume flow</div><div>▪ Oil volume flow</div><div>▪ Water volume flow</div><div>▪ Water cut</div></div></div>			

Diagnostic information			Remedy instructions
No.	Short text		
276	I/O module faulty		1. Restart device 2. Change I/O module
	Measured variable status		
	Quality	Good	
	Quality substatus	Ok	
	Coding (hex)	0x80 to 0x83	
	Status signal	F	
	Diagnostic behavior	Alarm	
	Influenced measured variables		
<div><div><div>■ Oscillation amplitude 1</div><div>■ Oscillation amplitude 2</div><div>■ Application specific output</div><div>■ Application specific output</div><div>■ Signal asymmetry</div><div>■ Carrier mass flow</div><div>■ Carrier pipe temperature</div><div>■ Target corrected volume flow</div><div>■ Carrier corrected volume flow</div><div>■ Sensor index coil asymmetry</div><div>■ Concentration</div><div>■ Measured values</div><div>■ Oscillation damping 1</div><div>■ Oscillation damping 2</div><div>■ Density</div><div>■ Oil density</div><div>■ Water density</div><div>■ Test point</div><div>■ Test point</div><div>■ Dynamic viscosity</div></div><div><div>■ Sensor electronics temperature (ISEM)</div><div>■ GSV flow</div><div>■ GSV flow alternative</div><div>■ Kinematic viscosity</div><div>■ Mass flow</div><div>■ Oil mass flow</div><div>■ Water mass flow</div><div>■ Inhomogeneous medium index</div><div>■ Suspended bubbles index</div><div>■ HBSI</div><div>■ NSV flow</div><div>■ NSV flow alternative</div><div>■ External pressure</div><div>■ Exciter current 1</div><div>■ Exciter current 2</div><div>■ Oscillation frequency 1</div><div>■ Oscillation frequency 2</div><div>■ Raw value mass flow</div><div>■ S&W volume flow</div><div>■ Torsion signal asymmetry</div></div><div><div>■ Reference density</div><div>■ Reference density alternative</div><div>■ Corrected volume flow</div><div>■ Oil corrected volume flow</div><div>■ Water corrected volume flow</div><div>■ Oscillation damping fluctuation 1</div><div>■ Oscillation damping fluctuation 2</div><div>■ Frequency fluctuation 1</div><div>■ Frequency fluctuation 2</div><div>■ Target mass flow</div><div>■ Carrier volume flow</div><div>■ Target volume flow</div><div>■ Temp. compensated dynamic viscosity</div><div>■ Temp. compensated kinematic viscosity</div><div>■ Temperature</div><div>■ Volume flow</div><div>■ Oil volume flow</div><div>■ Water volume flow</div><div>■ Water cut</div></div></div>			

Diagnostic information			Remedy instructions
No.	Short text		
283	Memory content inconsistent		Restart device
	Measured variable status		
	Quality	Good	
	Quality substatus	Ok	
	Coding (hex)	0x80 to 0x83	
	Status signal	F	
	Diagnostic behavior	Alarm	
	Influenced measured variables		
<div><div><div>▪ Oscillation amplitude 1</div><div>▪ Oscillation amplitude 2</div><div>▪ Application specific output</div><div>▪ Application specific output</div><div>▪ Signal asymmetry</div><div>▪ Carrier mass flow</div><div>▪ Carrier pipe temperature</div><div>▪ Target corrected volume flow</div><div>▪ Carrier corrected volume flow</div><div>▪ Sensor index coil asymmetry</div><div>▪ Concentration</div><div>▪ Measured values</div><div>▪ Oscillation damping 1</div><div>▪ Oscillation damping 2</div><div>▪ Density</div><div>▪ Oil density</div><div>▪ Water density</div><div>▪ Test point</div><div>▪ Test point</div><div>▪ Dynamic viscosity</div></div><div><div>▪ Sensor electronics temperature (ISEM)</div><div>▪ GSV flow</div><div>▪ GSV flow alternative</div><div>▪ Kinematic viscosity</div><div>▪ Mass flow</div><div>▪ Oil mass flow</div><div>▪ Water mass flow</div><div>▪ Inhomogeneous medium index</div><div>▪ Suspended bubbles index</div><div>▪ HBSI</div><div>▪ NSV flow</div><div>▪ NSV flow alternative</div><div>▪ External pressure</div><div>▪ Exciter current 1</div><div>▪ Exciter current 2</div><div>▪ Oscillation frequency 1</div><div>▪ Oscillation frequency 2</div><div>▪ Raw value mass flow</div><div>▪ S&W volume flow</div><div>▪ Torsion signal asymmetry</div></div><div><div>▪ Reference density</div><div>▪ Reference density alternative</div><div>▪ Corrected volume flow</div><div>▪ Oil corrected volume flow</div><div>▪ Water corrected volume flow</div><div>▪ Oscillation damping fluctuation 1</div><div>▪ Oscillation damping fluctuation 2</div><div>▪ Frequency fluctuation 1</div><div>▪ Frequency fluctuation 2</div><div>▪ Target mass flow</div><div>▪ Carrier volume flow</div><div>▪ Target volume flow</div><div>▪ Temp. compensated dynamic viscosity</div><div>▪ Temp. compensated kinematic viscosity</div><div>▪ Temperature</div><div>▪ Volume flow</div><div>▪ Oil volume flow</div><div>▪ Water volume flow</div><div>▪ Water cut</div></div></div>			

Diagnostic information			Remedy instructions
No.	Short text		
302	Device verification active		Device verification active, please wait.
	Measured variable status [from the factory] ¹⁾		
	Quality	Good	
	Quality substatus	Function check	
	Coding (hex)	0xBC to 0xBF	
	Status signal	C	
	Diagnostic behavior	Warning	
	Influenced measured variables		
<div><div><div>▪ Oscillation amplitude 1</div><div>▪ Oscillation amplitude 2</div><div>▪ Application specific output</div><div>▪ Application specific output</div><div>▪ Signal asymmetry</div><div>▪ Carrier mass flow</div><div>▪ Carrier pipe temperature</div><div>▪ Target corrected volume flow</div><div>▪ Carrier corrected volume flow</div><div>▪ Sensor index coil asymmetry</div><div>▪ Concentration</div><div>▪ Measured values</div><div>▪ Oscillation damping 1</div><div>▪ Oscillation damping 2</div><div>▪ Density</div><div>▪ Oil density</div><div>▪ Water density</div><div>▪ Test point</div><div>▪ Test point</div><div>▪ Dynamic viscosity</div></div><div><div>▪ Sensor electronics temperature (ISEM)</div><div>▪ GSV flow</div><div>▪ GSV flow alternative</div><div>▪ Kinematic viscosity</div><div>▪ Mass flow</div><div>▪ Oil mass flow</div><div>▪ Water mass flow</div><div>▪ Inhomogeneous medium index</div><div>▪ Suspended bubbles index</div><div>▪ HBSI</div><div>▪ NSV flow</div><div>▪ NSV flow alternative</div><div>▪ External pressure</div><div>▪ Exciter current 1</div><div>▪ Exciter current 2</div><div>▪ Oscillation frequency 1</div><div>▪ Oscillation frequency 2</div><div>▪ Raw value mass flow</div><div>▪ S&W volume flow</div><div>▪ Torsion signal asymmetry</div></div><div><div>▪ Reference density</div><div>▪ Reference density alternative</div><div>▪ Corrected volume flow</div><div>▪ Oil corrected volume flow</div><div>▪ Water corrected volume flow</div><div>▪ Oscillation damping fluctuation 1</div><div>▪ Oscillation damping fluctuation 2</div><div>▪ Frequency fluctuation 1</div><div>▪ Frequency fluctuation 2</div><div>▪ Target mass flow</div><div>▪ Carrier volume flow</div><div>▪ Target volume flow</div><div>▪ Temp. compensated dynamic viscosity</div><div>▪ Temp. compensated kinematic viscosity</div><div>▪ Temperature</div><div>▪ Volume flow</div><div>▪ Oil volume flow</div><div>▪ Water volume flow</div><div>▪ Water cut</div></div></div>			

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

Diagnostic information			Remedy instructions
No.	Short text		
303	I/O 1 to n configuration changed		1. Apply I/O module configuration (parameter 'Apply I/O configuration') 2. Afterwards reload device description and check wiring
	Measured variable status		
	Quality	Good	
	Quality substatus	Ok	
	Coding (hex)	0x80 to 0x83	
	Status signal	M	
	Diagnostic behavior	Warning	
	Influenced measured variables		
	—		

Diagnostic information			Remedy instructions
No.	Short text		
304	Device verification failed		1. Check verification report 2. Repeat commissioning procedure 3. Check sensor
	Measured variable status [from the factory] ¹⁾		
	Quality	Good	
	Quality substatus	Ok	
	Coding (hex)	0x80 to 0x83	
	Status signal	F	
	Diagnostic behavior	Alarm	
	Influenced measured variables		
<div><div><ul style="list-style-type: none">▪ Oscillation amplitude 1▪ Oscillation amplitude 2▪ Application specific output▪ Application specific output▪ Signal asymmetry▪ Carrier mass flow▪ Carrier pipe temperature▪ Target corrected volume flow▪ Carrier corrected volume flow▪ Sensor index coil asymmetry▪ Concentration▪ Measured values▪ Oscillation damping 1▪ Oscillation damping 2▪ Density▪ Oil density▪ Water density▪ Test point▪ Test point▪ Dynamic viscosity</div><div><ul style="list-style-type: none">▪ Sensor electronics temperature (ISEM)▪ GSV flow▪ GSV flow alternative▪ Kinematic viscosity▪ Mass flow▪ Oil mass flow▪ Water mass flow▪ Inhomogeneous medium index▪ Suspended bubbles index▪ HBSI▪ NSV flow▪ NSV flow alternative▪ External pressure▪ Exciter current 1▪ Exciter current 2▪ Oscillation frequency 1▪ Oscillation frequency 2▪ Raw value mass flow▪ S&W volume flow▪ Torsion signal asymmetry</div><div><ul style="list-style-type: none">▪ Reference density▪ Reference density alternative▪ Corrected volume flow▪ Oil corrected volume flow▪ Water corrected volume flow▪ Oscillation damping fluctuation 1▪ Oscillation damping fluctuation 2▪ Frequency fluctuation 1▪ Frequency fluctuation 2▪ Target mass flow▪ Carrier volume flow▪ Target volume flow▪ Temp. compensated dynamic viscosity▪ Temp. compensated kinematic viscosity▪ Temperature▪ Volume flow▪ Oil volume flow▪ Water volume flow▪ Water cut</div></div>			

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

Diagnostic information			Remedy instructions
No.	Short text		
311	Sensor electronics (ISEM) faulty		Maintenance required! Do not reset device
	Measured variable status		
	Quality	Good	
	Quality substatus	Ok	
	Coding (hex)	0x80 to 0x83	
	Status signal	M	
	Diagnostic behavior	Warning	
	Influenced measured variables		
<div><div><div>■ Oscillation amplitude 1</div><div>■ Oscillation amplitude 2</div><div>■ Application specific output</div><div>■ Application specific output</div><div>■ Signal asymmetry</div><div>■ Carrier mass flow</div><div>■ Carrier pipe temperature</div><div>■ Target corrected volume flow</div><div>■ Carrier corrected volume flow</div><div>■ Sensor index coil asymmetry</div><div>■ Concentration</div><div>■ Measured values</div><div>■ Oscillation damping 1</div><div>■ Oscillation damping 2</div><div>■ Density</div><div>■ Oil density</div><div>■ Water density</div><div>■ Test point</div><div>■ Test point</div><div>■ Dynamic viscosity</div></div><div><div>■ Sensor electronics temperature (ISEM)</div><div>■ GSV flow</div><div>■ GSV flow alternative</div><div>■ Kinematic viscosity</div><div>■ Mass flow</div><div>■ Oil mass flow</div><div>■ Water mass flow</div><div>■ Inhomogeneous medium index</div><div>■ Suspended bubbles index</div><div>■ HBSI</div><div>■ NSV flow</div><div>■ NSV flow alternative</div><div>■ External pressure</div><div>■ Exciter current 1</div><div>■ Exciter current 2</div><div>■ Oscillation frequency 1</div><div>■ Oscillation frequency 2</div><div>■ Raw value mass flow</div><div>■ S&W volume flow</div><div>■ Torsion signal asymmetry</div></div><div><div>■ Reference density</div><div>■ Reference density alternative</div><div>■ Corrected volume flow</div><div>■ Oil corrected volume flow</div><div>■ Water corrected volume flow</div><div>■ Oscillation damping fluctuation 1</div><div>■ Oscillation damping fluctuation 2</div><div>■ Frequency fluctuation 1</div><div>■ Frequency fluctuation 2</div><div>■ Target mass flow</div><div>■ Carrier volume flow</div><div>■ Target volume flow</div><div>■ Temp. compensated dynamic viscosity</div><div>■ Temp. compensated kinematic viscosity</div><div>■ Temperature</div><div>■ Volume flow</div><div>■ Oil volume flow</div><div>■ Water volume flow</div><div>■ Water cut</div></div></div>			

Diagnostic information			Remedy instructions
No.	Short text		
330	Flash file invalid		1. Update firmware of device 2. Restart device
	Measured variable status		
	Quality	Good	
	Quality substatus	Ok	
	Coding (hex)	0x80 to 0x83	
	Status signal	M	
	Diagnostic behavior	Warning	
	Influenced measured variables		
	<div><div><div>▪ Oscillation amplitude 1</div><div>▪ Oscillation amplitude 2</div><div>▪ Application specific output</div><div>▪ Application specific output</div><div>▪ Signal asymmetry</div><div>▪ Carrier mass flow</div><div>▪ Carrier pipe temperature</div><div>▪ Target corrected volume flow</div><div>▪ Carrier corrected volume flow</div><div>▪ Sensor index coil asymmetry</div><div>▪ Concentration</div><div>▪ Measured values</div><div>▪ Oscillation damping 1</div><div>▪ Oscillation damping 2</div><div>▪ Density</div><div>▪ Oil density</div><div>▪ Water density</div><div>▪ Test point</div><div>▪ Test point</div><div>▪ Dynamic viscosity</div></div><div><div>▪ Sensor electronics temperature (ISEM)</div><div>▪ GSV flow</div><div>▪ GSV flow alternative</div><div>▪ Kinematic viscosity</div><div>▪ Mass flow</div><div>▪ Oil mass flow</div><div>▪ Water mass flow</div><div>▪ Inhomogeneous medium index</div><div>▪ Suspended bubbles index</div><div>▪ HBSI</div><div>▪ NSV flow</div><div>▪ NSV flow alternative</div><div>▪ External pressure</div><div>▪ Exciter current 1</div><div>▪ Exciter current 2</div><div>▪ Oscillation frequency 1</div><div>▪ Oscillation frequency 2</div><div>▪ Raw value mass flow</div><div>▪ S&W volume flow</div><div>▪ Torsion signal asymmetry</div></div><div><div>▪ Reference density</div><div>▪ Reference density alternative</div><div>▪ Corrected volume flow</div><div>▪ Oil corrected volume flow</div><div>▪ Water corrected volume flow</div><div>▪ Oscillation damping fluctuation 1</div><div>▪ Oscillation damping fluctuation 2</div><div>▪ Frequency fluctuation 1</div><div>▪ Frequency fluctuation 2</div><div>▪ Target mass flow</div><div>▪ Carrier volume flow</div><div>▪ Target volume flow</div><div>▪ Temp. compensated dynamic viscosity</div><div>▪ Temp. compensated kinematic viscosity</div><div>▪ Temperature</div><div>▪ Volume flow</div><div>▪ Oil volume flow</div><div>▪ Water volume flow</div><div>▪ Water cut</div></div></div>		

Diagnostic information			Remedy instructions
No.	Short text		
331	Firmware update failed		1. Update firmware of device 2. Restart device
	Measured variable status		
	Quality	Good	
	Quality substatus	Ok	
	Coding (hex)	0x80 to 0x83	
	Status signal	F	
	Diagnostic behavior	Warning	
	Influenced measured variables		
<div><div><ul style="list-style-type: none">■ Oscillation amplitude 1■ Oscillation amplitude 2■ Application specific output■ Application specific output■ Signal asymmetry■ Carrier mass flow■ Carrier pipe temperature■ Target corrected volume flow■ Carrier corrected volume flow■ Sensor index coil asymmetry■ Concentration■ Measured values■ Oscillation damping 1■ Oscillation damping 2■ Density■ Oil density■ Water density■ Test point■ Test point■ Dynamic viscosity</div><div><ul style="list-style-type: none">■ Sensor electronics temperature (ISEM)■ GSV flow■ GSV flow alternative■ Kinematic viscosity■ Mass flow■ Oil mass flow■ Water mass flow■ Inhomogeneous medium index■ Suspended bubbles index■ HBSI■ NSV flow■ NSV flow alternative■ External pressure■ Exciter current 1■ Exciter current 2■ Oscillation frequency 1■ Oscillation frequency 2■ Raw value mass flow■ S&W volume flow■ Torsion signal asymmetry</div><div><ul style="list-style-type: none">■ Reference density■ Reference density alternative■ Corrected volume flow■ Oil corrected volume flow■ Water corrected volume flow■ Oscillation damping fluctuation 1■ Oscillation damping fluctuation 2■ Frequency fluctuation 1■ Frequency fluctuation 2■ Target mass flow■ Carrier volume flow■ Target volume flow■ Temp. compensated dynamic viscosity■ Temp. compensated kinematic viscosity■ Temperature■ Volume flow■ Oil volume flow■ Water volume flow■ Water cut</div></div>			

Diagnostic information			Remedy instructions
No.	Short text		
332	Writing in HistoROM backup failed		1. Replace user interface board 2. Ex d/XP: replace transmitter
	Measured variable status		
	Quality	Good	
	Quality substatus	Ok	
	Coding (hex)	0x80 to 0x83	
	Status signal	F	
	Diagnostic behavior	Alarm	
	Influenced measured variables		
<div><div><ul style="list-style-type: none">■ Oscillation amplitude 1■ Oscillation amplitude 2■ Application specific output■ Application specific output■ Signal asymmetry■ Carrier mass flow■ Carrier pipe temperature■ Target corrected volume flow■ Carrier corrected volume flow■ Sensor index coil asymmetry■ Concentration■ Measured values■ Oscillation damping 1■ Oscillation damping 2■ Density■ Oil density■ Water density■ Test point■ Test point■ Dynamic viscosity</div><div><ul style="list-style-type: none">■ Sensor electronics temperature (ISEM)■ GSV flow■ GSV flow alternative■ Kinematic viscosity■ Mass flow■ Oil mass flow■ Water mass flow■ Inhomogeneous medium index■ Suspended bubbles index■ HBSI■ NSV flow■ NSV flow alternative■ External pressure■ Exciter current 1■ Exciter current 2■ Oscillation frequency 1■ Oscillation frequency 2■ Raw value mass flow■ S&W volume flow■ Torsion signal asymmetry</div><div><ul style="list-style-type: none">■ Reference density■ Reference density alternative■ Corrected volume flow■ Oil corrected volume flow■ Water corrected volume flow■ Oscillation damping fluctuation 1■ Oscillation damping fluctuation 2■ Frequency fluctuation 1■ Frequency fluctuation 2■ Target mass flow■ Carrier volume flow■ Target volume flow■ Temp. compensated dynamic viscosity■ Temp. compensated kinematic viscosity■ Temperature■ Volume flow■ Oil volume flow■ Water volume flow■ Water cut</div></div>			

Diagnostic information			Remedy instructions
No.	Short text		
361	I/O module 1 to n faulty		1. Restart device 2. Check electronic modules 3. Change I/O module or main electronics
	Measured variable status		
	Quality	Good	
	Quality substatus	Ok	
	Coding (hex)	0x80 to 0x83	
	Status signal	F	
	Diagnostic behavior	Alarm	
	Influenced measured variables		
	<div><div><div>■ Oscillation amplitude 1</div><div>■ Oscillation amplitude 2</div><div>■ Application specific output</div><div>■ Application specific output</div><div>■ Signal asymmetry</div><div>■ Carrier mass flow</div><div>■ Carrier pipe temperature</div><div>■ Target corrected volume flow</div><div>■ Carrier corrected volume flow</div><div>■ Sensor index coil asymmetry</div><div>■ Concentration</div><div>■ Measured values</div><div>■ Oscillation damping 1</div><div>■ Oscillation damping 2</div><div>■ Density</div><div>■ Oil density</div><div>■ Water density</div><div>■ Test point</div><div>■ Test point</div><div>■ Dynamic viscosity</div></div><div><div>■ Sensor electronics temperature (ISEM)</div><div>■ GSV flow</div><div>■ GSV flow alternative</div><div>■ Kinematic viscosity</div><div>■ Mass flow</div><div>■ Oil mass flow</div><div>■ Water mass flow</div><div>■ Inhomogeneous medium index</div><div>■ Suspended bubbles index</div><div>■ HBSI</div><div>■ NSV flow</div><div>■ NSV flow alternative</div><div>■ External pressure</div><div>■ Exciter current 1</div><div>■ Exciter current 2</div><div>■ Oscillation frequency 1</div><div>■ Oscillation frequency 2</div><div>■ Raw value mass flow</div><div>■ S&W volume flow</div><div>■ Torsion signal asymmetry</div></div><div><div>■ Reference density</div><div>■ Reference density alternative</div><div>■ Corrected volume flow</div><div>■ Oil corrected volume flow</div><div>■ Water corrected volume flow</div><div>■ Oscillation damping fluctuation 1</div><div>■ Oscillation damping fluctuation 2</div><div>■ Frequency fluctuation 1</div><div>■ Frequency fluctuation 2</div><div>■ Target mass flow</div><div>■ Carrier volume flow</div><div>■ Target volume flow</div><div>■ Temp. compensated dynamic viscosity</div><div>■ Temp. compensated kinematic viscosity</div><div>■ Temperature</div><div>■ Volume flow</div><div>■ Oil volume flow</div><div>■ Water volume flow</div><div>■ Water cut</div></div></div>		

Diagnostic information			Remedy instructions
No.	Short text		
369	Matrix code scanner defective		Replace matrix code scanner
	Measured variable status		
	Quality	Good	
	Quality substatus	Ok	
	Coding (hex)	0x80 to 0x83	
	Status signal	F	
	Diagnostic behavior	Alarm	
	Influenced measured variables		
<div><div><div>▪ Oscillation amplitude 1</div><div>▪ Oscillation amplitude 2</div><div>▪ Application specific output</div><div>▪ Application specific output</div><div>▪ Signal asymmetry</div><div>▪ Carrier mass flow</div><div>▪ Carrier pipe temperature</div><div>▪ Target corrected volume flow</div><div>▪ Carrier corrected volume flow</div><div>▪ Sensor index coil asymmetry</div><div>▪ Concentration</div><div>▪ Measured values</div><div>▪ Oscillation damping 1</div><div>▪ Oscillation damping 2</div><div>▪ Density</div><div>▪ Oil density</div><div>▪ Water density</div><div>▪ Test point</div><div>▪ Test point</div><div>▪ Dynamic viscosity</div></div><div><div>▪ Sensor electronics temperature (ISEM)</div><div>▪ GSV flow</div><div>▪ GSV flow alternative</div><div>▪ Kinematic viscosity</div><div>▪ Mass flow</div><div>▪ Oil mass flow</div><div>▪ Water mass flow</div><div>▪ Inhomogeneous medium index</div><div>▪ Suspended bubbles index</div><div>▪ HBSI</div><div>▪ NSV flow</div><div>▪ NSV flow alternative</div><div>▪ External pressure</div><div>▪ Exciter current 1</div><div>▪ Exciter current 2</div><div>▪ Oscillation frequency 1</div><div>▪ Oscillation frequency 2</div><div>▪ Raw value mass flow</div><div>▪ S&W volume flow</div><div>▪ Torsion signal asymmetry</div></div><div><div>▪ Reference density</div><div>▪ Reference density alternative</div><div>▪ Corrected volume flow</div><div>▪ Oil corrected volume flow</div><div>▪ Water corrected volume flow</div><div>▪ Oscillation damping fluctuation 1</div><div>▪ Oscillation damping fluctuation 2</div><div>▪ Frequency fluctuation 1</div><div>▪ Frequency fluctuation 2</div><div>▪ Target mass flow</div><div>▪ Carrier volume flow</div><div>▪ Target volume flow</div><div>▪ Temp. compensated dynamic viscosity</div><div>▪ Temp. compensated kinematic viscosity</div><div>▪ Temperature</div><div>▪ Volume flow</div><div>▪ Oil volume flow</div><div>▪ Water volume flow</div><div>▪ Water cut</div></div></div>			

Diagnostic information		Remedy instructions
No.	Short text	
371	Temperature sensor defective	Contact service
	Measured variable status	
	Quality	
	Quality substatus	
	Coding (hex)	
	Status signal	
	Diagnostic behavior	
	Influenced measured variables	
	<ul style="list-style-type: none"> ■ Oscillation amplitude 1 ■ Oscillation amplitude 2 ■ Application specific output ■ Application specific output ■ Signal asymmetry ■ Carrier mass flow ■ Carrier pipe temperature ■ Target corrected volume flow ■ Carrier corrected volume flow ■ Sensor index coil asymmetry ■ Concentration ■ Measured values ■ Oscillation damping 1 ■ Oscillation damping 2 ■ Density ■ Oil density ■ Water density ■ Test point ■ Test point ■ Dynamic viscosity 	
	<ul style="list-style-type: none"> ■ Sensor electronics temperature (ISEM) ■ GSV flow ■ GSV flow alternative ■ Kinematic viscosity ■ Mass flow ■ Oil mass flow ■ Water mass flow ■ Inhomogeneous medium index ■ Suspended bubbles index ■ HBSI ■ NSV flow ■ NSV flow alternative ■ External pressure ■ Exciter current 1 ■ Exciter current 2 ■ Oscillation frequency 1 ■ Oscillation frequency 2 ■ Raw value mass flow ■ S&W volume flow ■ Torsion signal asymmetry 	
	<ul style="list-style-type: none"> ■ Reference density ■ Reference density alternative ■ Corrected volume flow ■ Oil corrected volume flow ■ Water corrected volume flow ■ Oscillation damping fluctuation 1 ■ Oscillation damping fluctuation 2 ■ Frequency fluctuation 1 ■ Frequency fluctuation 2 ■ Target mass flow ■ Carrier volume flow ■ Target volume flow ■ Temp. compensated dynamic viscosity ■ Temp. compensated kinematic viscosity ■ Temperature ■ Volume flow ■ Oil volume flow ■ Water volume flow ■ Water cut 	

Diagnostic information			Remedy instructions
No.	Short text		
372	Sensor electronics (ISEM) faulty		1. Restart device 2. Check if failure recurs 3. Replace sensor electronic module (ISEM)
	Measured variable status		
	Quality	Good	
	Quality substatus	Ok	
	Coding (hex)	0x80 to 0x83	
	Status signal	F	
	Diagnostic behavior	Alarm	
	Influenced measured variables		
<div><div><ul style="list-style-type: none">▪ Oscillation amplitude 1▪ Oscillation amplitude 2▪ Application specific output▪ Application specific output▪ Signal asymmetry▪ Carrier mass flow▪ Carrier pipe temperature▪ Target corrected volume flow▪ Carrier corrected volume flow▪ Sensor index coil asymmetry▪ Concentration▪ Measured values▪ Oscillation damping 1▪ Oscillation damping 2▪ Density▪ Oil density▪ Water density▪ Test point▪ Test point▪ Dynamic viscosity</div><div><ul style="list-style-type: none">▪ Sensor electronics temperature (ISEM)▪ GSV flow▪ GSV flow alternative▪ Kinematic viscosity▪ Mass flow▪ Oil mass flow▪ Water mass flow▪ Inhomogeneous medium index▪ Suspended bubbles index▪ HBSI▪ NSV flow▪ NSV flow alternative▪ External pressure▪ Exciter current 1▪ Exciter current 2▪ Oscillation frequency 1▪ Oscillation frequency 2▪ Raw value mass flow▪ S&W volume flow▪ Torsion signal asymmetry</div><div><ul style="list-style-type: none">▪ Reference density▪ Reference density alternative▪ Corrected volume flow▪ Oil corrected volume flow▪ Water corrected volume flow▪ Oscillation damping fluctuation 1▪ Oscillation damping fluctuation 2▪ Frequency fluctuation 1▪ Frequency fluctuation 2▪ Target mass flow▪ Carrier volume flow▪ Target volume flow▪ Temp. compensated dynamic viscosity▪ Temp. compensated kinematic viscosity▪ Temperature▪ Volume flow▪ Oil volume flow▪ Water volume flow▪ Water cut</div></div>			

Diagnostic information			Remedy instructions
No.	Short text		
373	Sensor electronics (ISEM) faulty		Transfer data or reset device
	Measured variable status		
	Quality	Good	
	Quality substatus	Ok	
	Coding (hex)	0x80 to 0x83	
	Status signal	F	
	Diagnostic behavior	Alarm	
	Influenced measured variables		
<div><div><ul style="list-style-type: none">■ Oscillation amplitude 1■ Oscillation amplitude 2■ Application specific output■ Application specific output■ Signal asymmetry■ Carrier mass flow■ Carrier pipe temperature■ Target corrected volume flow■ Carrier corrected volume flow■ Sensor index coil asymmetry■ Concentration■ Measured values■ Oscillation damping 1■ Oscillation damping 2■ Density■ Oil density■ Water density■ Test point■ Test point■ Dynamic viscosity</div><div><ul style="list-style-type: none">■ Sensor electronics temperature (ISEM)■ GSV flow■ GSV flow alternative■ Kinematic viscosity■ Mass flow■ Oil mass flow■ Water mass flow■ Inhomogeneous medium index■ Suspended bubbles index■ HBSI■ NSV flow■ NSV flow alternative■ External pressure■ Exciter current 1■ Exciter current 2■ Oscillation frequency 1■ Oscillation frequency 2■ Raw value mass flow■ S&W volume flow■ Torsion signal asymmetry</div><div><ul style="list-style-type: none">■ Reference density■ Reference density alternative■ Corrected volume flow■ Oil corrected volume flow■ Water corrected volume flow■ Oscillation damping fluctuation 1■ Oscillation damping fluctuation 2■ Frequency fluctuation 1■ Frequency fluctuation 2■ Target mass flow■ Carrier volume flow■ Target volume flow■ Temp. compensated dynamic viscosity■ Temp. compensated kinematic viscosity■ Temperature■ Volume flow■ Oil volume flow■ Water volume flow■ Water cut</div></div>			

Diagnostic information			Remedy instructions
No.	Short text		
374	Sensor electronics (ISEM) faulty		1. Restart device 2. Check if failure recurs 3. Replace sensor electronic module (ISEM)
	Measured variable status [from the factory] ¹⁾		
	Quality	Good	
	Quality substatus	Ok	
	Coding (hex)	0x80 to 0x83	
	Status signal	S	
	Diagnostic behavior	Warning	
	Influenced measured variables		
	<div><div><ul style="list-style-type: none">■ Oscillation amplitude 1■ Oscillation amplitude 2■ Application specific output■ Application specific output■ Signal asymmetry■ Carrier mass flow■ Carrier pipe temperature■ Target corrected volume flow■ Carrier corrected volume flow■ Sensor index coil asymmetry■ Concentration■ Oscillation damping 1■ Oscillation damping 2■ Density■ Oil density■ Water density■ Test point■ Test point■ Dynamic viscosity■ Sensor electronics temperature (ISEM)</div><div><ul style="list-style-type: none">■ GSV flow■ GSV flow alternative■ Kinematic viscosity■ Mass flow■ Oil mass flow■ Water mass flow■ Inhomogeneous medium index■ Suspended bubbles index■ HBSI■ NSV flow■ NSV flow alternative■ External pressure■ Exciter current 1■ Exciter current 2■ Oscillation frequency 1■ Oscillation frequency 2■ Raw value mass flow■ S&W volume flow■ Torsion signal asymmetry■ Reference density</div><div><ul style="list-style-type: none">■ Reference density alternative■ Corrected volume flow■ Oil corrected volume flow■ Water corrected volume flow■ Oscillation damping fluctuation 1■ Oscillation damping fluctuation 2■ Frequency fluctuation 1■ Frequency fluctuation 2■ Target mass flow■ Carrier volume flow■ Target volume flow■ Temp. compensated dynamic viscosity■ Temp. compensated kinematic viscosity■ Temperature■ Volume flow■ Oil volume flow■ Water volume flow■ Water cut</div></div>		

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

Diagnostic information		Remedy instructions	
No.	Short text		
375	I/O- 1 to n communication failed	1. Restart device 2. Check if failure recurs 3. Replace module rack inclusive electronic modules	
	Measured variable status		
	Quality		Good
	Quality substatus		Ok
	Coding (hex)		0x80 to 0x83
	Status signal		F
	Diagnostic behavior		Alarm
Influenced measured variables			
<div><div><div>■ Oscillation amplitude 1</div><div>■ Oscillation amplitude 2</div><div>■ Application specific output</div><div>■ Application specific output</div><div>■ Signal asymmetry</div><div>■ Carrier mass flow</div><div>■ Carrier pipe temperature</div><div>■ Target corrected volume flow</div><div>■ Carrier corrected volume flow</div><div>■ Sensor index coil asymmetry</div><div>■ Concentration</div><div>■ Measured values</div><div>■ Oscillation damping 1</div><div>■ Oscillation damping 2</div><div>■ Density</div><div>■ Oil density</div><div>■ Water density</div><div>■ Test point</div><div>■ Test point</div><div>■ Dynamic viscosity</div></div><div><div>■ Sensor electronics temperature (ISEM)</div><div>■ GSV flow</div><div>■ GSV flow alternative</div><div>■ Kinematic viscosity</div><div>■ Mass flow</div><div>■ Oil mass flow</div><div>■ Water mass flow</div><div>■ Inhomogeneous medium index</div><div>■ Suspended bubbles index</div><div>■ HBSI</div><div>■ NSV flow</div><div>■ NSV flow alternative</div><div>■ External pressure</div><div>■ Exciter current 1</div><div>■ Exciter current 2</div><div>■ Oscillation frequency 1</div><div>■ Oscillation frequency 2</div><div>■ Raw value mass flow</div><div>■ S&W volume flow</div><div>■ Torsion signal asymmetry</div></div><div><div>■ Reference density</div><div>■ Reference density alternative</div><div>■ Corrected volume flow</div><div>■ Oil corrected volume flow</div><div>■ Water corrected volume flow</div><div>■ Oscillation damping fluctuation 1</div><div>■ Oscillation damping fluctuation 2</div><div>■ Frequency fluctuation 1</div><div>■ Frequency fluctuation 2</div><div>■ Target mass flow</div><div>■ Carrier volume flow</div><div>■ Target volume flow</div><div>■ Temp. compensated dynamic viscosity</div><div>■ Temp. compensated kinematic viscosity</div><div>■ Temperature</div><div>■ Volume flow</div><div>■ Oil volume flow</div><div>■ Water volume flow</div><div>■ Water cut</div></div></div>			

Diagnostic information			Remedy instructions
No.	Short text		
378	Supply voltage ISEM faulty		1. If available: Check connection cable between sensor and transmitter 2. Replace main electronic module 3. Replace sensor electronic module (ISEM)
	Measured variable status		
	Quality	Good	
	Quality substatus	Ok	
	Coding (hex)	0x80 to 0x83	
	Status signal	F	
	Diagnostic behavior	Alarm	
	Influenced measured variables		
<div><div><div><div>■ Oscillation amplitude 1</div><div>■ Oscillation amplitude 2</div><div>■ Application specific output</div><div>■ Application specific output</div><div>■ Signal asymmetry</div><div>■ Carrier mass flow</div><div>■ Carrier pipe temperature</div><div>■ Target corrected volume flow</div><div>■ Carrier corrected volume flow</div><div>■ Sensor index coil asymmetry</div><div>■ Concentration</div><div>■ Measured values</div><div>■ Oscillation damping 1</div><div>■ Oscillation damping 2</div><div>■ Density</div><div>■ Oil density</div><div>■ Water density</div><div>■ Test point</div><div>■ Test point</div><div>■ Dynamic viscosity</div></div><div><div>■ Sensor electronics temperature (ISEM)</div><div>■ GSV flow</div><div>■ GSV flow alternative</div><div>■ Kinematic viscosity</div><div>■ Mass flow</div><div>■ Oil mass flow</div><div>■ Water mass flow</div><div>■ Inhomogeneous medium index</div><div>■ Suspended bubbles index</div><div>■ HBSI</div><div>■ NSV flow</div><div>■ NSV flow alternative</div><div>■ External pressure</div><div>■ Exciter current 1</div><div>■ Exciter current 2</div><div>■ Oscillation frequency 1</div><div>■ Oscillation frequency 2</div><div>■ Raw value mass flow</div><div>■ S&W volume flow</div><div>■ Torsion signal asymmetry</div></div><div><div>■ Reference density</div><div>■ Reference density alternative</div><div>■ Corrected volume flow</div><div>■ Oil corrected volume flow</div><div>■ Water corrected volume flow</div><div>■ Oscillation damping fluctuation 1</div><div>■ Oscillation damping fluctuation 2</div><div>■ Frequency fluctuation 1</div><div>■ Frequency fluctuation 2</div><div>■ Target mass flow</div><div>■ Carrier volume flow</div><div>■ Target volume flow</div><div>■ Temp. compensated dynamic viscosity</div><div>■ Temp. compensated kinematic viscosity</div><div>■ Temperature</div><div>■ Volume flow</div><div>■ Oil volume flow</div><div>■ Water volume flow</div><div>■ Water cut</div></div></div></div>			

Diagnostic information			Remedy instructions
No.	Short text		
382	Data storage		1. Insert T-DAT 2. Replace T-DAT
	Measured variable status		
	Quality	Good	
	Quality substatus	Ok	
	Coding (hex)	0x80 to 0x83	
	Status signal	F	
	Diagnostic behavior	Alarm	
	Influenced measured variables		
<div><div><div>■ Oscillation amplitude 1</div><div>■ Oscillation amplitude 2</div><div>■ Application specific output</div><div>■ Application specific output</div><div>■ Signal asymmetry</div><div>■ Carrier mass flow</div><div>■ Carrier pipe temperature</div><div>■ Target corrected volume flow</div><div>■ Carrier corrected volume flow</div><div>■ Sensor index coil asymmetry</div><div>■ Concentration</div><div>■ Measured values</div><div>■ Oscillation damping 1</div><div>■ Oscillation damping 2</div><div>■ Density</div><div>■ Oil density</div><div>■ Water density</div><div>■ Test point</div><div>■ Test point</div><div>■ Dynamic viscosity</div></div><div><div>■ Sensor electronics temperature (ISEM)</div><div>■ GSV flow</div><div>■ GSV flow alternative</div><div>■ Kinematic viscosity</div><div>■ Mass flow</div><div>■ Oil mass flow</div><div>■ Water mass flow</div><div>■ Inhomogeneous medium index</div><div>■ Suspended bubbles index</div><div>■ HBSI</div><div>■ NSV flow</div><div>■ NSV flow alternative</div><div>■ External pressure</div><div>■ Exciter current 1</div><div>■ Exciter current 2</div><div>■ Oscillation frequency 1</div><div>■ Oscillation frequency 2</div><div>■ Raw value mass flow</div><div>■ S&W volume flow</div><div>■ Torsion signal asymmetry</div></div><div><div>■ Reference density</div><div>■ Reference density alternative</div><div>■ Corrected volume flow</div><div>■ Oil corrected volume flow</div><div>■ Water corrected volume flow</div><div>■ Oscillation damping fluctuation 1</div><div>■ Oscillation damping fluctuation 2</div><div>■ Frequency fluctuation 1</div><div>■ Frequency fluctuation 2</div><div>■ Target mass flow</div><div>■ Carrier volume flow</div><div>■ Target volume flow</div><div>■ Temp. compensated dynamic viscosity</div><div>■ Temp. compensated kinematic viscosity</div><div>■ Temperature</div><div>■ Volume flow</div><div>■ Oil volume flow</div><div>■ Water volume flow</div><div>■ Water cut</div></div></div>			

Diagnostic information			Remedy instructions
No.	Short text		
383	Memory content		Reset device
	Measured variable status		
	Quality	Good	
	Quality substatus	Ok	
	Coding (hex)	0x80 to 0x83	
	Status signal	F	
	Diagnostic behavior	Alarm	
	Influenced measured variables		
<div><div><div>▪ Oscillation amplitude 1</div><div>▪ Oscillation amplitude 2</div><div>▪ Application specific output</div><div>▪ Application specific output</div><div>▪ Signal asymmetry</div><div>▪ Carrier mass flow</div><div>▪ Carrier pipe temperature</div><div>▪ Target corrected volume flow</div><div>▪ Carrier corrected volume flow</div><div>▪ Sensor index coil asymmetry</div><div>▪ Concentration</div><div>▪ Measured values</div><div>▪ Oscillation damping 1</div><div>▪ Oscillation damping 2</div><div>▪ Density</div><div>▪ Oil density</div><div>▪ Water density</div><div>▪ Test point</div><div>▪ Test point</div><div>▪ Dynamic viscosity</div></div><div><div>▪ Sensor electronics temperature (ISEM)</div><div>▪ GSV flow</div><div>▪ GSV flow alternative</div><div>▪ Kinematic viscosity</div><div>▪ Mass flow</div><div>▪ Oil mass flow</div><div>▪ Water mass flow</div><div>▪ Inhomogeneous medium index</div><div>▪ Suspended bubbles index</div><div>▪ HBSI</div><div>▪ NSV flow</div><div>▪ NSV flow alternative</div><div>▪ External pressure</div><div>▪ Exciter current 1</div><div>▪ Exciter current 2</div><div>▪ Oscillation frequency 1</div><div>▪ Oscillation frequency 2</div><div>▪ Raw value mass flow</div><div>▪ S&W volume flow</div><div>▪ Torsion signal asymmetry</div></div><div><div>▪ Reference density</div><div>▪ Reference density alternative</div><div>▪ Corrected volume flow</div><div>▪ Oil corrected volume flow</div><div>▪ Water corrected volume flow</div><div>▪ Oscillation damping fluctuation 1</div><div>▪ Oscillation damping fluctuation 2</div><div>▪ Frequency fluctuation 1</div><div>▪ Frequency fluctuation 2</div><div>▪ Target mass flow</div><div>▪ Carrier volume flow</div><div>▪ Target volume flow</div><div>▪ Temp. compensated dynamic viscosity</div><div>▪ Temp. compensated kinematic viscosity</div><div>▪ Temperature</div><div>▪ Volume flow</div><div>▪ Oil volume flow</div><div>▪ Water volume flow</div><div>▪ Water cut</div></div></div>			

Diagnostic information		Remedy instructions	
No.	Short text		
387	HistoROM data faulty	Contact service organization	
	Measured variable status		
	Quality		Good
	Quality substatus		Ok
	Coding (hex)		0x80 to 0x83
	Status signal		F
	Diagnostic behavior		Alarm
	Influenced measured variables		
<div><div><div>■ Oscillation amplitude 1</div><div>■ Oscillation amplitude 2</div><div>■ Application specific output</div><div>■ Application specific output</div><div>■ Signal asymmetry</div><div>■ Carrier mass flow</div><div>■ Carrier pipe temperature</div><div>■ Target corrected volume flow</div><div>■ Carrier corrected volume flow</div><div>■ Sensor index coil asymmetry</div><div>■ Concentration</div><div>■ Measured values</div><div>■ Oscillation damping 1</div><div>■ Oscillation damping 2</div><div>■ Density</div><div>■ Oil density</div><div>■ Water density</div><div>■ Test point</div><div>■ Test point</div><div>■ Dynamic viscosity</div></div><div><div>■ Sensor electronics temperature (ISEM)</div><div>■ GSV flow</div><div>■ GSV flow alternative</div><div>■ Kinematic viscosity</div><div>■ Mass flow</div><div>■ Oil mass flow</div><div>■ Water mass flow</div><div>■ Inhomogeneous medium index</div><div>■ Suspended bubbles index</div><div>■ HBSI</div><div>■ NSV flow</div><div>■ NSV flow alternative</div><div>■ External pressure</div><div>■ Exciter current 1</div><div>■ Exciter current 2</div><div>■ Oscillation frequency 1</div><div>■ Oscillation frequency 2</div><div>■ Raw value mass flow</div><div>■ S&W volume flow</div><div>■ Torsion signal asymmetry</div></div><div><div>■ Reference density</div><div>■ Reference density alternative</div><div>■ Corrected volume flow</div><div>■ Oil corrected volume flow</div><div>■ Water corrected volume flow</div><div>■ Oscillation damping fluctuation 1</div><div>■ Oscillation damping fluctuation 2</div><div>■ Frequency fluctuation 1</div><div>■ Frequency fluctuation 2</div><div>■ Target mass flow</div><div>■ Carrier volume flow</div><div>■ Target volume flow</div><div>■ Temp. compensated dynamic viscosity</div><div>■ Temp. compensated kinematic viscosity</div><div>■ Temperature</div><div>■ Volume flow</div><div>■ Oil volume flow</div><div>■ Water volume flow</div><div>■ Water cut</div></div></div>			

12.7.3 Diagnostic of configuration

Diagnostic information		Remedy instructions
No.	Short text	
410	Data transfer failed	1. Retry data transfer 2. Check connection
	Measured variable status	
	Quality	
	Quality substatus	
	Coding (hex)	
	Status signal	
	Diagnostic behavior	
	Influenced measured variables	
<ul style="list-style-type: none"> ▪ Oscillation amplitude 1 ▪ Oscillation amplitude 2 ▪ Application specific output ▪ Application specific output ▪ Signal asymmetry ▪ Carrier mass flow ▪ Carrier pipe temperature ▪ Target corrected volume flow ▪ Carrier corrected volume flow ▪ Sensor index coil asymmetry ▪ Concentration ▪ Measured values ▪ Oscillation damping 1 ▪ Oscillation damping 2 ▪ Density ▪ Oil density ▪ Water density ▪ Test point ▪ Test point ▪ Dynamic viscosity 		<ul style="list-style-type: none"> ▪ Sensor electronics temperature (ISEM) ▪ GSV flow ▪ GSV flow alternative ▪ Kinematic viscosity ▪ Mass flow ▪ Oil mass flow ▪ Water mass flow ▪ Inhomogeneous medium index ▪ Suspended bubbles index ▪ HBSI ▪ NSV flow ▪ NSV flow alternative ▪ External pressure ▪ Exciter current 1 ▪ Exciter current 2 ▪ Oscillation frequency 1 ▪ Oscillation frequency 2 ▪ Raw value mass flow ▪ S&W volume flow ▪ Torsion signal asymmetry
		<ul style="list-style-type: none"> ▪ Reference density ▪ Reference density alternative ▪ Corrected volume flow ▪ Oil corrected volume flow ▪ Water corrected volume flow ▪ Oscillation damping fluctuation 1 ▪ Oscillation damping fluctuation 2 ▪ Frequency fluctuation 1 ▪ Frequency fluctuation 2 ▪ Target mass flow ▪ Carrier volume flow ▪ Target volume flow ▪ Temp. compensated dynamic viscosity ▪ Temp. compensated kinematic viscosity ▪ Temperature ▪ Volume flow ▪ Oil volume flow ▪ Water volume flow ▪ Water cut

Diagnostic information			Remedy instructions
No.	Short text		
412	Processing download		Download active, please wait
	Measured variable status		
	Quality	Good	
	Quality substatus	Ok	
	Coding (hex)	0x80 to 0x83	
	Status signal	C	
	Diagnostic behavior	Warning	
	Influenced measured variables		
<div><div><ul style="list-style-type: none">■ Oscillation amplitude 1■ Oscillation amplitude 2■ Application specific output■ Application specific output■ Signal asymmetry■ Carrier mass flow■ Carrier pipe temperature■ Target corrected volume flow■ Carrier corrected volume flow■ Sensor index coil asymmetry■ Concentration■ Measured values■ Oscillation damping 1■ Oscillation damping 2■ Density■ Oil density■ Water density■ Test point■ Test point■ Dynamic viscosity</div><div><ul style="list-style-type: none">■ Sensor electronics temperature (ISEM)■ GSV flow■ GSV flow alternative■ Kinematic viscosity■ Mass flow■ Oil mass flow■ Water mass flow■ Inhomogeneous medium index■ Suspended bubbles index■ HBSI■ NSV flow■ NSV flow alternative■ External pressure■ Exciter current 1■ Exciter current 2■ Oscillation frequency 1■ Oscillation frequency 2■ Raw value mass flow■ S&W volume flow■ Torsion signal asymmetry</div><div><ul style="list-style-type: none">■ Reference density■ Reference density alternative■ Corrected volume flow■ Oil corrected volume flow■ Water corrected volume flow■ Oscillation damping fluctuation 1■ Oscillation damping fluctuation 2■ Frequency fluctuation 1■ Frequency fluctuation 2■ Target mass flow■ Carrier volume flow■ Target volume flow■ Temp. compensated dynamic viscosity■ Temp. compensated kinematic viscosity■ Temperature■ Volume flow■ Oil volume flow■ Water volume flow■ Water cut</div></div>			

Diagnostic information			Remedy instructions
No.	Short text		
431	Trim 1 to n required		Carry out trim
	Measured variable status		
	Quality	Good	
	Quality substatus	Ok	
	Coding (hex)	0x80 to 0x83	
	Status signal	C	
	Diagnostic behavior	Warning	
	Influenced measured variables		
	-		

Diagnostic information			Remedy instructions
No.	Short text		
437	Configuration incompatible		1. Update firmware 2. Execute factory reset
	Measured variable status		
	Quality	Good	
	Quality substatus	Ok	
	Coding (hex)	0x80 to 0x83	
	Status signal	F	
	Diagnostic behavior	Alarm	
	Influenced measured variables		
<div><div><ul style="list-style-type: none">■ Oscillation amplitude 1■ Oscillation amplitude 2■ Application specific output■ Application specific output■ Signal asymmetry■ Carrier mass flow■ Carrier pipe temperature■ Target corrected volume flow■ Carrier corrected volume flow■ Sensor index coil asymmetry■ Concentration■ Measured values■ Oscillation damping 1■ Oscillation damping 2■ Density■ Oil density■ Water density■ Test point■ Test point■ Dynamic viscosity</div><div><ul style="list-style-type: none">■ Sensor electronics temperature (ISEM)■ GSV flow■ GSV flow alternative■ Kinematic viscosity■ Mass flow■ Oil mass flow■ Water mass flow■ Inhomogeneous medium index■ Suspended bubbles index■ HBSI■ NSV flow■ NSV flow alternative■ External pressure■ Exciter current 1■ Exciter current 2■ Oscillation frequency 1■ Oscillation frequency 2■ Raw value mass flow■ S&W volume flow■ Torsion signal asymmetry</div><div><ul style="list-style-type: none">■ Reference density■ Reference density alternative■ Corrected volume flow■ Oil corrected volume flow■ Water corrected volume flow■ Oscillation damping fluctuation 1■ Oscillation damping fluctuation 2■ Frequency fluctuation 1■ Frequency fluctuation 2■ Target mass flow■ Carrier volume flow■ Target volume flow■ Temp. compensated dynamic viscosity■ Temp. compensated kinematic viscosity■ Temperature■ Volume flow■ Oil volume flow■ Water volume flow■ Water cut</div></div>			

Diagnostic information			Remedy instructions
No.	Short text		
438	Dataset different		1. Check dataset file 2. Check device parameterization 3. Download new device parameterization
	Measured variable status		
	Quality	Good	
	Quality substatus	Ok	
	Coding (hex)	0x80 to 0x83	
	Status signal	M	
	Diagnostic behavior	Warning	
	Influenced measured variables		
<div><div><div>■ Oscillation amplitude 1</div><div>■ Oscillation amplitude 2</div><div>■ Application specific output</div><div>■ Application specific output</div><div>■ Signal asymmetry</div><div>■ Carrier mass flow</div><div>■ Carrier pipe temperature</div><div>■ Target corrected volume flow</div><div>■ Carrier corrected volume flow</div><div>■ Sensor index coil asymmetry</div><div>■ Concentration</div><div>■ Measured values</div><div>■ Oscillation damping 1</div><div>■ Oscillation damping 2</div><div>■ Density</div><div>■ Oil density</div><div>■ Water density</div><div>■ Test point</div><div>■ Test point</div><div>■ Dynamic viscosity</div></div><div><div>■ Sensor electronics temperature (ISEM)</div><div>■ GSV flow</div><div>■ GSV flow alternative</div><div>■ Kinematic viscosity</div><div>■ Mass flow</div><div>■ Oil mass flow</div><div>■ Water mass flow</div><div>■ Inhomogeneous medium index</div><div>■ Suspended bubbles index</div><div>■ HBSI</div><div>■ NSV flow</div><div>■ NSV flow alternative</div><div>■ External pressure</div><div>■ Exciter current 1</div><div>■ Exciter current 2</div><div>■ Oscillation frequency 1</div><div>■ Oscillation frequency 2</div><div>■ Raw value mass flow</div><div>■ S&W volume flow</div><div>■ Torsion signal asymmetry</div></div><div><div>■ Reference density</div><div>■ Reference density alternative</div><div>■ Corrected volume flow</div><div>■ Oil corrected volume flow</div><div>■ Water corrected volume flow</div><div>■ Oscillation damping fluctuation 1</div><div>■ Oscillation damping fluctuation 2</div><div>■ Frequency fluctuation 1</div><div>■ Frequency fluctuation 2</div><div>■ Target mass flow</div><div>■ Carrier volume flow</div><div>■ Target volume flow</div><div>■ Temp. compensated dynamic viscosity</div><div>■ Temp. compensated kinematic viscosity</div><div>■ Temperature</div><div>■ Volume flow</div><div>■ Oil volume flow</div><div>■ Water volume flow</div><div>■ Water cut</div></div></div>			

Diagnostic information			Remedy instructions
No.	Short text		
441	Current output 1 to n saturated		1. Check current output settings 2. Check process
	Measured variable status		
	Quality	Good	
	Quality substatus	Ok	
	Coding (hex)	0x80 to 0x83	
	Status signal	S	
	Diagnostic behavior	Warning	
	Influenced measured variables		
	-		

Diagnostic information		Remedy instructions
No.	Short text	
442	Frequency output 1 saturated	1. Check frequency output settings 2. Check process
	Measured variable status	
	Quality	
	Quality substatus	
	Coding (hex)	
	Status signal	
	Diagnostic behavior	
	Influenced measured variables	
	–	

Diagnostic information		Remedy instructions
No.	Short text	
443	Pulse output 1 saturated	1. Check pulse output settings 2. Check process
	Measured variable status [from the factory] ¹⁾	
	Quality	
	Quality substatus	
	Coding (hex)	
	Status signal	
	Diagnostic behavior	
	Influenced measured variables	
	–	

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

Diagnostic information		Remedy instructions
No.	Short text	
444	Current input 1 to n saturated	1. Check current input settings 2. Check connected device 3. Check process
	Measured variable status [from the factory] ¹⁾	
	Quality	
	Quality substatus	
	Coding (hex)	
	Status signal	
	Diagnostic behavior	
	Influenced measured variables	
	Measured values	

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

Diagnostic information			Remedy instructions
No.	Short text		
453	Flow override active		Deactivate flow override
	Measured variable status		
	Quality	Good	
	Quality substatus	Ok	
	Coding (hex)	0x80 to 0x83	
	Status signal	C	
	Diagnostic behavior	Warning	
	Influenced measured variables		
	<div><div><div>■ Oscillation amplitude 1</div><div>■ Oscillation amplitude 2</div><div>■ Application specific output</div><div>■ Application specific output</div><div>■ Signal asymmetry</div><div>■ Carrier mass flow</div><div>■ Carrier pipe temperature</div><div>■ Target corrected volume flow</div><div>■ Carrier corrected volume flow</div><div>■ Sensor index coil asymmetry</div><div>■ Concentration</div><div>■ Oscillation damping 1</div><div>■ Oscillation damping 2</div><div>■ Density</div><div>■ Oil density</div><div>■ Water density</div><div>■ Test point</div><div>■ Test point</div><div>■ Dynamic viscosity</div><div>■ Sensor electronics temperature (ISEM)</div></div><div><div>■ GSV flow</div><div>■ GSV flow alternative</div><div>■ Kinematic viscosity</div><div>■ Mass flow</div><div>■ Oil mass flow</div><div>■ Water mass flow</div><div>■ Inhomogeneous medium index</div><div>■ Suspended bubbles index</div><div>■ HBSI</div><div>■ NSV flow</div><div>■ NSV flow alternative</div><div>■ External pressure</div><div>■ Exciter current 1</div><div>■ Exciter current 2</div><div>■ Oscillation frequency 1</div><div>■ Oscillation frequency 2</div><div>■ Raw value mass flow</div><div>■ S&W volume flow</div><div>■ Torsion signal asymmetry</div><div>■ Reference density</div></div><div><div>■ Reference density alternative</div><div>■ Corrected volume flow</div><div>■ Oil corrected volume flow</div><div>■ Water corrected volume flow</div><div>■ Oscillation damping fluctuation 1</div><div>■ Oscillation damping fluctuation 2</div><div>■ Frequency fluctuation 1</div><div>■ Frequency fluctuation 2</div><div>■ Target mass flow</div><div>■ Carrier volume flow</div><div>■ Target volume flow</div><div>■ Temp. compensated dynamic viscosity</div><div>■ Temp. compensated kinematic viscosity</div><div>■ Temperature</div><div>■ Volume flow</div><div>■ Oil volume flow</div><div>■ Water volume flow</div><div>■ Water cut</div></div></div>		

Diagnostic information		Remedy instructions
No.	Short text	
484	Failure mode simulation active	Deactivate simulation
	Measured variable status	
	Quality	
	Quality substatus	
	Coding (hex)	
	Status signal	
	Diagnostic behavior	
	Influenced measured variables	
	<ul style="list-style-type: none"> ▪ Oscillation amplitude 1 ▪ Oscillation amplitude 2 ▪ Application specific output ▪ Application specific output ▪ Signal asymmetry ▪ Carrier mass flow ▪ Carrier pipe temperature ▪ Target corrected volume flow ▪ Carrier corrected volume flow ▪ Sensor index coil asymmetry ▪ Concentration ▪ Oscillation damping 1 ▪ Oscillation damping 2 ▪ Density ▪ Oil density ▪ Water density ▪ Test point ▪ Test point ▪ Dynamic viscosity ▪ Sensor electronics temperature (ISEM) 	
		<ul style="list-style-type: none"> ▪ GSV flow ▪ GSV flow alternative ▪ Kinematic viscosity ▪ Mass flow ▪ Oil mass flow ▪ Water mass flow ▪ Inhomogeneous medium index ▪ Suspended bubbles index ▪ HBSI ▪ NSV flow ▪ NSV flow alternative ▪ External pressure ▪ Exciter current 1 ▪ Exciter current 2 ▪ Oscillation frequency 1 ▪ Oscillation frequency 2 ▪ Raw value mass flow ▪ S&W volume flow ▪ Torsion signal asymmetry ▪ Reference density
		<ul style="list-style-type: none"> ▪ Reference density alternative ▪ Corrected volume flow ▪ Oil corrected volume flow ▪ Water corrected volume flow ▪ Oscillation damping fluctuation 1 ▪ Oscillation damping fluctuation 2 ▪ Frequency fluctuation 1 ▪ Frequency fluctuation 2 ▪ Target mass flow ▪ Carrier volume flow ▪ Target volume flow ▪ Temp. compensated dynamic viscosity ▪ Temp. compensated kinematic viscosity ▪ Temperature ▪ Volume flow ▪ Oil volume flow ▪ Water volume flow ▪ Water cut

Diagnostic information		Remedy instructions
No.	Short text	
485	Process variable simulation active	Deactivate simulation
	Measured variable status	
	Quality	
	Quality substatus	
	Coding (hex)	
	Status signal	
	Diagnostic behavior	
	Influenced measured variables	
	<ul style="list-style-type: none"> ■ Oscillation amplitude 1 ■ Oscillation amplitude 2 ■ Application specific output ■ Application specific output ■ Signal asymmetry ■ Carrier mass flow ■ Carrier pipe temperature ■ Target corrected volume flow ■ Carrier corrected volume flow ■ Sensor index coil asymmetry ■ Concentration ■ Oscillation damping 1 ■ Oscillation damping 2 ■ Density ■ Oil density ■ Water density ■ Test point ■ Test point ■ Dynamic viscosity ■ Sensor electronics temperature (ISEM) 	
	<ul style="list-style-type: none"> ■ GSV flow ■ GSV flow alternative ■ Kinematic viscosity ■ Mass flow ■ Oil mass flow ■ Water mass flow ■ Inhomogeneous medium index ■ Suspended bubbles index ■ HBSI ■ NSV flow ■ NSV flow alternative ■ External pressure ■ Exciter current 1 ■ Exciter current 2 ■ Oscillation frequency 1 ■ Oscillation frequency 2 ■ Raw value mass flow ■ S&W volume flow ■ Torsion signal asymmetry ■ Reference density 	
	<ul style="list-style-type: none"> ■ Reference density alternative ■ Corrected volume flow ■ Oil corrected volume flow ■ Water corrected volume flow ■ Oscillation damping fluctuation 1 ■ Oscillation damping fluctuation 2 ■ Frequency fluctuation 1 ■ Frequency fluctuation 2 ■ Target mass flow ■ Carrier volume flow ■ Target volume flow ■ Temp. compensated dynamic viscosity ■ Temp. compensated kinematic viscosity ■ Temperature ■ Volume flow ■ Oil volume flow ■ Water volume flow ■ Water cut 	

Diagnostic information		Remedy instructions
No.	Short text	
486	Current input 1 to n simulation active	Deactivate simulation
	Measured variable status	
	Quality	
	Quality substatus	
	Coding (hex)	
	Status signal	
	Diagnostic behavior	
	Influenced measured variables	
	Measured values	

Diagnostic information		Remedy instructions
No.	Short text	
491	Current output 1 to n simulation active	Deactivate simulation
	Measured variable status	
	Quality	
	Quality substatus	
	Coding (hex)	
	Status signal	
	Diagnostic behavior	
	Influenced measured variables	
	–	

Diagnostic information		Remedy instructions
No.	Short text	
492	Frequency output 1 to n simulation active	Deactivate simulation frequency output
	Measured variable status	
	Quality	
	Quality substatus	
	Coding (hex)	
	Status signal	
	Diagnostic behavior	
	Influenced measured variables	
	–	

Diagnostic information		Remedy instructions
No.	Short text	
493	Pulse output simulation active	Deactivate simulation pulse output
	Measured variable status	
	Quality	
	Quality substatus	
	Coding (hex)	
	Status signal	
	Diagnostic behavior	
	Influenced measured variables	
	–	

Diagnostic information		Remedy instructions
No.	Short text	
494	Switch output 1 to n simulation active	Deactivate simulation switch output
	Measured variable status	
	Quality	
	Quality substatus	
	Coding (hex)	
	Status signal	
	Diagnostic behavior	
	Influenced measured variables	
	–	

Diagnostic information		Remedy instructions
No.	Short text	
495	Diagnostic event simulation active	Deactivate simulation
	Measured variable status	
	Quality	
	Quality substatus	
	Coding (hex)	
	Status signal	
	Diagnostic behavior	
	Influenced measured variables	
	–	

Diagnostic information		Remedy instructions
No.	Short text	
496	Status input 1 to n simulation active	Deactivate simulation status input
	Measured variable status	
	Quality	
	Quality substatus	
	Coding (hex)	
	Status signal	
	Diagnostic behavior	
	Influenced measured variables	
	–	

Diagnostic information		Remedy instructions
No.	Short text	
520	I/O 1 to n hardware configuration invalid	
	Measured variable status	
	Quality	Good
	Quality substatus	Ok
	Coding (hex)	0x80 to 0x83
	Status signal	F
	Diagnostic behavior	Alarm
	Influenced measured variables	
	-	

Diagnostic information		Remedy instructions
No.	Short text	
528	Concentration calculation not possible	
	Measured variable status	
	Quality	Good
	Quality substatus	Ok
	Coding (hex)	0x80 to 0x83
	Status signal	S
	Diagnostic behavior	Alarm
	Influenced measured variables	
	<ul style="list-style-type: none"> ▪ Carrier mass flow ▪ Target corrected volume flow ▪ Carrier corrected volume flow ▪ Concentration ▪ Density ▪ Mass flow ▪ Target mass flow ▪ Carrier volume flow ▪ Target volume flow ▪ Volume flow 	

Diagnostic information		Remedy instructions
No.	Short text	
529	Concentration calculation not accurate	
	Measured variable status	
	Quality	Good
	Quality substatus	Ok
	Coding (hex)	0x80 to 0x83
	Status signal	S
	Diagnostic behavior	Warning
	Influenced measured variables	
	<ul style="list-style-type: none"> ▪ Carrier mass flow ▪ Target corrected volume flow ▪ Carrier corrected volume flow ▪ Concentration ▪ Density ▪ Mass flow ▪ Target mass flow ▪ Carrier volume flow ▪ Target volume flow ▪ Volume flow 	

Diagnostic information		Remedy instructions
No.	Short text	
537	Configuration	1. Check IP addresses in network 2. Change IP address
	Measured variable status	
	Quality	
	Quality substatus	
	Coding (hex)	
	Status signal	
	Diagnostic behavior	
	Influenced measured variables	
	–	

Diagnostic information		Remedy instructions
No.	Short text	
594	Relay output 1 to n simulation active	Deactivate simulation switch output
	Measured variable status	
	Quality	
	Quality substatus	
	Coding (hex)	
	Status signal	
	Diagnostic behavior	
	Influenced measured variables	
	–	

12.7.4 Diagnostic of process

Diagnostic information		Remedy instructions
No.	Short text	
803	Loop current 1 faulty	1. Check wiring 2. Change I/O module
	Measured variable status	
	Quality	
	Quality substatus	
	Coding (hex)	
	Status signal	
	Diagnostic behavior	
	Influenced measured variables	
	–	

Diagnostic information			Remedy instructions
No.	Short text		
830	Ambient temperature too high		Reduce ambient temp. around the sensor housing
	Measured variable status [from the factory] ¹⁾		
	Quality	Good	
	Quality substatus	Ok	
	Coding (hex)	0x80 to 0x83	
	Status signal	S	
	Diagnostic behavior	Warning	
	Influenced measured variables		
<div><div><div>▪ Oscillation amplitude 1</div><div>▪ Oscillation amplitude 2</div><div>▪ Application specific output</div><div>▪ Application specific output</div><div>▪ Signal asymmetry</div><div>▪ Carrier mass flow</div><div>▪ Carrier pipe temperature</div><div>▪ Target corrected volume flow</div><div>▪ Carrier corrected volume flow</div><div>▪ Sensor index coil asymmetry</div><div>▪ Concentration</div><div>▪ Oscillation damping 1</div><div>▪ Oscillation damping 2</div><div>▪ Density</div><div>▪ Oil density</div><div>▪ Water density</div><div>▪ Test point</div><div>▪ Test point</div><div>▪ Dynamic viscosity</div><div>▪ Sensor electronics temperature (ISEM)</div></div><div><div>▪ GSV flow</div><div>▪ GSV flow alternative</div><div>▪ Kinematic viscosity</div><div>▪ Mass flow</div><div>▪ Oil mass flow</div><div>▪ Water mass flow</div><div>▪ Inhomogeneous medium index</div><div>▪ Suspended bubbles index</div><div>▪ HBSI</div><div>▪ NSV flow</div><div>▪ NSV flow alternative</div><div>▪ External pressure</div><div>▪ Exciter current 1</div><div>▪ Exciter current 2</div><div>▪ Oscillation frequency 1</div><div>▪ Oscillation frequency 2</div><div>▪ Raw value mass flow</div><div>▪ S&W volume flow</div><div>▪ Torsion signal asymmetry</div><div>▪ Reference density</div></div><div><div>▪ Reference density alternative</div><div>▪ Corrected volume flow</div><div>▪ Oil corrected volume flow</div><div>▪ Water corrected volume flow</div><div>▪ Oscillation damping fluctuation 1</div><div>▪ Oscillation damping fluctuation 2</div><div>▪ Frequency fluctuation 1</div><div>▪ Frequency fluctuation 2</div><div>▪ Target mass flow</div><div>▪ Carrier volume flow</div><div>▪ Target volume flow</div><div>▪ Temp. compensated dynamic viscosity</div><div>▪ Temp. compensated kinematic viscosity</div><div>▪ Temperature</div><div>▪ Volume flow</div><div>▪ Oil volume flow</div><div>▪ Water volume flow</div><div>▪ Water cut</div></div></div>			

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

Diagnostic information		Remedy instructions
No.	Short text	
831	Ambient temperature too low	Increase ambient temp. around the sensor housing
	Measured variable status [from the factory] ¹⁾	
	Quality	
	Quality substatus	
	Coding (hex)	
	Status signal	
	Diagnostic behavior	
	Influenced measured variables	
	<ul style="list-style-type: none"> ■ Oscillation amplitude 1 ■ Oscillation amplitude 2 ■ Application specific output ■ Application specific output ■ Signal asymmetry ■ Carrier mass flow ■ Carrier pipe temperature ■ Target corrected volume flow ■ Carrier corrected volume flow ■ Sensor index coil asymmetry ■ Concentration ■ Oscillation damping 1 ■ Oscillation damping 2 ■ Density ■ Oil density ■ Water density ■ Test point ■ Test point ■ Dynamic viscosity ■ Sensor electronics temperature (ISEM) 	
		<ul style="list-style-type: none"> ■ GSV flow ■ GSV flow alternative ■ Kinematic viscosity ■ Mass flow ■ Oil mass flow ■ Water mass flow ■ Inhomogeneous medium index ■ Suspended bubbles index ■ HBSI ■ NSV flow ■ NSV flow alternative ■ External pressure ■ Exciter current 1 ■ Exciter current 2 ■ Oscillation frequency 1 ■ Oscillation frequency 2 ■ Raw value mass flow ■ S&W volume flow ■ Torsion signal asymmetry ■ Reference density
		<ul style="list-style-type: none"> ■ Reference density alternative ■ Corrected volume flow ■ Oil corrected volume flow ■ Water corrected volume flow ■ Oscillation damping fluctuation 1 ■ Oscillation damping fluctuation 2 ■ Frequency fluctuation 1 ■ Frequency fluctuation 2 ■ Target mass flow ■ Carrier volume flow ■ Target volume flow ■ Temp. compensated dynamic viscosity ■ Temp. compensated kinematic viscosity ■ Temperature ■ Volume flow ■ Oil volume flow ■ Water volume flow ■ Water cut

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

Diagnostic information			Remedy instructions
No.	Short text		
832	Electronics temperature too high		Reduce ambient temperature
	Measured variable status [from the factory] ¹⁾		
	Quality	Good	
	Quality substatus	Ok	
	Coding (hex)	0x80 to 0x83	
	Status signal	S	
	Diagnostic behavior	Warning	
	Influenced measured variables		
<div><div><div>▪ Oscillation amplitude 1</div><div>▪ Oscillation amplitude 2</div><div>▪ Application specific output</div><div>▪ Application specific output</div><div>▪ Signal asymmetry</div><div>▪ Carrier mass flow</div><div>▪ Carrier pipe temperature</div><div>▪ Target corrected volume flow</div><div>▪ Carrier corrected volume flow</div><div>▪ Sensor index coil asymmetry</div><div>▪ Concentration</div><div>▪ Measured values</div><div>▪ Oscillation damping 1</div><div>▪ Oscillation damping 2</div><div>▪ Density</div><div>▪ Oil density</div><div>▪ Water density</div><div>▪ Test point</div><div>▪ Test point</div><div>▪ Dynamic viscosity</div></div><div><div>▪ Sensor electronics temperature (ISEM)</div><div>▪ GSV flow</div><div>▪ GSV flow alternative</div><div>▪ Kinematic viscosity</div><div>▪ Mass flow</div><div>▪ Oil mass flow</div><div>▪ Water mass flow</div><div>▪ Inhomogeneous medium index</div><div>▪ Suspended bubbles index</div><div>▪ HBSI</div><div>▪ NSV flow</div><div>▪ NSV flow alternative</div><div>▪ External pressure</div><div>▪ Exciter current 1</div><div>▪ Exciter current 2</div><div>▪ Oscillation frequency 1</div><div>▪ Oscillation frequency 2</div><div>▪ Raw value mass flow</div><div>▪ S&W volume flow</div><div>▪ Torsion signal asymmetry</div></div><div><div>▪ Reference density</div><div>▪ Reference density alternative</div><div>▪ Corrected volume flow</div><div>▪ Oil corrected volume flow</div><div>▪ Water corrected volume flow</div><div>▪ Oscillation damping fluctuation 1</div><div>▪ Oscillation damping fluctuation 2</div><div>▪ Frequency fluctuation 1</div><div>▪ Frequency fluctuation 2</div><div>▪ Target mass flow</div><div>▪ Carrier volume flow</div><div>▪ Target volume flow</div><div>▪ Temp. compensated dynamic viscosity</div><div>▪ Temp. compensated kinematic viscosity</div><div>▪ Temperature</div><div>▪ Volume flow</div><div>▪ Oil volume flow</div><div>▪ Water volume flow</div><div>▪ Water cut</div></div></div>			

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

Diagnostic information		Remedy instructions	
No.	Short text		
833	Electronics temperature too low	Increase ambient temperature	
	Measured variable status [from the factory] ¹⁾		
	Quality		Good
	Quality substatus		Ok
	Coding (hex)		0x80 to 0x83
	Status signal		S
	Diagnostic behavior		Warning
	Influenced measured variables		
<div><div><ul style="list-style-type: none">■ Oscillation amplitude 1■ Oscillation amplitude 2■ Application specific output■ Application specific output■ Signal asymmetry■ Carrier mass flow■ Carrier pipe temperature■ Target corrected volume flow■ Carrier corrected volume flow■ Sensor index coil asymmetry■ Concentration■ Measured values■ Oscillation damping 1■ Oscillation damping 2■ Density■ Oil density■ Water density■ Test point■ Test point■ Dynamic viscosity</div><div><ul style="list-style-type: none">■ Sensor electronics temperature (ISEM)■ GSV flow■ GSV flow alternative■ Kinematic viscosity■ Mass flow■ Oil mass flow■ Water mass flow■ Inhomogeneous medium index■ Suspended bubbles index■ HBSI■ NSV flow■ NSV flow alternative■ External pressure■ Exciter current 1■ Exciter current 2■ Oscillation frequency 1■ Oscillation frequency 2■ Raw value mass flow■ S&W volume flow■ Torsion signal asymmetry</div><div><ul style="list-style-type: none">■ Reference density■ Reference density alternative■ Corrected volume flow■ Oil corrected volume flow■ Water corrected volume flow■ Oscillation damping fluctuation 1■ Oscillation damping fluctuation 2■ Frequency fluctuation 1■ Frequency fluctuation 2■ Target mass flow■ Carrier volume flow■ Target volume flow■ Temp. compensated dynamic viscosity■ Temp. compensated kinematic viscosity■ Temperature■ Volume flow■ Oil volume flow■ Water volume flow■ Water cut</div></div>			

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

Diagnostic information			Remedy instructions
No.	Short text		
834	Process temperature too high		Reduce process temperature
	Measured variable status [from the factory] ¹⁾		
	Quality	Good	
	Quality substatus	Ok	
	Coding (hex)	0x80 to 0x83	
	Status signal	S	
	Diagnostic behavior	Warning	
	Influenced measured variables		
<div><div><div>▪ Oscillation amplitude 1</div><div>▪ Oscillation amplitude 2</div><div>▪ Application specific output</div><div>▪ Application specific output</div><div>▪ Signal asymmetry</div><div>▪ Carrier mass flow</div><div>▪ Carrier pipe temperature</div><div>▪ Target corrected volume flow</div><div>▪ Carrier corrected volume flow</div><div>▪ Sensor index coil asymmetry</div><div>▪ Concentration</div><div>▪ Oscillation damping 1</div><div>▪ Oscillation damping 2</div><div>▪ Density</div><div>▪ Oil density</div><div>▪ Water density</div><div>▪ Test point</div><div>▪ Test point</div><div>▪ Dynamic viscosity</div><div>▪ Sensor electronics temperature (ISEM)</div></div><div><div>▪ GSV flow</div><div>▪ GSV flow alternative</div><div>▪ Kinematic viscosity</div><div>▪ Mass flow</div><div>▪ Oil mass flow</div><div>▪ Water mass flow</div><div>▪ Inhomogeneous medium index</div><div>▪ Suspended bubbles index</div><div>▪ HBSI</div><div>▪ NSV flow</div><div>▪ NSV flow alternative</div><div>▪ External pressure</div><div>▪ Exciter current 1</div><div>▪ Exciter current 2</div><div>▪ Oscillation frequency 1</div><div>▪ Oscillation frequency 2</div><div>▪ Raw value mass flow</div><div>▪ S&W volume flow</div><div>▪ Torsion signal asymmetry</div><div>▪ Reference density</div></div><div><div>▪ Reference density alternative</div><div>▪ Corrected volume flow</div><div>▪ Oil corrected volume flow</div><div>▪ Water corrected volume flow</div><div>▪ Oscillation damping fluctuation 1</div><div>▪ Oscillation damping fluctuation 2</div><div>▪ Frequency fluctuation 1</div><div>▪ Frequency fluctuation 2</div><div>▪ Target mass flow</div><div>▪ Carrier volume flow</div><div>▪ Target volume flow</div><div>▪ Temp. compensated dynamic viscosity</div><div>▪ Temp. compensated kinematic viscosity</div><div>▪ Temperature</div><div>▪ Volume flow</div><div>▪ Oil volume flow</div><div>▪ Water volume flow</div><div>▪ Water cut</div></div></div>			

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

Diagnostic information		Remedy instructions
No.	Short text	
835	Process temperature too low	Increase process temperature
	Measured variable status [from the factory] ¹⁾	
	Quality	
	Quality substatus	
	Coding (hex)	
	Status signal	
	Diagnostic behavior	
	Influenced measured variables	
	<ul style="list-style-type: none"> ■ Oscillation amplitude 1 ■ Oscillation amplitude 2 ■ Application specific output ■ Application specific output ■ Signal asymmetry ■ Carrier mass flow ■ Carrier pipe temperature ■ Target corrected volume flow ■ Carrier corrected volume flow ■ Sensor index coil asymmetry ■ Concentration ■ Oscillation damping 1 ■ Oscillation damping 2 ■ Density ■ Oil density ■ Water density ■ Test point ■ Test point ■ Dynamic viscosity ■ Sensor electronics temperature (ISEM) 	
	<ul style="list-style-type: none"> ■ GSV flow ■ GSV flow alternative ■ Kinematic viscosity ■ Mass flow ■ Oil mass flow ■ Water mass flow ■ Inhomogeneous medium index ■ Suspended bubbles index ■ HBSI ■ NSV flow ■ NSV flow alternative ■ External pressure ■ Exciter current 1 ■ Exciter current 2 ■ Oscillation frequency 1 ■ Oscillation frequency 2 ■ Raw value mass flow ■ S&W volume flow ■ Torsion signal asymmetry ■ Reference density 	
		<ul style="list-style-type: none"> ■ Reference density alternative ■ Corrected volume flow ■ Oil corrected volume flow ■ Water corrected volume flow ■ Oscillation damping fluctuation 1 ■ Oscillation damping fluctuation 2 ■ Frequency fluctuation 1 ■ Frequency fluctuation 2 ■ Target mass flow ■ Carrier volume flow ■ Target volume flow ■ Temp. compensated dynamic viscosity ■ Temp. compensated kinematic viscosity ■ Temperature ■ Volume flow ■ Oil volume flow ■ Water volume flow ■ Water cut

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

Diagnostic information		Remedy instructions
No.	Short text	
842	Process value below limit	1. Decrease process value 2. Check application 3. Check sensor
	Measured variable status [from the factory] ¹⁾	
	Quality	
	Good	
	Quality substatus	
	Ok	
	Coding (hex)	
	0x80 to 0x83	
	Status signal	
	S	
	Diagnostic behavior	
	Warning	
Influenced measured variables		
<ul style="list-style-type: none"> ▪ Oscillation amplitude 1 ▪ Oscillation amplitude 2 ▪ Application specific output ▪ Application specific output ▪ Signal asymmetry ▪ Carrier mass flow ▪ Carrier pipe temperature ▪ Target corrected volume flow ▪ Carrier corrected volume flow ▪ Sensor index coil asymmetry ▪ Concentration ▪ Oscillation damping 1 ▪ Oscillation damping 2 ▪ Density ▪ Oil density ▪ Water density ▪ Test point ▪ Test point ▪ Dynamic viscosity ▪ Sensor electronics temperature (ISEM) 		<ul style="list-style-type: none"> ▪ GSV flow ▪ GSV flow alternative ▪ Kinematic viscosity ▪ Mass flow ▪ Oil mass flow ▪ Water mass flow ▪ Inhomogeneous medium index ▪ Suspended bubbles index ▪ HBSI ▪ NSV flow ▪ NSV flow alternative ▪ External pressure ▪ Exciter current 1 ▪ Exciter current 2 ▪ Oscillation frequency 1 ▪ Oscillation frequency 2 ▪ Raw value mass flow ▪ S&W volume flow ▪ Torsion signal asymmetry ▪ Reference density
		<ul style="list-style-type: none"> ▪ Reference density alternative ▪ Corrected volume flow ▪ Oil corrected volume flow ▪ Water corrected volume flow ▪ Oscillation damping fluctuation 1 ▪ Oscillation damping fluctuation 2 ▪ Frequency fluctuation 1 ▪ Frequency fluctuation 2 ▪ Target mass flow ▪ Carrier volume flow ▪ Target volume flow ▪ Temp. compensated dynamic viscosity ▪ Temp. compensated kinematic viscosity ▪ Temperature ▪ Volume flow ▪ Oil volume flow ▪ Water volume flow ▪ Water cut

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

Diagnostic information		Remedy instructions
No.	Short text	
862	Partly filled pipe	1. Check for gas in process 2. Adjust detection limits
	Measured variable status [from the factory] ¹⁾	
	Quality	
	Quality substatus	
	Coding (hex)	
	Status signal	
	Diagnostic behavior	
	Influenced measured variables	
	<ul style="list-style-type: none"> ■ Application specific output ■ Application specific output ■ Carrier mass flow ■ Target corrected volume flow ■ Carrier corrected volume flow ■ Concentration ■ Density ■ Oil density ■ Water density ■ Dynamic viscosity ■ Sensor electronics temperature (ISEM) ■ GSV flow ■ GSV flow alternative 	<ul style="list-style-type: none"> ■ Kinematic viscosity ■ Mass flow ■ Oil mass flow ■ Water mass flow ■ Inhomogeneous medium index ■ Suspended bubbles index ■ HBSI ■ NSV flow ■ NSV flow alternative ■ External pressure ■ S&W volume flow ■ Reference density ■ Reference density alternative
		<ul style="list-style-type: none"> ■ Corrected volume flow ■ Oil corrected volume flow ■ Water corrected volume flow ■ Target mass flow ■ Carrier volume flow ■ Target volume flow ■ Temp. compensated dynamic viscosity ■ Temp. compensated kinematic viscosity ■ Temperature ■ Volume flow ■ Oil volume flow ■ Water volume flow ■ Water cut

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

Diagnostic information		Remedy instructions
No.	Short text	
882	Input signal faulty	1. Check input signal parameterization 2. Check external device 3. Check process conditions
	Measured variable status	
	Quality	
	Quality substatus	
	Coding (hex)	
	Status signal	
	Diagnostic behavior	
	Influenced measured variables	
	<ul style="list-style-type: none"> ■ Oscillation amplitude 1 ■ Oscillation amplitude 2 ■ Application specific output ■ Application specific output ■ Signal asymmetry ■ Carrier mass flow ■ Carrier pipe temperature ■ Target corrected volume flow ■ Carrier corrected volume flow ■ Sensor index coil asymmetry ■ Concentration ■ Measured values ■ Oscillation damping 1 ■ Oscillation damping 2 ■ Density ■ Oil density ■ Water density ■ Test point ■ Test point ■ Dynamic viscosity 	<ul style="list-style-type: none"> ■ Sensor electronics temperature (ISEM) ■ GSV flow ■ GSV flow alternative ■ Kinematic viscosity ■ Mass flow ■ Oil mass flow ■ Water mass flow ■ Inhomogeneous medium index ■ Suspended bubbles index ■ HBSI ■ NSV flow ■ NSV flow alternative ■ External pressure ■ Exciter current 1 ■ Exciter current 2 ■ Oscillation frequency 1 ■ Oscillation frequency 2 ■ Raw value mass flow ■ S&W volume flow ■ Torsion signal asymmetry
		<ul style="list-style-type: none"> ■ Reference density ■ Reference density alternative ■ Corrected volume flow ■ Oil corrected volume flow ■ Water corrected volume flow ■ Oscillation damping fluctuation 1 ■ Oscillation damping fluctuation 2 ■ Frequency fluctuation 1 ■ Frequency fluctuation 2 ■ Target mass flow ■ Carrier volume flow ■ Target volume flow ■ Temp. compensated dynamic viscosity ■ Temp. compensated kinematic viscosity ■ Temperature ■ Volume flow ■ Oil volume flow ■ Water volume flow ■ Water cut

Diagnostic information		Remedy instructions
No.	Short text	
910	Tubes not oscillating	1. If available: Check connection cable between sensor and transmitter 2. Check or replace sensor electronic module (ISEM) 3. Check sensor
	Measured variable status	
	Quality	
	Quality substatus	
	Coding (hex)	
	Status signal	
	Diagnostic behavior	
	Influenced measured variables	
	–	

Diagnostic information		Remedy instructions
No.	Short text	
912	Medium inhomogeneous	1. Check process cond. 2. Increase system pressure
	Measured variable status [from the factory] ¹⁾	
	Quality	
	Quality substatus	
	Coding (hex)	
	Status signal	
	Diagnostic behavior	
	Influenced measured variables	
	<ul style="list-style-type: none"> ▪ Oscillation amplitude 1 ▪ Oscillation amplitude 2 ▪ Application specific output ▪ Application specific output ▪ Signal asymmetry ▪ Carrier mass flow ▪ Carrier pipe temperature ▪ Target corrected volume flow ▪ Carrier corrected volume flow ▪ Sensor index coil asymmetry ▪ Concentration ▪ Oscillation damping 1 ▪ Oscillation damping 2 ▪ Density ▪ Oil density ▪ Water density ▪ Test point ▪ Test point ▪ Dynamic viscosity ▪ Sensor electronics temperature (ISEM) 	<ul style="list-style-type: none"> ▪ GSV flow ▪ GSV flow alternative ▪ Kinematic viscosity ▪ Mass flow ▪ Oil mass flow ▪ Water mass flow ▪ Inhomogeneous medium index ▪ Suspended bubbles index ▪ HBSI ▪ NSV flow ▪ NSV flow alternative ▪ External pressure ▪ Exciter current 1 ▪ Exciter current 2 ▪ Oscillation frequency 1 ▪ Oscillation frequency 2 ▪ Raw value mass flow ▪ S&W volume flow ▪ Torsion signal asymmetry ▪ Reference density
	<ul style="list-style-type: none"> ▪ Reference density alternative ▪ Corrected volume flow ▪ Oil corrected volume flow ▪ Water corrected volume flow ▪ Oscillation damping fluctuation 1 ▪ Oscillation damping fluctuation 2 ▪ Frequency fluctuation 1 ▪ Frequency fluctuation 2 ▪ Target mass flow ▪ Carrier volume flow ▪ Target volume flow ▪ Temp. compensated dynamic viscosity ▪ Temp. compensated kinematic viscosity ▪ Temperature ▪ Volume flow ▪ Oil volume flow ▪ Water volume flow ▪ Water cut 	

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

Diagnostic information		Remedy instructions
No.	Short text	
913	Medium unsuitable	1. Check process conditions 2. Check electronic modules or sensor
	Measured variable status [from the factory] ¹⁾	
	Quality	
	Quality substatus	
	Coding (hex)	
	Status signal	
	Diagnostic behavior	
	Influenced measured variables	
	<ul style="list-style-type: none"> ■ Oscillation amplitude 1 ■ Oscillation amplitude 2 ■ Application specific output ■ Application specific output ■ Signal asymmetry ■ Carrier mass flow ■ Carrier pipe temperature ■ Target corrected volume flow ■ Carrier corrected volume flow ■ Sensor index coil asymmetry ■ Concentration ■ Oscillation damping 1 ■ Oscillation damping 2 ■ Density ■ Oil density ■ Water density ■ Test point ■ Test point ■ Dynamic viscosity ■ Sensor electronics temperature (ISEM) 	
		<ul style="list-style-type: none"> ■ GSV flow ■ GSV flow alternative ■ Kinematic viscosity ■ Mass flow ■ Oil mass flow ■ Water mass flow ■ Inhomogeneous medium index ■ Suspended bubbles index ■ HBSI ■ NSV flow ■ NSV flow alternative ■ External pressure ■ Exciter current 1 ■ Exciter current 2 ■ Oscillation frequency 1 ■ Oscillation frequency 2 ■ Raw value mass flow ■ S&W volume flow ■ Torsion signal asymmetry ■ Reference density
		<ul style="list-style-type: none"> ■ Reference density alternative ■ Corrected volume flow ■ Oil corrected volume flow ■ Water corrected volume flow ■ Oscillation damping fluctuation 1 ■ Oscillation damping fluctuation 2 ■ Frequency fluctuation 1 ■ Frequency fluctuation 2 ■ Target mass flow ■ Carrier volume flow ■ Target volume flow ■ Temp. compensated dynamic viscosity ■ Temp. compensated kinematic viscosity ■ Temperature ■ Volume flow ■ Oil volume flow ■ Water volume flow ■ Water cut

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

Diagnostic information			Remedy instructions
No.	Short text		
915	Viscosity out of specification		1. Avoid 2-phase flow 2. Increase system pressure 3. Verify viscosity and density are within range 4. Check process conditions
	Measured variable status [from the factory] ¹⁾		
	Quality	Good	
	Quality substatus	Ok	
	Coding (hex)	0x80 to 0x83	
	Status signal	S	
	Diagnostic behavior	Warning	
	Influenced measured variables		
<div><div><ul style="list-style-type: none">■ Oscillation amplitude 1■ Oscillation amplitude 2■ Application specific output■ Application specific output■ Signal asymmetry■ Carrier mass flow■ Carrier pipe temperature■ Target corrected volume flow■ Carrier corrected volume flow■ Sensor index coil asymmetry■ Concentration■ Measured values■ Oscillation damping 1■ Oscillation damping 2■ Density■ Oil density■ Water density■ Test point■ Test point■ Dynamic viscosity</div><div><ul style="list-style-type: none">■ Sensor electronics temperature (ISEM)■ GSV flow■ GSV flow alternative■ Kinematic viscosity■ Mass flow■ Oil mass flow■ Water mass flow■ Inhomogeneous medium index■ Suspended bubbles index■ HBSI■ NSV flow■ NSV flow alternative■ External pressure■ Exciter current 1■ Exciter current 2■ Oscillation frequency 1■ Oscillation frequency 2■ Raw value mass flow■ S&W volume flow■ Torsion signal asymmetry</div><div><ul style="list-style-type: none">■ Reference density■ Reference density alternative■ Corrected volume flow■ Oil corrected volume flow■ Water corrected volume flow■ Oscillation damping fluctuation 1■ Oscillation damping fluctuation 2■ Frequency fluctuation 1■ Frequency fluctuation 2■ Target mass flow■ Carrier volume flow■ Target volume flow■ Temp. compensated dynamic viscosity■ Temp. compensated kinematic viscosity■ Temperature■ Volume flow■ Oil volume flow■ Water volume flow■ Water cut</div></div>			

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

Diagnostic information			Remedy instructions
No.	Short text		
941	API/ASTM temperature out of specificat.		1. Check process temperature with selected API/ASTM commodity group 2. Check API/ASTM-related parameters
	Measured variable status [from the factory] ¹⁾		
	Quality	Good	
	Quality substatus	Ok	
	Coding (hex)	0x80 to 0x83	
	Status signal	S	
	Diagnostic behavior	Warning	
	Influenced measured variables		
	<div><div><div><div>■ Oil density</div><div>■ Water density</div><div>■ GSV flow</div><div>■ GSV flow alternative</div><div>■ Mass flow</div><div>■ Oil mass flow</div></div><div><div>■ Water mass flow</div><div>■ NSV flow</div><div>■ NSV flow alternative</div><div>■ S&W volume flow</div><div>■ Reference density alternative</div><div>■ Corrected volume flow</div></div><div><div>■ Oil corrected volume flow</div><div>■ Water corrected volume flow</div><div>■ Oil volume flow</div><div>■ Water volume flow</div><div>■ Water cut</div></div></div></div>		

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

Diagnostic information			Remedy instructions
No.	Short text		
942	API/ASTM density out of specification		1. Check process density with selected API/ASTM commodity group 2. Check API/ASTM-related parameters
	Measured variable status [from the factory] ¹⁾		
	Quality	Good	
	Quality substatus	Ok	
	Coding (hex)	0x80 to 0x83	
	Status signal	S	
	Diagnostic behavior	Warning	
	Influenced measured variables		
	<ul style="list-style-type: none">Oil densityWater densityGSV flowGSV flow alternativeMass flowOil mass flow	<ul style="list-style-type: none">Water mass flowNSV flowNSV flow alternativeS&W volume flowReference density alternativeCorrected volume flow	<ul style="list-style-type: none">Oil corrected volume flowWater corrected volume flowOil volume flowWater volume flowWater cut

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

Diagnostic information			Remedy instructions
No.	Short text		
943	API pressure out of specification		1. Check process pressure with selected API commodity group 2. Check API related parameters
	Measured variable status [from the factory] ¹⁾		
	Quality	Good	
	Quality substatus	Ok	
	Coding (hex)	0x80 to 0x83	
	Status signal	S	
	Diagnostic behavior	Warning	
	Influenced measured variables		
	<div><div>■ Oil density</div><div>■ Water density</div><div>■ GSV flow</div><div>■ GSV flow alternative</div><div>■ Mass flow</div><div>■ Oil mass flow</div></div>	<div><div>■ Water mass flow</div><div>■ NSV flow</div><div>■ NSV flow alternative</div><div>■ S&W volume flow</div><div>■ Reference density alternative</div><div>■ Corrected volume flow</div></div>	<div><div>■ Oil corrected volume flow</div><div>■ Water corrected volume flow</div><div>■ Oil volume flow</div><div>■ Water volume flow</div><div>■ Water cut</div></div>

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

Diagnostic information		Remedy instructions
No.	Short text	
944	Monitoring failed	Check process conditions for Heartbeat Monitoring
	Measured variable status [from the factory] ¹⁾	
	Quality	
	Quality substatus	
	Coding (hex)	
	Status signal	
	Diagnostic behavior	
	Influenced measured variables	
	<ul style="list-style-type: none"> ▪ Oscillation amplitude 1 ▪ Oscillation amplitude 2 ▪ Signal asymmetry ▪ Carrier pipe temperature ▪ Sensor index coil asymmetry ▪ Oscillation damping 1 ▪ Oscillation damping 2 ▪ Test point ▪ Test point 	<ul style="list-style-type: none"> ▪ Dynamic viscosity ▪ Kinematic viscosity ▪ Inhomogeneous medium index ▪ Suspended bubbles index ▪ HBSI ▪ Exciter current 1 ▪ Exciter current 2 ▪ Oscillation frequency 1 ▪ Oscillation frequency 2
		<ul style="list-style-type: none"> ▪ Raw value mass flow ▪ Torsion signal asymmetry ▪ Oscillation damping fluctuation 1 ▪ Oscillation damping fluctuation 2 ▪ Frequency fluctuation 1 ▪ Frequency fluctuation 2 ▪ Temp. compensated dynamic viscosity ▪ Temp. compensated kinematic viscosity

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

Diagnostic information		Remedy instructions
No.	Short text	
948	Oscillation damping too high	Check process conditions
	Measured variable status [from the factory] ¹⁾	
	Quality	
	Quality substatus	
	Coding (hex)	
	Status signal	
	Diagnostic behavior	
	Influenced measured variables	
	<ul style="list-style-type: none"> ▪ Oscillation amplitude 1 ▪ Oscillation amplitude 2 ▪ Application specific output ▪ Application specific output ▪ Signal asymmetry ▪ Carrier mass flow ▪ Carrier pipe temperature ▪ Target corrected volume flow ▪ Carrier corrected volume flow ▪ Sensor index coil asymmetry ▪ Concentration ▪ Oscillation damping 1 ▪ Oscillation damping 2 ▪ Density ▪ Oil density ▪ Water density ▪ Test point ▪ Test point ▪ Dynamic viscosity ▪ Sensor electronics temperature (ISEM) 	<ul style="list-style-type: none"> ▪ GSV flow ▪ GSV flow alternative ▪ Kinematic viscosity ▪ Mass flow ▪ Oil mass flow ▪ Water mass flow ▪ Inhomogeneous medium index ▪ Suspended bubbles index ▪ HBSI ▪ NSV flow ▪ NSV flow alternative ▪ External pressure ▪ Exciter current 1 ▪ Exciter current 2 ▪ Oscillation frequency 1 ▪ Oscillation frequency 2 ▪ Raw value mass flow ▪ S&W volume flow ▪ Torsion signal asymmetry ▪ Reference density
		<ul style="list-style-type: none"> ▪ Reference density alternative ▪ Corrected volume flow ▪ Oil corrected volume flow ▪ Water corrected volume flow ▪ Oscillation damping fluctuation 1 ▪ Oscillation damping fluctuation 2 ▪ Frequency fluctuation 1 ▪ Frequency fluctuation 2 ▪ Target mass flow ▪ Carrier volume flow ▪ Target volume flow ▪ Temp. compensated dynamic viscosity ▪ Temp. compensated kinematic viscosity ▪ Temperature ▪ Volume flow ▪ Oil volume flow ▪ Water volume flow ▪ Water cut


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





Diagnostic information		Remedy instructions
No.	Short text	
984	Condensation risk	
	Measured variable status [from the factory] ¹⁾	
	Quality	Good
	Quality substatus	Ok
	Coding (hex)	0x80 to 0x83
	Status signal	S
	Diagnostic behavior	Warning
	Influenced measured variables	
<div><div><ul style="list-style-type: none">■ Oscillation amplitude 1■ Oscillation amplitude 2■ Application specific output■ Application specific output■ Signal asymmetry■ Carrier mass flow■ Carrier pipe temperature■ Target corrected volume flow■ Carrier corrected volume flow■ Sensor index coil asymmetry■ Concentration■ Measured values■ Oscillation damping 1■ Oscillation damping 2■ Density■ Oil density■ Water density■ Test point■ Test point■ Dynamic viscosity</div><div><ul style="list-style-type: none">■ Sensor electronics temperature (ISEM)■ GSV flow■ GSV flow alternative■ Kinematic viscosity■ Mass flow■ Oil mass flow■ Water mass flow■ Inhomogeneous medium index■ Suspended bubbles index■ HBSI■ NSV flow■ NSV flow alternative■ External pressure■ Exciter current 1■ Exciter current 2■ Oscillation frequency 1■ Oscillation frequency 2■ Raw value mass flow■ S&W volume flow■ Torsion signal asymmetry</div><div><ul style="list-style-type: none">■ Reference density■ Reference density alternative■ Corrected volume flow■ Oil corrected volume flow■ Water corrected volume flow■ Oscillation damping fluctuation 1■ Oscillation damping fluctuation 2■ Frequency fluctuation 1■ Frequency fluctuation 2■ Target mass flow■ Carrier volume flow■ Target volume flow■ Temp. compensated dynamic viscosity■ Temp. compensated kinematic viscosity■ Temperature■ Volume flow■ Oil volume flow■ Water volume flow■ Water cut</div></div>		



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

12.8 Pending diagnostic events

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




 To call up the measures to rectify a diagnostic event:

- Via local display →  214
- Via web browser →  215
- Via "FieldCare" operating tool →  216
- Via "DeviceCare" operating tool →  216

 Other pending diagnostic events can be displayed in the **Diagnostic list** submenu
→  285


Navigation

"Diagnostics" menu

 Diagnostics	
Actual diagnostics	→  285
Previous diagnostics	→  285

Operating time from restart	→ ⓘ 285
Operating time	→ ⓘ 285

Parameter overview with brief description

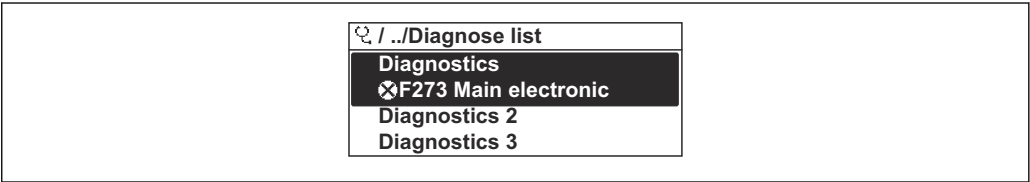
Parameter	Prerequisite	Description	User interface
Actual diagnostics	A diagnostic event has occurred.	Shows the current occurred diagnostic event along with its diagnostic information.  If two or more messages occur simultaneously, the message with the highest priority is shown on the display.	Symbol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

12.9 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 → Diagnostic list



42 Taking the example of the local display

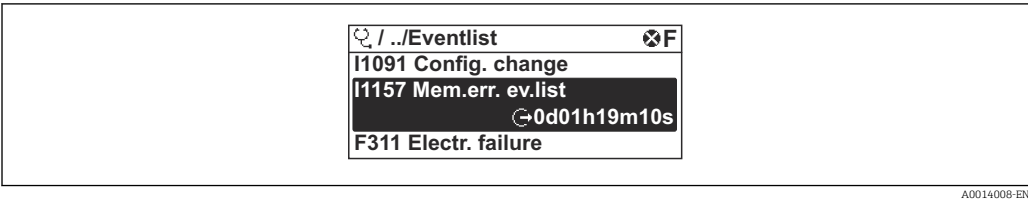
-  To call up the measures to rectify a diagnostic event:
- Via local display → ⓘ 214
 - Via web browser → ⓘ 215
 - Via "FieldCare" operating tool → ⓘ 216
 - Via "DeviceCare" operating tool → ⓘ 216

12.10 Event logbook

12.10.1 Reading out the event logbook

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

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



43 Taking the example of the local display

- A maximum of 20 event messages can be displayed in chronological order.
- If the **Extended HistoROM** application package (order option) is enabled in the device, the event list can contain up to 100 entries .

The event history includes entries for:

- Diagnostic events → 218
- Information events → 286

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

- Diagnostic event
 - ☹: Occurrence of the event
 - ☺: End of the event
- Information event
 - ☹: Occurrence of the event

- i** To call up the measures to rectify a diagnostic event:
- Via local display → 214
 - Via web browser → 215
 - Via "FieldCare" operating tool → 216
 - Via "DeviceCare" operating tool → 216

- i** For filtering the displayed event messages → 286

12.10.2 Filtering the event logbook

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

Navigation path
Diagnostics → Event logbook → Filter options

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

12.10.3 Overview of information events


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

Info number	Info name
I1000	----- (Device ok)
I1079	Sensor changed

Info number	Info name
I1089	Power on
I1090	Configuration reset
I1091	Configuration changed
I1092	HistoROM backup deleted
I1111	Density adjust failure
I11280	ZeroPT verified and adjustm. recommended
I11281	ZeroPT verif. and adjust. not recommend.
I1137	Electronics changed
I1151	History reset
I1155	Reset electronics temperature
I1156	Memory error trend
I1157	Memory error event list
I1209	Density adjustment ok
I1221	Zero point adjust failure
I1222	Zero point adjustment ok
I1256	Display: access status changed
I1278	I/O module restarted
I1335	Firmware changed
I1361	Web server: login failed
I1397	Fieldbus: access status changed
I1398	CDI: access status changed
I1444	Device verification passed
I1445	Device verification failed
I1447	Record application reference data
I1448	Application reference data recorded
I1449	Recording application ref. data failed
I1450	Monitoring off
I1451	Monitoring on
I1457	Measurement error verification failed
I1459	I/O module verification failed
I1460	HBSI verification failed
I1461	Sensor verification failed
I1462	Sensor electronic module verif. 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	All totalizers reset
I1625	Write protection activated

Info number	Info name
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
I1639	Max. switch cycles number reached
I1649	Hardware write protection activated
I1650	Hardware write protection deactivated
I1712	New flash file received
I1725	Sensor electronic module (ISEM) changed
I1726	Configuration backup failed

12.11 Resetting the measuring device

The entire device configuration or some of the configuration can be reset to a defined state with the **Device reset** parameter (→  174).

12.11.1 Function scope of "Device reset" parameter

Options	Description
Cancel	No action is executed and the user exits the parameter.
To delivery settings	Every parameter for which a customer-specific default setting was ordered is reset to the customer-specific value. All other parameters are reset to the factory setting.
Restart device	The restart resets every parameter with data stored in volatile memory (RAM) to the factory setting (e.g. measured value data). The device configuration remains unchanged.

12.12 Device information


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

Navigation


"Diagnostics" menu → Device information

► Device information


Device tag

→  289

Serial number





→  289


Firmware version

→  289

Device name	→ ⓘ 289
Manufacturer	→ ⓘ 289
Order code	→ ⓘ 289
Extended order code 1	→ ⓘ 289
Extended order code 2	→ ⓘ 289
Extended order code 3	→ ⓘ 290
ENP version	→ ⓘ 290


Parameter overview with brief description


Parameter	Description	User interface	Factory setting
Device tag	Shows name of measuring point.	Character string comprising numbers, letters and special characters	Promass
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.	Promass 300/500	–
Device name		Character string comprising numbers, letters and special characters	Prowirl
Manufacturer	Displays the manufacturer.	Character string comprising numbers, letters and special characters	Endress+Hauser
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	–


Parameter	Description	User interface	Factory setting
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

12.13 Firmware history

Release date	Firmware version	Order code for "Firmware version"	Firmware changes	Documentation type	Documentation
2023	01.00.zz	Option 61	Original firmware	Operating Instructions	BA02129D/06/EN/01.21

 It is possible to flash the firmware to the current version using the service interface.

 For the compatibility of the firmware version with 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. 8Q5B
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.

13.2 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: →  294 →  296

13.3 Endress+Hauser services

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

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

14 Repair

14.1 General information

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 and Netilion Analytics.

14.2 Spare parts


Device Viewer (www.endress.com/deviceviewer):

All the spare parts for the measuring device, along with the order code, are listed here and can be ordered. If available, users can also download the associated Installation Instructions.

-  Measuring device serial number:
 - Is located on the nameplate of the device.
 - Can be read out via the **Serial number** parameter (→  289) 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 requirements for safe device return can vary depending on the device type and national legislation.

1. Refer to the web page for information:
<http://www.endress.com/support/return-material>
 - ↳ Select the region.
2. Return the device if repairs or a factory calibration are required, or if the wrong device was ordered or delivered.

14.5 Disposal



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

14.5.1 Removing the measuring device

1. Switch off the device.

WARNING

Danger to persons from process conditions!

- ▶ Beware of hazardous process conditions such as pressure in the measuring device, high temperatures or aggressive media.
2. Carry out the mounting and connection steps from the "Mounting the measuring device" and "Connecting the measuring device" sections in reverse order. Observe the safety instructions.

14.5.2 Disposing of the measuring device

WARNING

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

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

Observe the following notes during disposal:













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





15 Accessories

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



15.1 Device-specific accessories

15.1.1 For the transmitter



Accessories	Description
Transmitter <ul style="list-style-type: none"> ■ Proline 500 – digital ■ Proline 500 	Transmitter for replacement or storage. Use the order code to define the following specifications: <ul style="list-style-type: none"> ■ Approvals ■ Output ■ Input ■ Display/operation ■ Housing ■ Software <div>  <ul style="list-style-type: none"> ■ Proline 500 – digital transmitter: Order number: 8X5BXX-*****A ■ Proline 500 transmitter: Order number: 8X5BXX-*****B </div> <div>  Proline 500 transmitter for replacement: It is essential to specify the serial number of the current transmitter when ordering. On the basis of the serial number, the device-specific data (e.g. calibration factors) of the replaced device can be used for the new transmitter. </div> <div>  <ul style="list-style-type: none"> ■ Proline 500 – digital transmitter: Installation Instructions EA01151D ■ Proline 500 transmitter: Installation Instructions EA01152D </div>
External WLAN antenna	External WLAN antenna with 1.5 m (59.1 in) connecting cable and two angle brackets. Order code for "Accessory enclosed", option P8 "Wireless antenna wide area". <div>  <ul style="list-style-type: none"> ■ The external WLAN antenna is not suitable for use in hygienic applications. ■ Additional information regarding the WLAN interface →  92. </div> <div>  Order number: 71351317 </div> <div>  Installation Instructions EA01238D </div>
Pipe mounting set	Pipe mounting set for transmitter. <div>  Proline 500 – digital transmitter Order number: 71346427 </div> <div>  Installation Instructions EA01195D </div> <div>  Proline 500 transmitter Order number: 71346428 </div>
Weather protection cover Transmitter <ul style="list-style-type: none"> ■ 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. <div>  <ul style="list-style-type: none"> ■ Proline 500 – digital transmitter Order number: 71343504 ■ Proline 500 transmitter Order number: 71343505 </div> <div>  Installation Instructions EA01191D </div>



Display guard Proline 500 – digital	<p>Is used to protect the display against impact or scoring, for example from sand in desert areas.</p> <p> Order number: 71228792</p> <p> Installation Instructions EA01093D</p>
Connecting cable Proline 500 – digital Sensor – Transmitter	<p>The connecting cable can be ordered directly with the measuring device (order code for "Cable, sensor connection") or as an accessory (order number DK8012).</p> <p>The following cable lengths are available: order code for "Cable, sensor connection"</p> <ul style="list-style-type: none"> ▪ Option B: 20 m (65 ft) ▪ Option E: User-configurable up to max. 50 m ▪ Option F: User-configurable up to max. 165 ft <p> Maximum possible cable length for a Proline 500 – digital connecting cable: 300 m (1 000 ft)</p>
Connecting cable Proline 500 Sensor – Transmitter	<p>The connecting cable can be ordered directly with the measuring device (order code for "Cable, sensor connection") or as an accessory (order number DK8012).</p> <p>The following cable lengths are available: order code for "Cable, sensor connection"</p> <ul style="list-style-type: none"> ▪ Option 1: 5 m (16 ft) ▪ Option 2: 10 m (32 ft) ▪ Option 3: 20 m (65 ft) <p> Possible cable length for a Proline 500 connecting cable: max. 20 m (65 ft)</p>

15.1.2 For the sensor



Accessories	Description
Heating jacket	<p>Is used to stabilize the temperature of the fluids in the sensor. Water, water vapor and other non-corrosive liquids are permitted for use as fluids.</p> <p> If using oil as a heating medium, please consult with Endress+Hauser.</p> <p>Use the order code with the product root DK8003.</p> <p> Special Documentation SD02161D</p>

15.2 Communication-specific accessories








Accessories	Description
Fieldgate FXA42	<p>Is used to transmit the measured values of connected 4 to 20 mA analog measuring devices, as well as digital measuring devices</p> <p> <ul style="list-style-type: none"> ▪ Technical Information TI01297S ▪ Operating Instructions BA01778S ▪ Product page: www.endress.com/fxa42 </p>
Field Xpert SMT50	<p>The Field Xpert SMT70 tablet PC for device configuration enables mobile plant asset management in non-hazardous areas. It is suitable for commissioning and maintenance staff to manage field instruments with a digital communication interface and to record progress.</p> <p>This tablet PC is designed as an all-in-one solution with a preinstalled driver library and is an easy-to-use, touch-sensitive tool which can be used to manage field instruments throughout their entire life cycle.</p> <p> <ul style="list-style-type: none"> ▪ Technical Information TI01342S ▪ Operating Instructions BA01709S ▪ Product page: www.endress.com/smt50 </p>

Field Xpert SMT70	<p>The Field Xpert SMT70 tablet PC for device configuration enables mobile plant asset management in hazardous and non-hazardous areas. It is suitable for commissioning and maintenance staff to manage field instruments with a digital communication interface and to record progress.</p> <p>This tablet PC is designed as an all-in-one solution with a preinstalled driver library and is an easy-to-use, touch-sensitive tool which can be used to manage field instruments throughout their entire life cycle.</p>  <ul style="list-style-type: none"> ■ Technical Information TI01342S ■ Operating Instructions BA01709S ■ Product page: www.endress.com/smt70
Field Xpert SMT77	<p>The Field Xpert SMT77 tablet PC for device configuration enables mobile plant asset management in areas categorized as Ex Zone 1.</p>  <ul style="list-style-type: none"> ■ Technical Information TI01418S ■ Operating Instructions BA01923S ■ Product page: www.endress.com/smt77

15.3 Service-specific accessories

Accessory	Description
Applicator	<p>Software for selecting and sizing Endress+Hauser measuring devices:</p> <ul style="list-style-type: none"> ■ Choice of measuring devices with 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. <p>Applicator is available:</p> <ul style="list-style-type: none"> ■ Via the Internet: https://portal.endress.com/webapp/applicator ■ As a downloadable DVD for local PC installation.
W@M	<p>W@M Life Cycle Management</p> <p>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.</p> <p>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.</p> <p>Combined with the right services, W@M Life Cycle Management boosts productivity in every phase. For more information, see: www.endress.com/lifecyclemanagement</p>
FieldCare	<p>FDT-based plant asset management tool from Endress+Hauser.</p> <p>It can configure all smart field units in your system and helps you manage them. By using the status information, it is also a simple but effective way of checking their status and condition.</p>  Operating Instructions BA00027S and BA00059S
DeviceCare	<p>Tool for connecting and configuring Endress+Hauser field devices.</p>  Innovation brochure IN01047S

15.4 System components

Accessories	Description
Memograph M graphic data manager	<p>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.</p> <ul style="list-style-type: none">  Technical Information TI00133R  Operating Instructions BA00247R
Cerabar M	<p>The pressure transmitter for measuring the absolute and gauge pressure of gases, steam and liquids. It can be used to read in the operating pressure value.</p> <ul style="list-style-type: none">  Technical Information TI00426P and TI00436P  Operating Instructions BA00200P and BA00382P
Cerabar S	<p>The pressure transmitter for measuring the absolute and gauge pressure of gases, steam and liquids. It can be used to read in the operating pressure value.</p> <ul style="list-style-type: none">  Technical Information TI00383P  Operating Instructions BA00271P
iTEMP	<p>The temperature transmitters can be used in all applications and are suitable for the measurement of gases, steam and liquids. They can be used to read in the medium temperature.</p> <ul style="list-style-type: none">  "Fields of Activity" document FA00006T

16 Technical data


16.1 Application

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

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

To ensure that the 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	Mass flow measurement based on the Coriolis measuring principle
Measuring system	<p>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.</p> <p>Information on the structure of the device →  13</p>

16.3 Input

Measured variable

Direct measured variables

- Mass flow
- Density
- Temperature

Calculated measured variables

- Volume flow
- Corrected volume flow
- Reference density

Measuring range

Measuring range for liquids

DN Measuring device		DN Compatible pipe diameter		Measuring range full scale values $\dot{m}_{\min(F)}$ to $\dot{m}_{\max(F)}$	
[mm]	[in]	[mm]	[in]	[kg/h]	[lb/min]
25	1	25/40	1/1½	0 to 20 000	0 to 735
50	2	50/80	2/3	0 to 80 000	0 to 2 940
80	3	80/100	3/4	0 to 200 000	0 to 7 350
100	4	100/150	4/6	0 to 550 000	0 to 20 210

Measuring range for gases

The full scale value depends on the density and the sound velocity of the gas used. The full scale value can be calculated with the following formulas:

$$\dot{m}_{\max(G)} = \text{minimum of } (\dot{m}_{\max(F)} \cdot \rho_G : x) \text{ and } (\rho_G \cdot (c_G/2) \cdot d_i^2 \cdot (\pi/4) \cdot 3600 \cdot n)$$

$\dot{m}_{\max(G)}$	Maximum full scale value for gas [kg/h]
$\dot{m}_{\max(F)}$	Maximum full scale value for liquid [kg/h]
$\dot{m}_{\max(G)} < \dot{m}_{\max(F)}$	$\dot{m}_{\max(G)}$ can never be greater than $\dot{m}_{\max(F)}$
ρ_G	Gas density in [kg/m³] at operating conditions
x	Limitation constant for max. gas flow [kg/m³]
c_G	Sound velocity (gas) [m/s]
d_i	Measuring tube internal diameter [m]
π	Pi
$n = 2$	Number of measuring tubes for DN 25 to 100 (1 to 4 ")
$n = 4$	Number of measuring tubes for DN 150 to 250 (6 to 10 ")



DN		x
[mm]	[in]	[kg/m³]
25	1	90
50	2	80

DN		x
[mm]	[in]	[kg/m³]
80	3	83
100	4	180

If calculating the full scale value using the two formulas:

1. Calculate the full scale value with both formulas.
2. The smaller value is the value that must be used.

Recommended measuring range



 Flow limit →  318

Operable flow range

Over 1000 : 1.
Flow rates above the preset full scale value do not override the electronics unit, with the result that the totalizer values are registered correctly.


Input signal

External measured values

 Various pressure and temperature measuring devices can be ordered from Endress +Hauser: see "Accessories" section →  297

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 →  300.

Digital communication

The measured values are written by the automation system via PROFINET with Ethernet-APL.

Current input 0/4 to 20 mA

Current input	0/4 to 20 mA (active/passive)
Current span	<div><div>■ 4 to 20 mA (active)</div><div>■ 0/4 to 20 mA (passive)</div></div>
Resolution	1 µA
Voltage drop	Typically: 0.6 to 2 V for 3.6 to 22 mA (passive)
Maximum input voltage	≤ 30 V (passive)
Open-circuit voltage	≤ 28.8 V (active)
Possible input variables	<div><div>■ Pressure</div><div>■ Temperature</div><div>■ Density</div></div>

Status input

Maximum input values	<div><div>■ DC -3 to 30 V</div><div>■ If status input is active (ON): R_i >3 kΩ</div></div>
Response time	Configurable: 5 to 200 ms

Input signal level	<ul style="list-style-type: none">▪ Low signal: DC -3 to +5 V▪ High signal: DC 12 to 30 V
Assignable functions	<ul style="list-style-type: none">▪ Off▪ Reset the individual totalizers separately▪ Reset all totalizers▪ Flow override

16.4 Output

Output signal


PROFINET with Ethernet-APL

Device use	Device connection to an APL field switch The device may only be operated according to the following APL port classifications: <ul style="list-style-type: none"> ■ If used in hazardous areas: SLAA or SLAC ¹⁾ ■ If used in non-hazardous areas: SLAX Connection values of APL field switch (for example corresponds to APL port classification SPCC or SPAA, for instance): <ul style="list-style-type: none"> ■ Maximum input voltage: 15 V_{DC} ■ Minimum output values: 0.54 W Device connection to an SPE switch <ul style="list-style-type: none"> ■ In non-hazardous areas, the device can be used with a suitable SPE switch: The device can be connected to an SPE switch with a maximum voltage of 30 V_{DC} and a minimum output power of 1.85 W. ■ The SPE switch must support the 10BASE-T1L standard and the PoDL power classes 10, 11 or 12 and have a function to disable power class recognition.
PROFINET	According to IEC 61158 and IEC 61784
Ethernet-APL	According to IEEE 802.3cg, APL port profile specification v1.0, galvanically isolated
Data transfer	10 Mbit/s
Current consumption	Transmitter <ul style="list-style-type: none"> ■ Max. 400 mA (24 V) ■ Max. 200 mA (110 V, 50/60 Hz; 230 V, 50/60 Hz)
Permitted supply voltage	9 to 30 V
Network connection	With integrated reverse polarity protection


1) For more information on using the device in the hazardous area, see the Ex-specific Safety Instructions



Current output 4 to 20 mA

Signal mode	Can be set to: <ul style="list-style-type: none"> ■ Active ■ Passive
Current span	Can be set to: <ul style="list-style-type: none"> ■ 4 to 20 mA NAMUR ■ 4 to 20 mA US ■ 4 to 20 mA ■ 0 to 20 mA (only if the signal mode is active) ■ Fixed current
Maximum output values	22.5 mA
Open-circuit voltage	DC 28.8 V (active)
Maximum input voltage	DC 30 V (passive)
Load	0 to 700 Ω
Resolution	0.38 µA

Damping	Configurable: 0 to 999.9 s
Assignable measured variables	<ul style="list-style-type: none"> ■ Mass flow ■ Volume flow ■ Corrected volume flow ■ Density ■ Reference density ■ Temperature ■ Electronics temperature ■ Oscillation frequency 0 ■ Oscillation damping 0 ■ Signal asymmetry ■ Exciter current 0 <p> The range of options increases if the measuring device has one or more application packages.</p>


Pulse/frequency/switch output

Function	Can be configured as pulse, frequency or switch output
Version	Open collector Can be set to: <ul style="list-style-type: none"> ■ Active ■ Passive ■ Passive NAMUR <p> Ex-i, passive</p>
Maximum input values	DC 30 V, 250 mA (passive)
Open-circuit voltage	DC 28.8 V (active)
Voltage drop	For 22.5 mA: ≤ DC 2 V
Pulse output	
Maximum input values	DC 30 V, 250 mA (passive)
Maximum output current	22.5 mA (active)
Open-circuit voltage	DC 28.8 V (active)
Pulse width	Configurable: 0.05 to 2 000 ms
Maximum pulse rate	10 000 Impulse/s
Pulse value	Configurable
Assignable measured variables	<ul style="list-style-type: none"> ■ Mass flow ■ Volume flow ■ Corrected volume flow
Frequency output	
Maximum input values	DC 30 V, 250 mA (passive)
Maximum output current	22.5 mA (active)
Open-circuit voltage	DC 28.8 V (active)
Output frequency	Configurable: end value frequency 2 to 10 000 Hz ($f_{\max} = 12\,500$ Hz)
Damping	Configurable: 0 to 999.9 s
Pulse/pause ratio	1:1

Assignable measured variables	<ul style="list-style-type: none"> ■ Mass flow ■ Volume flow ■ Corrected volume flow ■ Density ■ Reference density ■ Temperature ■ Electronics temperature ■ Oscillation frequency 0 ■ Oscillation damping 0 ■ Signal asymmetry ■ Exciter current 0 <p> The range of options increases if the measuring device has one or more application packages.</p>
Switch output	
Maximum input values	DC 30 V, 250 mA (passive)
Open-circuit voltage	DC 28.8 V (active)
Switching behavior	Binary, conductive or non-conductive
Switching delay	Configurable: 0 to 100 s
Number of switching cycles	Unlimited
Assignable functions	<ul style="list-style-type: none"> ■ Off ■ On ■ Diagnostic behavior ■ Limit value <ul style="list-style-type: none"> ■ Mass flow ■ Volume flow ■ Corrected volume flow ■ Density ■ Reference density ■ Temperature ■ Totalizer 1-3 ■ Flow direction monitoring ■ Status <ul style="list-style-type: none"> ■ Partially filled pipe detection ■ Low flow cut off <p> The range of options increases if the measuring device has one or more application packages.</p>

Relay output

Function	Switch output
Version	Relay output, galvanically isolated
Switching behavior	Can be set to: <ul style="list-style-type: none"> ■ NO (normally open), factory setting ■ NC (normally closed)

Maximum switching capacity (passive)	<ul style="list-style-type: none"> ■ DC 30 V, 0.1 A ■ AC 30 V, 0.5 A
Assignable functions	<ul style="list-style-type: none"> ■ Off ■ On ■ Diagnostic behavior ■ Limit value <ul style="list-style-type: none"> ■ Mass flow ■ Volume flow ■ Corrected volume flow ■ Density ■ Reference density ■ Temperature ■ Totalizer 1-3 ■ Flow direction monitoring ■ Status <ul style="list-style-type: none"> ■ Partially filled pipe detection ■ Low flow cut off <p> The range of options increases if the measuring device has one or more application packages.</p>

User-configurable input/output

One specific input or output is assigned to a user-configurable input/output (configurable I/O) during device commissioning.

The following inputs and outputs are available for assignment:

- Choice of current output: 4 to 20 mA (active), 0/4 to 20 mA (passive)
- Pulse/frequency/switch output
- Choice of current input: 4 to 20 mA (active), 0/4 to 20 mA (passive)
- Status input

Signal on alarm

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

PROFINET with Ethernet-APL

Device diagnostics	Diagnostics according to PROFINET PA Profile 4
---------------------------	--

Current output 0/4 to 20 mA

4 to 20 mA

Failure mode	Choose from: <ul style="list-style-type: none"> ■ 4 to 20 mA in accordance with NAMUR recommendation NE 43 ■ 4 to 20 mA in accordance with US ■ Min. value: 3.59 mA ■ Max. value: 22.5 mA ■ Definable value between: 3.59 to 22.5 mA ■ Actual value ■ Last valid value
---------------------	---

0 to 20 mA

Failure mode	Choose from: <ul style="list-style-type: none"> ■ Maximum alarm: 22 mA ■ Definable value between: 0 to 20.5 mA
---------------------	--

Pulse/frequency/switch output

Pulse output	
Failure mode	Choose from: <ul style="list-style-type: none">Actual valueNo pulses
Frequency output	
Failure mode	Choose from: <ul style="list-style-type: none">Actual value0 HzDefinable value between: 2 to 12 500 Hz
Switch output	
Failure mode	Choose from: <ul style="list-style-type: none">Current statusOpenClosed

Relay output

Failure mode	Choose from: <ul style="list-style-type: none">Current statusOpenClosed
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Local display

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

 Status signal as per NAMUR recommendation NE 107

Interface/protocol



- Via digital communication:
PROFINET with Ethernet-APL
- Via service interface
 - CDI-RJ45 service interface
 - WLAN interface

Plain text display	With information on cause and remedial measures
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Web browser

Plain text display	With information on cause and remedial measures
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Light emitting diodes (LED)

Status information	<p>Status indicated by various light emitting diodes</p> <p>The following information is displayed depending on the device version:</p> <ul style="list-style-type: none"> ■ Supply voltage active ■ Data transmission active ■ Device alarm/error has occurred ■ PROFINET network available ■ PROFINET connection established ■ PROFINET blinking feature <p> Diagnostic information via light emitting diodes →  208</p>
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Low flow cut off The switch points for low flow cut off are user-selectable.

Galvanic isolation The outputs are galvanically isolated:

- from the power supply
- from one another
- from the potential equalization (PE) terminal

protocol-specific data	Protocol	Application layer protocol for decentral device periphery and distributed automation, Version 2.43
	Communication type	Ethernet Advanced Physical Layer 10BASE-T1L
	Conformance Class	Conformance Class B (PA)
	Netload Class	PROFINET Netload Robustness Class 2 10 Mbit/s
	Baud rates	10 Mbit/s Full-duplex
	Cycle times	64 ms
	Polarity	Automatic correction of crossed "APL signal +" and "APL signal -" signal lines
	Media Redundancy Protocol (MRP)	Not possible (point-to-point connection to APL field switch)
	System redundancy support	System redundancy S2 (2 AR with 1 NAP)
	Device profile	PROFINET PA profile 4 (Application interface identifier API: 0x9700)
	Manufacturer ID	17
	Device type ID	0xA43B
	Device description files (GSD, DTM, FDI)	<p>Information and files at:</p> <ul style="list-style-type: none"> ■ www.endress.com → Download Area ■ www.profibus.com
	Supported connections	<ul style="list-style-type: none"> ■ 2x AR (IO Controller AR) ■ 2x AR (IO Supervisor Device AR connection allowed)

Configuration options for measuring device

- DIP switches on the electronics module, for device name assignment (last part)
- Asset management software (FieldCare, DeviceCare, Field Xpert)
- Integrated Web server via Web browser and IP address
- Device master file (GSD), can be read out via the integrated Web server of the measuring device.
- Onsite operation

Configuration of the device name

- DIP switches on the electronics module, for device name assignment (last part)
- DCP protocol
- Asset management software (FieldCare, DeviceCare, Field Xpert)
- Integrated Web server

Supported functions	<ul style="list-style-type: none">■ Identification & Maintenance, simple device identifier via:<ul style="list-style-type: none">■ Control system■ Nameplate■ Measured value status The process variables are communicated with a measured value status■ Blinking feature via the local display for simple device identification and assignment■ Device operation via asset management software (e.g. FieldCare, DeviceCare, SIMATIC PDM with FDI package)
System integration	Information regarding system integration . <ul style="list-style-type: none">■ Cyclic data transmission■ Overview and description of the modules■ Status coding■ Factory setting

16.5 Power supply

Terminal assignment → 40

Available device plugs → 41

Pin assignment, device plug → 41

Supply voltage	Order code for "Power supply"	Terminal voltage		Frequency range
	Option D	DC 24 V	±20%	–
	Option E	AC 100 to 240 V	–15 to +10%	50/60 Hz
	Option I	DC 24 V	±20%	–
		AC 100 to 240 V	–15 to +10%	50/60 Hz



Power consumption	Transmitter Max. 10 W (active power)	
	<table><tr><td>switch-on current</td><td>Max. 36 A (<5 ms) as per NAMUR Recommendation NE 21</td></tr></table>	switch-on current
switch-on current	Max. 36 A (<5 ms) as per NAMUR Recommendation NE 21	


Current consumption	Transmitter <ul style="list-style-type: none">■ Max. 400 mA (24 V)■ Max. 200 mA (110 V, 50/60 Hz; 230 V, 50/60 Hz)
---------------------	--

Power supply failure	<ul style="list-style-type: none">■ Totalizers stop at the last value measured.■ Depending on the device version, the configuration is retained in the device memory or in the plug-in memory (HistoROM DAT).■ Error messages (incl. total operated hours) are stored.
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Overcurrent protection element	The device must be operated with a dedicated circuit breaker, as it does not have an ON/OFF switch of its own. <ul style="list-style-type: none">■ The circuit breaker must be easy to reach and labeled accordingly.■ Permitted nominal current of the circuit breaker: 2 A up to maximum 10 A.
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Electrical connection

- →  43
- →  52


Potential equalization →  61

Terminals Spring-loaded terminals: Suitable for strands and strands with ferrules.
Conductor cross-section 0.2 to 2.5 mm² (24 to 12 AWG).

Cable entries

- Cable gland: M20 × 1.5 with cable Ø 6 to 12 mm (0.24 to 0.47 in)
- Thread for cable entry:
 - NPT ½"
 - G ½"
 - M20
- Device plug for connecting cable: M12
A device plug is always used for the device version with the order code for "Sensor connection housing", option **C** "Ultra-compact, hygienic, stainless".



Cable specification →  35

Overvoltage protection	Mains voltage fluctuations	→  308
	Overvoltage category	Overvoltage category II
	Short-term, temporary overvoltage	Up to 1200 V between cable and ground, for max. 5 s
	Long-term, temporary overvoltage	Up to 500 V between cable and ground

16.6 Performance characteristics

Reference operating conditions

- Error limits based on ISO 11631
- Water with +15 to +45 °C (+59 to +113 °F) at 2 to 6 bar (29 to 87 psi)
- Specifications as per calibration protocol
- Accuracy based on accredited calibration rigs that are traced to ISO 17025.

 To obtain measured errors, use the *Applicator* sizing tool →  296

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

Base accuracy

 Design fundamentals →  313

Mass flow and volume flow (liquids)

- ±0.05 % o.r. (optional for mass flow: PremiumCal; order code for "Calibration flow", option D)
- ±0.10 % o.r. (standard)

Mass flow (gases)

±0.25 % o.r.

Mass flow (cryogenic liquids and gases under –100 °C (–148 °F))

±0.35 % o.r. (order code for "Measuring tube material", option LA)


Density (liquids)

Standard density

- $\pm 0.2 \text{ kg/m}^3$ ($\pm 0.0002 \text{ g/cm}^3$)
- Valid in density range: 0 to 2 000 kg/m^3

Premium density (DN 25 (1")); order code for "Application package", option EI)

- $\pm 0.1 \text{ kg/m}^3$
- Valid in density range: 0 to 3 000 kg/m^3

For additional information, see the Special Documentation on the advanced density function →  331

For highly accurate density measurement, the pitch and roll angle and pressure compensation must be configured.

For highly accurate density measurement, avoid significant tensile stresses due to the installation and ensure the flow velocity in the nominal diameter is $> 0.1 \text{ m/s}$ (0.33 ft/s).

Density (cryogenic liquids and gases under -100°C (-148°F)) $\pm 0.03 \text{ g/cm}^3$ (order code for "Measuring tube material", option LA)*Temperature* $\pm 0.1^\circ\text{C} \pm 0.003 \cdot T^\circ\text{C}$ ($\pm 0.18^\circ\text{F} \pm 0.003 \cdot (T - 32)^\circ\text{F}$)**Zero point stability**

DN		Zero point stability	
[mm]	[in]	[kg/h]	[lb/min]
25	1	0.36	0.013
50	2	1.3	0.048
80	3	4.4	0.162
100	4	11.5	0.42

Flow values

Flow values as turndown parameters depending on the nominal diameter.

SI units

DN	1:1	1:10	1:20	1:50	1:100	1:500
[mm]	[kg/h]	[kg/h]	[kg/h]	[kg/h]	[kg/h]	[kg/h]
25	20 000	2 000	1 000	400	200	40
50	80 000	8 000	4 000	1 600	800	160
80	200 000	20 000	10 000	4 000	2 000	400
100	550 000	55 000	27 500	11 000	5 500	1 100

US units

DN	1:1	1:10	1:20	1:50	1:100	1:500
[inch]	[lb/min]	[lb/min]	[lb/min]	[lb/min]	[lb/min]	[lb/min]
1	735	73	37	15	7	1
2	2939	294	147	59	29	6

DN	1:1	1:10	1:20	1:50	1:100	1:500
[inch]	[lb/min]	[lb/min]	[lb/min]	[lb/min]	[lb/min]	[lb/min]
3	7349	735	367	147	73	15
4	20209	2021	1010	404	202	40

Accuracy of outputs

The outputs have the following base accuracy specifications.

Current output

Accuracy	±5 µA
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Pulse/frequency output

o.r. = of reading

Accuracy	Max. ±50 ppm o.r. (over the entire ambient temperature range)
-----------------	---

Repeatability

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

Base repeatability

 Design fundamentals →  313

Mass flow and volume flow (liquids)

±0.025 % o.r.

Mass flow (gases)

±0.20 % o.r.

Mass flow (cryogenic liquids and gases under –100 °C (–148 °F))

±0.175 % o.r. (order code for "Measuring tube material", option LA)

Density (liquids)

- ±0.1 kg/m³ / ±0.0001 g/cm³
- Premium density: ±0.02 kg/m³ / ±0.00002 g/cm³

Density (cryogenic liquids and gases under –100 °C (–148 °F))

±0.015 g/cm³ (order code for "Measuring tube material", option LA)

Temperature

±0.05 °C ± 0.0025 · T °C (±0.09 °F ± 0.0015 · (T–32) °F)

Response time

The response time depends on the configuration (damping).

Influence of ambient temperature

Current output

Temperature coefficient	Max. 1 µA/°C
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Pulse/frequency output

Temperature coefficient	No additional effect. Included in accuracy.
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Influence of medium temperature

Mass flow and volume flow

o.f.s. = of full scale value

If there is a difference between the temperature at zero adjustment and the process temperature, the additional measured error of the sensors is typically

DN 25 (1"): ±0.0001 % o.f.s./°C (±0.00005 % o.f.s./°F)

DN 50 to 250 (2 to 10"): ±0.00015 % o.f.s./°C (±0.000075 % o.f.s./°F)

The influence is reduced when the zero adjustment is performed at process temperature.

Density

If there is a difference between the density calibration temperature and the process temperature, the measured error of the sensors is typically

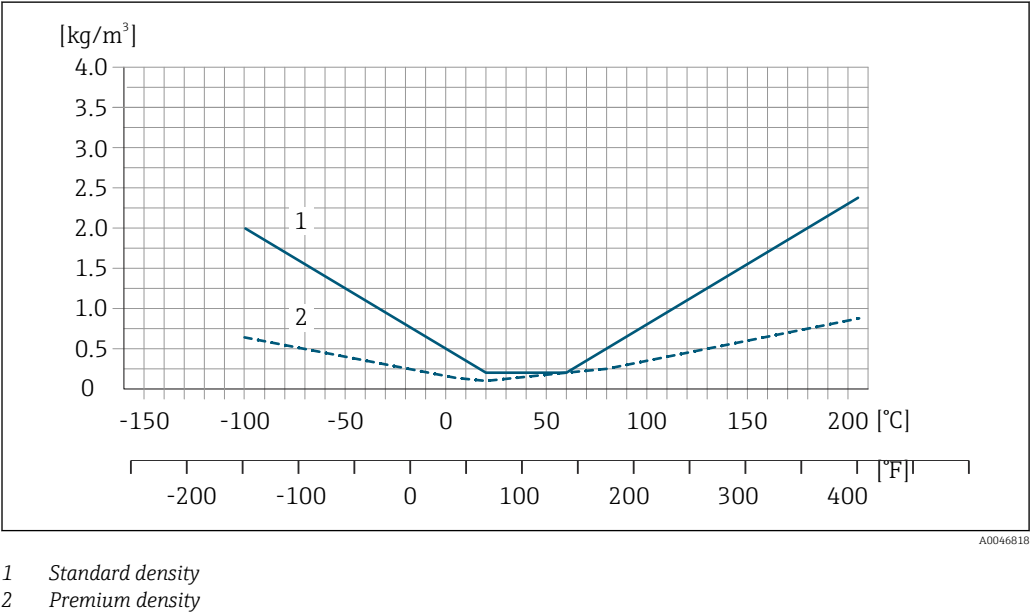
±0.015 kg/m³/°C (±0.0075 kg/m³/°F) outside of +20 to +60 °C (+68 to +140 °F).

Premium density (order code for "Application package", option EI)

If there is a difference between the reference temperature of 20°C and the process temperature, the additional maximum measured error of the sensors is typically

±0.0025 kg/m³/°C (±0.00139 kg/m³/°F) within the temperature calibration range.

Outside the calibrated temperature range, the influence of the process temperature is typically ±0.005 kg/m³/°C (±0.00278 kg/m³/°F)



Temperature

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

Influence of medium pressure

The tables below show the effect that a difference in pressure between the calibration pressure and the process pressure has on the accuracy in the case of the mass flow and density.

o.r. = of reading



It is possible to compensate for the effect by:

- Reading in the current pressure measured value via the current input or a digital input.
- Specifying a fixed value for the pressure in the device parameters.



Operating Instructions .

Mass flow

DN		[% o.r./bar] ±0.0005	[% o.r./psi] ±0.00003
[mm]	[in]		
25	1	-0.0040	-0.000276
50	2	-0.0025	-0.000172
80	3	-0.0050	-0.000345
100	4	-0.0040	-0.000276

Density

DN		[% o.r./bar] ±0.0006 ±0.0003 ¹⁾	[% o.r./psi] ±0.00004 ±0.00002 ¹⁾
[mm]	[in]		
25	1	-0.0029	-0.000200
50	2	-0.0034	-0.000234
80	3	-0.0024	-0.000166
100	4	-0.0006	-0.000041

1) Premium density



The values for the influence of the medium pressure are based on the density of water.

Design fundamentals

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

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

MeasValue = measured value; ZeroPoint = zero point stability

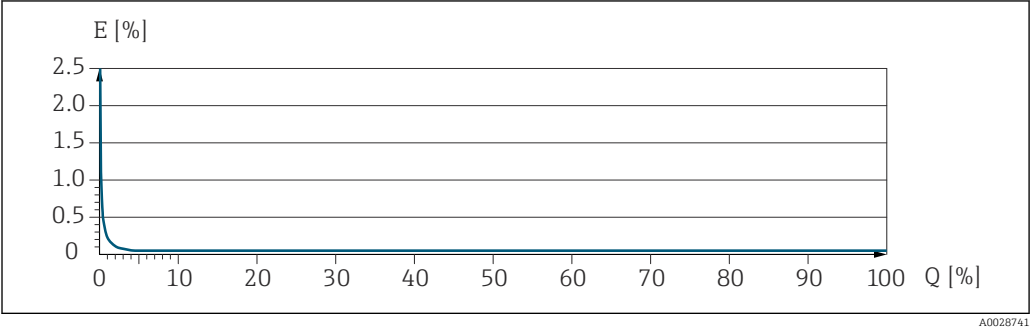
Calculation of the maximum measured error as a function of the flow rate

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

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

Flow rate	Maximum repeatability in % o.r.
$\geq \frac{\frac{1}{2} \cdot \text{ZeroPoint}}{\text{BaseRepeat}} \cdot 100$ <small>A0021335</small>	$\pm \text{BaseRepeat}$ <small>A0021340</small>
$< \frac{\frac{1}{2} \cdot \text{ZeroPoint}}{\text{BaseRepeat}} \cdot 100$ <small>A0021336</small>	$\pm \frac{1}{2} \cdot \frac{\text{ZeroPoint}}{\text{MeasValue}} \cdot 100$ <small>A0021337</small>

Example of maximum measured error



E Maximum measured error in % o.r. (example with PremiumCal)
Q Flow rate in % of maximum full scale value



16.7 Mounting

Mounting requirements → 21

16.8 Environment

Ambient temperature range → 24

Temperature tables

-  Observe the interdependencies between the permitted ambient and fluid temperatures when operating the device in hazardous areas.
-  For detailed information on the temperature tables, see the separate document entitled "Safety Instructions" (XA) for the device.

Storage temperature -50 to +80 °C (-58 to +176 °F)



Climate class DIN EN 60068-2-38 (test Z/AD)

Relative humidity The device is suitable for use in outdoor and indoor areas with a relative humidity of 4 to 95%.

Operating height	<p>According to EN 61010-1</p> <ul style="list-style-type: none"> ■ ≤ 2 000 m (6 562 ft) ■ > 2 000 m (6 562 ft) with additional overvoltage protection (e.g. Endress+Hauser HAW Series)
Degree of protection	<p>Transmitter</p> <ul style="list-style-type: none"> ■ IP66/67, Type 4X enclosure, suitable for pollution degree 4 ■ When the housing is open: IP20, Type 1 enclosure, suitable for pollution degree 2 ■ Display module: IP20, Type 1 enclosure, suitable for pollution degree 2 <p>Sensor</p> <ul style="list-style-type: none"> ■ IP66/67, Type 4X enclosure, suitable for pollution degree 4 ■ When the housing is open: IP20, Type 1 enclosure, suitable for pollution degree 2 <p><i>Optional</i></p> <p>DN 25 to 100: order code for "Sensor options", option CM "IP69</p> <p>External WLAN antenna</p> <p>IP67</p>
Vibration- and shock-resistance	<p>Vibration sinusoidal, in accordance with IEC 60068-2-6</p> <p>Sensor: order code for "Meas. tube mat., wetted parts surface", option LA, SD, SE, SF, TH, TT, TU</p> <ul style="list-style-type: none"> ■ 2 to 8.4 Hz, 3.5 mm peak ■ 8.4 to 2 000 Hz, 1 g peak <p>Sensor: order code for "Meas. tube mat., wetted parts surface", option HA, SA, SB, SC</p> <ul style="list-style-type: none"> ■ 2 to 8.4 Hz, 7.5 mm peak ■ 8.4 to 2 000 Hz, 2 g peak <p>Transmitter</p> <ul style="list-style-type: none"> ■ 2 to 8.4 Hz, 7.5 mm peak ■ 8.4 to 2 000 Hz, 2 g peak <p>Vibration broad-band random, according to IEC 60068-2-64</p> <p>Sensor: order code for "Meas. tube mat., wetted parts surface", option LA, SD, SE, SF, TH, TT, TU</p> <ul style="list-style-type: none"> ■ 10 to 200 Hz, 0.003 g²/Hz ■ 200 to 2 000 Hz, 0.001 g²/Hz ■ Total: 1.54 g rms <p>Sensor: order code for "Meas. tube mat., wetted parts surface", option HA, SA, SB, SC</p> <ul style="list-style-type: none"> ■ 10 to 200 Hz, 0.01 g²/Hz ■ 200 to 2 000 Hz, 0.003 g²/Hz ■ Total: 2.70 g rms <p>Transmitter</p> <ul style="list-style-type: none"> ■ 10 to 200 Hz, 0.01 g²/Hz ■ 200 to 2 000 Hz, 0.003 g²/Hz ■ Total: 2.70 g rms <p>Shock half-sine, according to IEC 60068-2-27</p>

- Sensor: order code for "Meas. tube mat., wetted parts surface", option LA, SD, SE, SF, TH, TT, TU
6 ms 30 g
- Sensor: order code for "Meas. tube mat., wetted parts surface", option HA, SA, SB, SC
6 ms 50 g
- Transmitter
6 ms 50 g

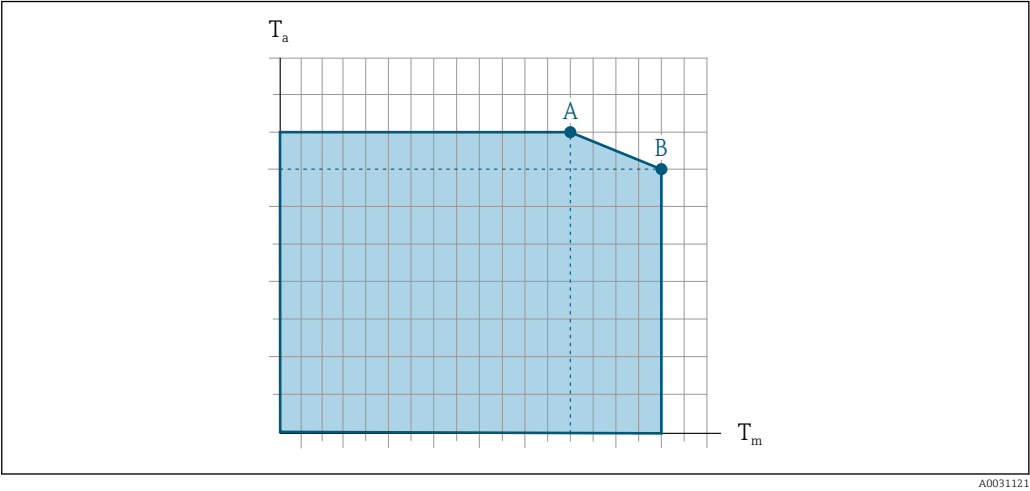
Rough handling shocks, according to IEC 60068-2-31

Interior cleaning	<ul style="list-style-type: none">■ Cleaning in place (CIP)■ Sterilization in place (SIP) <p>Options</p> <ul style="list-style-type: none">■ Oil- and grease-free version for wetted parts, without declaration Order code for "Service", option HA■ Oil- and grease-free version for wetted parts as per IEC/TR 60877-2.0 and BOC 50000810-4, with declaration Order code for "Service", option HB
Mechanical load	<p>Transmitter housing and sensor connection housing:</p> <ul style="list-style-type: none">■ Protect against mechanical effects, such as shock or impact■ Do not use as a ladder or climbing aid
Electromagnetic compatibility (EMC)	<div> Details are provided in the Declaration of Conformity.</div> <div> This unit is not intended for use in residential environments and cannot guarantee adequate protection of the radio reception in such environments.</div>

16.9 Process

Medium temperature range	Standard version	–50 to +205 °C (–58 to +401 °F)	Order code for "Measuring tube mat., wetted surface", option SA, SB
	Low-temperature version	–196 to +150 °C (–320 to +302 °F) <div>NOTICE Material fatigue due to excessive temperature difference! ► Maximum temperature difference of media used: 300 K</div>	Order code for "Measuring tube mat., wetted surface", option LA

Dependency of ambient temperature on medium temperature



44 Exemplary representation, values in the table below.

- T_a Ambient temperature
- T_m Medium temperature
- A Maximum permitted medium temperature T_m at T_{a max} = 60 °C (140 °F); higher medium temperatures T_m require a reduction in the ambient temperature T_a
- B Maximum permitted ambient temperature T_a for the maximum specified medium temperature T_m of the sensor

i Values for devices that are used in the hazardous area:
Separate Ex documentation (XA) for the device → 331.

Version ¹⁾	Not insulated					Insulated			
	A		B			A		B	
	T _a	T _m	T _a	T _m		T _a	T _m	T _a	T _m
Standard version	60 °C (140 °F)	205 °C (401 °F)	–	–		60 °C (140 °F)	150 °C (302 °F)	50 °C (122 °F)	205 °C (401 °F)

1) The values apply for Promass Q 500 - digital and Promass Q 500.

Density 0 to 5 000 kg/m³ (0 to 312 lb/cf)


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

Sensor housing The sensor housing is filled with helium and protects the electronics and mechanics inside.
i If a measuring tube fails (e.g. due to process characteristics like corrosive or abrasive fluids), the fluid will initially be contained by the sensor housing.

In the event of a tube failure, the pressure level inside the sensor housing will rise according to the operating process pressure. If the user judges that the sensor housing burst pressure does not provide an adequate safety margin, the device can be fitted with a rupture disk. This prevents excessively high pressure from forming inside the sensor housing. Therefore, the use of a rupture disk is strongly recommended in applications involving high gas pressures, and particularly in applications in which the process pressure is greater than 2/3 of the sensor housing burst pressure.

If there is a need to drain the leaking medium into a discharge device, the sensor should be fitted with a rupture disk. Connect the discharge to the additional threaded connection .

If the sensor is to be purged with gas (gas detection), it should be equipped with purge connections.

-  Do not open the purge connections unless the containment can be filled immediately with a dry, inert gas. The use of helium at low pressure is recommended for purging.
Maximum pressure: 0.5 bar (7.3 psi)

Burst pressure of the sensor housing


The following sensor housing burst pressures are only valid for standard devices and/or devices equipped with closed purge connections (not opened/as delivered).

If a device fitted with purge connections (order code for "Sensor option", option CH "Purge connection") is connected to the purge system, the maximum pressure is determined by the purge system itself or by the device, depending on which component has the lower pressure classification.

If the device is fitted with a rupture disk (order code for "Sensor option", option CA "Rupture disk"), the rupture disk trigger pressure is decisive .


The sensor housing burst pressure refers to a typical internal pressure which is reached prior to mechanical failure of the sensor housing and which was determined during type testing. The corresponding type test declaration can be ordered with the device (order code for "Additional approval", option LN "Sensor housing burst pressure, type test").

DN		Sensor housing burst pressure	
[mm]	[in]	[bar]	[psi]
25	1	220	3 191
50	2	160	2 320
80	3	150	2 175
100	4	120	1 740

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



Rupture disk

To increase the level of safety, a device version with a rupture disk with a trigger pressure of 10 to 15 bar (145 to 217.5 psi) can be used (order code for "Sensor option", option "rupture disk").



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

Flow limit



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

 For an overview of the full scale values for the measuring range, see the "Measuring range" section →  299

- The minimum recommended full scale value is approx. 1/20 of the maximum full scale value
- In most applications, 20 to 50 % of the maximum full scale value can be considered ideal
- A low full scale value must be selected for abrasive media (such as liquids with entrained solids): flow velocity < 1 m/s (< 3 ft/s).

 To calculate the flow limit, use the *Applicator* sizing tool →  296

Pressure loss

 To calculate the pressure loss, use the *Applicator* sizing tool →  296

System pressure →  24

16.10 Mechanical construction

Design, dimensions



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

Weight

All values (weight exclusive of packaging material) refer to devices with EN/DIN PN 40 flanges.

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)
DN ≥ 150 (6"): 9 kg (19.8 lbs)
- Proline 500 cast, stainless: 15.6 kg (34.4 lbs)
DN ≥ 150 (6"): 18.5 kg (40.8 lbs)

Sensor

- Sensor with cast connection housing version, stainless: +3.7 kg (+8.2 lbs)
- Sensor with aluminum connection housing version:

Weight in SI units

DN [mm]	Weight [kg]
25	11
50	33
80	60
100	149

Weight in US units

DN [in]	Weight [lbs]
1	24
2	73
3	132
4	329

Materials

Transmitter housing

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

Fastening components for mounting on a post



- Screws, threaded bolts, washers, nuts: stainless A2 (chrome-nickel steel)
- Metal plates: stainless steel, 1.4301 (304)

Sensor connection housing


Order code for "Sensor connection housing":

- Option **A** "Aluminum coated": aluminum, AlSi10Mg, coated
- Option **B** "Stainless":
 - Stainless steel 1.4301 (304)
 - Optional: Order code for "Sensor feature", option **CC** "Hygienic version, for maximum corrosion resistance": stainless steel, 1.4404 (316L)
- Option **C** "Ultra-compact, stainless":
 - Stainless steel 1.4301 (304)
 - Optional: Order code for "Sensor feature", option **CC** "Hygienic version, for maximum corrosion resistance": stainless steel, 1.4404 (316L)
- Option **L** "Cast, stainless": 1.4409 (CF3M) similar to 316L

Cable entries/cable glands

Cable entries and adapters	Material
Cable gland M20 × 1.5	Plastic
<ul style="list-style-type: none"> ■ Adapter for cable entry with female thread G ½" ■ Adapter for cable entry with female thread NPT ½"  Only available for certain device versions: <ul style="list-style-type: none"> ■ Order code for "Transmitter housing": <ul style="list-style-type: none"> ■ Option A "Aluminum, coated" ■ Option D "Polycarbonate" ■ Order code for "Sensor connection housing": <ul style="list-style-type: none"> ■ Proline 500 – digital: <ul style="list-style-type: none"> Option A "Aluminum coated" Option B "Stainless" Option L "Cast, stainless" ■ Proline 500: <ul style="list-style-type: none"> Option B "Stainless" Option L "Cast, stainless" 	Nickel-plated brass
<ul style="list-style-type: none"> ■ Adapter for cable entry with female thread G ½" ■ Adapter for cable entry with female thread NPT ½"  Only available for certain device versions: <ul style="list-style-type: none"> ■ Order code for "Transmitter housing": <ul style="list-style-type: none"> Option L "Cast, stainless" ■ Order code for "Sensor connection housing": <ul style="list-style-type: none"> Option L "Cast, stainless" 	Stainless steel, 1.4404 (316L)

Connecting cable

-  UV rays can impair the cable outer sheath. Protect the cable from exposure to sun as much as possible.

Connecting cable for sensor - Proline 500 – digital transmitter

PVC cable with copper shield

Connecting cable for sensor - Proline 500 transmitter

- PUR cable with copper shield
- Devices with order code for «Approval; transmitter; sensor», options **AA, BS, CS, CZ, GR, GS, MS, NS, UR, US**: PVC cable with copper shield

Measuring tubes

Stainless steel, 1.4404 (316/316L); manifold: stainless steel, 1.4404 (316/316L)

Process connections

Flanges according to EN 1092-1 (DIN 2501) / according to ASME B16.5 / as per JIS B2220:

Stainless steel, 1.4404 (F316/F316L)



Available process connections → 321

Seals

Welded process connections without internal seals

Accessories*Protective cover*

Stainless steel, 1.4404 (316L)

External WLAN antenna

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

Process connections

Fixed flange connections:

- EN 1092-1 (DIN 2501) flange
- EN 1092-1 (DIN 2512N) flange
- ASME B16.5 flange
- JIS B2220 flange



Process connection materials → 321

Surface roughness

All data refer to parts in contact with the medium. The following surface roughness categories can be ordered.

- Not polished
- $Ra_{max} = 0.76 \mu m$ (30 μin)
- $Ra_{max} = 0.38 \mu m$ (15 μin)

16.11 Operability

Languages

Can be operated in the following languages:



- Via local operation
 - English, German, French, Spanish, Italian, Dutch, Portuguese, Polish, Russian, Turkish, Chinese, Japanese, Korean, Vietnamese, Czech, Swedish
- Via Web browser
 - English, German, French, Spanish, Italian, Dutch, Portuguese, Polish, Russian, Turkish, Chinese, Japanese, Vietnamese, Czech, Swedish
- Via "FieldCare", "DeviceCare" operating tool: English, German, French, Spanish, Italian, Chinese, Japanese

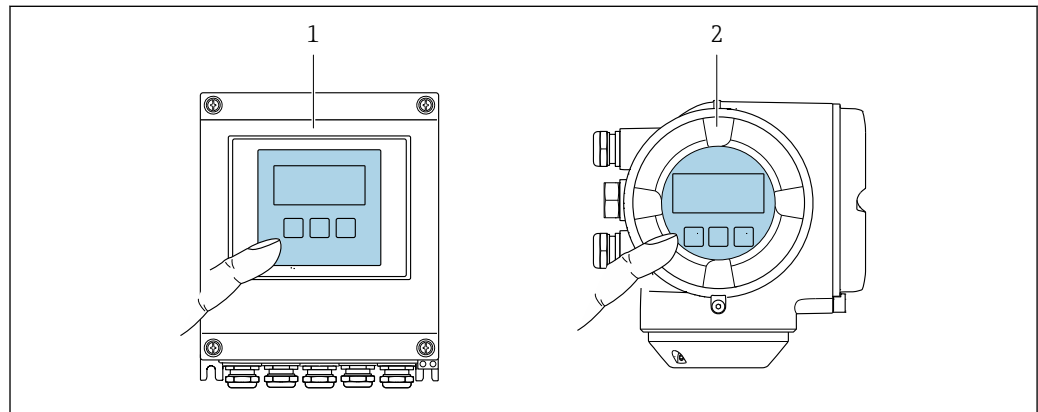
Local operation

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 →  92



A0028232




 45 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


Operating elements

- External operation via touch control (3 optical keys) without opening the housing: , , 
- Operating elements also accessible in the various zones of the hazardous area

Remote operation





→  91

Service interface

→  92

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	<ul style="list-style-type: none"> CDI-RJ45 service interface WLAN interface 	Special Documentation for the device →  331
DeviceCare SFE100	Notebook, PC or tablet with Microsoft Windows system	<ul style="list-style-type: none"> CDI-RJ45 service interface WLAN interface Fieldbus protocol 	→  296
FieldCare SFE500	Notebook, PC or tablet with Microsoft Windows system	<ul style="list-style-type: none"> CDI-RJ45 service interface WLAN interface Fieldbus protocol 	→  296
Field Xpert	SMT70/77/50	<ul style="list-style-type: none"> All fieldbus protocols WLAN interface Bluetooth CDI-RJ45 service interface 	Operating Instructions BA01202S Device description files: Use update function of handheld terminal
SmartBlue app	Smart phone or tablet with iOS or Android	WLAN	→  296



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:

- Field Device Manager (FDM) from Honeywell → www.process.honeywell.com
- FieldMate from Yokogawa → www.yokogawa.com
- PACTWare → www.pactware.com

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

Web server

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


Access to the network is required for the Ethernet-APL connection.



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 →  328)

 Web server special documentation →  331

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:

	HistoROM backup	T-DAT	S-DAT
Available data	<ul style="list-style-type: none">■ 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: GSDML for PROFINET	<ul style="list-style-type: none">■ Measured value logging ("Extended HistoROM" order option)■ Current parameter data record (used by firmware at run time)■ Peakhold indicator (min/max values)■ Totalizer values	<ul style="list-style-type: none">■ 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 transmission**Manual**

- Transfer of a device configuration to another device using the export function of the specific operating tool, e.g. with FieldCare, DeviceCare or Web server: to duplicate the configuration or to store in an archive (e.g. for backup purposes)
- Transmission of the drivers for system integration via Web server, e.g.: GSDML for PROFINET

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 1 000 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

Current certificates and approvals that are available for the product can be selected via the Product Configurator at www.endress.com:

1. Select the product using the filters and search field.
2. Open the product page.
3. Select **Configuration**.

CE mark	<p>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.</p> <p>Endress+Hauser confirms successful testing of the device by affixing to it the CE mark.</p>
UKCA marking	<p>The device meets the legal requirements of the applicable UK regulations (Statutory Instruments). These are listed in the UKCA Declaration of Conformity along with the designated standards. By selecting the order option for UKCA marking, Endress+Hauser confirms a successful evaluation and testing of the device by affixing the UKCA mark.</p> <p>Contact address Endress+Hauser UK: Endress+Hauser Ltd. Floats Road Manchester M23 9NF United Kingdom www.uk.endress.com</p>
Ex approval	<p>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.</p>

Hygienic compatibility	<ul style="list-style-type: none"> ■ 3-A approval <ul style="list-style-type: none"> ■ Only measuring devices with the order code for "Additional approval", option LP "3A" have 3-A approval. ■ The 3-A approval refers to the measuring device. ■ When installing the measuring device, ensure that no liquid can accumulate on the outside of the measuring device. A remote display module must be installed in accordance with the 3-A Standard. ■ Accessories (e.g. heating jacket, weather protection cover, wall holder unit) must be installed in accordance with the 3-A Standard. Each accessory can be cleaned. Disassembly may be necessary under certain circumstances. ■ EHEDG-tested Only devices with the order code for "Additional approval", option LT "EHEDG" have been tested and meet the requirements of the EHEDG. To meet the requirements for EHEDG certification, the device must be used with process connections in accordance with the EHEDG position paper entitled "Easy cleanable Pipe couplings and Process connections" (www.ehedg.org). ■ FDA ■ Food Contact Materials Regulation (EC) 1935/2004
Pharmaceutical compatibility	<ul style="list-style-type: none"> ■ FDA 21 CFR 177 ■ USP <87> ■ USP <88> Class VI 121 °C ■ TSE/BSE Certificate of Suitability ■ cGMP Devices with the order code for "Test, certificate", option JG "Conformity with cGMP-derived requirements, declaration" comply with the requirements of cGMP with regard to the surfaces of parts in contact with the medium, design, FDA 21 CFR material conformity, USP Class VI tests and TSE/BSE conformity. A serial number-specific declaration is generated.
Certification PROFINET with Ethernet-APL	<p>PROFINET interface</p> <p>The measuring device is certified and registered by the PNO (PROFIBUS Nutzerorganisation e.V. / PROFIBUS User Organization). The measuring system meets all the requirements of the following specifications:</p> <ul style="list-style-type: none"> ■ Certified according to: <ul style="list-style-type: none"> ■ Test specification for PROFINET devices ■ PROFINET PA Profile 4 ■ PROFINET Netload Robustness Class 2 10 Mbps ■ APL conformance test ■ The device can also be operated with certified devices of other manufacturers (interoperability) ■ The device supports PROFINET S2 system redundancy.

Pressure Equipment Directive

- With the marking:
 - a) PED/G1/x (x = category) or
 - b) UK/G1/x (x = category)
 on the sensor nameplate, Endress+Hauser confirms compliance with the "Essential Safety Requirements"
 - a) specified in Annex I of the Pressure Equipment Directive 2014/68/EU or
 - b) Schedule 2 of Statutory Instruments 2016 No. 1105.
- Devices not bearing this marking (without PED or UKCA) are designed and manufactured according to sound engineering practice. They meet the requirements of
 - a) Art. 4 Para. 3 of the Pressure Equipment Directive 2014/68/EU or
 - b) Part 1, Para. 8 of Statutory Instruments 2016 No. 1105.
 The scope of application is indicated
 - a) in diagrams 6 to 9 in Annex II of the Pressure Equipment Directive 2014/68/EU or
 - b) Schedule 3, Para. 2 of Statutory Instruments 2016 No. 1105.

Radio approval

The measuring device has radio approval.



For detailed information on the radio approval, see the Special Documentation
→ 331

Additional certification

CRN approval

Some device versions have CRN approval. A CRN-approved process connection with a CSA approval must be ordered for a CRN-approved device.

Tests and certificates

- EN10204-3.1 material certificate, wetted parts and sensor housing
- Pressure test, internal process, inspection certificate
- PMI test (XRF), internal procedure, wetted parts, test report
- Compliance with requirements derived from cGMP, Declaration
- EN10204-2.1 confirmation of compliance with the order and EN10204-2.2 test report

Testing of welded connections

Option	Test standard				Component	
	ISO 23277 AL2x (PT) ISO 10675-1 AL1 (RT, DR)	ASME B31.3 NFS	ASME VIII Div.1 Appx. 4+8	NORSOK M-601	Measuring tube	Process connection
KF	x				PT	RT
KK		x			PT	RT
KP			x		PT	RT
KR				x	VT, PT	VT, RT
K1	x				PT	DR
K2		x			PT	DR
K3			x		PT	DR
K4				x	VT, PT	VT, DR
PT = penetrant testing, RT = radiographic testing, VT = visual testing, DR = digital radiography All options with test report						

Other standards and guidelines

- EN 60529
Degrees of protection provided by enclosures (IP code)
- IEC/EN 60068-2-6
Environmental influences: Test procedure - Test Fc: vibrate (sinusoidal).
- IEC/EN 60068-2-31
Environmental influences: Test procedure - Test Ec: shocks due to rough handling, primarily for devices.
- EN 61010-1
Safety requirements for electrical equipment for measurement, control and laboratory use - general requirements
- IEC/EN 61326-2-3
Emission in accordance with Class A requirements. Electromagnetic compatibility (EMC requirements).
- NAMUR NE 21
Electromagnetic compatibility (EMC) of industrial process and laboratory control equipment
- NAMUR NE 32
Data retention in the event of a power failure in field and control instruments with microprocessors
- NAMUR NE 43
Standardization of the signal level for the breakdown information of digital transmitters with analog output signal.
- NAMUR NE 53
Software of field devices and signal-processing devices with digital electronics
- NAMUR NE 80
The application of the pressure equipment directive to process control devices
- NAMUR NE 105
Specifications for integrating fieldbus devices in engineering tools for field devices
- NAMUR NE 107
Self-monitoring and diagnosis of field devices
- NAMUR NE 131
Requirements for field devices for standard applications
- NAMUR NE 132
Coriolis mass meter
- ETSI EN 300 328
Guidelines for 2.4 GHz radio components.
- EN 301489
Electromagnetic compatibility and radio spectrum matters (ERM).

16.13 Application packages

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

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



Detailed information on the application packages:
Special Documentation for the device → 331

Diagnostic functionality

Order code for "Application package", option EA "Extended HistoROM"

Comprises extended functions concerning the event log and the activation of the measured value memory.

Event log:

Memory volume is extended from 20 message entries (standard version) to up to 100 entries.

Data logging (line recorder):

- Memory capacity for up to 1000 measured values is activated.
- 250 measured values can be output via each of the 4 memory channels. The recording interval can be defined and configured by the user.
- Measured value logs can be accessed via the local display or operating tool e.g. FieldCare, DeviceCare or Web server.



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

Heartbeat Technology

Order code for "Application package", option EB "Heartbeat Verification + Monitoring"

Heartbeat Verification

Meets the requirement for traceable verification to DIN ISO 9001:2008 Chapter 7.6 a) "Control of monitoring and measuring equipment".

- Functional testing in the installed state without interrupting the process.
- Traceable verification results on request, including a report.
- Simple testing process via local operation or other operating interfaces.
- Clear measuring point assessment (pass/fail) with high test coverage within the framework of manufacturer specifications.
- Extension of calibration intervals according to operator's risk assessment.

Heartbeat Monitoring

Continuously supplies data, which are characteristic of the measuring principle, to an external condition monitoring system for the purpose of preventive maintenance or process analysis. These data enable the operator to:

- Draw conclusions - using these data and other information - about the impact process influences (e.g. corrosion, abrasion, formation of buildup etc.) have on the measuring performance over time.
- Schedule servicing in time.
- Monitor the process or product quality, e.g. gas pockets.



For detailed information, see the Special Documentation for the device.

Concentration measurement

Order code for "Application package", option ED "Concentration"

Calculation and outputting of fluid concentrations.

The measured density is converted to the concentration of a substance of a binary mixture using the "Concentration" application package:

- Choice of predefined fluids (e.g. various sugar solutions, acids, alkalis, salts, ethanol etc.).
- Common or user-defined units (°Brix, °Plato, % mass, % volume, mol/l etc.) for standard applications.
- Concentration calculation from user-defined tables.



For detailed information, see the Special Documentation for the device.

Advanced density function




Order code for "Application package", option EH "Advanced density function"

Advanced software functions for density measurement:



- Easy integration into existing density applications with integrated time period signal (TPS).
- Two density values shown simultaneously on the local display.
- Advanced density coefficients for optimum recalibrations.




For detailed information, see the Special Documentation for the device.

Premium density and extended density function	<p>Order code for "Application package", option EI "Premium density, +/- 0.1 kg/m3 + extended density function"</p> <p>Highest density measurement accuracy thanks to premium density calibration and extended software functions for density measurement:</p> <ul style="list-style-type: none">▪ Easy integration into existing density applications with integrated time period signal (TPS).▪ Two density values shown simultaneously on the local display.▪ Advanced density coefficients for optimum recalibrations. <p> For detailed information, see the Special Documentation for the device.</p>
Petroleum	<p>Order code for "Application package", option EJ "Petroleum"</p> <p>The most important parameters for the Oil & Gas Industry can be calculated and displayed with this application package.</p> <ul style="list-style-type: none">▪ Corrected volume flow and calculated reference density in accordance with the "API Manual of Petroleum Measurement Standards, Chapter 11.1"▪ Water content, based on density measurement▪ Weighted mean of the density and temperature <p> For detailed information, see the Special Documentation for the device.</p>
Petroleum & locking function	<p>Order code for "Application package", option EM "Petroleum & locking function"</p> <p>The most important parameters for the Oil & Gas Industry can be calculated and displayed with this application package. It is also possible to lock the settings.</p> <ul style="list-style-type: none">▪ Corrected volume flow and calculated reference density in accordance with the "API Manual of Petroleum Measurement Standards, Chapter 11.1"▪ Water content, based on density measurement▪ Weighted mean of the density and temperature <p> For detailed information, see the Special Documentation for the device.</p>

16.14 Accessories

 Overview of accessories available for order →  294

16.15 Supplementary documentation

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

Standard documentation	Brief Operating Instructions
<i>Brief Operating Instructions for the sensor</i>	
Measuring device	Documentation code
Proline Promass Q	KA01262D

Brief Operating Instructions for the transmitter

Measuring device	Documentation code
Proline 500	KA01520D
Proline 500 – digital	KA01521D

Technical Information

Measuring device	Documentation code
Promass Q 500	TI01287D

Description of Device Parameters

Measuring device	Documentation code
Promass 500	GP01173D

Supplementary device-dependent documentation

Safety instructions



Safety instructions for electrical equipment for hazardous areas.

Contents	Documentation code Measuring device
ATEX/IECEX Ex i	XA01473D
ATEX/IECEX Ex ec	XA01474D
cCSAus IS	XA01475D
cCSAus Ex i	XA01509D
cCSAus Ex nA	XA01510D
INMETRO Ex i	XA01476D
INMETRO Ex ec	XA01477D
NEPSI Ex i	XA01478D
NEPSI Ex nA	XA01479D
NEPSI Ex i	XA01658D
NEPSI Ex nA	XA01659D
JPN	XA01780D

Special Documentation

Contents	Documentation code
Information on the Pressure Equipment Directive	SD01614D
Radio approvals for WLAN interface for A309/A310 display module	SD01793D
Web server	SD02769D
Heartbeat Technology	SD02732D
Concentration measurement	SD02736D
Petroleum	SD02740D
Advanced density function	SD02354D
Overrun measurement	SD02342D

Installation Instructions

Contents	Comment
Installation instructions for spare part sets and accessories	<ul style="list-style-type: none">▪ Access the overview of all the available spare part sets via <i>Device Viewer</i> →  292▪ Accessories available for order with Installation Instructions →  294

Index

0 ... 9

3-A approval 326

A

Access authorization to parameters

Read access 82

Write access 82

Access code 82

Incorrect input 82

Adapting the diagnostic behavior 217

Additional certification 327

Ambient conditions

Mechanical load 316

Operating height 315

Relative humidity 314

Ambient temperature

Influence 311

Ambient temperature range 314

Analog Output module 106

Application 298

Application packages 328

Applicator 299

Approvals 325

Attaching the connecting cable

Proline 500 transmitter 56

B

Binary Input module 102

Binary Output module 107

C

Cable entries

Technical data 309

Cable entry

Degree of protection 68

CE mark 10, 325

Certificates 325

Certification PROFINET with Ethernet-APL 326

cGMP 326

Check

Connection 68

Installation 34

Checklist

Post-connection check 68

Post-installation check 34

Cleaning

Exterior cleaning 291

Cleaning in place (CIP) 316

Climate class 314

Commissioning 112

Advanced settings 151

Configuring the measuring device 113

Connecting cable 35

Connecting the connecting cable

Proline 500 – digital transmitter 47

Proline 500 terminal assignment 52

Sensor connection housing, Proline 500 53

Sensor connection housing, Proline 500 - digital .. 43

Terminal assignment of Proline 500 - digital 43

Connecting the measuring device

Proline 500 52

Proline 500 – digital 43

Connecting the signal cable/supply voltage cable

Proline 500 – digital transmitter 48

Connecting the signal cables 57

Connecting the supply voltage cables 57

Connection

see Electrical connection

Connection preparations 42

Connection tools 35

Context menu

Calling up 78

Closing 78

Explanation 78

Current consumption 308

Cyclic data transmission 99

D

Date of manufacture 16, 18

Declaration of Conformity 10

Define access code 178

Degree of protection 68, 315

Density 317

Density adjustment 154

Design

Measuring device 13

Design fundamentals

Maximum measured error 313

Repeatability 313

Device components 13

Device description files 97

Device locking, status 182

Device master file

GSD 97

Device name

Sensor 18

Transmitter 16

Device repair 292

Device revision 97

Device type ID 97

Device Viewer 292

DeviceCare 96

Device description file 97

Diagnostic behavior

Explanation 213

Symbols 213

Diagnostic information

Design, description 213, 216

DeviceCare 215

FieldCare 215

Light emitting diodes 208

Local display 212

Overview	218
Remedial measures	218
Web browser	214
Diagnostic list	285
Diagnostic message	212
Diagnostics	
Symbols	212
Dimensions	23
DIP switch	
see Write protection switch	
Direct access	80
Direct access code	74
Disabling write protection	177
Display	
see Local display	
Display area	
For operational display	72
In the navigation view	75
Display values	
For locking status	182
Disposal	293
Document	
Function	6
Symbols	6
Document function	6
Document information	6
Down pipe	22
E	
Editing view	76
Input screen	77
Using operating elements	76, 77
EHDEG-certified	326
Electrical connection	
Degree of protection	68
Measuring device	35
Operating tools	
Via APL network	91
Via service interface (CDI-RJ45)	92
Via WLAN interface	92
RSLogix 5000	91
Web server	92
WLAN interface	92
Electromagnetic compatibility	316
Electronics module	13
Enabling write protection	177
Enabling/disabling the keypad lock	83
Endress+Hauser services	
Maintenance	291
Repair	292
Environment	
Storage temperature	314
Vibration- and shock-resistance	315
Error messages	
see Diagnostic messages	
Event list	285
Event logbook	285
Ex approval	325

Extended order code	
Sensor	18
Transmitter	16
Exterior cleaning	291
F	
FDA	326
Field of application	
Residual risks	10
FieldCare	94
Device description file	97
Establishing a connection	95
Function	94
User interface	95
Filtering the event logbook	286
Firmware	
Release date	97
Version	97
Firmware history	290
Flow direction	22, 29
Flow limit	318
Food Contact Materials Regulation	326
Function scope	
SIMATIC PDM	96
Functions	
see Parameters	
G	
Galvanic isolation	307
Gas Fraction Handler	204
H	
Hardware write protection	179
Help text	
Calling up	81
Closing	81
Explanation	81
HistoROM	171
Hygienic compatibility	326
I	
Identifying the measuring device	15
Incoming acceptance	15
Influence	
Ambient temperature	311
Medium pressure	312
Medium temperature	312
Inlet runs	23
Input	299
Inspection	
Received goods	15
Intended use	9
Interior cleaning	316
L	
Languages, operation options	322
Line recorder	200
Local display	322
Navigation view	74
see Diagnostic message	

see In alarm condition	
see Operational display	
Text editor	76
Low flow cut off	307
M	
Main electronics module	13
Maintenance tasks	291
Managing the device configuration	171
Manufacturer ID	97
Mass module	103
Mass Totalizer Control module	103
Materials	319
Maximum measured error	309
Measured values	
see Process variables	
Measurement accuracy	309
Measuring and test equipment	291
Measuring device	
Configuration	113
Conversion	292
Design	13
Disposal	293
Mounting the sensor	29
Preparing for electrical connection	42
Preparing for mounting	29
Removing	293
Repairs	292
Switching on	112
Measuring principle	298
Measuring range	
For gases	299
For liquids	299
Measuring range, recommended	318
Measuring system	298
Mechanical load	316
Medium pressure	
Influence	312
Medium temperature	
Influence	312
Menu	
Diagnostics	284
Setup	114
Menus	
For measuring device configuration	113
For specific settings	151
Module	
Analog output	106
Binary Input	102
Binary Output	107
Mass	103
Mass Totalizer Control	103
Totalizer	
Totalizer	104
Totalizer Control	105
Mounting	21
Mounting dimensions	
see Dimensions	
Mounting location	21

Mounting preparations	29
Mounting requirements	
Dimensions	23
Down pipe	22
Inlet and outlet runs	23
Mounting location	21
Orientation	22
Rupture disk	26
Sensor heating	25
System pressure	24
Thermal insulation	24
Vibrations	25
Mounting tool	29
N	
Nameplate	
Sensor	18
Transmitter	16
Navigation path (navigation view)	74
Navigation view	
In the submenu	74
In the wizard	74
Numeric editor	76
O	
Onsite display	
Numeric editor	76
Operable flow range	300
Operating elements	78, 213
Operating height	315
Operating keys	
see Operating elements	
Operating menu	
Menus, submenus	70
Structure	70
Submenus and user roles	71
Operating philosophy	71
Operation	182
Operation options	69
Operational display	72
Operational safety	10
Order code	16, 18
Orientation (vertical, horizontal)	22
Outlet runs	23
Output signal	302
Output variables	302

P	
Packaging disposal	21
Parameter	
Changing	81
Entering values or text	81
Parameter settings	
Administration (Submenu)	174
Advanced setup (Submenu)	152
APL port (Submenu)	115
Configuration backup (Submenu)	171
Corrected volume flow calculation (Submenu)	153
Current input	125

Current input (Wizard)	125
Current input 1 to n (Submenu)	195
Current output	127
Current output (Wizard)	127
Data logging (Submenu)	200
Define access code (Wizard)	173
Density adjustment (Wizard)	155
Device information (Submenu)	288
Diagnostics (Menu)	284
Display (Submenu)	162
Display (Wizard)	143
I/O configuration	124
I/O configuration (Submenu)	124
Low flow cut off (Wizard)	149
Mass flow (Submenu)	121
Measured variables (Submenu)	183
Measurement mode (Submenu)	204
Medium index (Submenu)	205
Medium selection (Wizard)	119
Network diagnostics (Submenu)	116
Partially filled pipe detection (Wizard)	150
Pulse/frequency/switch output	131
Pulse/frequency/switch output (Wizard)	131, 133, 137
Pulse/frequency/switch output 1 to n (Submenu)	197
Relay output	140
Relay output 1 to n (Submenu)	198
Relay output 1 to n (Wizard)	140
Reset access code (Submenu)	173
Sensor adjustment (Submenu)	154
Service interface (Submenu)	115
Setup (Menu)	114
Simulation (Submenu)	174
Status input	126
Status input 1 to n (Submenu)	196
Status input 1 to n (Wizard)	126
System units (Submenu)	116
Totalizer (Submenu)	194
Totalizer 1 to n (Submenu)	160
Totalizer handling (Submenu)	198
Value current output 1 to n (Submenu)	197
Web server (Submenu)	90
WLAN settings (Wizard)	169
Zero adjustment (Wizard)	159
Zero verification (Wizard)	157
Performance characteristics	309
Performing density adjustment	155
Pharmaceutical compatibility	326
Post-connection check	112
Post-connection check (checklist)	68
Post-installation check	112
Post-installation check (checklist)	34
Potential equalization	61
Power consumption	308
Power supply failure	308
Pressure Equipment Directive	327
Pressure loss	318
Pressure-temperature ratings	317
Process connections	321

Process variables	
Calculated	299
Measured	299
Product safety	10
Proline 500 – digital transmitter	
Connecting the signal cable/supply voltage cable	48
Protecting parameter settings	177

R

Radio approval	327
Read access	82
Reading measured values	182
Recalibration	291
Reference operating conditions	309
Registered trademarks	8
Remedial measures	
Calling up	214
Closing	214
Remote operation	322
Repair	292
Notes	292
Repair of a device	292
Repeatability	311
Replacement	
Device components	292
Requirements for personnel	9
Response time	311
Return	292
Rupture disk	
Safety instructions	26
Triggering pressure	318

S

Safety	9
Sensor	
Mounting	29
Sensor heating	25
Sensor housing	317
Serial number	16, 18
Setting the operating language	112
Settings	
Adapting the measuring device to the process	
conditions	198
Administration	172
Advanced display configurations	162
Analog Input	121
Communication interface	114
Current input	125
Current output	127
I/O configuration	124
Local display	143
Low flow cut off	149
Managing the device configuration	171
Medium	119
Operating language	112
Partially filled pipe detection	150
Pulse output	131
Pulse/frequency/switch output	131, 133
Relay output	140

Resetting the device	288	Petroleum	171
Resetting the totalizer	198	Process variables	152
Sensor adjustment	154	Pulse/frequency/switch output 1 to n	197
Simulation	174	Relay output 1 to n	198
Status input	126	Reset access code	173
Switch output	137	Sensor adjustment	154
System units	116	Service interface	115
Tag name	114	Simulation	174
Totalizer	160	Status input 1 to n	196
Totalizer reset	198	System units	116
WLAN	169	Totalizer	194
Show data logging	200	Totalizer 1 to n	160
Signal on alarm	305	Totalizer handling	198
SIMATIC PDM	96	Value current output 1 to n	197
Function	96	Viscosity	170
Software release	97	Web server	90
Spare part	292	Supply voltage	308
Spare parts	292	Surface roughness	321
Special connection instructions	61	Switch output	304
Special mounting instructions		Symbols	
Hygienic compatibility	26	Controlling data entries	77
Standards and guidelines	328	For communication	72
Status area		For diagnostic behavior	72
For operational display	72	For locking	72
In the navigation view	74	For measured variable	72
Status signals	212, 215	For measurement channel number	72
Sterilization in place (SIP)	316	For menus	75
Storage concept	324	For parameters	75
Storage conditions	20	For status signal	72
Storage temperature	20	For submenu	75
Storage temperature range	314	For wizard	75
Structure		In the status area of the local display	72
Operating menu	70	Input screen	77
Submenu		Operating elements	76
Administration	172, 174	System design	
Advanced setup	151, 152	Measuring system	298
Analog inputs	121	see Measuring device design	
APL port	115	System integration	97
Calculated values	152	System pressure	24
Communication	114	System redundancy S2	111
Concentration	171	T	
Configuration backup	171	Technical data, overview	298
Corrected volume flow calculation	153	Temperature range	
Current input 1 to n	195	Ambient temperature range for display	322
Data logging	200	Medium temperature	316
Device information	288	Storage temperature	20
Display	162	Terminal assignment	40
Event list	285	Terminal assignment of connecting cable for Proline	
Heartbeat setup	171	500- digital	
I/O configuration	124	Sensor connection housing	43
Input values	195	Terminals	309
Mass flow	121	Tests and certificates	327
Measured values	182	Text editor	76
Measured variables	183	Thermal insulation	24
Measurement mode	204	Tool	
Medium index	205	For mounting	29
Network diagnostics	116	Transport	20
Output values	196		
Overview	71		

Tool tip		
see Help text		
Tools		
Electrical connection	35	
Totalizer		
Assign process variable	194	
Configuration	160	
Totalizer Control module	105	
Totalizer module	104	
Transmitter		
Turning the display module	33	
Turning the housing	33	
Transporting the measuring device	20	
Troubleshooting		
General	206	
TSE/BSE Certificate of Suitability	326	
Turning the display module	33	
Turning the electronics housing		
see Turning the transmitter housing		
Turning the transmitter housing	33	
U		
UKCA marking	325	
Use of the measuring device		
Borderline cases	9	
Incorrect use	9	
see Intended use		
User interface		
Current diagnostic event	284	
Previous diagnostic event	284	
User roles	71	
USP Class VI	326	
V		
Version data for the device	97	
Vibration- and shock-resistance	315	
Vibrations	25	
W		
W@M	291, 292	
W@M Device Viewer	15	
Weight		
SI units	319	
Transport (notes)	20	
US units	319	
Wizard		
Current input	125	
Current output	127	
Define access code	173	
Density adjustment	155	
Display	143	
Low flow cut off	149	
Medium selection	119	
Partially filled pipe detection	150	
Pulse/frequency/switch output	131, 133, 137	
Relay output 1 to n	140	
Status input 1 to n	126	
WLAN settings	169	
Zero adjustment	159	
Zero verification	157	
WLAN settings	169	
Workplace safety	10	
Write access	82	
Write protection		
Via access code	178	
Via write protection switch	179	
Write protection switch	179	



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